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SPRING FLORA

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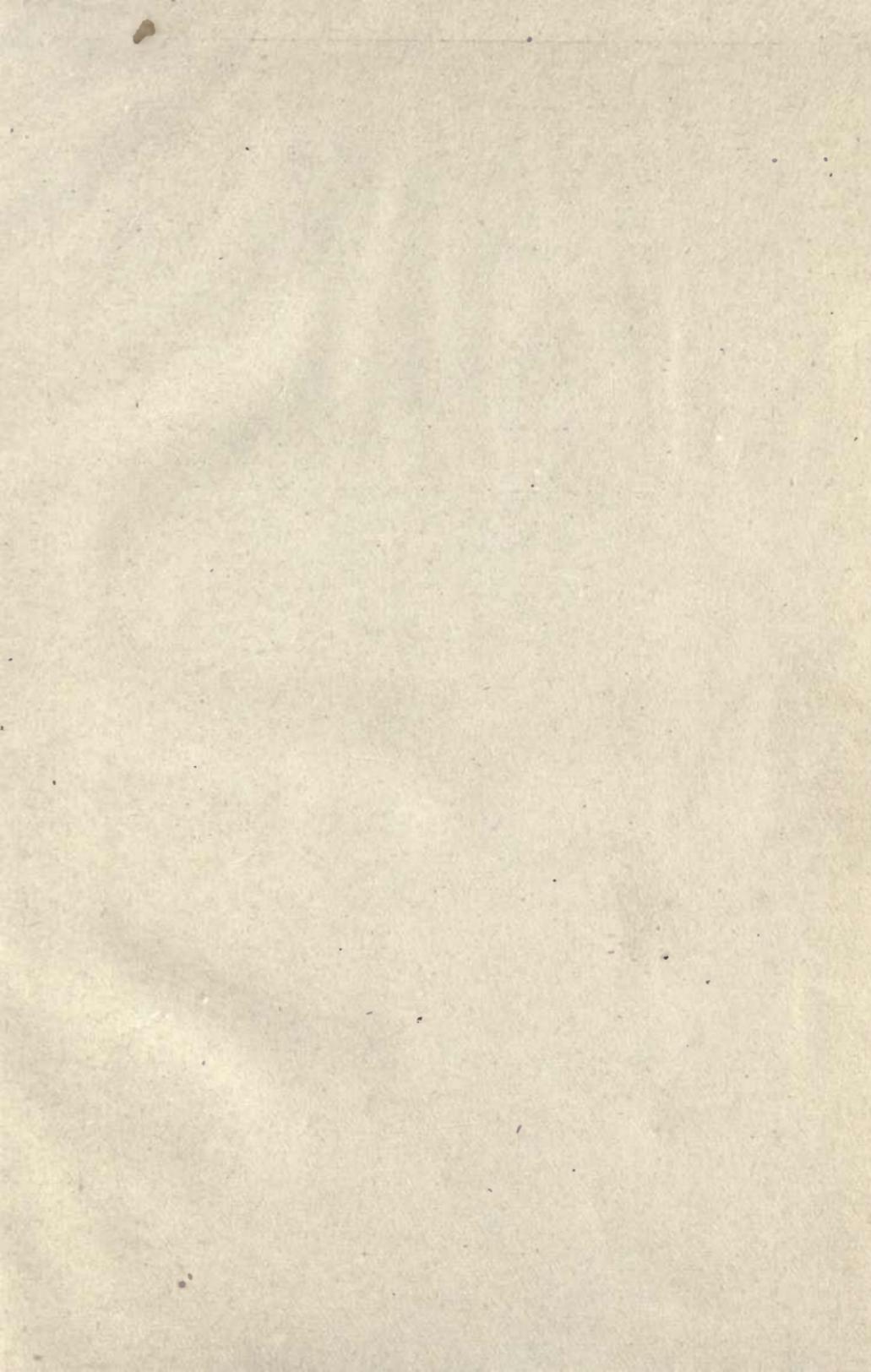
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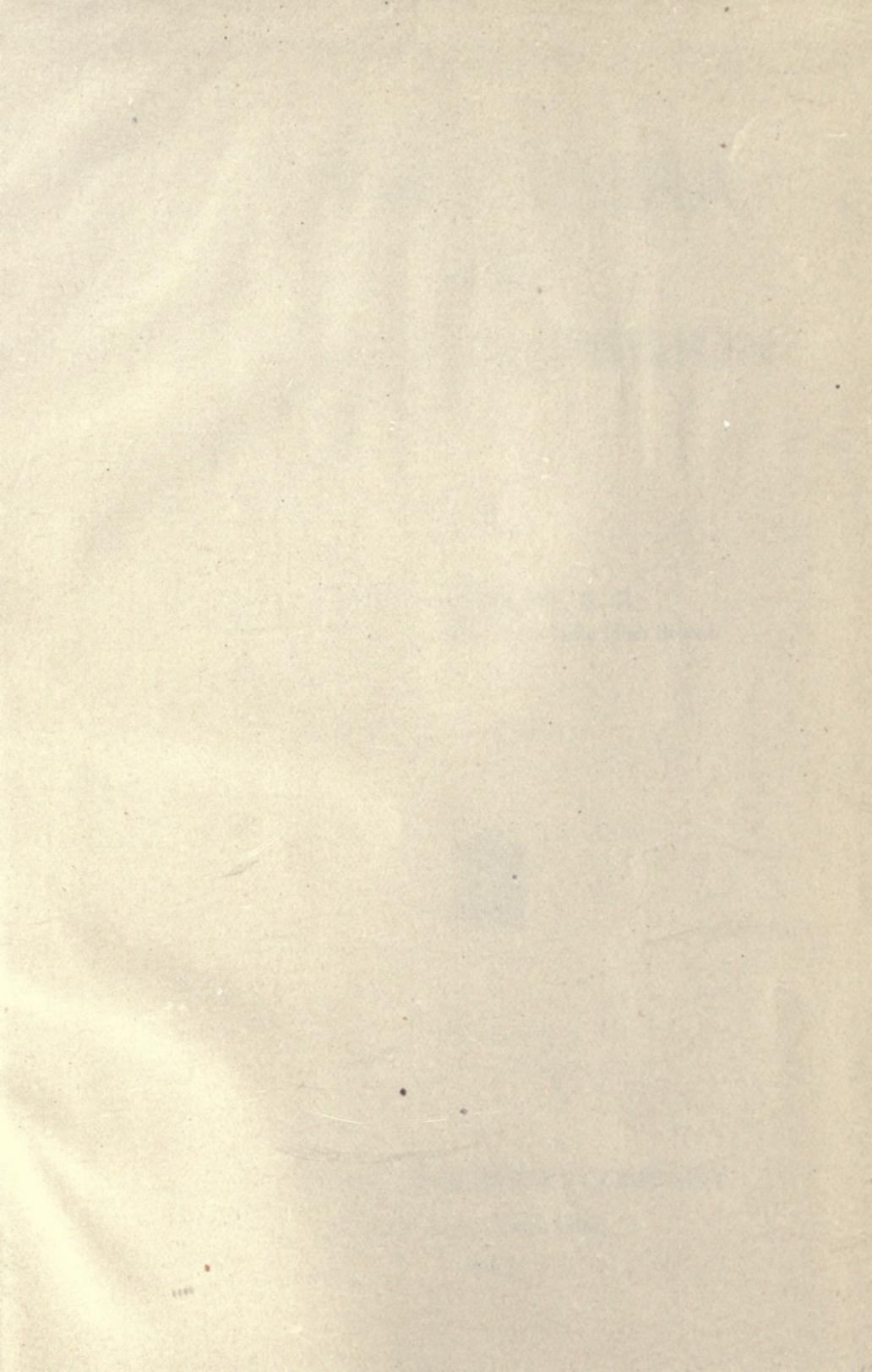


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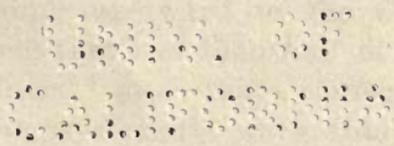




SPRING FLORA
of the
WASATCH REGION

BY

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TO THE
BIOLOGY

PREFACE

Of all the botanical areas in the United States, perhaps none has more sharply defined boundaries than the Great Basin. Here we have a vast interior drainage basin; lofty mountains to the east and to the west, and arid or semi-arid lands extending in nearly all directions beyond its boundaries. Some few of the plants of neighboring districts have succeeded in passing these barriers, but have gotten no further; and so here we find a meeting-place of the floras of the east, of the west, of the north and of the south. And yet this region never has had a botanical manual of its own! Those who live on its western borders have to be content with a Flora prepared for California; while those on its eastern side must be satisfied with a book taking the Continental Divide for its central point, and extending westward to the Great Basin. What wonder, then, that less than half of our species are therein included, and that consequently the teachers attempting systematic work find themselves seriously handicapped! These small manuals have been without exception unsatisfactory; as must be every small book of this character which attempts to cover a large area, especially where the area pretended to be covered consists of parts of several distinct botanical areas.

To furnish a Flora containing practically all the plants of a limited area that bloom during the spring months is the aim of this little book. The area represented is that of the eastern edge of the Great Basin as far south as Manti. Only those plants blooming by June fifteenth have been included.

Believing that an international botanical code is preferable to one of local application, the writer has endeavored to follow the rules of nomenclature established by the Vienna Congress.

This little book is prepared for the use of the student who has no previous botanical training in the use of a key and manual; hence the descriptions in many cases have been made longer than would be necessary for the trained botanist; technical terms have been used as sparingly as possible, and the keys are correspondingly simple and often artificial.

Because of the extremely divergent views held by botanists today, both regarding nomenclature and specific and generic limitations, the writer gives a more extended synonymy than is usually thought necessary for so limited a manual; but it will be found that an extensive list of synonyms is absolutely required by the teacher who does not have access to a fairly complete botanical library. In order that these synonyms be in the most convenient place, they have been put immediately after the accepted name of the plant, instead of at the end of the description as is usually done.

In compiling this Manual, the writer has made use of Britton & Brown's Illustrated Manual of the Northern States and Canada; of both editions of Coulter's Manual of Rocky Mountain Botany; of

Jepson's Flora of California; of Miss Eastwood's Key and Flora of Rocky Mountain Botany; of Rydberg's Flora of Colorado; of Piper's Flora of Washington, and of the original descriptions of many of the plants published in the various botanical journals.

To Dr. Rydberg, to Dr. Nelson and to Professor Marcus E. Jones for determination of material; to Professor Charles P. Smith for furnishing lists of the spring-flowering plants of Cache County; to Dr. Rydberg and to Professor Jones for advice on critical points, and especially to the latter for valuable criticism of the manuscript, the writer's warmest thanks are due.

Doubtless discrepancies may be discovered when the book is put to use, and plants will be found not herein included. It is the writer's earnest wish that these may be communicated to him, in order that all such errors of commission and omission may be rectified. For this very reason, the present edition is based on an estimate of only a year's supply. The writer hereby offers his aid to the teachers of botany in determining any plants that may be sent to him, with the end in view that we may all become better acquainted with the flora of our State.

A. O. G.

Salt Lake City, Utah,
Jan. 25, 1911.

KEY TO THE FAMILIES.

DIVISION SPERMATOPHYTA. (SPERMATOPHYTES). Seed Plants.

Class I. Gymnospermae. Gymnosperms or Polycotyls.

Ovules not enclosed in an ovary. Evergreen shrubs and trees with needle-like, scale-like or awl-shaped leaves.

Ovules 2 or more at the base of each scale; fruit a cone (berry-like in *Juniperus*) by the coherence of scales.....**Pinaceæ** 1

Class II. Angiospermae. Angiosperms.

Ovules in an ovary, the latter when ripe becoming the fruit.

Subclass 1. Monocotyledoneae. Monocotyls.

Stem without distinct zones of bark, wood and pith; leaves mostly parallel-veined, the early ones always alternate; parts of the flower in threes (rarely in fours), never in fives; embryo with a single cotyledon.

Ovary free from the floral envelopes; i. e., it is "superior." Stamens 6.....**Liliaceæ** 4

Ovary adnate to the floral envelopes; i. e., it is "inferior."

Flowers regular; stamens 3.....**Iridaceæ** 8

Flowers irregular; anther-bearing stamens 1 or 2.....**Orchidaceæ** 8

Subclass II. Dicotyledoneae. Dicotyls.

Stem with distinct zones of bark, wood and pith; leaves mostly netted-veined. Parts of flower mostly in fours or fives. Embryo normally with 2 cotyledons (none in *Cuscuta*, 1 by abortion in *Abronia*, 4 in *Ceratophyllaceæ*).

Corolla, and sometimes calyx, lacking.

Flowers (at least the staminate ones) in catkins or catkin-like spikes; shrubs or trees.

Calyx (and corolla) lacking; i. e., the flowers are "naked."

Dioecious; a single flower to each scale of the catkin; fruit a 1-celled pod with many downy-tufted seeds.....**Salicaceæ** 9

Monoecious; staminate catkins drooping, pistillate ones erect, with 2-3 flowers to each scale of the cone-like inflorescence; seeds not downy.....**Betulaceæ** 12

Calyx present.

Monoecious; staminate flowers in catkins; pistillate ones 1-3 in a cup or involucre**Fagaceæ** 13

Monoecious or dioecious; flowers in drooping catkin-like spikes, the pistillate ones becoming juicy multiple fruits....
.....No. 2 in **Urticaceæ** 13

Flowers neither in catkins nor in catkin-like spikes.

Shrubs or trees.

Leaves opposite.

Fruit a samara; flowers inconspicuous.

Leaves simple; stamens 3-8; fruit in pairs**Aceraceæ** 55

Leaves pinnately-compound.

Leaflets 3-5; stamens 4-5; samaras in pairs**Aceraceæ** 55

Leaflets 5-9; stamens 2; samaras single**Oleaceæ** 71

Fruit a tailed achene; flowers showy....
.....Clematis in **Ranunculaceæ** 26

Leaves alternate.

Leaves toothed; fruit a samara or drupe**Urticaceæ** 13

Leaves entire, revolute; fruit an achene, tipped by the long, feathery style.....**Cercocarpus** in **Rosaceæ** 42

Herbs; sepals when present often petal-like.

Pistils several....**Thalictrum** in **Ranunculaceæ** 24

Pistil 1.

Ovary 2-celled.....**Lepidium** in **Cruciferae** 30

Ovary 1-celled.

Leaves alternate.

Styles 1-3; fruit a flat achene...
.....**Chenopodiaceæ** 17

Style 1; fruit berry-like in shape**Santalaceæ** 15

Styles 2-3; achene 3-sided.....	
.....	Polygonaceæ 15
Leaves opposite.	
Stems swollen at nodes; at least some of the flowers terminal.	
Flowers several in a cluster, sur- rounded by the calyx-like involucre .	Nyctaginaceæ 19
Flowers solitary or cy- mose; not surrounded by a calyx-like in- volucre .	Caryophyllaceæ 19
Stems not swollen at the nodes; flowers all axillary.....	
.....	Glauca in Primulaceæ 70
Corolla and calyx both present.	
Corolla of separate petals (apopetalous).	
Stamens more than 10.	
Shrubs or trees.	
Leaves alternate or fascicled.....	Rosaceæ 41
Leaves opposite.	
Trees or tall shrubs.....	Aceraceæ 55
Low woody vines.....	
.....	Clematis in Ranunculaceæ 20
Herbs.	
Pistil 1, of united carpels.	
Filaments united into a tube.	Malvaceæ 57
Filaments distinct.	
Leaves entire, smooth and suc- culent	Portulacaceæ 22
Leaves entire to sinuate- toothed, covered with barbed hairs	Loasaceæ 61
Leaves spiny-toothed.	Papaveraceæ 27
Leaves reduced to spines or wanting; very fleshy plants	Cactaceæ 61
Pistils several, of distinct carpels.	
Stamens on receptacle..	Ranunculaceæ 23
Stamens on the calyx.....	Rosaceæ 41
Stamens not more than 10.	
Shrubs or trees.	
Leaves alternate.	
Leaves compound.	
Styles 3; fruit a small drupe	Anacardiaceæ 54
Style 1, not cleft; fruit a legume	Leguminosæ 46
Style none; fruit a ber- ry	Berberidaceæ 27

KEY TO THE FAMILIES

- Leaves simple.
- Styles 2; fruit a berry.....
*Ribes* in **Saxifragaceæ** 40
- Style 1, 3-cleft; fruit a capsule
**Rhamnaceæ** 57
- Leaves opposite.
- Evergreen shrubs, less than 4 ft. high
**Celastraceæ** 55
- Deciduous trees or tall shrubs.
- Leaves entire; style simple; fruit a drupe.....
**Cornaceæ** 69
- Leaves coarsely-lobed; style 2-branched; fruit a samara
**Aceraceæ** 55
- Herbs.
- Ovary 1-celled.
- Corolla regular or nearly so.
- Sepals 4 or 5.
- Stamens 8**Onagraceæ** 62
- Stamens 5 or 10.
- Stamens alternate with the petals**Saxifragaceæ** 38
- Stamens opposite the petals
**Primulaceæ** 69
- Sepals 2**Portulacaceæ** 22
- Corolla irregular.
- Stamens 5, distinct, the anthers forming a ring around the pistil; lowest petal bluntly spurred
**Violaceæ** 59
- Stamens 6 in 2 equal sets.....
**Fumariaceæ** 28
- Stamens 10; monadelphous, or in 2 sets of 9 and 1..**Leguminosæ** 46
- Ovary more than 1-celled.
- Ovary "superior."
- Ovary 2-celled.
- Root parasites without leaves or green color; stamens 4 (2 long and 2 short)**Orobanchaceæ** 88
- Green plants with alternate leaves; stamens 6 (4 long and 2 short), except in *Lepidium* and *Streptanthus* .**Cruciferae** 29
- Ovary 5- (or imperfectly 10-) celled.
- Leaves stipulate; stamens 10 or 5.....**Geraniaceæ** 52

- Leaves not stipulate; stamens
 5 **Linaceæ** 53
- Ovary "inferior."
 Fruit a 4-celled capsule. **Onagraceæ** 62
 Fruit of 2 dry seed-like carpels,
 which when ripe often split
 longitudinally; flowers in
 umbels **Umbellifereæ** 65
- Corolla with petals, or some of them, united (at base
 at least).
 Stamens exceeding in number the corolla-lobes.
 Ovary 1-celled.
 Sepals 5; leaves usually compound; not
 fleshy **Leguminosæ** 46
 Sepals 4-5; leaves simple, fleshy. **Crassulaceæ** 38
 Sepals 2; leaves compound. **Fumariaceæ** 28
 Sepals 2; leaves simple. **Portulacaceæ** 22
 Ovary 3-many celled. (Petals united by being
 attached to the base of the tube of
 filaments) **Malvaceæ** 57
- Stamens not exceeding in number the corolla-lobes.
 Ovary "superior."
 Corolla regular or nearly so.
 Stamens of the same number as the
 corolla-lobes.
 Ovaries 2, united only at apex of
 fleshy disk. **Asclepedaceæ** 71
 Ovary 1.
 Deeply 4-lobed.
 Leaves alternate; mostly
 rough-hairy plants.
 **Boraginaceæ** 77
 Leaves opposite; not rough-
 hairy **Labiataæ** 82
- Not deeply 4-lobed.
 1-celled; stamens 5; leaves
 coarsely - toothed or
 compound; pod opening
 lengthwise
 **Hydrophyllaceæ** 76
- 2-5-celled.
 Stamens 4; leaves entire
 or finely - toothed;
 pod opening cross-
 wise . **Plantaginaceæ** 89
- Stamens 5.
 Ovules many.
 Style and stigma 1;
 fruit a berry.
 **Solanaceæ** 84

Style 3-cleft in mature flowers; fruit a capsule	
.... Polemoniaceæ	73
Ovules few; stigmas 2-3 (rarely 4); fruit a capsule.	
Ovary 1-2-celled	
... Convolvulaceæ	72
Ovary 3- (rarely 4-) celled	
.... Polemoniaceæ	73
Stamens less in number than corolla-lobes.	
Stamens 2 Veronica in Scrophulariaceæ	87
Stamens 4..... Verbenaceæ	81
Corolla irregular.	
Ovules and seeds solitary in the cells.	
Ovary not lobed	Verbenaceæ 81
Ovary 4-lobed.....	Labiatae 82
Ovules and seeds 2 or more in each cell.	
Trees with large, showy flowers	Bignoniaceæ 89
Herbs	Scrophulariaceæ 84
Ovary "inferior."	
Flowers not in an involucrate head; anthers not united.	
Stamens 4-5, as many as corolla-lobes.	
Leaves whorled; herbs...	Rubiaceæ 90
Leaves opposite or perfoliate; shrubs	Caprifoliaceæ 91
Leaves alternate; herbs.....	Campanulaceæ 93
Stamens 1-3, always less than corolla-lobes	Valerianaceæ 92
Flowers in an involucrate head; anthers united into a tube enclosing the pistil (nearly distinct in Iva). Compositæ	94

Spring Flora of the Wasatch Region

ORDER CONIFERALES.

PINACEÆ. (CONIFERÆ.) Pine Family.

Resinous evergreen shrubs or trees with awl-shaped, scale-like or needle-shaped leaves. Flowers naked; monoecious (or in *Juniperus* mostly dioecious); in catkins or solitary. Cotyledons 2-16.

Leaves short (much less than $\frac{1}{2}$ inch long), scale-like and overlapping or awl-shaped; fruit berry-like 1. *Juniperus*

Leaves longer (at least $\frac{1}{2}$ inch long); needle-shaped; fruit a cone.

Needles in bundles of 2-5, each bundle surrounded by a sheath at the base (at least when young).. 2. *Pinus*

Needles one at each node.

Surrounded by a sheath at the base; cone-scales thick 2. *Pinus* (2a)

Not surrounded by a sheath at the base; cone-scales thin.

Needles elliptical or nearly so in cross-section.

Sessile; leaf-scars round, conspicuous.. 3. *Abies*

Petioled; leaf-scars elliptical, inconspicuous 4. *Pseudotsuga*

Needles strongly 4-angled in cross-section 5. *Picea*

1. JUNIPERUS. (Includes *Sabina*.) Juniper; Cedar.

Strongly aromatic shrubs or low trees with thin shreddy bark. Leaf-buds scaly or naked. Leaves awl-shaped and rigid, or scale-like and overlapping; sometimes both kinds on same tree. Flowers mostly dioecious; axillary or terminal on short lateral twigs, the staminate oblong or ovoid with 2-6-celled anthers; the pistillate of a few opposite fleshy scales, each scale bearing a solitary ovule. Fruit berry-like by the coherence of scales; often bluish or blackish; ripening at the end of the first, the second or rarely the third season. Seeds 1-6, wingless; cotyledons 2 (or 4-6 in some species).

Bark peeling off in papery layers; wood white... 1. *J. utahensis*

Bark never peeling off in papery layers; wood purplish 2. *J. scopolorum*

1. *J. utahensis* (Engelm.) Lemmon. (*J. californica* *utahensis* Engelm.; *Sabina utahensis* (Engelm.) Rydb.) Utah Red Cedar. A bushy shrub or small tree (20 ft. high or less), with thin light-brown scaly bark. Leaves opposite or rarely in whorls of 3. Catkins terminal. Stamens 18-24. "Berries" large, mostly globose, usually with a single seed; reddish-brown or sometimes bluish; ripening the second season; with dry, thin, sweet flesh. Cotyledons 4-6. On dry mountain slopes.

2. **J. scopulorum** Sarg. (*Sabina scopulorum* (Sarg.) Rydb.) Larger than the preceding, sometimes reaching a height of 30-60 feet. Leaves opposite; entire; short. Catkins terminal. Fruit smaller than that of No. 1; subglobose; juicy and resinous; maturing the second season; blue with a whitish bloom or rarely copper-colored (light-green when immature); seeds 2-4. Dry rocky slopes, May.

2. PINUS. Pine.

Trees with 2 kinds of leaves: the primary are deciduous bud-scales, in the axils of which are borne the secondary or ordinary foliage leaves. The latter are evergreen, needle-shaped and sheathed at base, in bundles of 2-5 (or single in 1 variety). Leaf-buds scaly. Cones large, with thick scales; maturing the second or rarely the third year. Seeds nut-like. Cotyledons 3-16.

Leaves in fascicles of 5; each with a single vascular bundle 1. **P. flexilis**

Leaves in fascicles of 2-3 (rarely 1); each with 2 vascular bundles.

Leaf-margins entire; cone-scales without prickles 2. **P. edulis**

Leaf-margins serrulate; cone-scales prickly-armed 3. **P. Murrayana**

1. **P. flexilis** James. Limber, White or Nut Pine. A tree, often gnarled, 60 ft. high or less, with few large, straggling branches at irregular intervals. Bark and wood very full of resinous sap; smooth until quite old. Leaves $1\frac{1}{2}$ -2 in. long (or as much as an inch longer on the cone bearing branches); the sheaths soon dropping off. Cones resinous; 3-5 in. long, light-brown, narrowly ovoid or subcylindrical; their scales blunt-tipped; opening widely at maturity and discharging the seeds. Seeds about $\frac{1}{2}$ inch long, somewhat angled and flattened, each with a narrow wing-rim. Cotyledons 6-7. On exposed mountain cliffs.

2. **P. edulis** Engelm. Pinyon Pine. A low, round-topped tree or sometimes shrubby, ovate in general outline; branches beginning at or near the base. Leaves in twos, or some in threes, 1- $1\frac{1}{2}$ inches long. Cones sessile, subglobose, 2 inches long. Seeds large, brown, wingless.

2a. **P. edulis monophylla** (Torr. & Frem.) Jones. (*P. monophylla* Torr. & Frem.) Differs from the type in that the leaves, or some of them, are single. These single leaves are terete; while those of the fascicles are semi-terete.

3. **P. Murrayana** Balf. (*P. contorta* Murrayana Eng.) Lodgepole or Black Pine. A tree sometimes reaching a height of 120 ft. and a diameter of 4-6 feet; tall and straight, with branches in little short whorls near the top. Bark of trunk thin, scaly, light-brown; rough from the start. Leaves 1-3 inches long, with resin-ducts as in *Abies lasiocarpa*. Cones somewhat ovate; 1-2 inches long; often remaining closed for many years; their scales armed with short, stout prickles. Seeds black, rough, ridged on lower side; each with a long, thin, persistent wing, widest below the middle. Cotyledons usually 5. On mountain slopes, 5,000-10,000 ft.

3. **ABIES.** Fir; Balsam.

Tall conical trees with horizontal branches. Wood coarse-grained, but sometimes used for lumber. Leaves flattened; alternate and apparently 2-ranked by a twist near the base; sessile and without sterigmata; stomata arranged in 2 longitudinal white lines on under side (at least when young). Leaf-scars circular, their axes at right angles to direction of the stem. Cones erect, maturing the first year; their scales thin, breaking away from the persistent axis, and therefore only these scales instead of cones are found under the tree. Seeds winged; cotyledons 4-10.

Leaves of cone-bearing branches blunt-tipped... 1. **A. concolor**
Leaves of cone-bearing branches sharp-tipped.. 2. **A. lasiocarpa**

1. **A. concolor** Lindl. White Fir. Tree 40-150 ft. high and 2-4 ft. in diameter. Bark rough, grayish. Leaves more or less curved; their resin-ducts 2, close to the lower epidermis; 8-ranked; their bases conspicuously disk-shaped; with stomata on both surfaces. Cones oblong-cylindrical, 2½-5 inches long by 1-1½ inches wide; green or sometimes dull-purplish; width of scales nearly twice their length. Tips of bracts visible above the scales. Seed-wings broad; rose-colored; cotyledons 5-10. Along streams and on mountain slopes, 7,500-10,000 ft. In flower early in May.

2. **A. lasiocarpa** (Hook.) Nutt. (*A. subalpina* Engelm.) Western Balsam Fir. A tree 60-80 ft. high, with bark of trunk ashy-gray and smooth (or that of old trees cracked). Leaves of the vigorous lower branches 1-1¾ inches long, blunt or notched at the end; those of the cone-bearing branches stiff, more scattered, curved upwards and tipped with sharp points; resin-ducts 2, equally distant from the upper and the lower epidermis, as seen in cross-section under a hand-lens. Cones purple or nearly black, white-resinous; puberulent; 2-3 inches long; bracts quite small and entirely concealed, their hook-like tips reflexed. Seed-wings dark and lustrous. Cotyledons 4-5. From 8,500 ft. to timber-line, often growing side by side with the spruces.

4. **PSEUDOTSUGA.** Douglas Spruce; Red Fir.

Tall trees—at first conical, but becoming more or less spreading; in characteristics intermediate between *Abies* and *Picea*. Leaves from scaly buds; smaller and more crowded than those of *Abies*; alternate and apparently 2-ranked by a twist near base; not borne on sterigmata; flat; blunt at apex; stomata on lower surface only; resin-ducts 2, lateral, close to lower epidermis. Cones pendulous; maturing the first year; greenish or purplish-tinged when young, light brown when mature; the scales thin, persistent, each furnished with a conspicuous, exerted, 3-pointed bract. Seeds winged; cotyledons 6-12.

1. **P. mucronata** (Raf.) Sudw. (*P. Douglasii* Carr.; *P. taxifolia* Britton.) Wood (under compound microscope) characterized by an abundance of spiral vessels. Bark brown, very thick and very much cracked. Leaf-scars small, elliptical, their axes making an angle of about 45 degrees with direction of the stem. Midrib prominent on lower surface. Leaves crowded; not notched at apex. Cones 2-4 inches long; middle tooth of bract long and narrow, lateral teeth broad and short. A tree known by at least thirty common names, "Oregon Pine" or "Douglas Fir" being those by which it is known in commerce. From 7,000-11,000 ft. (in the Wasatch).

5. **PICEA.** Spruce.

Tall conical trees with alternate leaves (deciduous in drying), which are sharp-pointed and strongly 4-angled in cross-section; from scaly buds. Branchlets rough from the prominent and persistent leaf-bases (sterigmata). Staminate flowers on branchlets of preceding year; their anthers opening lengthwise. Cones mature the first year, becoming pendulous; their scales thin, persistent. Seeds winged.

Branchlets glabrous..... 1. **P. pungens**
Branchlets pubescent under a lens..... 2. **P. Engelmanni**

1. **P. pungens** (Lambert) Engelm. (*P. Parryana* (Andree) Sarg.) Blue or Colorado Spruce. Tree 60-100 ft. high with soft wood and with bark of trunk furrowed and grooved lengthwise. Branches spreading, with thick, smooth and gray bark; branchlets smooth and shining as if varnished. Needles of branches green and of young shoots bluish. Cones abundant, light-yellow, 2-4 inches long, solitary or clustered. Mountain slopes near streams, 6,500-10,000 ft. The "State tree" of Colorado.

2. **P. Engelmanni** (Parry) Engelm. Engelmann or White Spruce. Tree 60-100 ft. high, with bark of trunk broken into rounded, plate-like scales. Branches horizontal, with thin reddish or purplish-brown bark. Needles less sharp and rigid than those of *P. pungens*. Cones solitary, brown, ovate-cylindric, 2 inches long or usually less; the scales usually more rounded than those of No. 1. Cotyledons usually 6. Mountain parks and mountain sides, more frequent on north slopes, 8,500-12,500 ft.

ORDER LILIALES.

LILIACEÆ. Lily Family.

Perennial herbs from underground stems; either leafy-stemmed or scape-like with basal leaves. Leaves rarely netted-veined. Flowers regular and perfect (or polygamous in some species of *Zygadenus*). Floral envelopes 6, the outer set of 3 often colored like the inner set. Stamens 6. Pistil 1, with a 3-celled, "superior" ovary. Fruit a berry or a capsule.

Stems from rhizomes; fruit a berry.

Unbranched; inflorescence terminal, racemose or
paniculate 1. **Smilacena**
Branched; inflorescence axillary, in umbels or
solitary 2. **Disporum**

Stems from solid bulbs; fruit a capsule.

Flowers nodding; solitary or racemose.... 3. **Erythronium**
Flowers erect; solitary or in umbels.

Outer perianth-segments sepal-like; inner petal-
like 4. **Calochortus**

All the perianth-segments of same size, shape
and color 5. **Brodiaea**

Stems from scaly bulbs (the scales tuber-like); fruit a
capsule 6. **Fritillaria**

Stems from coated bulbs; fruit a capsule.

- With odor of onions; inflorescence umbellate,
 spathaceous 7. **Allium**
 Without odor of onions; inflorescence racemed or
 paniced, not spathaceous.
 Leafy-stemmed; raceme compound; fruit septi-
 cidal 8. **Zygadenus**
 Leaves all basal; raceme simple; fruit loculi-
 cidal 9. **Camassia**

1. SMILACENA. (Vagnera.) False Solomon's Seal.

Leaves firm; alternate; elliptical, lanceolate or ovate; short-petioled or sessile; entire. Flowers small; white or greenish-white. Floral envelopes of 6 distinct segments.

Flowers numerous, in a racemose panicle.... 1. **S. amplexicaulis**
 Flowers few, in a simple, open raceme..... 2. **S. sessilifolia**

1. **S. amplexicaulis** Nutt. Wild Spikenard. Stem 1-3 ft. high, perennial, from a thick rhizome with short internodes. Leaves broadly lanceolate to ovate; sessile and clasping; acute. Stamens exserted. Berry reddish. Rich soil in light shade along streams. May-July.

2. **S. sessilifolia** Nutt. (Vagnera liliacea (Greene) Rydb.) Star-flowered Solomon's Seal. Stem 1-2 ft. high, perennial from a slender rhizome. Leaves elliptical to lanceolate; sessile and somewhat clasping; acuminate or sometimes acute. Flowers on long pedicels. Stamens included. Berry reddish-purple to nearly black. April-May. Rich soil in shade along streams. (Locally called "Wild Lily of the Valley.")

2. DISPORUM. (Prosartes.) Fairy Bells.

Stems branching above from rather slender rhizomes. Leaves alternate, sessile and somewhat clasping; the veinlets netted. Floral envelopes 6, distinct, somewhat deciduous; all colored alike. The pedicel is slightly enlarged at the apex, forming a cup or hypanthium, and on this cup are borne the stamens and the floral envelopes, thereby making the stamens appear to be perigynous. Stigma 3-lobed or entire.

1. **D. trachycarpum** (S. Wats.) B. & H. (Prosartes trachycarpa S. Wats.; *D. majus* (Hook.) Britton.) Stem 9-24 inches high. Leaves thin; ovate to elliptic-lanceolate; acute or rarely acuminate; light-green and shining; 5-11-nerved. Flowers nodding; whitish; narrow bell-shaped; solitary or in clusters of 2-3; $\frac{1}{2}$ - $\frac{3}{8}$ inch long. Floral envelopes slightly spreading. Berry obovate; bright red (orange if unripe); obtuse, rather deeply lobed; papillose; leathery. In flower the last of April, berry ripe by first week in June. Along streams, in rich soil in shaded places.

3. ERYTHRONIUM. Easter Bells.

Scape from a deep-seated solid bulb. Leaves netted-veined: 2, basal and opposite on flowering plants, but only 1 on sterile plants, and that cauline, long-petioled. Flowers nodding, showy, solitary or in a naked raceme or umbel. Floral envelopes all colored alike, spreading, acute. Fruit a 3-angled loculicidal capsule.

1. **E. grandiflorum parviflorum** S. Wats. (*E. parviflorum* (Wats.) Goodding.) Yellow Dog-tooth Violet. Leaves uniformly pale-green. Flowers bright yellow. 1-6, about 1 inch long. Anthers innate; purplish-red. In rich moist soil in oak copses and along mountain streams. March-July, according to altitude. 6,000-11,500 ft.

4. **CALOCHORTUS.** Mariposa Lily; Star Tulp.

Bulbs thin-coated. Leaves few; keeled; grass-like; both basal and cauline. Inflorescence solitary or umbellate. Flowers showy. Floral envelopes with 3 outer segments narrowly-lanceolate; the inner large and petaloid, each with a hairy cushion-like gland at base, Capsule septical.

1. **C. Nuttallii** T. & G. Sego Lily. Stem bulblet-bearing above the true bulb. Flowers 1-5 in a naked umbel. Outer surface of calyx-lobes at first green but often becoming reddish-tinged, inner surface whitish or yellowish, usually purple-spotted near base. Petals broadly obovate-wedge-shaped, usually abruptly acute at apex; white or cream-color, with a patch of purple shaped like a candle-flame just above the yellow nectar-gland. Anthers erect, obtuse; longer than filaments. On dry plains and hillsides, 4,400-7,000 ft. May-June. The State flower of Utah.

5. **BRODIAEA.** (Hookera; Tritelia). Wild Hyacinth.

Scapes erect from brown-coated solid bulbs. Leaves few, basal, grass-like; withering before the flowers do. Inflorescence usually a terminal and involucrate umbel. Pedicels jointed. Flowers few, showy; withering-persistent; segments colored alike. Stamens 6; all anther-bearing, or 3 anther-bearing and 3 with sterile filaments. Fruit a loculicidal capsule.

1. **B. Douglasii** Wats. (*Tritelia grandiflora* Lindl.) Leaves keeled, often a foot or more in length. Scape sometimes 2 ft. long. Perianth blue or purplish; broadly tubular. Stamens 6, in 2 rows, all anther-bearing; the filaments of inner stamens narrow. In rich moist soil in the canyons, often in oak copses. June. Sometimes called Blue Cammas.

6. **FRITILLARIA.** Lily Bells. Rice Roots.

Stem erect, simple, leafy, from a scaly bulb. Inflorescence solitary or umbellate. Flowers few; showy. Floral envelopes colored alike, each with a shallow nectary. Stamens borne upon base of segments; anthers versatile. Fruit a 6-angled or 6-winged loculicidal capsule.

Flowers yellow or orange..... 1. **F. pudica**
Flowers dull-purplish, mottled with darker purple 2. **F. atropurpurea**

1. **F. pudica** Spreng. Yellow Bells; Snowdrop; Orange Fritillaria. (Locally called "Crocus" and "Buttercup.") Bulb of numerous tuberous-thickened spheroidal scales. Stem 3-8 inches high. Leaves 3-8, alternate or somewhat whorled. Flowers usually 1 or 2, sometimes as many as 6; nodding; with obtuse segments. Grassy plains. March-May.

2. **F. atropurpurea** Nutt. Leopard Lily; Dark Purple Fritillaria. Bulb of numerous terete scales, larger than those of No. 1. Stem 6-18 inches high. Leaves sessile, 3½ inches long, whorled or alternate (¾). Flowers 1-6, somewhat nodding. Perianth-segments acute or acuminate; becoming revolute at apex until edges meet somewhat below extreme tip. May-June. Grassy slopes along streams in rich moist soil.

7. **ALLIUM.** Wild Onion.

Easily recognized by the characteristic taste and odor. Stem scapose from a coated bulb (or in some species, from a solid bulb or rhizome). Leaves basal; narrow; flat or channeled, or in some species terete. Inflorescence umbellate; subtended by scarious bracts. Pedicels not jointed. Perianth-segments 1-nerved; all colored alike or nearly alike; white, pink or red. Stamens borne on base of perianth-segments. Fruit a loculicidal capsule. Seeds black, wrinkled.

Leaves 2-4.

Ovary not long-crested.

Leaves nearly as long as peduncle... 1. **A. acuminatum**

Leaves at least a third longer than peduncle 2. **A. Diehlii**

Ovary conspicuously 6-crested..... 3. **A. bisceptrum**

Leaf 1; ovary very long-crested..... 4. **A. nevadense**

1. **A. acuminatum** Hook. Mostly from solitary coated bulbs (not rhizome-producing), the outer coats of which are coarsely and distinctly quadrately to hexagonally reticulated. Involucre of 2 papery bracts. Leaves narrowly linear. Flowers light pink to dark rose-purple. Perianth-segments with acuminate, recurved tips, the inner ones wavy-serrulate; a third longer than stamens. Ovary obscurely crested if at all. Usually in dry soil in open fields. May-June.

2. **A. Diehlii** Jones. (*A. tribracteatum* Diehlii Jones.) From solitary, mostly red-coated, nearly spherical bulbs (not rhizome-producing), the outer coats of which have oblong reticulations, pointed at the end. Leaves 2; 4-6 inches long. Bracts 2; short-acuminate. Sepals acute; erect. Petals white, each with a brown midrib. Ovary obscurely crested. Among rocks on mountain-sides. May.

3. **A. bisceptrum** Wats. From solitary light-coated and faintly-reticulated bulbs. Scapes often in pairs. Perianth-segments acuminate, not serrulate, slightly longer than the stamens; the alternate stamens with a dilated base. In the mountains.

4. **A. nevadense** Wats. From brown-coated, ovate bulbs, without rhizomes, but producing whitish bulblets; outer bulb-coats with irregular reticulations. Leaf round, channeled on upper side; much longer than scape and hooked at end. Bracts usually 2; ovate, acute, reddish-green. Sepals lanceolate, spreading. Petals white or pinkish. May.

8. **ZYGADENUS.** Star Lily.

Stem simple, scape-like. Leaves folded lengthwise; from narrow to broadly linear; obscurely nerved, mostly basal. Inflorescence in terminal racemes or panicles. Flowers erect, rather large; perfect or polygamous. Perianth-segments all colored alike, white or greenish-white; withering-persistent; each with a green or greenish-yellow glandular spot at base. Anthers 1-celled. Styles 3, distinct. Fruit a 3-lobed capsule.

1. **Z. paniculatus** Wats. Plant rather stout. Leaves usually broad and sheathing. Flowers mostly perfect, their segments acute, rhombic-ovate, short-clawed. Gland large. Filaments adnate to base of claws. April-June. On dry, gravelly hills. Locally called "Poison Sege" and "Coxcomb."

9. **CAMASSIA.** (Quamassia.) Camas.

Leaves basal, linear, flat. Flowers pale-blue or white, slightly gibbous; each with 6 3-7-nerved, spreading segments. Pedicels jointed. Bracts scarious. Anthers introrse. Style long and slender, its base persistent. Ovary 3-angled; becoming a loculicidal capsule, each cell of which contains several black, shining seeds.

1. **C. quamash** Greene. (Quamassia quamash (Pursh) Coville.) Perianth irregular, with 3- or 5-nerved segments; flower-buds gibbous on one side. Wet meadows. May.

IRIDACEÆ. Iris Family.

Herbs with equitant 2-ranked leaves. Flowers from a spathe of 2 or more bracts; usually showy. Stamens 3, with extrorse anthers. Style 3-cleft at apex. Ovary "inferior," 3-celled, becoming a 3-lobed capsule.

Outer perianth-segments recurved; inner erect..... 1. **Iris**
All the perianth-segments alike..... 2. **Sisyrinchium**

1. **IRIS.** Flag; Flower-de-luce.

Leaves from thickened horizontal rootstalks. Flowers showy; solitary or in a forked corymb. Stamens distinct; underneath the arched, petaloid style-branches.

1. **I. missouriensis** Nutt. Stems $\frac{1}{2}$ -2 ft. high. Leaves shorter than the stem. Flowers usually 2; pale blue, with segments 2-3 inches long. In swamps.

2. **SISYRINCHIUM.**

Stems simple or branched, flattened and 2-edged; from fibrous roots. Leaves grass-like. Inflorescence umbellate, from a 2-leaved spathe. Stamens monadelphous.

1. **S. angustifolium** Mill. Erect or ascending, smooth, 3-14 in. high, the stem distinctly winged. Spathes green; floral envelopes violet or rarely white. Capsules dull-brown or purplish-tinged. Wet meadows. May-July.

ORDER ORCHIDALES.**ORCHIDACEÆ.** Orchid Family.

Perennial herbs with mostly alternate leaves. Flowers usually bracted; often showy. Sepals 3, petal-like. Petals 3, very irregular; the lowest one called the "lip." Fertile stamens 1 or 2; stamens and style united into a central column. Pollen usually in waxy

masses called 'pollinia (granular in *Cypripedium*). Ovary "inferior," 1-celled, with 3 parietal placentae. Fruit a capsule.

With large green leaves; perfect anthers 2; flowers showy 1. *Cypripedium*
 Without green leaves; anther 1; flowers not showy 2. *Corallorhiza*

1. **CYPRIPEDIUM.** Lady's Slipper; Mocassin Flower.

Stems pubescent, from coarsely-fibrous roots. Leaves conspicuously nerved; sheathing at the base. Flowers large. Sepals spreading; the two lower usually united. Petals usually spreading, the lip an inflated sac. Fertile stamens 2, with the rudiments of a third. Column declined. Stigma terminal.

1. *C. parviflorum* Salisb. Yellow Lady's Slipper. Stem 8-18 in. high, leafy at the top. Flowers 1-3, both the sepals and the lateral petals greenish-yellow; lip yellow. In timber along streams. May-July. Rare.

2. **CORALLORHIZA.** Coral-root.

Root-parasites; stems from fleshy, branched, coral-like rootstalks. Flowers racemose, in a solitary scape with 2-4 membranous sheaths; brownish, yellowish or purplish; pedicels reflexed in fruit. Sepals and petals ascending, the lateral sepals oblique at the base.

1. *C. multiflora* Nutt. Scape many-flowered, 1-2 ft. high. Sepals and petals 3-nerved; spur of sepals adnate to ovary; lip nearly sessile, 3-lobed by a deep cleft on each side. Capsule $\frac{1}{2}$ - $\frac{3}{4}$ in. long, narrowed to a short, rather stout pedicel. Rich, moist soil in mountains, May-August.

ORDER SALICALES.

SALICACEÆ. Willow Family.

Dioecious shrubs or trees, with alternate simple leaves. Stipules present, but soon falling off. Flowers in catkins, 1 to each bract of the catkin. Ovary 1-celled with or without a style and with 2 more or less lobed stigmas. Fruit a 1-celled, 2-valved capsule containing many downy-tufted seeds.

Bract entire. Flowers with small glands; disks none.

Buds with a single scale..... 1. *Salix*

Bracts irregularly incised at apex as if torn. Flowers with a broad or cup-shaped disk somewhat resembling a calyx. Buds resinous, with several scales 2. *Populus*

1. **SALIX.** Willow.

Shrubs or trees, usually near water. Leaves pinnately-veined. Catkins appearing before or with the leaves. Bracts of catkins often hairy. Stamens 1-10; their filaments distinct or rarely united. Pistillate catkins erect or spreading. Stigmas 2, entire or 2-cleft.

Stamens 3-7; leaves lanceolate, serrate or serrulate.

Petioles not glandular..... 1. **S. amygdaloides**

Petioles glandular..... 2. **S. Fendleriana**

Stamens 2.

Leaves obtuse..... 3. **S. Schouleriana**

Leaves acute.

Leaves linear..... 4. **S. exigua**

Leaves cordate or subcordate.... 5. **S. cordata Watsoni**

1. **S. amygdaloides** Anders. Peach-leaved or Black Willow. A small tree. Leaves lanceolate with short acuminate apex and serrulate margins; 2-4 inches long; under surface paler than the upper; petioles slender, without glands. Staminate catkins elongated, the flowers with caducous, light-yellow bracts. Stamens 3-5; their filaments hairy, at least below. Capsule smooth, stipitate.

2. **S. Fendleriana** Anders. (*S. lasiandra* Fendleriana Bebb; *S. pentandra* caudata Nutt.; *S. lasiandra* caudata (Nutt.) Sudworth.) A slender tree sometimes reaching a height of 20 ft. Water sprouts bright yellow. Leaves green on both sides; narrowly lanceolate; long-acuminate; closely glandular-serrate. Petioles short; glandular. Staminate catkins densely flowered; 1-2 inches long. Stamens 3-7, mostly 5. Style short; stigmas 2, each 2-lobed.

3. **S. Schouleriana** Barratt. (*S. Nuttallii* Sarg.; *S. flavescens* Nutt.) Usually shrubby but sometimes a slender tree. Leaves 2-3 inches long, obovate or oblanceolate; usually obtuse; wedge-shaped at base; upper surface at first downy, but becoming glabrate and dull-green. Catkins appearing before the leaves; scales black, very silky. Stamens 2, their filaments smooth. Pistillate catkins on peduncles, in fruit usually at least 2 inches long; stigmas long, sessile; entire or deeply parted. Capsules hairy, stipitate. Along mountain streams. April-June, according to altitude. The freshly-cut wood sometimes has a disagreeable skunk-like odor.

4. **S. exigua** Nutt. (*S. nevadensis* Wats.; *S. luteosericea* Rydb.; *S. longifolia* exigua Nutt.) Tall, bushy shrub. Leaves entire, broadly linear, obscurely-veined. Catkins appearing just before, with or just after the leaves; bracts yellow, caducous. Stamens 2; their filaments hairy. Capsule smooth, sessile. April-May, 4,000-7,000 ft.

5. **S. cordata Watsoni** Bebb. (*S. Watsoni* (Bebb) Rydb.; *S. flava* Rydb.; *S. lutea* Nutt.) Bushy shrubs with smooth branches, light-yellow (at least when young). Leaves light-green; elliptical, short-acuminate; entire or obscurely serrulate, 1-3 inches long; obtuse or subcordate at base. Stipules oblique, usually large and persistent. Catkins leafy-bracted, peduncled; appearing before the leaves. Stamens 2, their filaments smooth. Capsule glabrous; long-stipitate. April-May.

2. **POPULUS.** Poplar; Cottonwood; Aspen.

Trees, often of excurrent habit, and with brittle branches. Buds scaly, covered with a resinous varnish. Leaves leathery. Flowers in catkins appearing before the leaves; long and drooping. Stamens many.

Petioles flattened laterally.

Styles 2; terminal buds small, but slightly resinous-viscid.

Mature leaves smooth on both sides.. 1. **P. tremuloides**

Mature leaves becoming smooth above; white-tomentose below..... 2. **P. alba**

Styles 2-4; terminal buds large and very resinous-viscid.

Leaves truncate at base.

Branches spreading..... 3. **P. deltoides**

Branches erect..... 4. **P. nigra**

Petioles terete or channeled; not laterally flattened.

Leaves broadly ovate..... 5. **P. candicans**

Leaves lanceolate or lanceolate-ovate.

Leaves acute, short-petioled..... 6. **P. angustifolia**

Leaves acuminate, long-petioled..... 7. **P. acuminata**

1. **P. tremuloides** Michx. Quaking Asp; American Aspen. A slender tree with smooth, light-green branches. Leaves broadly ovate or roundish, short-acuminate; margin crenulate and ciliate; moving with the slightest breeze. Mountain slopes, usually at altitudes of 7,000-9,000 ft. in the Great Basin. March-May.

2. **P. alba** L. White or Silver-leaved Poplar. A large tree in moist climates, but seldom exceeding 75 ft. in the Great Basin. Branches smooth, covered with a white bloom; the trunk light-green. Leaves broadly ovate or roundish, palmately 3-5-lobed or merely coarsely dentate; petioles shorter than the blade, sometimes scarcely flattened. Catkins greenish. Stamens 6-20. Cultivated. March-May.

3. **P. deltoides** Marsh. (*P. monilifera* Ait.) Carolina or Necklace Poplar. The largest tree of the genus; with grayish-green bark, becoming rough when old. Leaves glabrous; broadly ovate-triangular; abruptly acuminate at apex; crenulate; truncate at base; petioles stout. Bracts glabrous, deeply fringed. Stamens 60 or more. Pistillate catkins loosely-flowered, becoming 6-10 inches long in fruit. Capsules on slender pedicels. Cultivated. April-May.

4. **P. nigra** L. Black Poplar; Lombardy Poplar. Tall trees usually with excurrent trunks, sometimes reaching a height of 100 ft. Leaves broadly deltoid with an abruptly acuminate apex and a crenate margin; obtuse or broadly wedge-shaped at the base. Staminate catkins 1-2 inches long; stamens about 20 to each flower. Pistillate catkins 2-5 inches long, spreading. Capsule very obtuse, on pedicels much shorter than capsule. Cultivated. April-May.

5. **P. candicans** Ait. (*P. balsamifera candicans* (Ait.) Gray.) Balm of Gilead. A large much-branched tree (20-90 ft. high) with large very resinous terminal buds. Leaves broad, more or less heart-shaped; their lower surfaces and the petioles hairy. Styles 2-4, with dilated lobes. Cultivated. April.

6. *P. angustifolia* James. Narrow-leaved Cottonwood. A slender tree (sometimes reaching a height of 70 ft.) with ascending branches and gray twigs. Leaves lanceolate, lanceolate-ovate or ovate; acute or acuminate or some obtuse; finely crenulate; short-petioled (much resembling willow leaves in general appearance). Capsules ovoid, short-pedicelled. Along mountain streams. April-May.

7. *P. acuminata* Rydb. Much like the last, but the leaves are more rhomboid-lanceolate, are abruptly long-acuminate, and are long-petioled.

BETULACEÆ. Birch Family.

Monoecious shrubs or trees with slender branches. Leaves simple and alternate, with deciduous stipules. Staminate flowers in catkins; pistillate ones in clusters, spikes or scaly cone-like catkins. Stamens 2-8; stigmas 2. Ovary 2-celled, ripening into a winged or wingless nut.

Pistillate inflorescence persistent..... 1. *Alnus*
Pistillate inflorescence deciduous..... 2. *Betula*

1. ALNUS. Alder.

Shrubs or trees growing near streams. Flowers developed before or with the leaves. Staminate catkins long and drooping, with 3 flowers to each scale. Stamens 3-6 (usually 4). Pistillate catkins ascending, at length erect; their bracts becoming woody and cone-like, and remaining on the tree through the winter. Fruit with or without wings.

1. *A. tenuifolia* Nutt. (*A. incana* virescens S. Wats.) A small tree (8-20 ft. high), the trunk with greenish-gray bark, and branches reddish-brown. Winter-buds obtuse. Leaves ovate, sharply double-toothed; light-green and smooth on both sides or slightly pubescent; strongly veined. Flowers produced early in spring before the leaves; the catkins are developed from terminal naked buds of the preceding year's growth. Peduncles shorter than the "cones." Bracts of both inflorescences dark-red while in bud; the fertile ones becoming light-brown in fruit. Seeds with thin membranous margins. March-April, 4,800-9,000 ft.

2. BETULA. Birch.

Smooth-barked shrubs or slender trees growing near streams. Staminate catkins sessile; long and drooping; the flowers usually 3 to each scale of bract; each flower consisting of a scale-like and shield-shaped calyx, which bears 2 2-forked filaments. Each fork of filament bears an anther-cell. Pistillate catkins cylindrical to ovoid, erect; flowers 2-3 to each 3-lobed bract, with neither calyx nor bractlets; the bracts dropping away from their axis as soon as seeds are mature.

1. *B. fontinalis* Sargent. (*B. microphylla* Bunge.) Black Birch. Shrub or slender tree 9-20 ft. high, with reddish-brown bark conspicuously marked with whitish, horizontal lenticels and with glandular-warty drooping branches. Leaves broadly ovate; sparingly pubescent; serrate with glandular teeth. April-May, 4,600-8,000 ft.

ORDER FAGALES.

FAGACEÆ. Beech Family.

Monoecious shrubs or trees. Leaves simple and alternate ($\frac{2}{5}$), with deciduous stipules. Flowers regular. Staminate flowers in catkins of small heads, each with 4-7 sepals, no petals and 4-20 stamens. Pistillate flowers in spikes, in capitate clusters, or solitary, with sepals soon dropping off, no petals and ovary 3-7-celled. Styles 3. Fruit a 1-seeded nut, more or less surrounded by a small cup (the hardened and enlarged involucre).

1. **QUERCUS.** Oak.

Shrubs or trees, often with deeply pinnately-lobed or cleft leaves. Flowers greenish or yellowish. Staminate catkins thread-like and drooping; one or several from the same scaly bud. Calyx 2-8-lobed. Pistillate flowers usually solitary. Stigmas 3. Ovary enclosed in a cup-like involucre; 3-celled and 6-ovuled (only 1 of the ovules maturing).

Cup covering about $\frac{1}{2}$ of the acute, ovoid acorn. 1. **Q. Gambellii**

Cup covering about $\frac{1}{3}$ of the obtuse, barrel-shaped acorn 2. **Q. Gunnisonii**

1. **Q. Gambellii** Nutt. (*Q. undulata* Gambellii Engelm.) Scrub Oak. A shrub 10-15 ft. high or rarely tree-like. Leaves more or less lobed; leathery; rather bright green and glabrate above, puberulent or glabrate below; dropping from the tree soon after frost. In more or less dense patches on the lower mountain slopes. May.

2. **Q. Gunnisonii** (Torr.) Rydb. (*Q. alba* Gunnisonii Torr.; *Q. undulata* Gunnisonii Torr.; *Q. novo-mexicana* Rydb.) A shrub 3-10 ft. high. Leaves firm; green and sparingly stellate or at length glabrate above, puberulent below; very leathery; lobes extending not more than half-way to the midrib, the lobes entire.

2a. **Q. Gunnisonii utahensis** (Rydb.) A shrub or small tree sometimes reaching a height of 30 ft. or more. Leaves almost velvety beneath, deeply divided.

URTICACEÆ. Nettle Family.

Herbs, shrubs or trees. Leaves with stipules, the latter often deciduous. Flowers monoecious, dioecious, polygamous, or perfect; not showy. Calyx regular; free from the ovary. Corolla none. Stamens fewer or as many as the lobes of the calyx, and opposite them.

Ovary 1- (rarely 2-) celled, ripening into a 1-seeded winged or wingless fruit.

- Fruit a samara..... 1. **Ulmus**
 Fruit multiple, consisting of an aggregation of achenes,
 each of which is surrounded by the fleshy and
 juicy calyx..... 2. **Morus**
 Fruit a berry-like drupe..... 3. **Celtis**

1. ULMUS. Elm.

Trees or rarely shrubs with deeply-furrowed bark. Leaves alternate, serrate, strongly pinnately-veined; oblique or heart-shaped at base. Flowers perfect or sometimes polygamous; axillary; appearing in the spring before the leaves and on branches of the preceding year, or in the autumn on growth of the year. Calyx bell-shaped, 4-9-cleft. Stamens 4-9, with long slender filaments. Styles 2, divergent, stigmatic along the inner surface. Ovary 1-2-celled, ripening into a samara, the wing of which extends all around the seed.

Bud-scales glabrous; flowers on long pedicels.. 1. **U. americana**
 Bud-scales coated with rusty hairs; flowers on short
 pedicels 2. **U. fulva**

1. **U. americana** L. White Elm. Leaves smooth or slightly rough above, soft-pubescent below; oblong-obovate, usually doubly-serrate. Flowers in clusters of 3-4, appearing before the leaves. Styles light-green. Fruit on long stems, $\frac{1}{2}$ inch long, ciliate on the margins, deeply notched at apex. Cultivated. March-April.

2. **U. fulva** Michx. Red or Slippery Elm. A small or medium-sized tree with reddish wood, downy twigs, and mucilaginous inner bark. Bud scales downy with rust-colored hairs. Leaves elliptical-ovate, long-acuminate, doubly-serrate; the upper surface very rough. Flowers on very short downy pedicels in crowded clusters. Fruit nearly round, slightly notched at apex, but not ciliate. Cultivated. March-April.

2. MORUS. Mulberry.

Trees with milky sap. Leaves simple, toothed, alternate; with stipules that soon drop off. Inflorescence spicate. Flowers monoecious or dioecious; greenish. Calyx 4-parted; its lobes ovate. Stamens 4. Styles 2, slender. Ovary 2-celled (the smaller cell not maturing), ripening into an achene which is covered by the juicy, berry-like calyx. All the achenes of the flower-cluster remain together as a juicy and edible multiple fruit, much resembling a blackberry in shape.

Upper surface of leaves rough; lower surface downy 1. **M. rubra**
 Upper surface of leaves smooth and shining..... 2. **M. alba**

1. **M. rubra** L. Red Mulberry. A large tree, sometimes reaching a height of 65 ft. Leaves ovate, or palmately-lobed on young shoots; somewhat heart-shaped at base; acute or acuminate. Fruit 1-1 $\frac{1}{2}$ inches long; dark-purple. April-May.

2. **M. alba** L. White or Chinese Mulberry. Tree somewhat smaller than No. 1. Leaves ovate, with or without a heart-shaped base; lobed; acute; smooth and shining. Fruit white, about $\frac{1}{2}$ inch long; oblong or subglobose. Cultivated. May.

3. **CELTIS.** Hackberry.

Trees (sometimes shrubby) with light bark in rough ridges. Inflorescence axillary. Flowers greenish; appearing with the leaves.

1. **C. reticulata** Torr. A bushy tree or shrub, usually 10 ft. or less in height in the Great Basin; bark of trunk very rough. Leaves thick and leathery, strongly netted-veined; lanceolate or elliptical to ovate; acute, acuminate or sometimes obtuse; entire or serrate above the middle; base decidedly oblique. Fruit green, becoming orange-red. Limestone cliffs. May.

ORDER SANTALALES.**SANTALACEÆ.** Sandal-wood Family.

Partially parasitic perennial shrubs or herbs with rather woody base and entire, alternate, almost or altogether sessile leaves. Flowers dioecious or perfect with 4-5-cleft calyx and no corolla; stamens equal in number to the calyx-lobes and opposite them; style 1; ovary 1-celled, containing 2-4 ovules borne on a free-central placenta. Fruit accessory. Seeds without a true seed-coat.

1. **COMANDRA.** False Toad-flax.

Erect glaucous herbs, branching from a woody base. Leaves elliptical to lanceolate. Inflorescence an umbel-like cyme. Flowers perfect. Calyx bell-shaped, its tube adnate to the ovary. Fruit a berry-like drupe, crowned by the persistent calyx like a rose-hip.

1. **C. pallida** A. DC. Pale Comandra. Pale, with terminal cymes of small greenish-white flowers. Fruit about the size of a small pea. On dry exposed plains and hillsides. April-July. 4,000-6,000 feet.

ORDER POLYGONALES.**POLYGONACEÆ.** Buckwheat Family.

Annual or perennial herbs (sometimes more or less woody at base), with entire and usually alternate and stipulate leaves. The stipules (if present) form sheaths (ocreae) above the swollen joints of the stem. Inflorescence terminal or axillary. Flowers small, regular, perfect (or sometimes monoecious, dioecious or

polygamous). Calyx 3-cleft; more or less persistent. Corolla none. Stamens 4-12, borne on base of calyx. Pistil of 2-3 stigmas, 2-3 styles, a "superior" 1-celled and 1-seeded ovary that ripens into a 3-angled achene.

Stipules wanting; stamens 9; flowers mostly involu-
crate 1. **Eriogonum**

Stipules conspicuous; stamens 4-8; flowers not involu-
crate 2. **Rumex**

1. ERIOGONUM.

Annual or perennial, some species woody at base. Stems branched or unbranched, often tufted. Leaves basal, alternate, opposite or whorled. Inflorescence various. Flowers small; perfect; usually involucrate. Calyx 6-cleft or -parted, usually bright-colored; persistent about the achene. Stamens 9, included or exserted. Styles 3; stigmas capitate. Achenes 3-angled (rarely 3-winged).

Flowers not stalk-like at base..... 1. **E. ovalifolium**
Flowers stalk-like at base.

Peduncles leafy-bracted; leaves narrow, tomentose
on both sides..... 2. **E. heracleoides**

Peduncles naked or 1-bracted; leaves broader, gla-
brous or glabrate above..... 3. **E. umbellatum**

1. **E. ovalifolium** Nutt. Silver Plant. Low and caespitose. perennial from a short caudex; densely white-woolly. Leaves round or oblong. Involucres in a single compact head. Bracts of 3 scales. Flowers white or yellowish, or reddish-purple with age. Calyx lobes very unequal. Sandy hillsides. June-July.

2. **E. heracleoides** Nutt. A tomentose perennial. Leaves spatulate-oblancoelate; tomentose but green above, white-woolly below; margins more or less undulate. Inflorescence umbellate, on a whorled and leafy-bracted peduncle. Flowers cream-colored or yellowish; glabrous. Achenes not winged. Hillsides. May-Sept.

3. **E. umbellatum** Torr. Sulphur-flower. Tomentose perennial herbs. Leaves spatulate-oblancoelate; smooth and shining above, white-woolly below. Inflorescence umbellate, on a long, naked (or rarely 1-bracted) peduncle. Flowers yellow, glabrous, usually turning reddish in fading. Achenes not winged. **E. umbelliferum** Greene is a form with under surface of leaves nearly glabrous when mature. **E. umbellatum majus** Benth. (**E. subalpinum** Greene) has cream-colored instead of yellow flowers, and is found at lower elevations than the type. Mountain ridges, 5,000-9,000 ft. May-Sept.

2. RUMEX. Sour-dock.

Annual or perennial mostly coarse and homely herbs, with grooved stems. Stipular sheaths conspicuous. Inflorescence a paniced raceme. Flowers dioecious, polygamous or perfect; on jointed pedicels; not involucrate; whorled; small and greenish. Sepals 6, in 2 sets of 3; the inner set veiny, sometimes with a tubercle on back; enlarging in fruit (and then called valves

or wings) and converging around the 3-angled achene. Style 3-parted; stigmas tufted, shield-shaped.

Inner perianth-lobes entire, undulate or denticulate; never spiny-toothed.

Margins of leaves not at all wavy or crisped.. 1. *R. venosus*

Margins of leaves more or less wavy or crisped.

Leaves broad.

Joints of pedicels obscure..... 2. *R. occidentalis*

Joints of pedicels swollen..... 3. *R. Patentia*

Leaves narrow..... 4. *R. crispus*

Inner perianth-lobes spiny-toothed..... 5. *R. obtusifolius*

1. *R. venosus* Pursh. Veined Dock. Stems ascending or erect, from running rootstalks. Leaves smooth, rather thick, usually light green. Fruit very showy, resembling that of some Begonias. Valves large, entire, without tubercles, cordate; waxy and bright rose-color, fading to light-brownish. In saline soil. May-June.

2. *R. occidentalis* Wats. Western Dock. Stems smooth, stout, erect, 2-3 ft. high; more or less purple-tinged. Leaves large, glossy, elliptical, with cordate or subcordate base. Fruit small ($\frac{1}{4}$ - $\frac{1}{2}$ inch in diameter), on pedicels 2-3 times its length. Valves sometimes rosy; broadly ovate or nearly round, often denticulate; all without tubercles or one of them with a thickened midrib; their apices obtuse. In moist or wet places. May-August.

3. *R. Patentia* L. Patience Dock. A perennial weed about as tall as No. 2, with green and glabrous stems. Leaves dark-green; lanceolate or elliptical with rounded or decurrently-acute base. Fruit about the size of that of No. 2, on pedicels nearly twice its length. Valves heart-shaped, nearly or quite entire; one of them bearing a small tubercle, or its midrib merely thickened at base. In moist or wet places. May-August.

4. *R. crispus* L. Yellow Dock. Stem smooth, erect, about 2 ft. high. Leaves dark-green; lanceolate with strongly-crisped margins. Flowers in wand-like racemes; pedicels conspicuously swollen at the joints. Fruit smaller than that of No. 2. Valves greenish, or red at the tubercles; round-heart-shaped, obscurely denticulate or entire; usually all of them bearing prominent tubercles. A common weed of waste and cultivated ground, especially near irrigation ditches. May-August.

5. *R. obtusifolius* L. Bitter Dock. Stem roughish, erect, 1-2 ft. high. Leaves membranous; the lowest ovate-heart-shaped, mostly obtuse; the upper oblong-lanceolate, acute. Fruit smaller than No. 2. Valves ovate-halberd-shaped, spinulose on the margin; one of them bearing a tubercle. In moist places, especially along irrigation ditches. June-August.

ORDER CHENOPODIALES.

CHENOPODIACEÆ. Goosefoot Family.

Herbs (often fleshy), sometimes shrubby. Leaves usually simple, alternate, exstipulate (reduced to scales or ridges in some salt-desert species). Flowers small.

green or greenish; monoecious, dioecious, polygamous or perfect. Calyx persistent (sometimes wanting); 2-5-lobed or parted, or reduced to a single sepal. Corolla none. Stamens equalling in number, or less than, the calyx-lobes, and opposite them. Anthers 2-celled. Pistil of 1-3 stigmas, an equal number of styles, and a "superior," 1-celled and 1-ovuled ovary. Fruit a utricle.

Flowers perfect or polygamous; not enclosed in bractlets 1. **Monolepis**

Flowers monoecious or dioecious, the pistillate enclosed in 2 bractlets..... 2. **Atriplex**

1. **MONOLEPIS.**

Low and homely glabrous or somewhat mealy annuals. Leaves small; alternate; petioled. Sepal 1, green and bract-like. Stamen 1. Styles 2.

1. **M. Nuttalliana** (R. & S.) Wats. (*M. chenopodioides* Moq.) Much-branched from the base, somewhat succulent, rather pale-green. Leaves lanceolate-hastate, changing upward into leafy bracts. Flowers small, clustered in the axils; often reddish. Saline soil. May-July.

2. **ATRIPLEX.** (Obione.) Saltbush; Orache.

Herbs or shrubs, usually mealy or scurfy. Flowers often in spikes; staminate flowers bractless and consisting of a 3-5-parted calyx and 3-5 stamens; the pistillate without perianth but bracted, the bracts enlarging in fruit. Styles 2.

Bracts not winged on the back; leaves ovate to obovate 1. **A. confertifolia**

Bracts broadly 4-winged on the back; leaves oblanceolate to narrowly oblong..... 2. **A. canescens**

1. **A. confertifolia** Wats. Shad-scale. A shrubby much-branched perennial, 1-4 ft. high; the branches somewhat spiny. Leaves entire; wedge-shaped at base. Flower-clusters small and axillary. Bracts round-wedge-shaped, united at base; thick and scurfy; their margins entire. Dry exposed places among rocks (especially calcareous tufa) on hills. June.

2. **A. canescens** (Pursh) James. A pale-green, shrubby, much-branched perennial; 1-4 ft. high. Leaves entire. Flowers mostly dioecious, in short, terminal spikes and in axillary clusters. Bracts ovate, united nearly to their tops; their wings thin, sinuately dentate. Dry saline soil. June-July.

NYCTAGINACEÆ. Four-o'clock Family.

Herbs with stems swollen at the joints. Leaves mostly entire and opposite. Inflorescence terminal or axillary. Flowers often showy, involucrate; tubular, salver-shaped or funnel-form. Stamens few, borne on the receptacle; filaments thread-like. Style short; stigma capitate. Ovary 1-celled, 1-ovuled; enclosed by the persistent, thickened and hardened base of the calyx-tube, thus becoming in fruit an anthocarp.

Bracts distinct; stamens usually 5..... 1. **Abronia**
 Bracts united; stamens usually 3..... 2. **Oxybaphus**

1. **ABRONIA.** Sand Puffs.

Stems branching, more or less glandular-pubescent. Leaves thick, opposite; mostly unequal. Inflorescence a many-flowered umbel, surrounded by an involucre of distinct bracts. Flowers showy, fragrant. Perianth salver-form, with an elongated tube and a 5-lobed limb. Stamens unequal; perigynous. Fruit crested or winged. Only 1 of the cotyledons becomes developed in the embryo.

1. **A. salsa** Rydb. A perennial with a long, viscid-pubescent, rather straggling stem. Leaves thick, on long petioles; stem-leaves elliptic, and the basal leaves often broadly oval. Involucral bracts broadly obovate; obtusish. Flowers many. Fruit distinctly winged, the wings very broad and nearly truncate above. Sandy saline soil. May-October. Locally called "Snow-ball."

2. **OXYBAPHUS.** (Allionia). Four-o'clock.

Herbs from thick, perennial roots. Leaves entire, opposite; equal. Flowers sessile; 3-5 in each of the shallow, calyx-like involucre; the latter of united bracts, which enlarge and become thin and net-veined in fruit. Calyx with a short tube and a bell-shaped limb. Stamens usually 3. Style thread-like. Fruit (an anthocarp) pubescent or angled; pear-shaped, longitudinally ribbed.

1. **O. linearis** (Pursh) Robinson. (*Allionia linearis* Pursh; *O. angustifolia* Sweet.) Tall, much-branched and brittle; glabrous except the more or less hairy peduncles and involucre. Leaves linear, thick and glaucous; sessile or nearly so. Flowers showy; pale-pink or white; opening in the evening. Gravelly plains and hillsides. June-August.

ORDER CARYOPHYLLALES.**CARYOPHYLLACEÆ.** Pink or Chickweed Family.

Herbs with the stems often swollen at the joints. Leaves entire; opposite, or the uppermost alternate;

usually without stipules. Sepals 4-5. Petals 4-5, often clawed; or none. Stamens 3-10, borne on the calyx or on the receptacle. Styles 2-5. Ovary 1- (rarely 3-5-) celled; seeds several or many, borne on a central placenta. Fruit a capsule (or rarely a utricle).

Calyx of united sepals.

Styles 2 1. *Saponaria*

Styles 3, or rarely 4 2. *Silene*

Calyx of distinct sepals.

Petals (if present) entire or slightly notched.. 3. *Arenaria*

Petals (if present) deeply notched.

Pod short and straight; styles usually 3.... 4. *Stellaria*

Pods long and often curved; styles usually

5 5. *Cerastium*

1. *SAPONARIA*. (Includes *Vaccaria*.) Soapwort.

Herbs with erect or diffuse stems and rather broad leaves. Calyx 5-toothed. Petals 5; entire or slightly notched, long-clawed. Stamens 10.

1. *S. Vaccaria* L. (*Vaccaria Vaccaria* Britton; *V. vulgaris* Host.) Cow Herb; Cow Cockle. A dichotomously-branched erect-stemmed glabrous annual 1-3 ft. high. Leaves lanceolate or ovate-lanceolate; clasping at base. Flowers pink, $\frac{1}{2}$ inch broad, on long and slender pedicels; in corymbose cymes. Calyx strongly 5-angled, enlarged in fruit. Petals crenulate, without scales at base. In dry, sandy soil. June-August.

2. *SILENE*. Catchfly.

Flowers solitary, cymose or paniced. Calyx cylindrical; 4-5-toothed. Petals 4-5, narrow-clawed. In some species, each petal has 2 scales at base, and these scales collectively form a crown. Stamens 10. Ovary 1-celled. Fruit a capsule.

Annual or biennial; inflorescence a cyme or panicle 1. *S. antirrhina*

Perennial; flowers solitary in the forks of leafy branches 2. *S. Menziesii*

1. *S. antirrhina* L. Sleepy Catchfly. Slender, glabrous, with a part of each joint viscid and colored red or brown; 4-20 inches high. Leaves narrowly-lanceolate to linear; sessile or the lowermost narrowed into a petiole. Flowers small; in a loose cymose panicle; becoming fully expanded only in bright sunshine. Petals pale-pink; obcordate, minutely-crowned. On dry, gravelly hills. June-September.

2. *S. Menziesii* Hook. Glandular-puberulent, much-branched, 6-18 inches high. Leaves sessile, or the lowermost short-petioled; elliptical or lanceolate. Inflorescence leafy; axillary and terminal. Peduncles slender, as long as the leaves. Flowers $\frac{1}{2}$ - $\frac{1}{2}$ inch long. Calyx 5-toothed, much shorter than the corolla, and about the length of the capsule. Petals white, 2-cleft, without scales. In moist shaded places, especially near mountain streams. June-August. 6,000-10,000 ft.

3. **ARENARIA.** Sandwort.

Mostly low and tufted. Leaves sessile; often rigid and subulate. Flowers white or sometimes tinged with pink; in cymes, panicles or sometimes capitate. Sepals 5. Petals 5 or none. Stamens 10. Styles usually 3. Capsules globose or oblong.

1. **A. Uintahensis** A. Nelson. Perennial from a much-branched caudex; caespitose. Leaves chiefly basal on the crowns; fascicled; needle-shaped. Stems slender, erect, few-leaved. Cyme loose. Sepals narrowly ovate, acute, scarious. Petals obtuse. Capsule slightly shorter than the styles. In crevices of rocks on mountain-slopes, usually in exposed situations. June-July.

4. **STELLARIA.** (Alsine.) Chickweed; Stitchwort.

Low annuals, often with 4-sided stems. Leaves exstipulate; sessile or rarely petioled. Inflorescence cymose or solitary. Sepals free to the base, or nearly so. Petals white. Stamens 10 or less. Styles usually 3. Fruit an ovate or oblong straight capsule, which in discharging its seeds splits to the base.

Lowest leaves petioled..... 1. **S. nitens**
Leaves all sessile..... 2. **S. longipes**

1. **S. nitens** Nutt. (Alsine nitens (Nutt.) Greene.) Erect with very slender stems (3-7 inches high); glabrous or slightly hairy below. Leaves linear, acute; sessile or the lowermost contracted into slender petioles. Inflorescence strict with erect pedicels, or the flowers sessile. Petals half as long as the sepals, or sometimes wanting. Capsules oblong, almost as long as the calyx. Dry gravelly meadows. May.

2. **S. longipes** Goldie. (Alsine longipes (Goldie) Coville.) Starwort. Stems weak; erect or decumbent; very slender; 6-10 inches high. Leaves linear-lanceolate, somewhat keeled, light-green. Inflorescence terminal, dichotomously forked; few-flowered; with small, papery bracts. Capsule ovoid, longer than calyx; on erect pedicels. Shaded or wet places. May-August.

5. **CERASTIUM.** Mouse-ear Chickweed; Powder-horn.

Pubescent or rarely glabrous herbs with dichotomous cymes of white flowers. Sepals 5, or sometimes only 4. Petals (if present) as many as the sepals. Stamens 10 or rarely less. Styles 5 or rarely 4. Capsule cylindrical; dehiscing by 8-10 apical teeth.

1. **C. brachypodum** Robinson. A viscid-pubescent annual, 3-10 inches high. Lower leaves spatulate or oblanceolate, narrowed into a petiole; upper linear to lanceolate, sessile. Petals longer than the sepals. Pedicels in fruit 1-3 times the length of the calyx; straight or nearly so. Capsules 2-3 times the length of the calyx. Among blue-grass in lawns. May-Sept.

PORTULACACEÆ. Purslane Family.

Herbs, usually from underground stems or thickened roots. Leaves succulent, entire, exstipulate. Inflorescence cymose, racemose or solitary. Flowers mostly ephemeral, opening only on bright, sunshiny days; regular, complete, unsymmetrical. Sepals 2 (rarely 4-8). Petals usually 5, fragile and becoming very thin in pressed specimens. Stamens hypogynous, 3-many, usually of the same number as the petals. Styles 2-3-cleft or divided. Ovary 1-celled, "superior," ripening into a capsule.

Petals distinct..... 1. **Claytonia**
 Petals united at the base forming a short tube..... 2. **Montia**

1. **CLAYTONIA.** Spring Beauty.

Annual or perennial succulent herbs often from a deep-seated tuber. Leaves entire. Inflorescence in terminal racemes or cymes. Flowers showy; proterandrous; not ephemeral; pink with darker veins of the same color (or in some species yellow). Sepals 2, persistent. Petals 5, all of the same length. Stamens 5. Ovules about 6.

Stems and the basal leaves from a thick caudex; stem-leaves alternate..... 1. **C. megarrhiza**
 Stems and the basal leaves from a tuber-like corm; stem leaves opposite..... 2. **C. lanceolata**

1. **C. megarrhiza** Parry. Perennial from a large root (often a foot long). Basal leaves rosette-forming; spatulate to broadly wedge-shaped. Stem leaves 2 (or rarely more); usually alternate; linear to spatulate, narrowing toward the base. Scapes cymose. May.

2. **C. lanceolata** Pursh. (*C. caroliniana sessilifolia* Torr.) Stem 4-12 inches long. Basal leaf narrow; stem leaves 2, lanceolate or linear. Raceme cymose, sessile or nearly so; few-flowered; scarious-bracted. On moist mountain slopes. April-May.

2. **MONTIA.** Indian, Miners' or Spanish Lettuce.

Mostly annuals. Roots fibrous. Sepals 2. Petals 3-5; mostly unequal, and usually slightly united at base. Stamens usually 3, borne at the base of the corolla. Ovules 2-5.

Calyx 4-25ths of an inch long; seeds 2-25ths of an inch broad 1. **M. perfoliata**
 Calyx 2-25ths of an inch long; seeds 1-25th of an inch broad.
 Basal leaves linear..... 2. **M. parviflora**
 Basal leaves ovate..... 3. **M. depressa**

1. *M. perfoliata* (Donn.) Howell. (*Claytonia perfoliata* Donn.) Stems erect or ascending, unbranched, 3-12 inches high; each bearing 2 leaves near the summit which are more or less united into a round or angulately 2-lobed rather shallow cup-shaped disk. Basal leaves rhomboid-ovate, with entire margins; long-petioled, but shorter than the stems. Inflorescence racemose. Pedicels short, in fruit seldom longer than the calyx. Corollas white or pink. Petals and stamens 5. Capsule globose, 2-5-seeded. Shaded places near streams in rich soil. April-May.

2. *M. parviflora* (Dougl.) Howell. (*Claytonia parviflora* Dougl.) Stem more slender than that of No. 1; 3-12 inches high. Basal leaves narrowly linear to spatulate, on rather short petioles; stem-leaves forming a disk as in No. 1, or sometimes nearly separate. Pedicels slender; in fruit 2-6 times as long as calyx. Corolla white or pink. Same habitat and time of flowering as No. 1.

3. *M. depressa* (A. Gray) Rydb. (*M. parviflora depressa* A. Gray). Depressed, a few inches high. Basal leaves broadly ovate or rhombic and petiolate; stem-leaves rather small and usually 2-angulate. Inflorescence glomerate or subumbellate. Flowers small, sessile. Corolla white or pink. Along streams in moist or in rather dry places, and on rather dry hills. April-June.

ORDER RANALES.

RANUNCULACEÆ. Buttercup or Crowfoot Family.

Herbs with acrid juice. (*Clematis* is more or less woody). Leaves without stipules; basal or alternate (opposite in *Clematis*). Flowers perfect or rarely dioecious, all their parts free and distinct. Sepals 3-15, generally caducous. Petals about as many as the sepals; or wanting, in which case the sepals are usually colored like a corolla. Stamens many or rarely few. Carpels usually many, but solitary in some species; ripening into achenes, follicles or berries.

Leaves alternate or basal: stem not woody; sepals imbricate.

Leaves once or more ternately-compound.

Flowers small; petals, if present, not spurred.

Petals none; fruit an achene..... 1. *Thalictrum*

Petals 3-10; fruit a berry..... 2. *Actaea*

Flowers showy; petals spurred; fruit a follicle 3. *Aquilegia*

Leaves variously lobed or divided; not compound.

Flowers irregular; fruit a follicle..... 4. *Delphinium*

Flowers regular; fruit an achene.

Plant not submerged; petals yellow.. 5. *Ranunculus*

Plant submerged; petals white..... 6. *Batrachium*

Leaves opposite; stem somewhat woody; sepals valv-

ate 7. *Clematis*

1. **THALICTRUM.** Meadow-Rue.

Perennials, 1-4 ft. high. Petioles dilated at base. Flowers paniced or corymbed; perfect or dioecious. Sepals 4-7, regular, greenish-white, petal-like. Carpels 4-15, ripening into achenes.

1. **T. Fendleri** Engelm. Granular or glandular-pubescent. Leaves triternate, petioled or the uppermost sessile; the leaflets petioled, small, roundish, 3-lobed. Flowers dioecious, paniced. Achenes large, with 8-10 prominent ribs. May-June. Along mountain streams in light shade. This plant is sometimes mistaken for Maidenhair fern.

2. **ACTAEA.** Baneberry.

Tall erect branched herbs, often unpleasantly scented; perennial from a short and branched rootstalk. Leaves 2-3 times ternately compound. Flowers small, racemose, white, numerous, regular. Sepals 3-6; petal-like; petals narrow; clawed; smaller than sepals. Stamens numerous. Stigma sessile, 2-lobed. Carpel 1; ovary many-ovuled, ripening into a poisonous berry.

1. **A. arguta** Nutt. (*A. spicata arguta* Torr. Includes *A. eburnea* Rydb.) Bushy-branched, 7-15 inches high; glabrous or nearly so. Basal leaf long-petioled; the divisions pinnate, also long-petioled. Leaflets thin, prominently veined; ovate, sharply incised and with acute or acuminate teeth. Raceme ovoid, elongating in fruit. Petals spatulate. Berries scarlet or white; oval or nearly round. In rich soil near mountain streams or springs. May-June.

3. **AQUILEGIA.** Columbine.

Perennials with large 2-3 ternately-compound leaves. Sepals 5, regular, petal-like. Petals 5, regular, each one usually prolonged backward between the sepals into a hollow spur. Stamens many; the inner row being a white membranous tube of staminodia. Carpels 5. Follicles many-seeded.

1. **A. flavescens** Watson. Yellow Columbine. Stem 2-5 ft. high. Peduncles and carpels pubescent, the rest of plant glabrous. Flowers nodding but becoming erect in fruit. Sepals pale-yellow, often tinged with red. Petals pale-yellow; their spurs more or less curved but scarcely hooked, knobbed at end, about as long as petals but shorter than the sepals. Stamens long-exserted. Along mountain streams, from 6,000-9,000 ft. May-July.

4. **DELPHINIUM.** Larkspur.

Perennials with palmately-lobed, cleft or divided leaves and blue flowers in simple racemes. Sepals 5; irregular, the upper one being prolonged into a slender spur, colored like the corolla. Petals 4; irregular, the upper 2 fitting into the calyx-spur. Stamens numerous. Carpels 3, ripening into many-seeded follicles.

Stem (at least above) usually viscid..... 1. **D. bicolor**
Stem not viscid,..... 2. **D. Nelsonii**

1. **D. bicolor** Nutt. Stem erect from a cluster of thickened, fusiform roots. Leaves round in outline, twice palmately-parted; the ultimate segments narrow. Flowers few, rather large, the lateral petals about $\frac{3}{8}$ inch long, indigo-blue; upper petals white or pale-yellow with blue veins. Pedicels longer than the flowers and fruit. Inflorescence not glandular. Dry hills. May-June.

2. **D. Nelsonii** Greene. Stem erect, puberulent but not viscid above, from a cluster of tuberous roots. Leaves firm; the basal ones pedately-divided into linear segments, the long petioles sheathing the stem; the upper short petioled, less divided. Flowers few, dark-blue; the lateral petals about $\frac{1}{2}$ inch long, somewhat pubescent; the lower petals 2-cleft, with a tuft of hairs near the middle. Dry hills. May-June.

5. **RANUNCULUS.** Buttercup; Crowfoot.

Annual or perennial herbs with basal or alternate stem-leaves and solitary or corymbed yellow flowers. Sepals 5, deciduous. Petals 5 or more, each with a nectiferous pit at base inside. Carpels numerous; capitate or spiculate; ripening into achenes.

Achenes spiny..... 1. **R. arvensis**
 Achenes not spiny.

Achenes longitudinally nerved; stoloniferous..... 2. **R. Cymbalaria**
 Achenes not nerved.

Plant glabrous.
 Stem hollow, about a foot high.... 3. **R. sceleratus**
 Stem solid, much less than a foot high 4. **R. digitatus**
 Plant rough-hairy..... 5. **R. Macounii**

1. **R. arvensis** L. Corn Crowfoot; Hunger Weed. Erect, 8-18 inches high; glabrous or sparingly pubescent. Leaves alternate, the lower ones petioled, broadly wedge-shaped and 3-toothed, or larger and deeply divided; the upper ones sessile. Flowers rather small ($\frac{3}{8}$ inch across), pale yellow. Achenes 4-8. Along roadsides; introduced. June.

2. **R. Cymbalaria** Pursh. (*Oxygraphis Cymbalaria* (Pursh) Prantl.; *Halerpestes Cymbalaria* (Pursh) Greene). Strawberry Buttercup. Low, glaucous, spreading by runners. Leaves mostly basal, slender-petioled, subcordate with crenate margins. Head of fruit oblong, longer than petals. Along ditches and around cold springs. April-October.

3. **R. sceleratus eremogenes** (Greene). A stout, coarse annual, 8-15 inches high, at length becoming much-branched. Leaves basal or alternate; all 3-parted or divided to near the base. (This distinguishes the variety from the type, in which the divisions do not extend more than halfway to the base.) Carpels in ovoid or cylindrical heads, soon falling off. In mud of ponds and around cold springs. June-August.

4. **R. digitatus** Hook. (*R. Jovis* A. Nels.) Stem 2-3 inches high, very glabrous. Roots thickened. Leaves few, digitately-lobed. Flowers 2-3, terminal, the sepals reflexed. Achenes tipped by the recurved style. In moist soil on hillsides. March-July, 7,000-9,000 ft.

5. **R. Macounii** Britton. Bristly Crowfoot. A coarse, hairy plant, 1-2 ft. high, with spreading branches. Leaves 3-divided; basal, or cauline and alternate. Petioles with dilated bases. Flowers about $\frac{1}{2}$ inch broad. Heads of fruit oblong. Achenes with short, straight beaks. In wet places near ditches and springs. June-August.

6. **BATRACHIUM.** (Ranunculus in part).

Winter annuals or perennials, growing in water or in mud of ponds. Leaves filiform-dissected (in our species); petioles dilated at the base. Peduncles solitary; opposite the leaves. Petals white, sometimes with a yellowish base, the claw bearing a small pit. Achenes transversely nerved.

Leaves collapsing when taken from water.. 1. **B. trichophyllum**
Leaves not collapsing when taken from water.. 2. **B. divaricatum**

1. **B. trichophyllum** (Chaix.) Bossch. (Ranunculus aquatilis trichophyllum DC; B. confervoides Auct, Amer. not Fries.) Common White Water Crowfoot. Stems usually a foot or more long. Leaves mostly petioled, mostly more than an inch long, the divisions rather remote. Petals oblong-ovate, less than $\frac{1}{2}$ inch long. Stamens 5-12. Receptacle ovoid. All but the flowers submerged in water, in irrigation ditches and ponds. June-August.

2. **B. divaricatum** (Schrank.) Wimm. (R. circinatus Sibth.; B. longirostre (Godr.) F. Schutz.) Stiff Water Crowfoot. Stems usually shorter than No. 1. Leaves less than an inch long, nearly sessile, dissected into capillary divisions shorter than those of No. 1. Petals broadly ovate, at least $\frac{1}{5}$ inch long. Stamens many. Receptacle conic. Achenes usually not beaked (conspicuously beaked in the form known as B. longirostre).

These two species are very polymorphic, and various so-called species have been separated from them. Perhaps the most important of these is the one that has been called B. flaccidum, which is intermediate in characteristics between the above species.

7. **CLEMATIS.** Virgin's Bower.

Perennial herbs or woody climbers. Leaves opposite; pinnately compound or in some species simple. Sepals 4-5, petaloid, valvate in the bud. Petals none, or small and transitional into stamens. Stamens many, with adnate anthers. Carpels many in a head, long-styled, ripening into long-tailed, plumose achenes.

1. **C. occidentalis** Hornem. (C. alpina occidentalis Gray; Atragene occidentalis Hornem.) A low, half-woody climber. Leaves usually 3-foliolate. Leaflets slender-petioled; entire or sparingly dentate; acuminate or sometimes acute. Flowers large and showy. Sepals violet; acute, rather thin. Filaments dilated, some of the outer ones usually petaloid. Styles persistent and plumose in fruit. Shaded cliffs in the mountains. May-July. 6,000-10,000 ft.

BERBERIDACEÆ. Barberry Family.

Shrubs (some species herbs) with exstipulate and usually alternate leaves and solitary or racemose inflorescence. Flower-parts opposite to each other, all free and distinct. Sepals and petals usually 6 each, deciduous. Stamens 6 (in our species), sensitive, closing around the pistil when irritated. Carpel 1, becoming a 1-3-seeded berry.

1. **BERBERIS.** Barberry; Mahonia.

Shrubs with yellow wood, and flowers in clustered bracteate racemes. Sepals 6, colored like the 6 yellow petals. Bractlets 3 or 6, sepal-like; green or yellowish. Anthers discharging pollen through uplifted valves hinged at top. Stigma peltate.

1. **B. repens** Lindl. "Oregon Grape"; Trailing Barberry. A creeping shrub less than a foot high; leaves evergreen, dull, strongly netted, pinnately 3-7-foliolate; leaflets 3-7, ovate to elliptical, acute, weakly spiny-toothed. Racemes terminating the stems. Sepals spreading, the alternate ones the larger. Petals erect. Berries blue or purple, with a bloom. April-June, in canyons on moist, protected slopes. Locally called "Wild Grapes." Children often confuse this plant with Poison Ivy. (According to some botanists, *B. repens* is a synonym of *B. aquifolium*, a more robust plant of the northwest.)

ORDER PAPAVERALES.**PAPAVERACEÆ.** Poppy Family.

Herbs with milky or colored juice and alternate, exstipulate leaves. Flowers solitary or racemose; regular, with 2 or rarely 3 fugaceous sepals and 4-6 deciduous petals. Stamens many. Sepals, petals and stamens all free and distinct. Pistil 1, with a "superior," 1-celled ovary, bearing 2 or more parietal placentae. Fruit a capsule, dehiscing by pores or valves at the apex.

1. **ARGEMONE.** Prickly Poppy; Mexican Poppy.

Coarse, branching herbs with reddish-yellow sap and pale-green stems and foliage. Leaves sessile; lobed and spiny-toothed. Flowers large and showy; white or yellow; erect but nodding in the bud. Sepals 3, each spiny-beaked, together making the bud 3-horned. Petals 4-6, thin and delicate, obovate. Capsule spiny, 1-celled, opening by 3 valves at apex.

1. **A. intermedia** Sweet. (*A. platyceras* Coulter in part.) Thistle Poppy. Stem 3 ft. high or less, glaucous except for the scattered spines. Leaves white-veined. Flowers on long peduncles. Petals white, broadly obovate, crape-like in texture. Dry fields. June-July.

FUMARIACEÆ. Fumitory Family.

Herbs with bland or slightly bitter juice, compound dissected exstipulate leaves and inflorescence in racemes, panicles, spikes or solitary. Flowers irregular. Sepals 2, scale-like. Petals 4, in 2 pairs, more or less united. Stamens 6, diadelphous, opposite the larger petals. Ovary 1-celled and 1-seeded, or several-seeded with 2 parietal placentae. (Some writers have united this family with Papaveraceae.)

Corolla 2-spurred at base..... 1. **Dicentra**
Corolla 1-spurred at base.

Fruit linear or oblong; dehiscent..... 2. **Corydalis**

Fruit globose or nearly so; indehiscent..... 3. **Fumaria**

1. **DICENTRA.** (Bicuculla.) Dutchman's Breeches.

Glabrous perennial herbs from a crown of small grain-like bodies that in our species are borne on the summit of the fusiform fleshy root. Inflorescence solitary, racemose or paniculate. Flowers white or pink, flattened and heart-shaped; the outer pair of petals spurred and spreading, much longer than the clawed and erect inner pair, the petals of which slightly cohere at apex. Filaments dilated. Placentae 2.

1. **D. uniflora** Kellogg. Squirrel Corn; Bleeding Heart. Leaf usually 1, basal; its blade 1-2 inches long, triangular in outline, pinnately 3-7-divided, each segment pinnatifid into a few linear-oblong or spatulate lobes. Scape weak, 2-3-bracted, bearing a single flesh-colored flower, $\frac{1}{2}$ inch long, which is often hidden among dead leaves. March-April. In rich soil on mountain sides.

2. **CORYDALIS.** (Capnoides.) Corydal.

Glaucous leafy-stemmed more or less succulent herbs, with decompound leaves. Inflorescence racemose. Flowers yellow, or pink with yellow tips. Corolla deciduous, one petal of the outer pair spurred at base; the inner pair narrow, keeled at back. Fruit many-seeded.

1. **C. aurea** Willd. (Capnoides aurea (Willd.) Kuntze.) Golden Corydal. Winter annual or biennial. Stems hollow, usually spreading, the size varying greatly with place of growth. Flowers few, golden-yellow. Pod spreading or nodding; distinctly torulose, at least after drying. On exposed banks, sometimes among rocks, or tangled among shrubs along mountain streams. April-June.

3. **FUMARIA.** Fumitory.

Annuals, with weak and much branched stems and finely dissected compound leaves. Racemes rather long. Flowers pink-purple with 4 erect-connivent petals, much as in *Corydalis*. Fruit 1-seeded.

1. *R. officinalis* L. Stems $\frac{1}{2}$ -3 ft. high, often climbing or decumbent. Flowers purplish, darker at apex. In waste places, often along railroad tracks. June-August.

CRUCIFERÆ. Mustard Family.

Herbs with a pungent watery juice, alternate exstipulate leaves and inflorescence in terminal racemes or corymbs. Pedicels without bracts. Flowers with 4 deciduous sepals, 4 cruciform petals (or wanting in some species of *Draba* and *Lepidium*), 6 tetradynamous stamens (or 2-4 in some species of *Lepidium* or in 3 sets of 2 each in some species of *Streptanthus*) and 1 pistil with a 2- or rarely 1-celled "superior" ovary. Fruit a silique or a silicle. Mature fruit is necessary for the determination of the species.

Fruit compressed or flattened at right angles to the (narrow) partition.

Fruit ovate-cordate to round in outline, each cell 1-seeded 1. *Lepidium*

Fruit broadly wedge-shaped or elliptic-oblong; each cell several-seeded..... 2. *Capsella*

Fruit compressed or flattened parallel to the (broad) partition.

Fruit globose, 2-8-seeded; filaments dilated near base 3. *Alyssum*

Fruit linear, oblong or ovate (rarely globose); many-seeded; filaments not dilated.

Fruit a silicle..... 4. *Draba*

Fruit a silique.

Valves of silique 1-nerved.

Fruit linear; anthers short, scarcely emarginate at base..... 5. *Arabis*

Fruit strap-shaped; anthers long, sagittate at base..... 6. *Streptanthus*

Valves of silique nerveless..... 7. *Cardamine*

Fruit neither compressed nor flattened.

Fruit a silicle.

Silicle didymous, its cells bladderly-inflated 8. *Physaria*

Silicle not didymous.

Silicle many-seeded; pubescence not stellate 9. *Camelina*

Silicle 2-8-seeded; pubescence stellate.. 3. *Alyssum*

Fruit a silique.

Fruit not distinctly beaked.

Fruit terete or nearly so.

Seeds in 2 rows in each cell.

Valves of fruit nerveless.... 10. *Radicula*

Valves of fruit 1-nerved... 11. *Sisymbrium*

Seeds in 1 row in each cell.

- Fruit long-linear, 1-4 inches long 12. **Caulanthus**
- Fruit linear (1 inch long or less).
Flowers yellow or white; pods spreading 11. **Sisymbrium**
- Flowers pink or purple; pods erect 13. **Thelypodium**
- Fruit 4-angled.
Flowers yellow; none of the leaves clasping 14. **Erysimum**
- Flowers yellowish-white; upper leaves clasping 15. **Couringia**
- Fruit distinctly beaked.
Beak long; seeds in 1 row; silique terete 16. **Brassica**
- Beak very short; seeds in 2 rows, silique flat 17. **Diploxis**

1. **LEPIDIUM.** Pepper-Grass.

Mostly homely herbs. Stems usually much-branched. Flowers usually in dense racemes; white, greenish or rarely yellow; on slender pedicels, without bracts; mostly inconspicuous. Petals small or none. Stamens tetradynamous, or sometimes 4 or only 2. Siliques small; notched at apex; roundish in outline; strongly flattened at right angles to the partition; each of its cells 1-seeded.

Stamens 6; tetradynamous.

Upper leaves clasping.

Petals yellow; style none 1. **L. perfoliatum**

Petals white; style conspicuous 2. **L. Draba**

None of the leaves clasping 3. **L. montanum**

Stamens 4 or 2.

Petals white, longer than sepals.

Petals broadly spatulate 4. **L. virginicum**

Petals narrowly spatulate 5. **L. medium**

Petals minute or none.

Siliques emarginate or retuse at apex.

Siliques glabrous.

Stem simple at base 6. **L. apetalum**

Stem divergently branched from base 7. **L. divergens**

Siliques pubescent.

Stem hirsute 8. **L. lasiocarpum**

Stem puberulent 9. **L. pubescarpum**

Siliques toothed or lobed at apex 10. **L. dictyotum**

1. **L. perfoliatum** L. Annual. 6-12 inches high. Stem simple below, branched above. Lower leaves 5 inches or less in length, petioled; pinnate, the sessile divisions again pinnate, but becoming less and less so upward on the stem until they are entire and clasping the stem by the sagittate or finally cordate base. Flowers very small, on slender reddish pedicels. Pods round, barely notched. In waste places. April-June.

2. **L. Draba** L. Hoary Cress. Perennial, 10-18 inches high; hoary-pubescent. Stem simple below, few-branched at the inflorescence. Leaves bluish-green; 2 inches or less in length; the lower petioled, lanceolate, obtuse; the upper sagittate, merging into bracts. Racemes corymbose. Pods broadly ovate; winged. In waste places. April-June. Introduced.

3. **L. montanum** Nutt. Decumbent (or rarely erect) and radially much-branched from a somewhat woody root. All the leaves more or less deeply toothed or pinnatifid, the segments obovate or broadly oblanceolate (very rarely entire). Sepals not falling off before the white and very conspicuous petals. Styles conspicuous. Capsules indistinctly netted; wingless; elliptical-ovate to nearly round; emarginate at apex. Dry hills and mountain valleys. April-August.

3a. **L. montanum alyssoides** Jones. (*L. Jonesii* Rydberg.) Distinguished from the type by the simple stem at base and by the linear segments of the basal leaves.

4. **L. virginicum** L. Erect, 8-24 inches high; simple below, branched at the inflorescence. Basal leaves pinnate or pinnatifid, usually withering before the fruit ripens; obovate or spatulate in outline, the terminal segment much the largest. Pedicels slender, widely spreading. Siliques round; smooth; often purple-tinged at maturity. Seeds wing-margined; cotyledons accumbent. In moist situations. May-November.

5. **L. medium** Greene. (*L. intermedium* Gray.) Erect annual with stems simple below, branched above; glabrous or nearly so. Leaves glabrous; lanceolate, dentate, but scarcely ever pinnatifid; those of the branches linear and entire. Siliques not shining. Stigma sessile. Cotyledons incumbent. In moist places near streams. May-October.

6. **L. apetalum** Willd. (*L. elongatum* Rydb.) Erect annual with stem simple below and more or less branched above; glabrous or nearly so. Basal leaves more or less incisedly toothed or pinnatifid; segments usually acutish. Flowers apetalous. Stamens 2. Siliques glabrous. (Includes *L. densiflorum* Schrader.) In dry soil in waste ground. May-June.

7. **L. divergens** Osterhout. A much-branched biennial; minutely pubescent. Basal leaves short-petioled; broadly spatulate, more or less dentate; those of the stem smaller and mostly entire. Flowers borne on horizontal pedicels in long racemes. Petals none. Siliques elliptical; glabrous. Dry soil of waste places, at rather high elevations. June-August.

8. **L. lasiocarpum** Nutt. Decumbent, branching from near the base; hirsutely white-pubescent. Lower leaves pinnately-parted, with sparingly toothed or entire segments. Sepals usually purple, with thin white margins. Petals usually lacking. Siliques suborbicular; thin-margined near the apex; hispid-pubescent upon both sides or at least upon the edge (very rarely quite smooth.) Includes *L. Wrightii* A. Gray.) Dry soil in waste places. May-June.

9. **L. pubecarpum** A. Nelson. Annual, 4-6 inches high; stem (and branches in well-developed plants) paniculately branched from near the base; obscurely puberulent. Leaves small; linear to somewhat spatulate, acute; the broader ones remotely cut-toothed. Sepals purplish. Petals none. Stamens 2. Siliques permanently finely pubescent; from broadly oval to round. Stigma sessile in the narrow, shallow notch. In rather moist places along mountain streams. May-July.

10. **L. dictyotum** A. Gray. Annual; decumbent, much branched from the base. Leaves linear, tapering to both ends, 1-2 inches long; usually entire. Petals usually wanting. Siliques ovate, strongly reticulated; pubescent when young. In alkaline soil.

2. **CAPSELLA.** (Bursa.) Shepherd's Purse.

Homely erect, branching annuals; more or less pubescent with forked or stellate hairs. Inflorescence at length a raceme of small white flowers. Style short, persistent. Fruit a silicle. Seeds many in each cell.

Siliques wedge-shaped, the length less than twice the breadth 1. **C. Bursa-pastoris**
 Siliques elliptical, the length 6-10 times the breadth 2. **C. procumbens**

1. **C. Bursa-pastoris** Medic. (Bursa Bursa-pastoris (L.) Britton.) A very familiar weed of waste places, usually less than a foot high. Inflorescence of buds corymbose, but lengthening into a raceme in fruit. Basal leaves rosette-forming; variously pinnatifid. Stem-leaves sagittate; entire or dentate. Siliques emarginately wedge-shaped. Jan.-Dec.

2. **C. procumbens** (L.) Fries. (*C. divaricata* Walp.; *C. elliptica* C. A. Meyer; *Hutchinsia procumbens* (L.) Desv.) A smaller plant with the upper leaves oblanceolate to linear, entire, not sagittate. Stigma sessile or nearly so. Siliques elliptic-oblong, entire at apex, on slender pedicels. April-June.

3. **ALYSSUM.**

Branching stellate-pubescent annual or perennial herbs. Leaves entire. Inflorescence a rather crowded simple raceme; but corymbose at first. Flowers small, with entire petals. Silique globose; seeds 1-2 in each cell.

1. **A. alyssoides** (L.) Gouan. (*A. calycinum* L.) Yellow or Small Alyssum. Erect, usually branching from the base, densely stellate-pubescent, 3-10 inches high. Leaves spatulate; entire; alternate ($\frac{3}{8}$); the internodes becoming shorter towards the summit. Flowers pale-yellow, fading to white; persisting around the base of the fruit. Filaments of the shorter stamens toothed at the base. Dry hills and waste places. May-June.

4. **DRABA.** Whitlow Grass.

Low tufted annuals or perennials with usually stellate pubescence. Leaves simple and basal, often in dense rosettes. Inflorescence racemose, often scape-like. Flowers small; petals yellow or white, or sometimes wanting.

Flowers white.

Leaves entire.

Pods smooth..... 1. **D. caroliniana**

Pods pubescent..... 2. **D. caroliniana micrantha**

Leaves dentate..... 3. **D. cuneifolia**

Flowers yellow..... 4. **D. nemorosa**

1. **D. caroliniana** Walt. Carolina Whitlow-Grass. Winter annual on short leafy stems. Leaves entire, oblong or obovate; sessile; stellate-hairy; somewhat fleshy; entire, or rarely 3-4-toothed. Raceme corymbose even in fruit. Petals white, twice the length of the sepals, entire (sometimes lacking in the later flowers). Style none. Pods glabrous. In sandy fields. March-June.

2. *D. caroliniana micrantha* (Nutt.) Gray. (*D. micrantha* Nutt.) Distinguished from the type by the minutely-hairy pods. The petals are often lacking.

3. *D. cuneifolia* Nutt. Winter annual on short leafy stems. Leaves obovate, wedge-shaped or the lowermost spatulate; loosely stellate-pubescent; sparingly dentate. Raceme somewhat lengthened in fruit. Petals white, 2-3 times longer than the sepals; notched at the apex. Style none. Pods minutely hairy. March-April.

4. *D. nemorosa* L. Winter annual, loosely-stellate pubescent, 3-12 inches high. Leaves narrowly-ovate to lanceolate; more or less toothed. Racemes lengthened. Petals notched at apex; yellow, fading to white. Style none. Pedicels horizontal or widely spreading; twice as long as the pods. Dry hills. April-June.

5. ARABIS. Rock Cress.

Glabrous or pubescent herbs. Leaves simple. Inflorescence a raceme, sometimes corymbose at the summit. Flowers white or purple. Silique linear, flat; its valves usually 1-nerved, not elastically dehiscent at maturity. Seeds winged or wingless; in 1 or 2 rows in each cell.

Siliques reflexed; style wanting..... 1. *A. Holboellii*
Siliques erect or spreading.

Flowers white or whitish.

Style wanting; flowers yellowish-white... 2. *A. glabra*

Style very short; flowers white..... 3. *A. hirsuta*

Flowers rose-purple or pink..... 4. *A. microphylla*

1. *A. Holboellii* Hornem. (*A. retrofracta* Graham.) A stellate-pubescent (rarely glabrous) biennial or perennial with simple or branching stems, $\frac{1}{2}$ -2 ft. high. Basal leaves spatulate; entire or slightly dentate. Petals white, pink or pink-purple, twice as long as the sepals; becoming reflexed. Silique long, somewhat curved. Seeds in 1 or 2 rows. (Includes *A. exilis* A. Nelson, a form with a simple stem not woody at base and seeds in 2 rows; *A. lignipes* A. Nels., with slender usually simple stems woody at base and seeds in 1 row; *A. rhodantha* Greene (*A. consanguinea* Greene) with stout simple stems and seeds in 1 row; and *A. lignifera* A. Nels. with woody stem branched from the base and seeds in 1 row.) April-June. In the mountains and on dry plains, often among sage-brush.

2. *A. glabra* (L.) Bernh. (*A. perfoliata* Lam.) Tower Mustard. An erect biennial. Stems 2-4 ft. high, glabrous and glaucous above, often hirsute below. Basal leaves petioled, 2-10 inches long; narrowly oblanceolate and coarsely dentate or even lyrate. Stem leaves sagittate, entire, clasping. Raceme simple; many-flowered. Siliques narrow, erect, closely-appressed. Seeds in 2 rows. May-June, in light shade in moist places.

3. *A. hirsuta* (L.) Scop. An erect, rough-hairy or nearly glabrous biennial, 1-3 ft. high; unbranched or nearly so. Basal leaves with margined petioles; oblanceolate to spatulate; usually toothed; clustered. Stem-leaves sessile, clasping; lanceolate or elliptical; auricled at base. Raceme simple, many-flowered. Petals white or greenish-white. Siliques (and pedicels) erect. Seeds with very narrow margins; in 1 row when mature.

4. **A. microphylla** Nutt. Stems slender, perennial, several from a woody caudex. Leaves small, sparingly pubescent; those of the base somewhat clustered; stem-leaves auriculate-clasping; entire or denticulate. Siliques ascending. Seeds in 1 row; slightly winged or wing-margined. Shaded mountain cliffs, May-June.

6. STREPTANTHUS.

Herbs, 1-2 ft. high. Basal leaves usually toothed or pinnatifid. Sepals and petals colored alike; some or all of the former being saccate at the base. Stamens 6: 4 long and 2 short, or in 3 sets of 2 each, with the 2 longer pairs more or less united by the filaments.

1. **S. cordatus** Nutt. Aglaucous perennial with unbranched rather stout stem, and thick elliptical to obovate leaves, those of the stem clasping by the auricled base. Flowers greenish-yellow to purple. Petals clawed and with very narrow limb, once and one-half longer than the sepals. Silique flat; nearly straight. Sunny banks and mountain sides. May-June.

7. CARDAMINE. Bitter Cress.

Smooth-stemmed perennials, usually from small tubers or running rootstalks. Leaves all petioled. Flowers in racemes. Silique straight. Seeds in 1 row.

1. **C. cordifolia** Gray. Stem erect, unbranched, leafy to the top, 1-3 ft. high. Leaves from round to cordate; wavy-margined or angular-toothed, ciliate; 2-4 in. broad. Flowers white, rather showy. Siliques erect. Around cold springs in the mountains. May-August.

8. PHYSARIA. Bladder-pod.

Perennial stellate-pubescent herbs. Leaves spatulate, mostly entire. Flowers yellow, in terminal racemes. Petals longer than the sepals. Styles filiform. Siliques stellate-pubescent.

1. **P. didymocarpa** (Hook.) A. Gray. Pale-green; stems several from a long root; 3-12 inches long. Basal leaves obtuse; rarely few-lobed; narrowed into margined petioles. Stem-leaves nearly sessile, narrowly spatulate. Seeds numerous. In dry soil among rocks. May-August.

9. CAMELINA. Gold of Pleasure.

Erect annuals, with entire or toothed clasping sagittate leaves and small dull-yellow flowers in loose racemes. Silique pear-shaped, beaked by the slender persistent style. Seeds several in each cell.

1. **C. sativa** Crantz. False Flax. Stem 1-2 ft. high, simple or branching above; leafy; glabrous or sparsely pilose-pubescent. A common weed of waste places and grain fields. It is cultivated in Europe for the oil contained in its seeds. May-June.

10. **RADICULA.** (*Nasturtium*; *Roripa*.) Cress.

Herbs growing in water or at least in wet places. Leaves varying from toothed to pinnately-divided. Flowers small; white or yellow. Siliqua oblong, with seeds in 2 rows in each cell.

Perennial growing in running water;

petals white..... 1. **R. Nasturtium-Aquaticum**

Biennial growing near water; petals yellow..... 2. **R. pacifica**

1. **R. Nasturtium-Aquaticum** (L.) Britton & Rendle. (*Nasturtium officinale* R. Br.; *Roripa Nasturtium* (L.) Rusby.) True Water Cress. Stems ascending and rooting at the nodes; glabrous; sometimes 2-3 ft. high. Leaves with 3-11 roundish or elliptical segments. Petals twice the length of sepals. Around cold springs and in irrigation ditches. Introduced. May-October.

2. **R. pacifica** (Howell). (*N. terrestre occidentale* S. Wats.; *Roripa clavata* Rydb.) Stems erect, about a foot high; glabrous. Leaves lyrate, glabrous, or the auricles ciliate. Style short and thick. Siliques stout, $\frac{1}{3}$ - $\frac{1}{2}$ inch long; sometimes 4-carpellary. Seeds tuberculate. In wet places. May-June.

11. **SISYMBRIUM.** (Includes *Sophia* and *Stenophragma*.)

Annuals, biennials or perennials with spreading pubescence. Flowers small; yellow or rarely white. Siliqua terete, flattened or 6-sided. Seeds without margins; in 1 or 2 rows in each cell.

Flowers yellow.

Pubescence of simple hairs; leaves not compound 1. **S. officinale**

Pubescence of forked or stellate hairs; leaves pinnately-compound.

Siliqua narrowly linear; $\frac{3}{8}$ -1 inch long.... 2. **S. Sophia**

Siliqua linear-oblong. $\frac{1}{3}$ - $\frac{2}{3}$ inch long.

Densely canescent; pedicels diverging nearly 90 degrees from stem..... 3. **S. pinnatum**

Glabrate or sparsely canescent; pedicels less widely divergent..... 4. **S. incisum**

Flowers white..... 5. **S. Thalianum**

1. **S. officinale** (L.) Scop. Hedge Mustard. Stem sparingly branched if at all. Leaves runcinate. Siliques thick-walled; pubescent, closely appressed; borne on a very short pedicel. Stigma 2-lobed. A homely weed of waste places. May-Nov.

2. **S. Sophia** L. A bushy, minutely hoary-pubescent annual. Stems slender, 1-2 $\frac{1}{2}$ ft. high. Leaves 2-3 pinnatifid, the ultimate segments linear or linear-oblong. Pedicels very slender, ascending, shorter than siliqua. Seeds in 1 row in each cell. Dry ground in waste places. June-August.

3. **S. pinnatum** (Walt.) (*Sophia pinnata* (Walt.) Brit.: *S. canescens* Nutt.) Tansy Mustard. Stem erect and slender; branched; 6-24 inches high. Leaves 1-3 pinnatifid into many obtuse segments. Flowers very small; ascending, on very slender pedicels. Style very short; stigma simple. Siliques ascending or nearly horizontal; longer or shorter than pedicels. Seeds in 2 rows in each cell. A homely weed of waste places and dry plains, May-September.

4. **S. incisum** Engelm. (*S. californicum* Wats.; *Sophia incisa* (Engelm.) Greene.) Stem 1-4 ft. high, with short and more or less glandular pubescence. Leaves once-pinnate (or twice-pinnate to dissected), the divisions sharply cut-lobed into linear to oblong-ovate segments. Stigmas simple. Siliques ascending, equalling or shorter than the ascending pedicels. Seeds in 1 row. In moist soil. May-August.

4a. **S. incisum filipes** Gray (*Sophia filipes* (Gray) Heller) is distinguished from the type by its spreading, thread-like pedicels, which are much longer than the mostly erect siliques, and the seeds usually in 2 rows. On dry hillsides. May-Aug.

5. **S. Thalianum** Gay. (*Stenophragma Thaliana* (L.) Celac.) Wall-Cress. Stem erect, 1-16 inches high, much-branched; more or less pubescent with simple or forked hairs. Basal leaves forming a loose rosette; 1-2 inches long; narrowed into a petiole; oblanceolate or oblong. Stem-leaves sessile; often entire. Inflorescence a terminal raceme. Flowers white, on very slender, spreading pedicels. Petals about twice the length of sepals. Style very short; stigma 2-lobed. Siliques narrowly linear. Seeds in 1 row in each cell. Dry hills. April-May.

12. CAULANTHUS.

Perennials from a stout tap-root. Leaves lyrate, the divisions entire. Flowers greenish-yellow or purple. Sepals large, nearly equally saccate at base. Petals with a broad claw. Filaments included, bearing linear, curved anthers. Stigma nearly sessile, somewhat 2-lobed.

1. **C. hastatus** Watson. Glabrous; unbranched or sometimes branched. Leaves petioled; the terminal leaflet of the basal leaves is very much larger than the lateral ones, and is ovate with a hastate base. Inflorescence a loose raceme. Flowers reflexed. Sepals narrow and far apart. Petals usually as long as the sepals; toothed on the sides. Pods sessile, 3 inches long or more; spreading. Seeds in 1 row, wingless. In mountain valleys. June-August.

13. THELYPODIUM.

Biennial or rarely perennial herbs with alternate, petioled or clasping leaves. Flowers white, pink or purple (or sometimes yellow). Sepals narrow, equal at base. Petals flat; usually narrowed into a claw at base. Filaments long and slender; anthers linear, sagittate at base.

1. **T. torulosum** Heller. (*T. sagittatum* Endl.) Stems weak, rarely erect, 12-18 inches high. Leaves entire; basal ones lanceolate, long-petioled; cauline sagittate and clasping. Sepals purplish; petals pale-pink. Silique somewhat torulose.

14. ERYSIMUM. (Cheiranthus.) Wall Flower.

Erect branched or unbranched biennial or perennial herbs. Leaves linear or lanceolate; entire, toothed or lobed. Inflorescence corymbose in bud, but lengthening into a raceme in fruit. Flowers in most species showy; yellow or orange, sometimes with a purplish tinge; often fragrant. Petals clawed. Siliques 4-angled. Seeds in 1 row.

Flowers showy; about an inch high..... 1. **E. asperum**
Flowers not showy; about $\frac{1}{4}$ inch high.... 2. **E. cheiranthoides**

1. *E. asperum* DC. (*Cheiranthus asper* Nutt.) Western Wall Flower. Stems usually unbranched, 1-1½ ft. high; rough-pubescent with 3-forked hairs. Leaves narrowly lanceolate or elliptical; entire or rather remotely dentate. Flowers lemon-yellow. Siliques ascending or widely spreading; 2-3 inches long. Hillsides. April-June.

2. *E. cheiranthoides* L. (*C. cheiranthoides* (L.) Heller.) Worm-seed or Treacle Mustard. Erect, minutely rough-pubescent, much-branched; ½-2 ft. high. Leaves lanceolate or elliptical; entire or slightly toothed; sessile or tapering into a short petiole. Flowers rather small. Calyx yellowish; corolla lemon-yellow, mixed with white below. Siliques nearly erect, less than an inch long when mature; on ascending pedicels about ¼ inch long. In dry soil in waste places. April-June.

15. CONRINGIA. Hare's Ear Mustard.

Glabrous annuals with sessile and entire stem-clasping leaves and long, 4-angled siliques. Seeds oblong, in 1 row in each cell.

1. *C. orientalis* (L.) Dumort. (*C. perfoliata* Link.) Stem usually erect; 1-3 ft. high. Leaves light-green; elliptical, with obtuse apex. Introduced. In waste places. May-June.

16. BRASSICA. Mustard.

Annual, biennial or perennial herbs. Stem erect and branching. Basal leaves pinnately-lobed; stem-leaves dentate or entire. Inflorescence racemose. Flowers showy; bright-yellow. Siliques sessile; terete or 4-angled; tipped with a mostly 1-seeded beak. Seeds globose, without margins; in 1 row in each cell.

None of the leaves clasping at base.

Pods not appressed; their beaks flat or angled,

1-seeded 1. *B. arvensis*

Pods appressed; their beaks conical, empty..... 2. *B. nigra*

Upper leaves clasping at base..... 3. *B. campestris*

1. *B. arvensis* (L.) Kuntze. (*B. Sinapistrum* Boiss.) Wild Field Mustard. Stem erect, 1-2 ft. high; hispid with scattered hairs. Pedicels stout. Pod smooth or sometimes bristly; somewhat constricted between the seeds; its beak large and flat or conspicuously angled. Fields and waste places. June-Sept.

2. *B. nigra* (L.) Koch. Black Mustard. Stem erect, 2-7 ft. high, hirsute with scattered hairs. Leaves on slender petioles or the upper sessile. Flowers fragrant. Pods short; on short, erect pedicels. Seeds dark-brown. Roadsides and waste places. April-November.

3. *B. campestris* L. Turnip; Ruta-Baga. Glaucous; light-green; biennial from a thickened root. Stem-leaves lyrate-lobed below; upper entire and cordate or auriculate-clasping. Flowers lemon-yellow. In waste places, escaping from cultivation. April-November. With it will probably be found *B. Napus* L. (Rape).

17. **DIPLLOTAXIS.** Rocket.

Annual or perennial herbs with yellow flowers in terminal racemes. Siliques long, slender, terete, with a short beak at apex. Seeds in 2 rows in each cell; marginless; ovoid.

1. **D. tenuifolia** (L.) DC. (*Sisymbrium tenuifolium* L.) Wall Rocket. A bushy perennial, much-branched above; glabrous or sparingly hirsute, 1-4 ft. high. Leaves a foot long or less, pinnately divided; the lobes far apart, often alternately 2-toothed, lanceolate below and linear above. Racemes loose, elongated in fruit. Siliques 1-1¼ in. long, nearly erect on long pedicels. May-July, in moist waste places.

ORDER ROSALES.**CRASSULACEÆ.** Orpine Family.

Annual or perennial more or less succulent herbs (sometimes shrubby). Leaves alternate or opposite; sessile and exstipulate. Inflorescence cymose or rarely solitary. Flowers regular and symmetrical. Sepals persistent, 4-5-lobed. Petals distinct or slightly united at base (or rarely wanting). Stamens as many or twice as many as sepals. Carpels as many as sepals; distinct or united below. Fruit a follicle.

1. **SEDUM.** Stone Crop. Orpine.

Glabrous annual, biennial or perennial herbs. Inflorescence cymose, usually unilateral. Flowers star-like. Sepals 4-5; petals 4-5, distinct, usually narrow and sharp-pointed. Stamens twice as many as sepals. Pistils 4-5, ripening into many-seeded follicles.

Leaves acute..... 1. **S. stenopetalum**
Leaves obtuse..... 2. **S. debile**

1. **S. stenopetalum** Pursh. Stems 3-6 inches high, simple or branched, perennial; tufted. Leaves alternate, sessile, linear, entire; terete or nearly so. Flowers bright yellow, with narrowly-lanceolate petals. Carpels spreading. Shaded cliffs among rocks. May-June.

2. **S. debile** Watson. Perennial from a slender rhizome. Stems slender, weak. Leaves round or nearly so, flat; sessile, but narrowed toward the base. Flowers yellow, on rather long pedicels. Petals more or less united at the base.

SAXIFRAGACEÆ. Saxifrage Family.

Herbs or shrubs. Leaves alternate, opposite or all basal, usually without stipules. Inflorescence solitary, racemose or paniculate. Calyx free from the ovary or adhering to it, usually persistent. Petals usually

4 or 5 (or rarely none); perigynous. Stamens as many or twice as many as petals, and alternate with them; perigynous. Carpels 2-5, more or less united. Ovary with parietal or axial placentae; ripening into follicles, a capsule or a berry.

Herbs; fruit a capsule or follicle.

Inflorescence paniculate..... 1. **Heuchera**

Inflorescence racemose.

Rootstalk scaly..... 2. **Mitella**

Rootstalk bulbiferous..... 3. **Tellima**

Shrubs; fruit a berry..... 4. **Ribes**

1. HEUCHERA. Alum-root.

Erect or ascending perennial herbs with scaly rootstalks. Leaves all basal; long-petioled and palmately-veined; mostly round-cordate. Flowers small, in a panicle or raceme. Sepals 5. Petals 5, entire. Stamens 5, opposite the petals. Styles 2, slender; persisting as beaks of the capsule. Ovary 1; 1-celled, with 2 parietal placentae.

Stamens and styles included (at least at first).. 1. **H. parvifolia**

Stamens and styles exerted..... 2. **H. rubescens**

1. **H. parvifolia utahensis** (Rydb.) (*H. utahensis* Rydb.)

Leaves round-cordate, crenately 5-7-lobed, the basal lobes usually overlapping; the blades smooth and shining; petioles 2-4 inches long. Inflorescence narrow but open, on a naked scape that sometimes reaches a length of 2 feet. Flowers yellowish-green. Sepals triangular. Petals spatulate, slightly shorter than the sepals. Moist mountain-slopes in rich soil, usually in light shade. May-July.

2. **H. rubescens** Torr. Leaves thick; dark green and shining above and often red beneath; 1 inch broad or less; round-cordate, obscurely 5-lobed, each of the coarsely dentate lobes terminating in a bristle; glabrous or slightly pubescent. Flowers pink or red; paniced. Forming mats in crevices of rocks on vertical cliffs. June-August.

2. MITELLA. Mitre-wort.

Herbs, perennial from a rhizome. Leaves ovate or round-cordate; mostly basal on long petioles. Inflorescence racemose; scape-like. Flowers small; white or greenish. Calyx 5-cleft, partly adherent to the depressed ovary. Petals 5; fringed, toothed or entire. Stamens 5 or 10; included. Styles 2, very short. Ovary 1-celled with 2 parietal placentae. Seeds many; smooth and shining.

1. **M. violacea** Rydb. (*M. stenopetala* Piper; *Ozomelis violacea* Rydb.) Rhizome short and thick. Leaves all basal; large and leathery; blades round-cordate, the crenate margins ciliate; obscurely round-lobed; under surface reddish; petioles 2-4 inches long. Flowers nearly sessile, borne on one side of the raceme. Sepals whitish. Petals $1\frac{1}{2}$ times the length of sepals; 3-cleft, filiform or entire. Stamens 5. Stigmas entire. In shaded places in rich, moist soil near mountain streams.

3. **TELLIMA.** (Includes *Lithophragma.*) Star-Flower.

Slender, erect herbs, perennial from a cluster of pink-tinged bulblets. Leaves round-cordate in outline. Inflorescence a slender terminal raceme or spike. Sepals 5; petals 5, clawed; white or rose-color. Stamens 10, included. Styles 2-3, short. Ovary 1-celled, with 3 parietal placentae.

Ovary free (except at base) from the bell-shaped calyx-tube.

Stem-leaves seldom bulb-bearing in the axils; stipules long and narrow, not fringed.... 1. **T. tenella**

Stem-leaves usually bulb-bearing in the axils; stipules short, broad and fringed..... 2. **T. bulbifera**

Ovary adnate for half its length to the elongated-obconical calyx-tube..... 3. **T. parviflora**

1. **T. tenella** (Nutt.) Walp. (*L. australis* Rydb.) Stems 4-8 inches high, glandular-puberulent. Leaves 3-5-cleft, the segments again cleft. Flowers 3-12. Petals 3-7-cleft or parted. Seeds smooth. Rich soil of mountain sides. April-June.

2. **T. bulbifera** (Rydb.) A. Nels. (*T. tenella* S. Wats.; *L. bulbifera* Rydb.) Stem 4-8 inches high, abundantly glandular-puberulent. Leaves divided to or near the base, the segments wedge-shaped or obovate, 3-cleft. Flowers 3-6, some or all replaced by red bulblets; the pedicels longer than the fruit. Petals 3-5-cleft. Seeds muricate. In rich black loam of mountain sides. March-July.

3. **T. parviflora** Hook. (*L. parviflora* (Hook.) Nutt.) Plant rarely producing bulblets among the flowers or in the axils of the leaves. Stem 4-12 inches high, scape-like, glandular-puberulent. Leaves palmately divided into 3-5-cleft or parted segments. Petals deeply 3-5-cleft into narrow segments. In rich moist soil of mountain sides, usually in light shade. April-June.

4. **RIBES.** Gooseberry; Currant.

Shrubs with alternate, palmately-veined and palmately-lobed leaves. Inflorescence solitary or racemose. Calyx 5-lobed; often colored and usually reflexed. Petals 5, erect; smaller than the calyx-lobes. Styles 2; distinct or united. Ovary 1-celled with 2 parietal placentae. Fruit a smooth or prickly berry, often with the remains of the withered flower at its apex.

Stems usually armed with spines and sometimes with prickles 1. **R. saxosum**

Stems neither thorny nor prickly.

Flowers yellow; spicy-fragrant..... 2. **R. aureum**

Flowers white, pink or greenish; not spicy-fragrant.

Calyx-tube not cylindrical..... 3. **R. Hudsonianum**

Calyx-tube cylindrical.

Leaves small; berries red or orange... 4. **R. cereum**

Leaves large; berry black..... 5. **R. viscosissimum**

1. **R. saxosum** Hook. (*R. inerme* Rydb.; *R. vallicola* Greene; *R. oxycanthoides irriguum* Jancz.) Mountain Gooseberry. A bush with grayish, glabrous branches usually without bristles; spines at the nodes few or sometimes wanting. Leaves rather thin; averaging 1½ inches in diameter; rounded in outline, with the base cordate, truncate or rarely obtuse; 3-5-lobed, the lobes crenate. Peduncles 1-4-flowered. Calyx shorter than the hypanthium; its lobes greenish or sometimes purplish. Petals white or pinkish, about a third as long as the

sepals. Stamens about twice as long as petals and shorter than sepals. Berry smooth and green, becoming wine-colored when fully ripe. Along mountain streams. April-June.

2. **R. aureum** Pursh. Missouri, Golden or Buffalo Currant. Stem 5-12 ft. high; smooth and thornless. Leaves fascicled, 3-5-lobed, the upper lobe wedge-shaped. Flowers in leafy racemes; yellow (or the petals tinged with red). Berry smooth; edible; either black or amber-colored when ripe. Cultivated and along streams. April-June.

3. **R. Hudsonianum** Richards. (*R. petiolare* Dougl.) Stems light-colored, erect, 3-6 ft. high. Leaves thin, rather large, on slender petioles; round-cordate and 5-lobed (resembling maple-leaves); resinous-dotted on the under surface. Racemes erect. Flowers whitish. Ovary with sessile glands. Berry black; globose; glandular. Strongly and unpleasantly scented. Along mountain streams. May.

4. **R. cereum** Dougl. Mountain Red Currant. A small thornless, scraggly bush, usually resinous-dotted and glutinous. Bark grayish-tinged or sometimes dark-brown. Leaves small (averaging $\frac{3}{8}$ inch in diameter); round-kidney-shaped with crenate margins. Racemes short, umbel-like, more or less drooping, few-flowered. Calyx pinkish or sometimes waxy-white or greenish; its tube long-cylindric, much longer than the berry. Fruit insipid, often glandular-pubescent. Among rocks on exposed mountain-sides. May-July. 5,000-11,000 ft.

5. **R. viscosissimum** Pursh. Stem 3-5 ft. high; with reddish, shreddy bark. Leaves large, viscid-pubescent; heart-shaped with rounded lobes. Inflorescence a few-flowered, corymbose, ascending raceme; conspicuously bracted. Calyx-tube prolonged above the ovary. Flowers dull-white or greenish or purplish-tinged. Berries black; glandular; without a bloom. Mountain slopes.

ROSACEÆ. Rose Family.

Herbs, shrubs or trees with alternate or fascicled usually stipulate leaves. Flowers perfect, regular, often showy; usually with many distinct stamens borne on the 5-sepaled calyx. Petals borne on calyx; as many as the sepals. Carpels 1-many; distinct or united.

Ovary "superior" or half-"inferior."

Carpel 1; shrubs or small trees.

Petals none; calyx petal-like..... 1. **Cercocarpus**

Petals evident; calyx green.

Leaves fascicled, evergreen; fruit an achene 2. **Purshia**

Leaves alternate, deciduous; fruit a drupe 3. **Prunus**

Carpels more than one.

Shrubs or small trees.

Leaves small, leathery, fascicled, evergreen 4. **Cowanina**

Leaves larger, not leathery; alternate, deciduous.

Pistils 1-5, becoming follicles in fruit 5. **Physocarpus**
 Pistils numerous, becoming aggregated drupelets 6. **Rubus**

Herbs.

Styles deciduous; neither jointed nor elongating in fruit.

Leaves palmately 3-foliate; flowers white 7. **Fragraria**

Leaves pinnate; flowers yellow or cream-color 8. **Potentilla**

Styles persistent; jointed and elongating in fruit 9. **Geum**

Ovary wholly "inferior." (Shrubs or small trees.)

Pistils several, simple, included in the urn-shaped receptacle; leaves pinnate..... 10. **Rosa**

Pistil 1, compound, with 2-5 cells (as many as the styles); leaves simple.

Flowers racemose; fruit juicy..... 11. **Amelanchier**

Flowers corymbose; fruit rather dry..... 12. **Crataegus**

1. CERCOCARPUS. Mountain Mahogany.

Leaves alternate, simple; entire or toothed; evergreen; leathery. Flowers from winter-buds; small; solitary or fascicled in the axils of the leaves. Calyx without bractlets; colored like a corolla. Corolla none. Stamens 15-25, inserted in 2-3 rows on calyx-tube. Carpel included, ripening into an achene, the persistent style becoming much lengthened and villous.

1. **C. ledifolius** Nutt. 6-15 ft. high. Leaves oblong-lanceolate; glabrous, smooth and shining above but more or less tomentose below; margins entire, rolled under. Flowers sessile, tomentose. The persistent style becomes spirally twisted and from 2 to 3 inches long in fruit. On mountain sides, 7,000-9,000 ft. April-June.

1a. **C. ledifolium intricatus** (Wats.) Jones. (*C. intricatus* Wats.) A low, intricately-branched shrub, seldom more than 3 ft. high, with linear leaves and smaller flowers and fruits than the type.

2. PURSHIA. (Kunzia.) Antelope Brush.

Shrubs similar to *Cowania*, but differing as follows: The wedge-shaped leaves have a 3-5-lobed apex and entire sides; petals drop off more quickly; stamens in 1 row; carpel 1 or sometimes 2, the fruiting styles not plumose and not more than $\frac{1}{2}$ inch long; body of achene exerted.

1. **P. tridentata** DC. Buck Brush; Bitter Brush. Seldom more than 6 ft. high. Bark brown or grayish. Carpels pubescent. Dry plains and mountain sides, 4,600-6,500 ft. May-June.

3. PRUNUS. Cherry; Plum.

Shrubs or small trees with simple and usually serrulate leaves which bear free and deciduous stipules. Flowers white; fascicled in the axils, or in terminal racemes. Calyx 5-cleft; deciduous. Petals 5, spreading. Stamens 15-25. Carpel 1 (rarely 5), ripening into a drupe. Ovules 2.

1. *P. demissa* Walpers. (*P. melanocarpa* Rydb.) Wild Cherry; Choke Cherry. Shrub or small tree, 10-16 ft. high. Leaves finely serrate with the teeth incurved or appressed; smooth or nearly so on both sides; petioles without glands. Racemes compact; erect or ascending. Flowers rather fragrant. Fruit red when immature, black when fully ripe. Along streams. May-June.

4. COWANIA. Cliff Rose.

Much-branched scrubby shrubs with shreddy bark. Leaves fasciated, leathery, glandular-dotted, wedge-shaped, persistent throughout the winter. Flowers solitary and terminal on short, lateral branches; short-peduncled. Petals 5; yellow or cream-colored. Stamens numerous, in 2 rows. Carpels 5-12; their fruiting styles 1-2 inches long, plumose with long hairs. Fruit an achene.

1. *C. Mexicana* Don. Shrub 1-8 ft. high. Leaves dark-green above, white-tomentose beneath; $\frac{1}{2}$ inch long or less; apex pinnately 1-3-lobed or parted and margins 2-4-divided. Stipules persistent. Calyx-tube narrowed into a short glandular-hairy pedicel. Body of the 3-sided achene nearly included within the dilated calyx-tube. Mountain-sides. May-June.

5. PHYSOCARPUS. (Opulaster.) Nine-Bark.

Bushy unarmed shrubs, 2-6 ft. high, with grayish or reddish-brown shreddy bark. Leaves simple, palmately lobed with large, deciduous stipules. Inflorescence corymbose. Flowers white, showy, fragrant. Calyx 5-cleft, persistent. Corolla regular, of 5 obovate petals. Stamens numerous. Pistils 1-5 (mostly 3), more or less united toward the base; ripening into 2-seeded follicles that dehisce along both sutures.

1. *P. pauciflorus* (T. & G.) Piper. (*P. malvaceus* (Greene) A. Nels.; *Spiraea opulifolia pauciflora* T. & G.; *O. pauciflorus* (T. & G.) Heller.) 3-6 ft. high; with rounded, 3-lobed leaves, which are stellate-pubescent on lower surface near the base. Carpels 2; pubescent; not longer than calyx. Mountain-sides in rich soil. June-July.

6. RUBUS. Raspberry; Blackberry; Bramble.

Erect or climbing perennial shrubs (or a few species herbs), often armed with curved prickles. Leaves alternate; simple and palmately-lobed or compound; with stipules adnate to the petiole. Flowers perfect or rarely dioecious. Calyx without bracts; persistent, deeply 5-parted. Petals deciduous. Stamens numerous; distinct. Carpels numerous, on a convex or a narrow and elongated cylindrical receptacle; becoming in fruit an aggregation of small stone-fruits.

Unarmed; leaves simple..... 1. *R. parviflorus*
Armed with hooks or bristles; leaves compound.

Sepals as long as petals; fruit red..... 2. *R. Idaeus*

Sepals usually longer than petals; fruit usually

black 3. *R. leucodermis*

1. **R. parviflorus** Nutt. (*R. Nutkanus* Moc.; *Bossekia parviflora* (Nutt.) Greene.) Salmon or Thimble Berry. Stems perennial; erect, 3-8 ft. high. Leaves palmately 5-lobed, the lobes nearly equal; 4-12 inches broad; with glandular hairs beneath on veins and on petioles. Inflorescence corymbose. Flowers few, showy (1 inch or more across); white (or occasionally pink-tinged). Calyx and carpels densely tomentose. Lobes of calyx long-acuminate, ascending. Fruit red, obovate-spheroidal; dry and not sweet enough to be palatable. In rich soil along streams. May-August.

2. **R. Idaeus gracillipes** Jones. (*R. strigosus* of Coulter's Man.—not *R. strigosus* Michx.) Wild Red Raspberry. Stems biennial, shrubby, erect and branching, 2-6 ft. high; not glaucous; densely covered with weak glandular bristles, mixed with hooked prickles on the older ones. Leaves pinnately 3-5-foliate; the leaflets cut-serrate, whitish-tomentose beneath, the lateral ones sessile. Flowers white; axillary or terminal, with petals as long as the sepals. Fruit light-red; very palatable; elongated-hemispheric in shape. In clefts of rocks. May-July.

3. **R. leucodermis** Dougl. Blackcap; Wild Black Raspberry. Stems biennial; glaucous, erect, long and straggling; armed with strong, recurved prickles. Leaves 3-foliate or pedately 5-foliate; leaflets broadly ovate or sometimes ovate-lanceolate; incised and serrate; sparingly pubescent above, white-tomentose and glaucous beneath; the lateral ones nearly sessile. Inflorescence terminal and axillary; few-flowered; corymbose. Sepals long-acuminate, slightly longer than the white petals. Fruit with a white bloom; black or sometimes red; very palatable. In mountain valleys, usually at lower elevations than No. 2.

7. FRAGRARIA. Strawberry.

Herbs, perennial from a scaly erect rootstalk. Leaves ternate; all basal. Flowers white or rarely pink. Stamens about 20, in 3 series. Receptacle conic or hemispheric, becoming red, juicy and much enlarged in fruit.

Pubescence spreading or reflexed; achenes on surface of fruit (not in pits)..... 1. **F. bracteata**
 Pubescence appressed; achenes set in pits..... 2. **F. glauca**

1. **F. bracteata** Heller. (*F. vesca americana* Porter; *F. americana* (Porter) Britton.) Rootstalk very short. Leaves slightly silky above, becoming glabrate in age; leaflets thin, pale-green, rhombic-obovate, subsessile. Scape usually with a leafy bract. Flowers white, rather large. Calyx in fruit ascending or spreading. Fruit ovoid or subconic. Rich soil in light shade along streams. June-July.

2. **F. glauca** (S. Wats.) Rydb. (*F. ovalis glauca* (Wats.) A. Nels.; *F. virginiana glauca* Wats.) Rootstalk short. Leaves glaucous and almost glabrous above, silky or becoming glabrate below; leaflets thin, broadly obovate, with evident petiolules. Scape rarely with a leafy bract. Flowers white, smaller than those of No. 1. Fruit subglobose, rather sour. Mountain meadows.

8. **POTENTILLA.** (Includes *Drymocallis*.) Cinque-foil.

Herbs or rarely shrubs. Leaves compound; alternate or opposite. Inflorescence cymose (or in some species solitary). Flowers yellow, cream-color or white, with a deeply 5-cleft calyx, 5 obcordate or broadly obovate deciduous petals, numerous stamens, and numerous carpels that ripen into achenes. Styles deciduous. Receptacle usually pubescent or hairy.

Leaves pinnate; style lateral.

Flowers pale yellow..... 1. **P. glandulosa**

Flowers white or cream-color..... 2. **P. micropetala**

Leaves digitately 5-7-foliolate; styles terminal.... 3. **P. gracilis**

1. **P. glandulosa** Lind. Stem erect; viscid and glandular-hairy, irregularly branched above; 1-2 ft. high. Leaves pinnate; leaflets opposite, 7-9; obovate. Sepals lanceolate to ovate with acute or rarely acuminate apex. Petals about length of sepals; round or nearly so. Moist mountain valleys. May-July.

2. **P. micropetala** (Rydb.) (*Drymocallis micropetala* Rydb.) Differing from No. 1 in the smaller flowers of a different color.

3. **P. gracilis** Dougl. Stems usually several, more or less branched; silky-villous. Leaflets oblanceolate to narrowly obovate; green and sparingly pubescent above, densely white-tomentose below. Flowers bright yellow, with emarginate petals. (Includes *P. Blaschkeana* Turcz.; *P. fastigiata* Nutt.; *P. filipes* Rydb.; *P. pulcherrima* Lehm.)

9. **GEUM.** Avens.

Perennial herbs with pinnate or lyrate leaves. Calyx deeply 5-cleft, usually with 5 bractlets alternating with its lobes. Petals 5. Stamens and carpels numerous. Styles becoming elongated and sometimes plumose in fruit; often jointed; persistent on the dry receptacle.

1. **G. macrophyllum** Willd. (*G. oregonense* Rydb.) Bristly-hairy, stout, 1-3 ft. high. Basal leaves lyrate and interruptedly pinnate, the terminal leaflet very much larger than the 2-4 lateral ones. Petals yellow. Rich soil in moist places. May-July.

10. **ROSA.** Wild Rose.

Bushy or climbing shrubs armed with thorns and prickles. Leaves odd-pinnate, with adnate stipules. Inflorescence solitary or corymbose. Flowers large and fragrant; white, pink or red (rarely yellow). Calyx-lobes 5; petals 5; stamens numerous, all borne around the edges of the globose or urn-shaped receptacle. Carpels numerous, enclosed in the receptacle. Ovaries hairy. Fruit consists of the enlarged receptacle (colored red), crowned by the persistent calyx, and enclosing the achenes.

Outer sepals laterally lobed..... 1. **R. Woodsi**

Outer sepals entire..... 2. **R. Nutkana**

1. **R. Woodsii** Lindl. Stems mostly low, 8-40 inches high. Leaflets 5-7, oblong or lanceolate to obovate. Flowers pink; $1\frac{1}{2}$ -2 inches across; solitary or corymbose. Fruit globose with a short neck. (Includes *R. Maximilianii* Nees—a form with somewhat curved spines and leaflets pubescent beneath; and *R. Macounii* Greene, with straight or nearly straight spines and leaflets glabrous or nearly so.)

2. **R. Nutkana** Presl. Stems stout, 1-6 ft. high. Leaflets 5-7 (rarely 9). Flowers large, 2-3 inches across; solitary or 2-3 in a corymb. Fruit globose, not contracted above into a neck. (Includes *R. melina* Greene, a form with slender spines and mostly glabrous leaves; and *R. grosse-serrata* E. Nelson, with short spines and minutely resinous-dotted, finely pubescent leaves.)

11. AMELANCHIER. June Berry; Shad Bush.

Shrubs or small trees with simple, serrate leaves. Flowers in racemes; white (rarely tinged with pink). Calyx-tube bell-shaped, the limb 5-parted. Petals 5. Stamens about 20, short. Pistil 1; styles 5, united below; ovary partly or entirely "inferior," 5-celled, but becoming 10-celled in fruit. Fruit a berry-like pome; globose, purplish, edible.

1. **A. alnifolia** Nutt. Service Berry. Shrub 3-15 ft. high. Leaves elliptical; usually entire except at and near apex, where they are serrate. Raceme short, dense. Petals narrowly oblong. In dry soil on hillsides. May.

12. CRATAEGUS. Hawthorn.

Thorny-branched shrubs or small trees with simple and toothed or lobed leaves. Inflorescence terminal, corymbose. Calyx with a cup-shaped tube and a 5-parted limb. Petals 5; white or pink; spreading; fragrant. Stamens 5-20. Ovary 2-5-celled, "inferior." Fruit a drupe, containing 2-5 bony 1-seeded carpels.

1. **C. rivularis** Nutt. Shrub 9-14 ft. high, with slender reddish branchlets. Thorns few, stout, slightly curved, $2\frac{1}{2}$ in. long or less. Leaves rigid, lanceolate-ovate; serrate; often cuneate. Petals white. Stamens 10; styles 5. Fruit very dark-red to black. On river banks. May.

LEGUMINOSÆ. Pulse Family.

Trees, shrubs or annual or perennial herbs; some species climbing. Leaves alternate; compound or sometimes simple; stipulate. Inflorescence various. Flowers papilionaceous or sometimes regular; perfect or rarely polygamo-dioecious. Calyx-lobes 4-5; equal or unequal. Stamens diadelphous, monadelphous or rarely separate; usually 10 (sometimes 9 or only 5).

Pistil 1; ovary 1-celled with a single parietal placenta. Fruit a legume or rarely a loment.

- Flowers regular; thorny trees..... 1. **Gleditsia**
 Flowers irregular.
 Leaves simple..... 8. **Astragalus**
 Leaves palmately compound.
 Stamens monadelphous; leaflets 5-11..... 2. **Lupinus**
 Stamens diadelphous; leaflets normally 3.. 3. **Trifolium**
 Leaves pinnately-compound.
 Leaflets 3.
 Flowers blue or purple..... 4. **Medicago**
 Flowers white..... 5. **Mellilotus**
 Leaflets more than 3.
 Leaves odd-pinnate.
 Trees 6. **Robinia**
 Herbs.
 Foliage not glandular-dotted; pod
 not hooked.
 Keel longest, wings shortest;
 fruit a loment.... 7. **Hedysarum**
 Standard longest, keel shortest
 or at least not longer
 than wings; fruit a
 legume 8. **Astragalus**
 Foliage glandular-dotted; fruit a pod
 with hooked prickles.. 9. **Glycyrrhiza**
 Leaves tendril-pinnate.
 Style slender; hairy only near the
 stigma 10. **Vicia**
 Style flattened; hairy on the inner
 side 11. **Lathyrus**

1. GLEDITSIA. (Gleditschia.) Honey Locust.

Large thorny trees. Leaves large; abruptly once or twice pinnately-compound. Inflorescence axillary; racemose. Flowers polygamous; greenish; regular or nearly so; inconspicuous. Calyx short; 3-cleft. Petals as many as the sepals; perigynous; the two lower sometimes united. Stamens 3-10, distinct; perigynous. Fruit a dark-brown, flat, somewhat curved legume; 1-many seeded.

1. **G. triacanthos L.** A tree sometimes reaching a height of 140 ft.; bark of trunk rather rough, that of branches smooth. Thorns branched or simple. Leaves petioled; fascicled and once-pinnate on the old growth, and alternate ($\frac{3}{8}$) and bi-pinnate on the season's growth. Inflorescence in spicate, drooping racemes, on growth of preceding year. Fruit strap-shaped, many-seeded; twisted when mature; 1-1 $\frac{1}{2}$ ft. long; with a sweet, greenish pulp between the seeds. May-July. Cultivated.

2. LUPINUS. Lupine; Quaker-Bonnets.

Herbs. Leaflets entire. Inflorescence terminal; racemose or spicate. Flowers showy, bracteate. Calyx deeply 2-lipped. Wings united above, enclosing the keel; sides of standard reflexed. Stamens 10, monadelphous; with anthers of 2 forms (round and oblong). Style incurved; stigma bearded. Ovary sessile. Legume flattened, leathery.

1. **L. laxiflorus** Dougl. A perennial with erect or ascending slender stems, several from the same root; pubescence short-silky. Leaflets 6-8, oblanceolate. Flowers of varying shades of blue, in loose and slender racemes. Calyx saccate at base. Legume silk-hairy; seeds 3-5. On dry gravelly hills. May-June.

3. **TRIFOLIUM.** Clover.

Tufted herbs of various habit. Leaves palmately (sometimes pinnately) mostly 3-foliolate. Inflorescence capitate. Flowers usually rather small. Petals persistent, adherent to the stamen-tube. Stamens diadelphous, or monadelphous at base. Legume membranous, 1-6-seeded.

Heads on axillary peduncles.

Stems procumbent and creeping; stipules acute 1. **T. repens**

Stems erect or ascending; stipules acuminate 2. **T. hybridum**

Heads on terminal peduncles.

Flowers red or pink; stipules bristle-pointed 3. **T. pratense**

Flowers whitish; stipules not bristle-pointed 4. **T. longipes**

1. **T. repens** L. White or Dutch Clover. A smooth perennial, rooting at the nodes. Leaflets often with a pale crescent on upper surface; inversely heart-shaped or merely notched at apex; obscurely toothed; stipules narrow, scale-like; petioles long and slender. Heads loose, borne on very long peduncles. Flowers white or rose-tinged, on rather short pedicels. Cultivated and along stream-banks as an escape. May-August.

2. **T. hybridum** L. Alsike Clover. A smooth perennial with stems not rooting at the nodes. Leaflets without a pale spot on upper surface; obovate and sometimes slightly notched at the apex but not inversely heart-shaped; serrulate with sharp-pointed teeth; stipules lanceolate-ovate; petioles long and slender. Heads as in No. 1. Flowers rose-tinged, on short pedicels. Cultivated; sometimes escaping. May-October.

3. **T. pratense** L. Red Clover. A hairy perennial with ascending stems. Leaflets elliptical or obovate, often notched at apex and marked on upper surface by a pale spot; stipules broad. Heads ovoid. Flowers sessile. Calyx soft-hairy. Cultivated and sometimes escaping.

4. **T. longipes** Nutt. A perennial with a slender, erect, usually glabrous stem. Leaflets sparingly villous; linear to narrowly oblong, serrulate. Heads ovoid. Flowers yellowish-white or purple-tinged; sessile or nearly so. Calyx-teeth straight, shorter than the corolla; more or less hairy. In wet alpine meadows. May-June.

4. **MEDICAGO.** Medick.

Herbs with pinnately 3-foliolate leaves having minutely-toothed leaflets. Inflorescence axillary. Flowers small. Calyx 5-toothed. Corolla deciduous. Stamens diadelphous, 9 and 1. Pod 1-several-seeded; more or less coiled.

Erect perennial; flowers blue or purple..... 1. **M. sativa**
Procumbent annual; flowers bright yellow..... 2. **M. lupulina**

1. *M. sativa* L. Lucerne. Alfalfa. A smooth, many-stemmed perennial from a deep tap-root. Flowers in a loose raceme. Legume coiled like a ram's horn. Cultivated.

2. *M. lupulina* L. Black Medick. Nonesuch. A pubescent annual with flowers in short dense heads. Pods kidney-shaped; 1-seeded; black when ripe. Escaping from cultivation. Locally called "Wild Yellow Clover." April-November.

5. MELILOTUS. Sweet Clover.

Annual or biennial herbs, fragrant in drying, with pinnately-compound leaves of 3-toothed leaflets. Inflorescence a spike-like raceme. Flowers small; white or yellow; very fragrant. Calyx 5-toothed. Petals deciduous. Stamens diadelphous. Legume ovoid; leathery; scarcely dehiscent; straight; wrinkled.

1. *M. alba* L. White Sweet Clover. Stems erect; 3-6 ft. high. Leaflets truncate. Corolla white; the standard longer than the other petals. Abundant along roadsides. May-October.

6. ROBINIA. Black Locust.

Shrubs or trees with odd-pinnate leaves of 9 or more stipellate leaflets. Stipules often short, stout spines. Flowers showy, in drooping, axillary racemes. Calyx short, very slightly 2-lipped, the 2 teeth of the upper lip somewhat united. Standard large, reflexed. Stamens diadelphous. Legume flat, straight.

1. *R. Pseudo-Acacia* L. A tree as much as 80 ft. high with rough-barked trunk. Flowers very fragrant, in loose racemes. Calyx often reddish. Corolla white, yellowish-veined. Legume smooth. Cultivated. May-June.

7. HEDYSARUM.

Perennial herbs with showy flowers in racemes. Calyx 5-cleft. Keel longer than wings. Stamens diadelphous (9 and 1). Legume flat, jointed into several strongly-veined 1-seeded roundish divisions, separating when ripe into loments.

1. *H. pabulare* A. Nels. (*H. utahense* Rydb.) Many-stemmed from a rootstalk. Stems 8-15 inches high, pubescent with short and stiff appressed hairs. Leaflets 9-17, usually elliptic. Bracts scarious; lanceolate to ovate. Calyx-teeth subulate, with appressed pubescence. Corolla rose-purple, fading to blue; the obovate standard conspicuously veined. Joints of loment 3-5. Dry plains and hillsides. May-June. 4,500-6,500 ft.

8. ASTRAGALUS. Milk Vetch; Rattleweed; Loco Weed.

Perennial herbs with odd-pinnate (or rarely simple) leaves. Inflorescence in spikes or racemes, often resembling heads. Flowers large, often showy. Calyx tubular, 5-toothed. Petals

clawed. Standard relatively narrow; erect. Keel blunt. Stamens diadelphous (9 and 1).

Legume 1-celled, neither suture intruded... 1. *A. diversifolius*
Legume incompletely 2-celled by the intrusion of 1 or both sutures.

Legume more or less pubescent, but not woolly.

Leaves glabrous or nearly so.

Legume sessile; flowers purplish; calyx black-strigose 2. *A. cibarius*

Legume stipitate; flowers yellowish; calyx glabrous 3. *A. Beckwithii*

Leaves silky-pubescent..... 4. *A. argophyllus*

Legume decidedly woolly-pubescent.

Leaflets oblong; flowers yellowish-white.. 5. *A. Purshii*

Leaflets subrotund; flowers pink-purple 6. *A. utahensis*

Legume completely 2-celled.

Legume leathery; not inflated..... 8. *A. agrestis*

Legume papery; conspicuously inflated... 9. *A. lentiginosus*

1. *A. diversifolius* A. Gray. (*A. junciformis* A. Nelson; *A. junceus* A. Gray.) Pubescent with short ashy hairs. Stems slender, elongated, diffuse; weak and at length decumbent. Petioles short; flattened. Leaflets 1-5, linear or narrowly-lanceolate. Peduncles 1-5-flowered. Corolla yellowish-white; the keel rather faintly purple-tipped. Legume cylindrical; oblong-linear, straight or slightly curved; canescent-puberulent; less than an inch long. Dry soil. May-October.

2. *A. cibarius* (Jones) Sheldon. (*A. Webberi cibarius* Jones.) Tidy Tips; Lady Fingers; "Wild Sweet Pea." Stems 1 ft. long or less. Leaflets 9-21, narrowly elliptical to nearly round; obtuse or retuse. Stipules large, erect, persistent; purplish-tinged. Racemes 6-12 flowered; capitate at first, elongated in fruit. Standard whitish or light purple, keel dark purple; wings whitish, purplish-tinged. Legume smooth, leathery; twice as long as broad; tipped by the persistent style. Dry soil. March-June.

3. *A. Beckwithii* T. & G. Stems 1-2 ft. long, several from the same root; diffusely spreading; glabrous or nearly so. Leaflets 6-12 pairs, broadly elliptical, $\frac{1}{2}$ inch long. Inflorescence a short, loose raceme of 5-8 yellowish-white flowers. Legume about 1 inch long, slightly curved; often blotched with red. In dry soil. May-June.

4. *A. argophyllus* Nutt. (*A. glareosus* Dougl.) Depressed-caespitose; villous-silky with white hairs. Stem short. Leaflets 11-15. Flowers 3-6. Corolla narrow, bright violet. Legume incurved; silky-pubescent, but becoming grabrate; oblong-ovate. Dry gravelly soil or rocky places. May-July.

5. *A. Purshii* Dougl. Canescent with a long, dense, woolly pubescence. Stem very short. Leaflets 9-17; lanceolate or oblong. Flowers yellowish-white, the keel purple-tipped. Legume leathery, very densely white-woolly, somewhat curved. Dry plains. June-July.

6. *A. utahensis* T. & G. Sheep-pod; Lady-slipper; "Wild Sweet Pea." Herbage soft-woolly, the pubescence appressed. Stems short, prostrate from a stout, perennial root. Leaves odd-pinnate. Inflorescence loosely capitate. Flowers about an inch long. Calyx long-cylindric. Corolla pink-purple, fading to blue. Legume very soft-woolly; short, leathery, sessile. In dry, gravelly soil. April-November.

7. *A. agrestis* Dougl. (*A. goniatus* Nutt.; *A. hypoglottis* Auct. Amer., not L.) Stems slender, procumbent or ascending. 3-10 inches high. Leaflets 13-21, oblong, rather thick. Peduncles erect, bearing a capitate cluster of erect, purplish flowers. Calyx loosely pubescent with whitish hairs. Corolla violet or yellowish-purple. Legume sulcate dorsally, silky-villous with black hairs. In wet meadows. May-June.

8. *A. lentiginosus* Dougl. Many-stemmed; more or less hoary-pubescent with appressed hairs. Stems decumbent or ascending, 4-15 inches long. Leaflets 11-19, obovate; obtuse or retuse. Corolla white or yellowish, the wings and keel often purple-tipped. Legume $\frac{1}{2}$ -1 inch long; ovate; slightly puberulent. Rather moist places. May-June. Includes *A. diphysus* A. Gray and *A. ineptus* A. Gray.

9. GLYCYRRHIZA. Wild Licorice.

Glandular-viscid perennials from a long, sweet tap-root. Leaves odd-pinnate, with minute stipules. Inflorescence axillary; spicate, on long peduncles. Flowers white or bluish. Stamens diadelphous (9 and 1), with 1-celled anthers. Legume 1-celled, almost indehiscent, densely armed with hooks, resembling a miniature cockle-bur.

1. *G. lepidota* Nutt. Stems erect, branching; 1-3 ft. high. Leaflets 15-19. Spike erect, short. Pod light-brown.

10. VICIA. Vetch. Wild Pea.

Climbing or trailing, annual or perennial herbs with pinnate leaves terminated by a tendril; stipules semi-sagittate. Inflorescence axillary; racemose or solitary. Flowers showy. Stamens diadelphous (9 and 1) or monadelphous at base. Style slender, tipped by the hairy and capitate stigma. Legume flat; dehiscent; continuous between the seeds.

1. *V. americana* Muhl. Pea Vine. Perennial, 2-3 ft. long, glabrous or with appressed pubescence. Leaflets broadly elliptical, with obscure veinlets. Flowers 3-9, in loose racemes; bluish-purple. In moist shady places, near streams. May-August. Not common. Usually represented by the var. *truncata* (Nutt.) Brewer. (*V. Oregana* Nutt.) This is distinguished from the type by the thicker, strongly-veined leaves, which are truncate at the apex and not so broadly elliptical. Stipules broadly semi-sagittate. The common form. Both forms are locally called "Wild Sweet Pea."

11. **LATHYRUS.** Vetchling; Everlasting Pea.

Perennial climbing or trailing herbs. Leaves pinnate, mostly terminated by tendrils. Inflorescence racemose. Stamens as in *Vicia*. Style flattened; hairy along the side next to the distinct stamen.

Tendrils 2 to each leaf.

Leaflets oval, obtuse at both ends..... 1. **L. utahensis**

Leaflets narrowly elliptical, acute at both ends 2. **L. leucanthus**

Tendrils 1 to each leaf (sometimes undeveloped) 3. **L. brachycalyx**

1. **L. utahensis** Jones. Plant smooth, 2-6 ft. high. Leaflets strongly veined; 1-2 inches long; 4-6 pairs; stipules leafy. Peduncles 4-8 inches long, bearing 4-6 white, yellowish-white or purplish flowers that fade to blue on drying, each about $\frac{3}{4}$ inch long. Mountain slopes. May-July.

2. **L. leucanthus** Rydb. Stem winged and conspicuously 4-5-angled; slender; 1-3 ft. long. Leaves terminated by 2 tendrils; leaflets 4-8; veiny; narrow to ovate-lanceolate. Stipules semi-sagittate. Flowers 2-6, in loose long-peduncled racemes; pink-purple to nearly white. Legume flat; sessile. In open woods near streams. May-July.

3. **L. brachycalyx** Rydb. Perennial from a creeping rhizome. Stem unbranched or slightly branched; sharply 4-angled. Leaves with pubescent semi-sagittate stipules and a somewhat winged rhachis. Leaflets 2-5 pairs, strongly veined. Raceme short, 2-6 flowered. Corolla purple, fading to blue. On rather dry mountain sides. May-June.

ORDER GERANIALES.**GERANIACEÆ.** Geranium Family.

Herbs with stipulate leaves. Flowers regular, with hypogynous parts. Sepals 5, imbricated. Petals 5. Stamens 10, or only 5 with anthers. Pistil with 5 styles adnate to a central column from which they separate at maturity. Ovaries 2-ovuled, but each maturing a single seed.

Leaves pinnately divided..... 1. **Erodium**
Leaves palmately parted or cleft..... 2. **Geranium**

1. **ERODIUM.** Filaree; Alfilaria; Pin Clover.

Winter annuals (or biennials) from a tap-root, with jointed nodes and opposite leaves. Inflorescence axillary; umbellate. Flowers regular or nearly so. Fertile stamens 5, alternate with the 5 sterile ones, which consist of scale-like filaments. Styles bearded inside; in fruit, twisting spirally when dry and untwisting when moistened.

1. *E. cicutarium* (L.) L'Her. Clocks; Storksbill; Pinkets. At first acaulescent, the leaves forming a close rosette upon the ground; at length ascending; villous-pubescent; stems red or green. Basal and lower stem-leaves petioled, pinnate with finely pinnatifid subsessile divisions. Pedicels at length reflexed, but the fruit remains erect. Flowers 4-8 in a 4-bracted umbel. Sepals tipped by 1-2 bristle-like hairs. Petals pink-purple with darker veins; hairy at the very base. An abundant weed of waste places. January-December.

2. GERANIUM.

Annual or perennial herbs, with forking stems and swollen nodes. Leaves simple. Inflorescence axillary; umbellate or solitary. Stamens 10; all with perfect anthers and in 2 sets as to length, or as in *Erodium*. Carpels 5.

Annual with weak stems and small flowers; stamens 5 1. *G. pusillum*
Perennials with stout stems and showy flowers; stamens 10.

Plant more or less tufted; petals pink-purple 2. *G. Fremontii*
Plant scarcely tufted if at all; petals usually white 3. *G. Richardsonii*

1. *G. pusillum* Burm. f. Cranesbill. Stems slender and weak; pubescent or villous; 4-18 inches long. Leaves round in outline with a heart-shaped base; deeply divided into 7-9 more or less wedge-shaped lobes that are entire or 3-toothed at the apex. Flowers 2 to each peduncle; small; pink-purple, with notched petals. Anther-bearing stamens often only 5 as in *Erodium*. In waste places; not common. May-September.

2. *G. Fremontii* Torr. (*G. nervosum* Rydb.) Perennial from a branched caudex. Stems tufted; ascending or spreading; pubescence more or less glandular above. Leaves large and rather thick; those from the caudex long-petioled and 7-cleft into wedge-shaped and 3-lobed or -incised segments; stem-leaves deeply 3-5-cleft. Pedicels stout; hirsute-glandular. Sepals awn-tipped. Petals pink-purple, with darker veins of same color; reversely-heart-shaped. Moist ground in river-valleys and on mountain slopes. June-August.

3. *G. Richardsonii* F. & M. (*G. strigosum* Rydb.) About same size as No. 2; perennial from an unbranched or slightly branched caudex. Stems single or few; erect or ascending; nearly glabrous or purplish glandular-pubescent. Leaves large and thin; those from the caudex long-petioled and 3-5-parted into incised, lobed or toothed divisions. Pedicels glandular. Sepals awn-tipped. Petals white (or sometimes pink). Moist shady places near mountain streams.

LINACEÆ. Flax Family.

Herbs with leaves alternate or opposite, entire and exstipulate. Inflorescence a raceme or a corymbose or paniced cyme. Flowers perfect; regular and usually symmetrical; the parts hypogynous. Sepals and petals normally 5, the latter usually ephemeral. Stamens

equalling the petals in number; monadelphous at base. Pistil of 5 (or sometimes 2-3) distinct or united carpels, each carpel containing 1-2 ovules. Fruit a capsule, which is as many celled as there are styles; each cell being partially divided into 2.

1. **LINUM.** Flax.

Herbs with tough fibers in the bark, and sessile leaves. Sepals, petals and stamens 5-merous. Styles 2-5. Ovary globose.

1. **L. Lewisii** Pursh. (L. perenne of Coulter's Manual; not L.) Blue Flax. Perennial. Stems several from the same root; erect, smooth, 1-3 ft. high. Leaves alternately 8-13; linear to narrowly-lanceolate, numerous; with a gland taking the place of stipules. Inflorescence corymbose. Flowers large, sky-blue. Styles 5. Capsule when ripe longer than the calyx. Dry plains. May-July.

ORDER SAPINDALES.

ANACARDIACEÆ. Cashew Family.

Shrubs or trees with a resinous or milky acrid juice. Leaves alternate and without stipules. Inflorescence paniculate. Flowers small and regular; usually dioecious or polygamous. Sepals 5. Petals 5. Stamens as many or twice as many as the petals. Styles (or stigmas) 3. Ovary 1-celled and 1-ovuled, ripening into a dry drupe.

1. **RHUS.** Sumac.

Shrubs or trees, with alternate and exstipulate 3-foliate or pinnate leaves. Inflorescence axillary or terminal. Flowers small; polygamous; greenish or yellowish-green. Stamens 5. Pistil 1; ovary 1-ovuled; styles 3, terminal. Fruit a small berry-like drupe.

1. **R. canadensis trilobata** (Nutt.) Gray. (*R. aromatica trilobata* Gray.) Squawbush; Skunkberry. (Known medicinally as Sweet, Fragrant or Aromatic Sumac.) A glabrous, bushy shrub 2-7 ft. high; strongly ill-scented. Leaves petioled; 3-foliate. Leaflets sessile or nearly so; the terminal one wedge-shaped, the lateral ones smaller and obovate; all more or less lobed. Flowers appearing before the leaves; yellowish-green; in paniced spikes, some of which are at the end of the branch, others at the ends of short lateral twigs. Drupe dark-red; flattened; viscid-coated; acid to taste. Stone smooth. Dry hills and plains. April-May.

CELASTRACEÆ. Staff Tree Family.

Shrubs or trees. Leaves simple; with small stipules that very soon drop off. Flowers small; regular and usually perfect. Calyx 4-5-lobed. Petals 4-5. Stamens as many as the petals and alternate with them, inserted on the margin of a broad disk that lines the calyx-tube and sometimes covers the ovary. Styles united into 1. Fruit a fleshy 2-5-celled capsule. Seeds arilled.

1. **PACHYSTIMA.** Mountain Hedge; Larb.

Low, slender-branched glabrous shrubs. Leaves opposite; leathery; evergreen; smooth; upper surface shining; on very short petioles. Inflorescence axillary; cymose. Flowers small; greenish or reddish. Calyx 4-lobed. Petals 4. Stamens 4. Ovary superior; 2-celled; style very short.

1. **P. Myrsinites** Raf. Branches often curved. Leaves ovate to elliptical; wedge-shaped at base; serrate or serrulate. In dense clumps on wooded slopes. May-July.

ACERACEÆ. Maple Family.

Shrubs or trees. Leaves opposite; simple or compound. Flowers small and regular, appearing before or with the leaves; in polygamous or dioecious racemes or umbel-like corymbs. Calyx usually 5-lobed; petals equal in number to calyx-lobes or none; stamens 3-12, usually 8; and pistil 1 with 2 long styles. Ovary 2-celled, 2-lobed, ripening into a pair of winged fruits (samaras). Ovules 2 in each cell.

1. **ACER.** Maple.

Wings extending in one direction from the seed, not developed equally on all sides.

Leaves simple, palmately-lobed.

Petals present.

Cultivated; leaves large.

Flowers in corymbs..... 1. **A. platanoides**

Flowers in drooping racemes 2. **A. Pseudo-platanus**

Native; leaves small..... 3. **A. glabrum**

Petals wanting.

Flowers appearing with or just before the leaves 4. **A. grandidentatum**

Flowers appearing much before the leaves 5. **A. saccharinum**

Leaves pinnately-compound..... 6. **A. Negundo**

1. **A. platanoides** L. Norway Maple. A round-topped tree with branches that exude a milky juice when broken. Leaves bright-green; 3-7-lobed and sharply much-toothed. Flowers monoecious, appearing with or before the leaves on the season's growth; yellowish-green and conspicuous; from quite large terminal buds, the scales of which enlarge and form a conspicuous involucre to the umbel-like corymb. Disk conspicuous. Samaras large, dark-brown, strongly-veined, with wide-spreading wings; truncate where they touch each other; dropping off in the autumn. April. Growing only in cultivation.

2. **A. Pseudo-platanus** L. Sycamore Maple. A medium-sized tree with rather large, deeply 3-5-lobed leaves. Flowers from terminal buds, polygamous, appearing after the leaves; greenish-yellow, in terminal, drooping, compound racemes, the lowermost flowers of the raceme being fertile. Stamens 8; filaments hairy. Ovaries very woolly. Samaras woolly on the inside around the seeds; remaining on the tree until the following spring. May-June. In cultivation only.

3. **A. glabrum** Torr. Mountain Maple. A slender-branched shrub or small tree with gray branches and reddish twigs, often growing in clumps. Leaves small (the largest scarcely exceeding 2 inches in length and slightly more in width); not leathery; 3 (or 5) lobed to divided, the lobes or divisions with many unequal coarse and sharp teeth. Petioles, peduncles and the fruit-wings often red on the upper surface. Flowers few; polygamous; in peduncled, nodding, umbel-like corymbs. Stamens 8. Fruit $\frac{3}{4}$ inch long or less; wings broad. April-May. 5,000-9,000 ft.

4. **A. grandidentatum** Nutt. Shrubby Maple. Shrub or small tree, somewhat larger than No. 3. Leaves strongly netted-veined; somewhat leathery; the largest 3 inches in diameter; 3-lobed, or 5-lobed with the 2 lowermost lobes scarcely more than teeth and the 3 upper ones coarsely and bluntly 3-5 toothed at apex, their sides entire or sinuate. Flowers both from axillary and terminal buds; monoecious or polygamous; on long, hairy pedicels, in nearly sessile, drooping, umbel-like corymbs. Disk hairy. Stamens 8, long; wings narrow. Along streams and in rich soil on foothills, often forming copses. March-May. 4,500-6,000 ft.

5. **A. saccharinum** L. (*A. dasycarpum* Ehrh.) White, Soft or Silver Maple. A large tree often reaching a height of 100 ft. or more; bark flaky. Leaves silvery-white beneath; deeply 5-lobed, the lobes and sinuses acute. Flowers on short pedicels; in lateral, umbel-like corymbs. Stamens 3-6. Fruit woolly when young; falling the last of April or the first of May. Cultivated. March.

6. **A. Negundo** L. (*Negundo aceroides* Moench.) Box Elder or Ash-leaved Maple. A tree sometimes approaching a height of 80 ft. Young branches often purplish-red with a white bloom. Leaves petioled; pinnately 3-5 foliate; leaflets toothed or lobed, ovate, veiny, pubescent when young but at length glabrous. Disk none. Flowers from mixed axillary buds (staminate flowers from accessory buds also); dioecious; apetalous; greenish; on long, drooping stems; appearing before the leaves; staminate flowers in umbels, the pistillate in drooping racemes. Stamens 4-5, with reddish subsessile anthers. Cultivated and along streams. March-April.

ORDER RHAMNALES.

RHAMNACEÆ. Buckthorn Family.

Shrubs or small trees, often thorny. Leaves simple, usually alternate, with small deciduous stipules. Inflorescence axillary or terminal. Flowers small and regular; dioecious, polygamous or perfect. Calyx 4-5-toothed. Corolla (if present) of 4-5 perigynous petals. Stamens of the same number as the petals, and opposite them. Ovary 2-5-celled, ripening into a drupe or capsule.

1. **CEANOTHUS.** Snow Brush; Mountain Lilac.

Leaves more or less leathery. Inflorescence a cymose panicle. Flowers small; perfect; blue or white. Petals 5, long-clawed at base, and hooded above by the coming together of their arched blades. Stamens 5. Style 3-cleft. Ovary half-sunken in the disk. Fruit a 3-celled and 3-seeded elastically-dehiscent capsule.

1. **C. velutinus** Dougl. A thornless shrub 2-12 ft. high, usually glabrous, often shining. Leaves thick and leathery; elliptical or ovate; varnished above, more or less velvety beneath. Flowers white; fragrant. Near the summits of mountain ridges. May-June.

ORDER MALVALES.

MALVACEÆ. Mallow Family.

Herbs or shrubs with mucilaginous juice, and alternate, stipulate usually palmately-veined leaves. Flowers regular. Sepals 5, valvate. Petals 5, convolute, united at their bases and with the base of the stamen-column. Anthers 1-celled, borne on a short filament attached by its base to a central stamen-column, which encloses the carpels. Pistils several; the ovaries united in a ring or forming a several-seeded pod.

- Stigma lateral..... 1. **Malva**
 Stigmas capitate.
 Bractlets not bristle-like.
 Ovule 1 only to each cell of the ovary.. 2. **Malvastrum**
 Ovules 2 (rarely 1 or 3) to each cell of the
 ovary 3. **Sphaeralcea**
 Bractlets bristle-like..... 4. **Sida**

1. MALVA. Mallow.

Pubescent or glabrate herbs, of erect, ascending or prostrate habit. Flowers perfect. Calyx with a 3-leaved involucre at base, which looks like an outer calyx. Stigmas linear. Carpels crowded side by side in a circle, all together resembling a cushion. Fruit a schizocarp.

1. *M. rotundifolia* L. Cheeses. Annual or biennial herb from a long tap-root. Stems glabrate; procumbent to ascending. Leaves long-petioled; round-cordate with crenate margins. Flowers axillary. Petals narrowly obovate; whitish with pink veins. Carpels about 15, pubescent; half as long as the petals. Very common; in waste places. May-August.

2. MALVASTRUM. Star-mallow.

Annual or perennial herbs, often tufted. Leaves entire or palmately lobed, cleft or divided. Flowers perfect, showy, in naked or leafy subpannulate racemes. Calyx 5-cleft, 1-3-bracted or naked. Stigmas capitate. Carpels 5 or more, dehiscent; each cell of the ovary 1-seeded, the seed ascending.

1. *M. coccineum* (Pursh) A. Gray. Red False Mallow. (Locally called "Slippery Elm.") A bushy perennial; erect or ascending; abundantly covered with a scurfy stellate pubescence; spreading by slender creeping rhizomes. Leaves palmately 3-5-parted or divided, the divisions wedge-shaped, 2-3-lobed. Flowers brick-red, $\frac{1}{2}$ inch in diameter. Carpels 10-15. In dry soil in fields and waste places. May-October. Very variable.

1a. *M. coccinium dissectum* (Nutt.) (M. dissectum (Nutt.) A. Nels.) Leaves covered with a hoary-white pubescence; dissected into narrow segments.

1b. *M. coccinium elatum* E. G. Baker. (M. elatum (E. G. B.) A. Nels.) An erect, less-branched form with stems several from the same root, 12-20 inches high. Leaf-divisions wedge-shaped, as in the type.

3. SPIHAERALCEA. Globe Mallow.

Differing from Malvastrum only in that the carpels are 2-3-seeded. (Sometimes the carpels of this genus will be only 1-seeded, in which case the upper part of the carpel will be empty.)

Stems rather slender, 1-2 ft. high; petals scarlet 1. *S. Munroana*
Stems stout, 2-6 ft. high; petals pink or white... 2. *S. rivularis*

1. *S. Munroana* (Dougl.) Spach. (Malvastrum Munroanum Gray.) A perennial with leafy, densely stellate-pubescent stems. Leaves cordate, the 3-5 obtuse lobes crenate. Corolla less than an inch in diameter; petals obovate. Mature carpels kidney-shaped, rounded at summit, pubescent on back. Dry soil. June-July.

2. *S. rivularis* (Hook.) Torr. (*S. acerifolia* Nutt.) Rose of Sharon. An erect, stellate-pubescent perennial, sometimes bushy. Leaves large (2-6 inches in diameter), 5-7 palmately-lobed or parted, their shape much resembling that of the maple. Flowers 1-1 $\frac{1}{2}$ in. across, mostly in subpannulate racemes. Calyx with an involucre of 3 bractlets. Carpels sev-

eral, beakless, stellate-pubescent and armed with stiff hairs that become prickles in fruit. Along banks of mountain streams. June-August.

4. SIDA.

Calyx usually without bractlets. Carpels 1-seeded, the seed pendulous.

1. *S. hederacea* Torr. Perennial; stellately pubescent; stem short, procumbent. Leaves thick; reniform-cordate, oblique at base crenate. Peduncles axillary; solitary; 1-flowered. Petals oblique, pubescent on the outside. That part of corolla exposed in the bud is colored purplish; the rest yellow. Calyx with 1-3 setaceous bractlets. Carpels 8-10, pointless. In alkaline soil. June-October.

ORDER VIOLALES.

VIOLACEÆ. Violet Family.

Herbs with simple, stipulate and basal or alternate leaves. Flowers axillary or scapose; nodding; irregular. Sepals 5. Petals 5, the lowest one usually larger or spurred. Stamens 5, with anthers erect, sessile or on short filaments, connate around the pistil. Stigma 1; style 1; ovary 1, 1-celled, with 3 parietal placentae.

1. VIOLA. Violet.

Perennials often from short, fleshy rhizomes. Flowers axillary or scapose, solitary; showy, or the later ones apetalous and cleistogamous and concealed among the leaves near the ground. Sepals of the showy flowers are nearly equal; prolonged backward into ears.

Petals blue or violet.

Leaves divided, pale-green..... 1. *V. Beckwithii*

Leaves crenate or serrate, not divided; dark-green.

Leaves all basal.

Beard of lateral petals strongly

knobbed 2. *V. cucullata*

Beard of lateral petals not strongly

knobbed 3. *V. nephrophylla*

Leaves both cauline and basal.... 4. *V. adunca longipes*

Petals yellow (at least on inside).

Petioles much longer than the peduncles.... 5. *V. Nuttallii*

Petioles not much longer than the ped-

uncles 6. *V. linguaefolia*

Petals white.

Leaves all basal..... 7. *V. blanda*

Leaves not all basal..... 8. *V. canadensis*

1. *V. Beckwithii* T. & G. Western Pansy Violet. Stem distinct, but short. Leaves biternately or pedately parted, the primary divisions ternately or pinnatisectly divided into linear lobes; pale green; stipules very small and inconspicuous, except on the lower leaves. Peduncles 2 inches long; naked. Sepals linear, obtuse, ciliolate. Petals minutely bearded at the gibbous summit; the lower one barely saccate at base, and deep purple with yellow claws; the 2 upper shorter and deep violet. Stigma lateral. Dry plains. April. Locally called "Bird-foot Violet."

2. *V. cucullata* Ait. Hooded Violet. Leaves from a thickened and fleshy rootstalk; heart-shaped with a crenate-serrate margin and acute apex. Flowers violet-blue, becoming darker near the throat. Sepals narrowly lanceolate. Spurred petal smooth. Cleistogamous flowers long and slender. Seeds dark-brown. Moist places. May-June.

3. *V. nephrophylla* Greene. Herbage glabrous; plants not stoloniferous. Leaves from a fleshy and thickened rootstalk; the earliest ones round or slightly kidney-shaped, and the later ones broadly heart-shaped with obtuse and obscurely crenate margins. Flowers blue-violet. Sepals lanceolate to ovate. Spurred petal villous. Cleistogamous flowers ovoid or acuminate-ovoid. Seeds olive-brown. Swamps, especially near cold springs. May-June.

4. *V. adunca longipes* (Nutt.) Rydb. (*V. canina longipes* Wats.) Stem mostly simple; at length producing stolons on which are borne cleistogamous flowers. Leaves elliptical-ovate to ovate, cordate at base; margins more or less crenate; apex obtuse. Flowers axillary, pale blue to nearly white; on peduncles usually longer than the stem-leaves. Lateral petals bearded. Spur short, straight, thick. In canyons. 5,000-9,000 ft.; the mountain forms much reduced in size. April-August.

5. *V. Nuttallii* Pursh. Stems several, short from thick, often branched or fascicled roots. Leaves usually erect; their blades oblong-lanceolate or narrower, tapering to the margined petiole, with entire or obscurely dentate margins; petioles usually much longer than the blade. Peduncles usually much shorter than the leaves. Sepals lanceolate. Plains and mountain sides, preferring rich, moist soil in the shade. March-May.

6. *V. linguaefolia* Nutt. (*V. vallicola* A. Nels.; *V. physalodes* Greene.) Plant more or less white-hirsute. Stems several, very short, from a slender rootstalk. Leaves erect or ascending; blades oblong-ovate to ovate, usually not tapering to the petiole, with margins obscurely denticulate and ciliate; petioles usually not much longer than the blades, and much shorter than the peduncles. Flowers 2-3 times as large as those of No. 5. Sepals narrowly linear. (*V. atriplicifolia* Greene is a dwarf form with coarsely-toothed leaves, or the upper ones sharply lobed; their margins not ciliate.) In exposed places on gravelly plains and mountain sides. April-July.

7. *V. blanda* Willd. Sweet White Violet. Smooth or slightly pubescent; stoloniferous. Leaves all basal, from a slender rhizome; broadly heart-shaped or kidney-shaped; crenate and obtuse. Peduncles often longer than the leaves. Flowers fragrant. Petals beardless or nearly so; all but the 2 upper ones purple-veined. In swamps and along streams in the mountains. April-July.

8. *V. canadensis scopulorum* A. Gray. Dwarf Canada Violet. Glabrous or nearly so; depressed-spreading; stem 1-3 inches high from branching rhizomes. Leaves cordate and mostly acuminate, denticulate-serrate; at flowering time $\frac{3}{4}$ inch or less in length. Outside of petals usually pale-violet; inside white with yellowish base, and more or less streaked with purple. April-May. In the mountains.

LOASACEÆ. Loasa Family.

Herbs with barbed or stinging hairs and exstipulate, simple leaves. Inflorescence solitary, racemose or cymose. Flowers regular. Sepals 4-5, epigynous. Petals 4-5, or sometimes 10, perigynous. Stamens many, perigynous; sometimes petaloid. Ovary "inferior," 1-celled, with 2-3 parietal placentae.

1. MENTZELIA. Blazing Star; Evening Star.

Leaves alternate; entire or pinnately lobed, cleft or divided. Stems white; together with the leaves, covered with barbed hairs. Fruit a dry capsule, opening at the summit.

1. *M. dispersa* Wats. (*M. integrifolia* (Wats.) Rydb.) A slender annual. Stems erect; simple or branching; 4-16 inches high. Leaves from entire to sinuate-toothed. Flowers small, pale yellow. Seeds somewhat cubical; smooth or nearly so. On moist rich banks. May-August.

ORDER OPUNTIALES.

CACTACEÆ. Cactus Family.

Green, fleshy and thickened mostly leafless plants; globular or columnar and many angled, or flattened and jointed; usually armed with bundles of spines from the areolae, which constitute the axils of the (mostly absent) leaves. Inflorescence mostly solitary. Flowers showy. Sepals, petals and stamens numerous, in several series, forming a cup above the 1-celled, many-ovuled ovary. Placentae parietal, several. Fruit a more or less fleshy berry.

1. OPUNTIA. Prickly Pear.

Stems jointed; flattened or cylindrical. Leaves deciduous. Spines barbed. Flowers red or yellow, borne on spine-bearing areolas. Petals many; slightly united at base. Stamens very numerous. Filaments distinct or slightly united. Fruit pear-shaped with a flattish apex.

Joints strongly flattened..... 1. *O. polyacantha*
 Joints slightly flattened if at all..... 2. *O. fragilis*

1. **O. polyacantha** Haw. (*O. missouriensis* DC.) Joints strongly compressed (except in young seedlings); broadly ovate and tuberculate, 2-4 inches long; leaves very small, their axils armed with a tuft of slender bristles. Flowers pale yellow. Fruit dry, very spiny. In dry soil on hillsides. May-June.

2. **O. fragilis** (Nutt.) Haw. Joints compressed or sometimes terete; 1-1½ in. long, ovoid or subglobose. Leaves very small, reddish. Areolae with few bristles; central spines 1-4. Flowers yellow, smaller than those of No. 1. Fruit dry, with areolae of spines and a few short bristles. In dry soil. May-June.

ORDER MYRTALES.

ONAGRACEÆ. Evening Primrose Family.

Herbs with simple, usually exstipulate leaves. Inflorescence axillary or terminal; solitary, spicate or racemose. Flowers complete; regular; symmetrical. Sepals epigynous; usually 4. Petals 2-6, usually 4; perigynous. Stamens 2-12, as many or twice as many as petals; perigynous. Ovary usually 4-celled, and then with many ovules on axile placentae; conspicuously "inferior." Stigma 2-4-lobed or capitate. Fruit a capsule or nutlet.

Ovary 4-celled, many-seeded; fruit a capsule.

Lower leaves opposite; seeds comose at apex.. 1. **Epilobium**

All the leaves alternate (or basal); seeds not comose.

Petals yellow, white or rose; anthers versatile 2. **Oenothera**

Petals purple or red-violet; anthers erect... 3. **Clarkia**

Ovary 1-celled, 1-4-seeded; fruit nut-like, indehiscent... 4. **Gaura**

1. **EPILOBIUM.** Willow Herb.

Leaves nearly sessile, with entire or serrate margins. Calyx 4-parted. Petals 4. Stamens 8, the alternate ones the longer. Capsule loculicidal, 4-angled; the seeds with a tuft of long hairs at the apex.

Annual; leaves entire or nearly so..... 1. **E. paniculatum**

Perennial; leaves serrulate or denticulate.... 2. **E. adenocaulon**

1. **E. paniculatum** Nutt. Slender-stemmed, erect and often diffusely-branched; glabrous or somewhat glandular-pubescent above; 6-36 inches high. Leaves linear or lanceolate; obscurely serrulate. Flowers few, small, terminal. Petals white or rose-color, notched at apex. On plains and in canyons, June-September. Varying much in size and branching according to water-supply of its habitat.

2. *E. adenocaulon* Haussk. Erect, much-branched, leafy, producing rosettes or turions; more or less white-hairy above (the inflorescence and capsules glandular-pubescent); 1-3 ft. high; often purplish. Leaves often erect; lanceolate-elliptical or ovate-lanceolate; mostly abruptly rounded into a short petiole; 2-6 inches long. Flowers numerous; small; axillary and often nodding. Petals white or pink, notched at apex. Seeds abruptly short-beaked with white coma. In water near springs. May-October.

2. **OENOTHERA.** Evening Primrose.

Leaves alternate or all basal. Calyx-tube prolonged above the ovary. Calyx-lobes 4, reflexed; often remaining united at the apex. Stamens 8, the anthers mostly versatile. The pollen often clings together like a spider's web. Flowers showy; yellow, white or rose-color. Stigma capitate or with 4 linear divisions. Capsule loculicidal.

Leaves alternate (or some basal).

Stigma deeply 4-cleft, its segments linear; biennials.

Flowers yellow; ovules and seeds horizontal.

Petals not over an inch long..... 1. *O. strigosa*

Petals as much as 1½ inches long.... 2. *O. Hookeri*

Flowers white; ovules and seeds ascending 3. *O. pallida*

Stigma capitate; annual..... 4. *O. utahensis*

Leaves all basal.

Flowers yellow..... 5. *O. subacaulis*

Flowers white (becoming rose-color in age).

Plant smooth; leaves somewhat leathery 6. *O. caespitosa*

Plant hairy; leaves not at all leathery.. 7. *O. marginata*

1. *O. strigosa* (Rydb.) (*O. muricata canescens* (T. & G.) Robinson.) Plant beset with rigid grayish hairs; 16-40 in. high. Basal leaves obovate or spatulate with obtuse apex; stem-leaves lanceolate to oblanceolate with acute apex and wavy margins. Spike many-flowered, leafy-bracted. Calyx-segments with short, free tips. Corolla yellow, not turning rose-color on fading. In rich, usually moist soil in open places. June-October.

2. *O. Hookeri* T. & G. (*O. biennis hirsutissima* A. Gray; *Anogra Hookeri* (T. & G.) Small.) Plant hairy; stems erect, stout, usually unbranched. Leaves lanceolate to ovate-lanceolate; acute to acuminate, wavy-margined and minutely toothed. Spike many-flowered, leafy-bracted. Calyx-segments acuminate. Corolla yellow, usually tinged with red, especially when fading. In open ground. May-August.

3. *O. pallida* Lindl. (*O. albicaulis* Nutt.; *O. Nuttallii* Sweet; *Anogra Nuttallii* (Sweet) A. Nelson; *Anogra pallida* Britton). A perennial with stems erect or sometimes straggling, usually branched, white and shreddy; glabrous or puberulent, or sometimes with a few scattered hairs. Leaves linear or narrowly lanceolate; entire, repand or pinnately-lobed; sessile or the lowermost petioled. Flowers axillary, drooping while in the bud. Calyx-lobes linear, the tips free in the bud. Throat of calyx glabrous. Petals nearly round; entire or notched; white, turning to rose-color after fertilization of ovules. Capsule curved; seeds smooth; in 1 row. Dry sandy soil of plains. May-October.

4. **O. subacaulis** (Pursh.) (Taraxia subacaulis (Pursh) Rydb.; *O. heterantha* Nutt.) Glabrous or glabrate perennial. Leaves lanceolate, tapering into a slender petiole; entire or denticulate. Calyx-segments linear-lanceolate; calyx-tube longer than the ovary. Capsules sessile; 4-winged. May-August. In the mountains.

5. **O. utahensis** (Small). (*Sphaerostigma utahense* Small). A villous annual, with a stem a foot or less high. Leaves varying from spatulate to ovate, densely villous; narrowed into slender petioles. Flowers white. Style slender; longer than the stamens. Stigma capitate. Capsule linear, sessile, scarcely narrowed above; slightly glandular. June.

6. **O. caespitosa** Nutt. (*Pachylophus caespitosus* (Nutt.) Raimann.) Biennial or perennial from a thick root. Leaves all basal, forming a loose rosette; lanceolate or oblanceolate, narrowed into a slender petiole; sinuate-dentate. Flowers few; white or rose-color; erect in bud. Calyx-tube long, resembling a peduncle. Capsules sessile; crested or margined. Stigma 4-lobed. On sunny mountain slopes, usually among rocks. May-July.

7. **O. marginata** Nutt. (*Pachylophus marginatus* (Nutt.) Rydb.) Much like No. 5, but the leaves are not leathery, the flowers are larger and with a tendency to open farther, the calyx and fruit are densely hirsute and the leaves are scarcely less so, and the capsule is stipitate. Dry gravelly plains, April-June. Locally known as "Sand Lily."

3. CLARKIA.

Erect annuals with brittle, somewhat succulent stems. Leaves alternate; petioled or the uppermost sessile. Inflorescence terminal; racemose. Flowers showy. Petals 4; purple or red-violet; clawed. Stamens 8, but the 4 opposite the petals often sterile. Style 1; stigma 1, broadly 4-lobed. Ovary 4-celled. Capsule 4-angled.

1. **C. rhomboldea** Dougl. More or less branched, finely puberulent; 1-3 ft. high. Leaves elliptical-lanceolate to elliptical-ovate, with entire margins. Petals entire, rhomboidal; rose-purple, often with dots of darker purple near the base. Anthers all perfect. Capsule sessile, often somewhat curved. In rich, moist soil in light shade. May-July.

4. GAURA.

Tall herbs with sessile, alternate leaves. Flowers small, in spikes or racemes. Calyx-tube reflexed, deciduous. Petals clawed; unequal or turned toward the upper side; reddish or white and becoming rose-color on fading. Stamens (and often the style) turned downward; each filament appendaged in front. Stigma 4-lobed. Fruit 3-8-angled or ribbed.

1. **G. parviflora** Dougl. Perennial with a much-branched stem, 2-6 ft. high. Leaves soft-downy; lanceolate to ovate-lanceolate with acute or acuminate apices and wavy margins. Flowers pink, in long terminal spikes. Fruit 8-ribbed, sessile, narrowed at both ends. In dry soil. June-September.

ORDER UMBELLALES.

UMBELLIFERÆ. Carrot or Parsley Family.

Herbs mostly with hollow stems. Leaves mostly compound, more or less clasping at the base. Flowers small; in simple or compound umbels. Calyx-tube adnate to the ovary; its margin truncate or 5-toothed. Petals 5, epigynous. Stamens 5. Pistils with 2 styles and a 2-celled, "inferior" ovary, each cell of which contains a single ovule. Fruit a pair of cremocarps.

"Umbels usually compound, forming umbellets. The bracts under the general umbel form an involucre; under an umbellet an involucl. The enlarged base of the style is the stylopodium, which is often surrounded by an epigynous disk. Each carpel usually has 5 longitudinal ribs; in the intervals are usually one or more longitudinal oil-tubes or vittae. The face by which the 2 carpels cohere is the commissure; a slender prolongation of the axis between them is the carpophore; this is apt to split into 2 branches, a carpel suspended from the tip of each."—Coulter's Manual of Rocky Mountain Botany, page 113.

Mature fruit is necessary for determination of the genera and species.

Oil-tubes wanting or obscure in the mature fruit.

Flowers white..... 1. *Osmorrhiza*

Flowers yellow or purple..... 2. *Leptotaenia*

Oil-tubes distinct.

Fruits strongly flattened dorsally.

Leafy-stemmed, tall, stout, branched.

Stem smooth; flowers yellow..... 3. *Pastinaca*

Stem woolly; flowers white..... 4. *Heracleum*

Mostly short-stemmed; lateral ribs thick. 2. *Leptotaenia*

Mostly without above-ground stem; lateral ribs thin 5. *Cogswellia*

Fruits not dorsally flattened.

With more than 1 oil-tube in each interval.

Seed-face sulcate or decidedly concave 6. *Aulospermum*

Seed-face slightly concave..... 7. *Orogenia*

With a single oil-tube in each interval..... 8. *Zizia*

1. **OSMORRHIZA**. (Washingtonia.) Sweet Cicely.

Perennial from thick aromatic roots. Stem slender, branching. Leaves few; 2-3 times compounded in threes. Umbel compound, few-flowered; with small involucre and involucels or none. Flowers small; white, on long pedicels. Calyx-teeth none. Stylopodium small, conical. Fruit fusiform or cylindrical, with 5 equal and bristly or glabrous ribs (without wings). Oil-tubes none (at least in mature fruit).

Fruit with bristly ribs..... 1. **O. divaricata**
Fruit glabrous..... 2. **O. occidentalis**

1. **O. divaricata** Nutt. (Washingtonia divaricata Britton; W. intermedia Rydb.) Nearly glabrous; 12-30 inches high. Leaflets thin; lanceolate or ovate; acute or acuminate and coarsely toothed. Umbels simple, of 2-9 spreading rays; and white flowers on pedicels usually about as long as the fruit; involucre none. Fruit with a distinct, sharp beak. In rich soil in shady places along streams. May-June.

2. **O. occidentalis** Nutt. (W. occidentalis (Nutt.) Coult. & Rose; Glycosma occidentalis Nutt.) Rather stout; puberulent or glabrous; 1-2 ft. high or even more. Leaves ternate; leaflets lanceolate-oblong; rather thick; acute; coarsely serrate. Umbel 5-12-rayed, without involucre or involucels (or rarely with 1-2 involucral bracts). Fruiting rays usually erect and forming a compact cluster of fruits. Flowers white or greenish. Fruit distinctly beaked; obtuse (not tapering) at base; glabrous. June-July.

2. **LEPTOTAENIA**. (Ferula). "Wild Carrot."

Nearly stemless smooth perennials. Leaves very large; pinnately decompound. Peduncles tall and stout. Involucre none or of a few bracts; involucels of many small bractlets. Flowers yellow or purple, in many-rayed umbels. Calyx-teeth none. Disk small; stylopodium depressed. Fruit flattened; elliptical or nearly round; strongly compressed dorsally with corky lateral wings as thick as the fruit. Oil-tubes 1-6, but obscure; or sometimes wanting.

1. **L. multifida** Nutt. (Ferula multifida A. Gray.) Leaves puberulent, finely dissected into linear divisions. Flowers yellow (or purplish). Fruit pedicelled, usually without oil-tubes. Seed-face concave. Dry plains or hillsides, often in oak copses. May-June. Often called "Wild Parsnip."

1a. **L. multifida Eatoni** (C. & R.) Jones. (L. Eatoni C. & R.) Leaves dissected into oblong divisions. Fruit usually with oil-tubes. Seed-face plane. Same habitat and time of flowering as the type.

3. **PASTINACA**. Parsnip.

Erect branching biennials from thick roots. Leaves once-pinnate. Umbels compound, usually without either involucre or involucels. Flowers yellow. Calyx-teeth wanting. Stylopodium depressed. Fruit oval; smooth, much flattened dorsally. Oil-tubes solitary in the intervals.

1. **P. sativa** L. Stem 2-5 ft. high from a long, conical root. Basal and lower stem-leaves petioled, long (often as much as 1-1½ ft.) Umbels several, 2-6 inches broad. Pedicels very slender. In waste ground. June-Sept.

4. **HERACLEUM.** Cow Parsnip.

Coarse erect perennials with large, ternately decompound leaves. Flowers in compound umbels. Bracts of the involucre (if present) few and deciduous; involucels of many narrow bracts. Outer petals of the marginal flowers much enlarged. Stylopodium thick, conic. Oil-tubes 1 in each interval.

1. **H. lanatum** Michx. Stems ribbed, 4-8 ft. high. Leaflets lobed and cut-toothed, 4-10 inches across; lower surface downy. Fruit somewhat downy. In wet places along streams and around cold springs in the mountains. May-August.

5. **COGSWELLIA.** (Lomatium; Peucedanum in part.)

Mostly acaulescent perennials with thickened roots (usually fusiform or tuberous). Leaves simple or compound. Flowers white, yellow or purple, without involucre but usually with involucels. Calyx-teeth usually wanting. Stylopodium none. Fruit strongly flattened dorsally. Oil-tubes 1-several in the intervals or rarely wanting.

Roots globose or moniliform.

Leaves 1-2 pinnate; umbellets open; pedicels slender 1. **C. ambigua**

Leaves dissected; umbellets compact; pedicels very short 2. **C. leptocarpa**

Roots more or less cylindrical.

Bractlets of the involucel conspicuous..... 3. **C. orientalis**

Bractlets of the involucel small or none.

Fruit from narrowly to broadly oblong.

Leaves 1-2 ternate..... 4. **C. platycarpa**

Leaves mostly much dissected, the segments short 5. **C. millefolia**

Fruit broadly linear to narrowly elliptical 6. **C. bicolor**

1. **C. ambigua** (Nutt.) Jones. (*L. ambiguum* (Nutt.) C. & R.) Acaulescent, or caulescent and then as much as a foot high; from tuberous and sometimes moniliform roots. Leaves on long petioles dilated at the base; the leaflets long and narrow. Umbel unequally 8-18-rayed, without bractlets. Flowers yellow. Fruit glabrous; narrowly oblong and with very narrow wings. Oil-tubes solitary in the intervals. Near streams. May.

2. **C. leptocarpa** (Nutt.) Jones. (*L. leptocarpum* (Nutt.) C. & R.) Acaulescent and glabrous, from deep-seated tuberous roots. Leaves ternate, then pinnate into linear segments. Umbels unequally rayed, the rays few; involucels of small linear bractlets. Flowers yellow. Fruit densely clustered; linear; nearly sessile; with very narrow wings. Oil-tubes solitary in the intervals. Dry hills. April-July.

3. **C. orientalis** Jones. (*Peucedanum nudicaule* Nutt.; *L. orientale* C. & R.) Acaulescent or shortly caulescent from a long, thick root. Leaves bipinnate, the short leaflets toothed. Umbel unequally 5-8-rayed, with involucels of lanceolate, scarious-margined, distinct and often purplish bractlets. Flowers white or pinkish. Fruit glabrous, nearly round; with wings narrower than the body. Oil-tubes solitary in the intervals. Seed-face plane. Dry sunny hillsides. May.

4. **C. platycarpa** (Torr.) Jones. (*L. platycarpum* (Torr.) C. & R.; *L. triternatum platycarpum* Torr; *Peucedanum simplex* Nutt.) Acaulescent or caulescent; often tall and stout; from more or less thickened roots. Leaves 1-2 ternate, with leaflets from narrowly linear to linear-lanceolate. Peduncles usually slender, not swollen at the top, bearing an unequally 3-15-rayed umbel of yellow flowers. Involucels of setaceous or lanceolate bractlets. Fruit broadly elliptical to nearly round, with large oil-tubes solitary in the intervals; wings broader than the body. Dry gravelly plains. April-May.

5. **C. millefolia** (Wats.) Jones. (*C. Grayi* C. & R.; *L. Grayi* C. & R.) Glabrous throughout, from very long, woody, cylindrical roots; strongly scented with the odor of celery-seed. Leaves ternate, then pinnately-decompound into linear-filiform and cuspidate divisions. Umbel rather equally 6-16-rayed, with involucels of distinct linear subulate bractlets. Flowers yellow. Fruit oblong. Oil-tubes solitary in the intervals. Among rocks on sunny mountain summits. April-May.

6. **C. bicolor** (Wats.) Jones. (*L. bicolor* (Wats.) C. & R.) Nearly acaulescent or with a stem 4-18 inches high. Leaves with much dilated petioles; ternate, with tripinnate divisions, the ultimate segments filiform. Umbel very unequally 2-10-rayed, with involucels. Flowers yellow on short pedicels. Fruit glabrous; broadly linear at first, but becoming narrowly elliptical when fully mature; wings very narrow in immature fruit, but becoming wide and conspicuous in age. Oil-tubes large and solitary in the intervals. Dry grassy mountain slopes. May.

6. **AULOSPERMUM.** (*Cymopterus* in part). Indian Parsnip.

Low perennials from a thick root; caulescent or acaulescent. Leaves ternate or more or less pinnately dissected. Umbel usually without involucre; umbellets with small and narrow bractlets. Flowers white, yellow or purple. Calyx-teeth evident. Carpels with 3-5 usually broad, thin wings. Stylopodium none. Fruit glabrous; elliptical or round; more or less laterally flattened. Oil-tubes usually several in each interval. Seed usually sulcate.

Flowers yellow (or a few of them purple)..... 1. **A. longipes**
Flowers white or cream-color (or a few purplish) 2. **A. ibapense**

1. **A. longipes** (Wats.) C. & R. (*Cymopterus longipes* Watson). Glabrous and glaucous; apparently acaulescent when in flower, but the cluster of pinnate or bipinnate leaves at length borne at the summit of an elongated stem, which is sheathed at the base. Umbels 5-10-rayed, without involucre but with subulate bractlets. Oil-tubes 3 in the intervals. On dry, sunny hills in gravelly soil. March-May.

2. **A. ibapense** (Jones) C. & R. (*C. ibapense* Jones.) Leaves tripinnate, their ultimate divisions crowded and obtuse with revolute margins. Umbels 6-8-rayed; without involucre but with involucels of linear bractlets. Oil-tubes 3 in the intervals. Same habitat as the preceding, but mostly at higher elevations.

7. **OROGENIA.**

Stems scape-like. Leaves 1-3 ternate. Involucre none; involucels of few linear bractlets. Flowers white. Calyx-teeth minute. Stylopodium depressed. Fruit oblong, slightly flattened dorsally. Oil-tubes minute; 3 in the intervals. Seed-face slightly concave.

1. *O. linearifolia* Watson. Stem slender, perennial from a deep-seated roundish tuber; 5 inches high or less. Leaves 2-3, upon slender petioles; 1-2 ternate; leaflets entire, linear. Umbels 2-10-rayed, with nearly sessile flowers. Anthers red. March-May. In rich moist soil in shaded mountain valleys.

8. ZIZIA.

Smooth perennials, 1-3 ft. high. Leaves simple or ternately compound. Umbel without involucre and with involucels of small bractlets. Flowers yellow; calyx-teeth prominent. Carpels with filiform ribs and long styles. Stylopodium none. Oil-tubes large, solitary in the broad intervals. Fruit glabrous, flattened laterally; oblong to ovate; the central one of each umbellet sessile.

1. *Z. cordata* (Walt.) Koch. Basal leaves long-petioled; round-cordate with the margin crenate or rarely lobed or divided; stem-leaves of 3-5 ovate and serrate or incised leaflets. Fruit ovate. Wet upland meadows. June-July.

CORNACEÆ. Dogwood Family.

Trees, shrubs or herbs. Leaves simple, entire, exstipulate. Flowers in cymes or involucrate heads. Calyx adherent to the 1-2-celled ovary. Corolla-lobes 4; together with the 4 stamens borne on the "inferior" ovary. Fruit a 1-2-celled drupe or berry.

1. CORNUS. Dogwood; Cornel.

Leaves opposite. Flowers perfect. Calyx minutely 4-toothed. Petals white or greenish. Style slender; stigma capitate or truncate. Fruit a small drupe.

1. *C. stolonifera* Michx. Shrub 3-8 ft. high with branches (especially the "water-sprouts") smooth and bright-red. Leaves ovate, rounded at base, abruptly sharp-pointed; whitish beneath. Flowers small, in open and flat cymes; petals white or somewhat cream-colored. Fruit white or lead-color. Along mountain streams. May-September. Locally called "Kinnikinnick," a name properly belonging to the Bearberry.

ORDER PRIMULALES.

PRIMULACEÆ. Primrose Family.

Herbs with simple exstipulate leaves. Flowers perfect, regular. Calyx usually of 5 united parts. Corolla usually of 5 united petals (wanting in *Glaux*). Stamens as many as the corolla-lobes. Pistil consists of 1 style,

1 stigma and a 1-celled ovary bearing a free-central placenta. The stamens, which are opposite the corolla-lobes, are sometimes monadelphous. Fruit a 2-6-valved capsule.

Inflorescence axillary and solitary..... 1. **Glaux**
 Inflorescence terminal and umbellate.

Petals erect or spreading; stamens distinct... 2. **Androsace**
 Petals reflexed; stamens somewhat monadelphous 3. **Dodecatheon**

1. **GLAUX**. Saltwort.

A low, somewhat succulent perennial with leafy stems. Leaves opposite. Flowers sessile or nearly so. Calyx 5-parted; pink or white. Corolla none. Stamens 5, borne on base of calyx and alternate with its lobes. Capsule dehiscent by valves.

1. **G. maritima** L. Perennial from slender rhizomes; glabrous and glaucous; usually branched; 2-8 inches high. Leaves elliptical or linear-oblong; sessile. Flowers of 2 forms; in one form the stamens are shorter than the pistil, in the other they are longer. Wet places in salty soil. May-August.

2. **ANDROSACE**.

Low annuals or perennials. Leaves (in our species) rosette-forming at base. Flowers small, in involucrate umbels. Calyx persistent. Corolla salver- or funnel-form, the tube shorter than calyx. Stamens distinct; included; with short filaments and short, blunt anthers. Style short.

1. **A. occidentalis** Pursh. Annual, from fibrous roots. Leaves sessile; oblong or spatulate; obtuse. Pedicels scape-like; solitary or numerous; very slender. Bracts of involucre oblong or ovate. Calyx-teeth ovate or triangular-lanceolate and acute; longer than the capsule and at least as long as the calyx-tube. Corolla very small, white; shorter than the calyx. Dry gravelly fields. April-June.

3. **DODECATHEON**. Shooting Star; American Cowslip.

Smooth perennial herbs. Leaves all basal, forming a loose rosette. Flowers terminal on a simple, naked scape. Calyx 5-cleft, the divisions reflexed in flower and erect in fruit. Corolla 5-cleft, the narrow rose-colored divisions reflexed. Stamens borne on the throat of the corolla, exerted, their filaments short; anthers erect, yellow or violet, conniving around the style.

Anthers about as long as tube of united filaments 1. **D. salinum**
 Anthers at least twice as long as tube of united filaments 2. **D. pauciflorum**

1. **D. salinum** A. Nels. Leaves widely spreading or ascending. Bracts oblong or spatulate. Anthers purple with whitish margins. Capsule elliptic, splitting from the obtuse summit into 2 equal valves. Wet alkali soil. May-August. 4,500-11,000 ft.

2. *D. pauciflorum* (Durand) Greene. (*D. vulgare* (Hook) Piper; *D. meadia pauciflorum* Durand.) Leaves erect or nearly so. Bracts lanceolate. Filaments united into a yellow tube half as long as the anthers. Anthers purple. Capsule nearly cylindrical, splitting from the acute summit by 5 short teeth. Wet soil. May-June.

ORDER GENTIANALES.

OLEACEÆ. Olive Family.

Shrubs or trees with opposite and exstipulate leaves. Inflorescence paniced, racemose or fascicled. Flowers monoecious, dioecious, polygamous or perfect. Calyx usually 4-cleft. Corolla of 4 more or less united lobes, or sometimes wanting. Stamens 2, or sometimes 3 or 4. Pistil 1, with a 2-celled ovary, ripening into a samara, capsule, drupe or berry.

1. FRAXINUS. Ash.

Trees with petioled, odd-pinnate leaves from terminal buds. Inflorescence axillary; densely paniced or racemose. Flowers greenish; appearing before or with the leaves. Calyx small and 4-cleft; toothed or entire, or wanting. Petals 4, or wanting. Anthers large. Style 1; stigma 1, 2-cleft. Fruit an oar-like samara, containing a single seed.

1. *F. pennsylvanica lanceolata* (Borkh.) Sarg. (*F. lanceolata* Borkh.; *F. viridis* Michx. f.) Green Ash. Glabrous throughout; usually not exceeding 60 ft. in height. Leaflets 5-9, often wedge-shaped at base and serrate above; bright-green on both sides. Flowers dioecious. Anthers linear-oblong. Calyx persistent in fruit. Petals none. Fruit 1-2 inches long; the fruit-body spindle-shaped, the wing extending upward to above its middle, slightly notched at apex. Cultivated. April-May.

ASCLEPEDIACEÆ. Milkweed Family.

Perennial herbs usually with a milky juice, entire exstipulate leaves, and umbellate inflorescence. Flowers regular and perfect. Calyx 5-lobed, reflexed. Corolla of 5 united lobes. A corona of 5 parts, called hoods (usually colored like petals), is between the corolla and the column of stamens, and is adnate either to the corolla or the stamen-column. Filaments 5, short and stout; monadelphous, or rarely distinct; borne on base of corolla. Anthers tipped by a membrane; 2-celled, each cell containing a waxy mass of pollen

called a pollinium. The two contiguous pollinia of adjacent anthers are united. The pistil-system consists of 2 separate ovaries, each with its style; and these are surmounted by a single flat, 5-angled stigmatic disk, which also surmounts the stamen-column. Fruit a pair of follicles. Seeds tufted.

Leaves opposite; corolla reflexed..... 1. **Asclepias**
 Leaves alternate; corolla not reflexed..... 2. **Asclepiodora**

1. ASCLEPIAS. Milkweed.

Erect or decumbent herbs from deep perennial roots. Leaves opposite or whorled (rarely alternate). Inflorescence terminal or axillary. Corolla deeply 5-parted, the segments reflexed. Corona-hoods each with an incurved horn within.

1. **A. speciosa** Torr. Stout, 1-2½ ft. high, white-tomentose or canescent all over. Leaves opposite; thick; broadly ovate or elliptical; obtuse and cuspidate or acute. Umbels several or rarely solitary. Corolla purplish. Column very short or none. Follicles erect or spreading on the recurved pedicels, woolly and spinose. In moist soil near springs and irrigation ditches. June-July.

2. ASCLEPIODORA.

Erect or decumbent stout herbs. Leaves mostly alternate (sometimes opposite). Inflorescence terminal. Flowers large. Corolla rotate, its segments spreading. Corona-hoods prominently crested within.

1. **A. decumbens** Gray. Stems decumbent or ascending; rough-puberulent; 1-2 ft. long. Leaves somewhat leathery, narrowly to broadly lanceolate; acuminate. Umbel solitary, many-flowered. Flowers greenish with purple hoods. Fruiting pedicels twice bent. Follicles ascending. Dry soil on hillsides. June-July.

ORDER POLEMONIALES.

CONVOLVULACEÆ. Morning-glory Family.

Mostly trailing or twining herbs (erect in *Cressa*). Leaves exstipulate, alternate (or scales in *Cuscuta*). Inflorescence axillary, cymose or solitary. Flowers regular, perfect. Calyx of 5 distinct, imbricated sepals. Corolla of 5 united petals. Stamens 5, inserted on the corolla, and alternate with its lobes. Pistils 2, or 1, with 1-3 styles, and a "superior," 2-3- or falsely 4-6-celled ovary. Fruit a 2-4-valved capsule, or 2-4 separate fruits.

1. **CONVOLVULUS.** Bindweed.

Twining or prostrate, mostly perennial herbs from slender rhizomes. Flowers axillary; solitary or clustered; large; white, pink or purplish. Corolla open funnel-form. Ovary entire, 1-2-celled; style filiform; stigmas 2, filiform to oblong.

1. **C. arvensis** L. Stems slender, prostrate. Leaves slender-petioled; dark-green; usually arrow-shaped and blunt at the apex. Peduncles usually 2-flowered; 1-3-bracted just below the flowers. Corolla an inch or less in diameter; white with a pink tinge. Calyx free from the bracts. In fields and waste places. May-September.

POLEMONIACEÆ. Phlox Family.

Herbs with alternate or opposite leaves. Inflorescence cymose, corymbose-paniculate or solitary. Flowers perfect; regular or nearly so. Calyx of 5 united sepals. Corolla of 5 united petals. Stamens 5, epipetalous; alternate with the corolla-lobes. Pistil consists of 1 filiform style, of 3 linear stigmas (most conspicuous in mature flowers), and of a "superior," mostly 3-celled ovary with axile placentae. Seeds of some genera emitting spiral threads when moistened. Capsule loculicidal.

- Leaves opposite, entire..... 1. **Phlox**
- Leaves mostly alternate.
- Corolla salverform or tubular-funnelform..... 2. **Gilia**
- Corolla open bell-shaped.. 3. **Polemonium**

1. **PHLOX.**

Perennial or rarely annual erect or diffuse herbs (in some species woody at the base). Leaves entire; opposite or the floral leaves alternate. Inflorescence cymose or paniculate. Flowers showy. Calyx tubular, 5-ribbed and 5-cleft. Corolla salverform, with a narrow tube and a 5-lobed limb. Stamens short, unequally inserted on the corolla-tube. Ovary 3-celled; style usually slender. Ovules few. Capsule at length distending and rupturing the calyx-tube. Seeds wingless, or narrowly winged, not developing spiral threads when moistened. Leaves linear; flowers more than 1..... 1. **P. longifolia**
 Leaves subulate; flowers solitary..... 2. **P. Hoodii**

1. **P. longifolia** Nutt. Wild Sweet William. Many-stemmed from a woody base; pubescent or nearly glabrous; 3-8 inches high. Leaves from narrowly to broadly linear. Calyx angled. Corolla dark pink to white. April-November. In dry soil.

1a. **P. longifolia puberula** E. Nelson. (*P. puberula* (E. Nels.) A. Nels.) Pubescence glandular, especially on the pedicels and calyx.

2. **P. Hoodii** Richards. Sparsely woolly when young, at length glabrate. Stem 2-4 inches high, densely tufted and branching from a woody root. Leaves imbricate, erect, rigid, subulate and mucronate. Flowers solitary and sessile at the ends of the branches. Corolla white. May-June.

2. **GILIA.** (Includes *Collomia*, *Microsteris*, *Linanthus*).

Annual, biennial or perennial herbs with alternate (or sometimes opposite) leaves. A genus of wide diversity as to shapes of leaves and of corolla, and types of inflorescence. Capsule at length distending and often bursting the calyx-tube. Seeds usually mucilaginous when moistened.

Annuals.

Leaves not spinulose-tipped.

Leaves sessile and entire; stamens unequally inserted.

Inflorescence scattered or loosely cymose 1. **G. gracilis**

Inflorescence capitate-glomerate and leafy-bracted.

Corolla from pink-purple to nearly white, with yellow tube..... 2. **G. linearis**

Corolla buff or pale salmon-color 3. **G. grandiflora**

Leaves (or some of them) palmately divided 4. **G. Harknessii**

Leaves pinnatifid or pinnately-parted. 5. **G. inconspicua**

Leaves and calyx-teeth spinulose-tipped..... 6. **G. minima**
Biennials or perennials.

Leaves alternate; pinnately divided into remote linear segments 7. **G. aggregata**

Leaves opposite or fasciated in the axils, palmately 3-7-parted into acerose segments..... 8. **G. Watsonii**

1. **G. gracilis** Hook. (*Microsteris micrantha* (Kellogg) Greene; *Collomia micrantha* Kellogg; *C. gracilis* A. Gray; *Gilia micrantha* (Kell.) A. Nels.) Pubescent, 2-6 inches high; at length becoming much-branched. Leaves opposite below, alternate above. Flowers small, borne singly or in pairs in the axils of the upper leaves. Calyx tubular, 5-cleft. Corolla salver-shaped with a narrow tube; white or rarely pink. Stamens straight, short. Capsule 3-celled, each cell 1-ovuled. Seeds few, not becoming mucilaginous when moistened. (In subspecies *spirillifera* the seeds do become mucilaginous when moistened). On dry plains. April-June.

2. **G. linearis** Gray. (*Collomia linearis* Nutt.) Sparingly viscid-pubescent; 6-20 inches high, simple or sparingly branched from base. Leaves broadly linear or oblong-lanceolate. Corolla salverform. Ovules solitary. Seeds emitting spiral threads when moistened. In moist shaded places, especially in the mountains. June-August.

3. **G. grandiflora** A. Gray. (*Collomia grandiflora* Dougl.) Stem leafy throughout, erect and unbranched; ½-2 ft. high, flowering only at the summit. Leaves from broadly linear to lanceolate, or nearly ovate above. Bracts and calyx viscid-pubescent. Corolla at least 1 inch long, narrowly funnelform. Seeds emitting spiral threads when moistened. Dry sandy soil on plains and hillsides. June-August.

4. *G. inconspicua* (Smith) Dougl. Stem simple or branching from the base, 4-12 inches high; usually slightly woolly-pubescent when young. Leaves becoming smaller and entire above. Corolla pink or purplish, narrowly funnellform. Ovules 2-several in each cell. Seeds emitting spiral threads when wetted. On sand dunes and mountain sides.

5. *G. Harknessii* Curran. (*Linanthus Harknessii* (Curran) Greene). Stem erect, slender, bushy-branched, 3-10 inches high. Flowers very small, on slender pedicels. Calyx minutely pubescent. Corolla white. Seeds solitary in the cells, mucilaginous when moistened. In canyons. June-July.

6. *G. minima* A. Gray. (*Navarretia minima* Nutt.) Plant depressed, 1-3 inches high, glabrate. Leaves pinnately-parted into needle-shaped segments. Flowers leafy-bracted, capitate-clustered; bracts and calyx-lobes with needle-shaped apices. Corolla white. Ovules 1-3 in each cell. Seeds emitting mucilage and spiral threads when moistened. In exposed places on mountains. May-July.

7. *G. aggregata* A. Gray. (*G. pulchella* Dougl.) Scarlet Gilia; Tree Cypress; "Polecat Plant." Biennial; pubescent or puberulent; with unbranched or slightly branched stem. Lower leaves basal and rosette-forming; upper alternate. Inflorescence narrowly thyrsoid-paniculate. Flowers red; showy. Calyx glandular. Corolla tubular-funnelform. Stamens equally or unequally inserted in the corolla-throat. Ovules numerous. Seeds mucilaginous and emitting spiral threads when wetted. On mountain sides. May-September. Locally known as "Wild Honeysuckle." Often characterized by an offensive odor.

7a. *G. aggregata attenuata* A. Gray. (*G. attenuata* (Gray) A. Nels.) Distinguished from the type by the long, white hairs on the calyx, the usually included stamens and style, and the usually lighter colored (pink to white) corolla.

8. *G. Watsonii* A. Gray. Stems 4-8 inches high; tufted and nearly herbaceous; perennial from a woody base. Flowers solitary or few in a cluster, terminating the branches. Calyx-lobes acerose. Corolla dull pinkish-white with pinkish throat; salverform. Stamens included; filaments short. Cells 10 (or more) ovuled. Seed-coat not developing mucilage when moistened. On rocky mountain ridges. June-August. 5,500-8,000 ft.

3. POLEMONIUM. Jacob's Ladder.

Herbs with alternate, pinnate leaves. Calyx bell-shaped; neither angled nor ribbed, becoming enlarged after flowering and persistent in fruit. Stamens about equally inserted near base of corolla, declined; the filaments slender and often pilose at base. Capsule ovoid; obtuse; 3-valved. Seeds emitting spiral threads when moistened.

1. *P. micranthum* Benth. Annual, somewhat viscid-pubescent, branching, weak and diffuse; 3-8 inches high. Leaflets entire, 5-13. Flowers small; solitary or scattered on the branches; white or tinged with pink. Calyx deeply 5-cleft. Corolla nearly rotate; shorter than calyx. Filaments dilated at base; very sparingly pilose-ciliate. April-May. In grassy fields and ravines.

HYDROPHYLLACEÆ. Waterleaf Family.

More or less hairy herbs. Leaves usually basal or alternate. Inflorescence in scorpioid cymes, in racemes, spikes or sometimes solitary. Flowers perfect; regular. Sepals 5, united. Petals 5, united. Stamens 5, inserted on the corolla and alternate with its lobes. Pistil with style 2-cleft or with 2 separate styles; and an entire 1-celled or rarely a 2-celled ovary, bearing 2 parietal placentae. Fruit a capsule.

- Leaves all basal and rosette-forming; peduncles 1-flowered 1. **Hesperochiron**
 Leaves neither all basal nor rosette-forming; peduncles several-flowered.
 Placentae broad; corolla convolute in bud.
 Perennials; stamens conspicuously exserted 2. **Hydrophyllum**
 Annuals; stamens included..... 3. **Nemophila**
 Placentae narrow, not fleshy; corolla imbricated in bud 4. **Phacelia**

1. **HESPEROCHIRON.** (Capnorea).

Perennials from short branching rootstalks. Leaves entire; spatulate or oblong, with long, wing-margined petioles. Peduncles naked. Calyx 5- (rarely 6-7-) parted. Corolla without disk; bell-shaped or saucer-shaped. Ovary 1-celled, with narrow placentae. Capsule loculicidal.

1. **H. pumilus** Porter. (Capnorea pumila (Dougl.) Greene). Leaves glabrous, except for the ciliate margins; lanceolate to spatulate, tapering below to a slender petiole. Calyx-lobes nearly equal. Corolla saucer-shaped; white to purple; inner surface of its tube and the base of the filaments pubescent. In wet places. May.

2. **HYDROPHYLLUM.** Water-Leaf.

Herbs with large, alternate and basal petioled leaves (often pinnatifid or pinnate). Inflorescence cymose or capitata. Flowers violet, bluish or white, often on long peduncles. Corolla bell-shaped, with a linear longitudinal appendage at each lobe. Stamens conspicuously exserted; filaments bearded at the middle. Style 2-cleft. Ovary 1-celled. Capsule spheroidal.

- Flowers in head-like cymes; peduncles shorter than petioles 1. **H. capitatum**
 Flowers in open cymes; peduncles longer than petioles 2. **H. occidentale** var.

1. **H. capitatum** Dougl. Stem rather weak; 6-12 inches high; pubescent or somewhat hispid; from fascicled roots. Leaves ovate in outline, with 2-3 pairs of coarsely-lobed segments. Flowers on short pedicels in dense sessile or short-peduncled head-like cymes. Calyx very hispid-pubescent. Corolla more or less purplish-tinged. Ovary hairy. In shade, often in oak copses; in rich, moist, loose soil. May-June. 5,000-9,000 ft.

2. **H. occidentale Watsoni** Gray. (*H. Watsoni* (Gray) Rydb.) Leaves longer than those of *H. capitatum*, pinnately parted or divided into 7-15 divisions, sparingly hispid. Cyme few-flowered, open. Flowers purplish-blue. In rich soil in light shade. June.

3. NEMOPHILA.

Weak and slender-stemmed annuals. Leaves more or less pinnate; opposite or the uppermost alternate. Flowers solitary or 2-3 in a raceme. Calyx with a reflexed appendage at each sinus; enlarging in fruit. Corolla wheel-shaped to broadly bell-shaped; longer than calyx and the stamens; with 10 appendages on the inside and at the base; with or without disk.

1. **N. parviflora** Dougl. Stems trailing or procumbent. Leaves pinnately parted or 3-5-lobed. Corolla white or bluish-white, the tube shorter than the lobe. Filaments borne on the very base of the corolla. Seeds 1-4, often deeply pitted. In rich soil in shady places along streams.

4. PHACELIA.

Herbs with simple alternate leaves. Flowers often showy, in racemes or raceme-like scorpioid cymes. Calyx 5-parted. Corolla 5-lobed; open bell-shaped. Stamens often exserted; filaments slender. Ovary imperfectly 2-celled, its walls bearing 2 narrow parietal placentae; style 2-cleft.

1. **P. linearis** (Pursh) Holzinger. (*P. Menziesii* Torr.) Annual; stem 6-12 inches high; hispid or rough-hairy; at length branched. Leaves mostly sessile, narrowly to broadly lanceolate; entire or some of them deeply 5-cleft. Racemes thyrsoid-paniculate. Flowers showy; proterandrous; from violet to blue or rarely white. Corolla appendaged; petals a half again as long as sepals, and about as long as stamens. Ovules several on each placenta. Dry ground, often under sage-brush. May-June. Locally called "Johnny-jump-up."

BORAGINACEÆ. Borage Family.

Chiefly rough-hairy herbs with alternate, entire and exstipulate leaves. Flowers usually regular. Calyx 5-parted, usually persistent. Corolla of 5 united petals; sometimes crested or appendaged in the throat. Stamens 5, epipetalous and alternate with the corolla-lobes. Ovary "superior"; usually deeply 4-lobed, in

fruit separating into 4 seed-like nutlets. Mature fruit is necessary for determination.

Nutlets armed with barbed prickles..... 1. **Lappula**
Nutlets unarmed.

Calyx membranous and much enlarged in fruit 2. **Asperugo**

Calyx neither membranous nor much enlarged.

Corolla tubular or funnellform; blue..... 3. **Mertensia**

Corolla funnellform or rotate.

Nutlets erect, attached by the very
base 4. **Lithospermum**

Nutlets erect or oblique, attached above the
base, borne on a fruiting receptacle
(gynobase).

Corolla yellow or orange, with open
naked throat..... 5. **Amsinckia**

Corolla white or blue with throat bearing
more or less prominent swellings.

Perennials; corolla white.... 6. **Oreocarya**
Annuals.

Gynobase elongate, the nutlets
attached by at least $\frac{1}{3}$ of
their length..... 7. **Cryptanthe**

Gynobase low; nutlets oblique or
incurved, attached about
the middle by a caruncle-
like process.... 8. **Plagiobothrys**

1. **LAPPULA.** (Echinospermum). Stickseed.

Rough-hairy and grayish annuals, biennials or perennials, with alternate entire leaves. Inflorescence a raceme or spike, often much elongated. Flowers mostly small; blue to whitish. Corolla short-saiverform with throat closed by 5 short scales. Stamens included. Ovary deeply 4-lobed. Nutlets erect, fixed laterally to base of style, and armed with 1-3 rows of barbed prickles.

Perennial; flowers showy..... 1. **L. subdecumbens**

Annual; flowers small..... 2. **L. Redowskii**

1. **L. subdecumbens** (Parry) A. Nels. Stems ascending, unbranched up to the inflorescence; several from a perennial root (10-18 inches high). Basal leaves numerous; grayish-hairy; oblanceolate or spatulate; obtuse and ciliate-margined, tapering into a winged petiole. Stem-leaves oblong; sessile, the upper more or less clasping. Flowers showy, in an open raceme. Calyx-lobes oblong and obtuse. Corolla white, usually tinged with blue; blue-veined; the crests in throat short-downy. Dry plains and hillsides. May-June. Locally called "Wild Forget-me-not."

1a. **L. subdecumbens coerulescens** (Rydb.) Differs from the species in the long-hairy crests in the throat of the corolla.

2. **L. Redowskii occidentalis** (Wats.) Rydb. (*L. occidentalis* (Wats.) Greene). Beggar-ticks. Erect, 4-12 inches high, at length much branched; with rough or hispid pubescence. Leaves narrowly linear or lanceolate. Racemes leafy-bracted; pedicels unequal and leafy; longer, but not twice as long, as fruit. Corolla white or pale-blue. Nutlets irregularly tuberculate, the margins armed with a single row of stout, flattened prickles. Dry soil. May-June.

2. ASPERUGO. German Madwort.

Annual, rough-bristly procumbent herbs. Leaves alternate, or the lowermost opposite; entire. Flowers small; blue or white, in the axils of the leaves. Calyx campanulate, unequally 5-cleft; much enlarged in fruit; the lobes unequally incised-dentate. Stamens 5; included; epipetalous; filaments very short. Ovary 4-divided; style short; stigma capitate. Nutlets 4; erect; laterally attached above the middle of the elongated receptacle.

1. **A. procumbens** L. Catchweed. Stems slender, 6-18 inches long; very rough with stiff short hairs. Leaves elliptical or lanceolate. Flowers blue, on short pedicels recurved in fruit. Fruiting calyx dry and strongly veined. In fields and waste places, introduced. May-August.

3. MERTENSIA. Bluebells.

Erect leafy perennial herbs, not rough-hairy. Leaves alternate; entire or nearly so, the lowermost petioled. Inflorescence a cyme or panicle. Flowers showy, from purple to blue or white; funnelliform or tubular. Stigma entire. Ovary deeply 4-parted. Nutlets 4, rugose at maturity, sessile or obscurely stipitate.

Anthers included; leaves obtuse..... 1. **M. brevistyla**

Anthers exserted; leaves acute..... 2. **M. foliosa**

1 **M. brevistyla** Wats. All but the lower surface of leaves pubescent with short appressed rigid hairs; 4-10 inches high. Leaves elliptical to elliptical-lanceolate, obtuse. Flowers in a loose panicle. Calyx 5-cleft, very hirsute. Corolla blue, its tube but slightly longer than calyx, naked within. Anthers inserted near the base of tube. Style very short. (This species is held by some authorities to be a variety of *M. alpina* Don.) In mountain valleys. May-June. 6,000-7,000 ft.

2. **M. foliosa** A. Nelson. Perennial and 1-several stemmed from a vertical rootstalk; 8-12 inches high. Leaves thick; glabrous; the basal ones numerous, elliptical to oblong, on slender petioles 1-2 times as long; stem-leaves crowded, sessile, oblanceolate or becoming lanceolate toward the top. Inflorescence paniculate, the leafy bracts lanceolate. Corolla rather large, its tube longer than the limb; throat conspicuously crested. On the rocky slopes of the foothills. April-May.

4. LITHOSPERMUM. Puccoon.

Herbs with erect and pubescent or hairy stems. Leaves alternate; entire; their veins usually indistinct. Inflorescence leafy-bracted; racemose, spicate or paniced. Flowers white, yellow or blue. Calyx narrowly 5-parted or cleft. Corolla 5-lobed; funnelliform or salverform. Stamens 5, included, borne

on corolla-throat; filaments short. Ovary 4-divided; style slender; stigma capitate or 2-lobed. Nutlets 4, erect; often white and shining; attached by their bases.

Annual; flowers dirty-white..... 1. **L. arvensis**

Perennial; flowers yellow or yellowish.

Corolla-tube not crested..... 2. **L. pilosum**

Corolla-tube prominently crested..... 3. **L. angustifolium**

1. **L. arvensis** L. Corn Gromwell. Annual or biennial, appressed-pubescent; 6-20 inches high. Leaves lanceolate or narrowly elliptical; mostly sessile. Flowers in loose spikes. Calyx-segments longer than the corolla-tube or equalling it. Corolla funnelform; puberulent in the throat. Nutlets brown. In fields and waste places, often in patches. April-August. Introduced.

2. **L. pilosum** Nutt. Perennial from thick roots; hirsute. Stems several from one root; very leafy; 8-18 inches high. Leaves narrowly lanceolate; alternate ($\frac{2}{3}$); acuminate; sessile. Flowers faintly perfumed; dull-yellow; in a terminal and crowded panicle. Calyx-segments densely hirsute, shorter than corolla-tube. Corolla salverform; with scattered hairs on the outside. Styles longer than the filaments. Nutlets ovoid, acute; bluish-white and shining. Dry fields. April-June.

3. **L. angustifolium** Michx. (*L. linearifolium* Goldie). Indian Paint. Perennial and tufted from a deep root; minutely strigose-pubescent, branched; 6-24 inches high. Leaves linear, sessile. The earlier flowers showy with bright yellow salverform corolla, their lobes fringed and their tubes 3-5 times the length of the calyx-segments; the later flowers inconspicuous and cleistogamous with recurved pedicels in fruit. Nutlets ovoid; white, smooth and shining. In dry soil. April-July.

5. AMSINCKIA.

Rough-hairy annuals. with alternate entire leaves. Inflorescence racemose or spicate. Flowers yellow or orange. Calyx-lobes 5 or sometimes 4. Corolla salverform, without crests or processes. Filaments very short. Style filiform, included. Nutlets 4, smooth or rough; attached to the style to above the middle.

Calyx-lobes linear, acuminate..... 1. **A. intermedia**

Calyx-lobes oblong, obtuse..... 2. **A. tessellata**

1. **A. intermedia** F. & M. Erect, often much-branched, 1-3 ft. high; stems and branches with scattered white bristles. Leaves oblong-lanceolate to linear; obscurely veined; densely hispid-bristly. Inflorescence at first corymbose at top, but lengthening into a leafy raceme, which becomes 5-10 inches long; peduncled; covered with curved stiff hairs. Calyx-segments rusty-hispid. Nutlets muricate-scabrous; much incurved. In waste places, especially around trash-piles. May-June.

2. **A. tessellata** Gray. Erect, coarsely hispid, 1-2 ft. high. Leaves linear to oblong-lanceolate. Spikes loose; 5-6 inches long when fully developed. Sepals 3 (1 narrow and 2 broad); rusty-hispid, enlarged in fruit. Nutlets abruptly acute; not keeled, but flattish on the back; their surfaces resembling cobblestone pavements. Same habitat and time of flowering as No. 1.

6. **OREOCARYA.** (Krynitskia in part).

Rough-bristly biennials or perennials from woody roots. Inflorescence thyrsoid or racemose-paniculate. Flowers salverform; white or yellow, crested in the throat. Stamens included. Style mostly short. Ovary deeply 4-lobed. Nutlets 4, attached laterally to an awl-shaped prolongation of the receptacle.

1. *O. sericea* (Gray) Greene. Cats' Eyes. Loosely tufted, a span high or less, with short branches; the dead leaf-bases conspicuous. Leaves crowded on the crowns, spatulate to narrowly obovate; basal or alternate, the latter sessile. Inflorescence at first crowded, with tawny-yellow pubescence. Corolla white, with yellow throat and crests. Nutlets oblong-ovate, with small tubercles on the back. Dry hillsides. April-June. 4,500-6,000 ft.

7. **CRYPTANTHE.**

Simple-branched annuals usually with sessile white flowers. Inflorescence mostly scorpioid-spicate. Calyx 5-parted to the base, closed in fruit; as long as the corolla-tube. Nutlets usually 4, but sometimes less; never rugose; attached to gynobase at the middle or wholly to apex along scar.

1. *C. Torreyana* (Gray) Greene. Erect; white-hairy; branched from the middle and sometimes from the base. Spikes commonly elongated, loose below; often in pairs. Nutlets ovate and acute; the groove forked at base, the fork sometimes minute. In dry ground. May-June.

8. **PLAGIOBOTHRYIS.** Pop-corn Flower.

Annuals with erect or decumbent elongated branches. Leaves mostly in a close rosette. Racemes spike-like and loose; with or without bracts. Pedicels thread-like; very short, persistent. Calyx 5-cleft or 5-parted; soft-pubescent with rusty hairs, especially when young. Corolla short, white, with crests or processes usually at the mouth of the throat. Nutlets roughened on the back.

1. *P. tenellus* (Nutt.) A. Gray. Branching at or near the base, 3-7 inches high. Basal leaves oblong and obtuse or acute; stem-leaves few, ovate or oblong-ovate. Flowers few. Calyx deeply cleft, sometimes imperfectly circumscissile. Nutlets small; shining and enamel-like on the back. Dry plains. May.

VERBENACEÆ. Verbena Family.

Herbs with exstipulate and usually opposite leaves. Flowers complete. Calyx 4-5-parted. Corolla 4-5-cleft; 2-lipped or sometimes regular. Stamens didynamous or rarely diandrous, borne on the corolla-lobes and alternate with them. Pistil consists of 1 terminal style, 1 or 2 stigmas and a "superior" 2-4-celled ovary, ripening into 2-4 seed-like nutlets.

1. **VERBENA.** Vervain.

Inflorescence spicate or capitate. Calyx tubular, 5-angled and more or less unequally 5-toothed. Corolla tubular, salver-shaped. Stamens 4, included; the upper 2 often without anthers. Ovary not lobed; splitting when ripe into 4 nutlets.

1. **V. bracteosa** Michx. Decumbent; coarsely hairy; at length radiately much-branched from the base. Leaves wedge-lanceolate, cut-pinnatifid or 3-cleft; short-petioled. Spike dense, with leafy bracts. Flowers small; blue or purple; shorter than bracts. Dry ground. June-September.

LABIATÆ. Mint Family.

Herbs, mostly aromatic, with square stems and opposite exstipulate leaves. Flowers complete. Calyx 4-5-toothed; 2-lipped or regular. Corolla 2-lipped or regular. Stamens didynamous or rarely 2 with or without staminodia; borne on corolla-tube and alternate with its lobes. Style 2-lobed. Ovary "superior," 4-lobed or 4-parted, ripening into 4 one-seeded nutlets.

Style and stamens exerted.

Upper pair of stamens the longer.

Leaves with crenate-dentate margins and heart-shaped bases..... 1. **Nepeta**

Leaves with sharply-serrate margins and acute bases 2. **Dracocephalum**

Upper pair of stamens the shorter.

Calyx 2-lipped..... 3. **Prunella**

Calyx regular or nearly so..... 4. **Lamium**

Style and stamens included..... 5. **Marrubium**

1. **NEPETA.** Catnip.

Strong-smelling herbs with the flowers whorled, the whorls forming interrupted terminal spikes. Corolla-tube dilated above, the limb distinctly 2-lipped.

1. **N. Cataria** L. An erect branched perennial, 1-3 ft. high. Corolla bluish or whitish, spotted with lavender. Calyx-teeth subulate, all about of the same length. In waste places. June-October. Introduced.

2. **DRACOCEPHALUM.** Dragon-head.

Herbs, with inflorescence spiked or capitate in many-flowered leafy-bracted whorls. Calyx tubular; unequally 5-toothed (the upper teeth very large), and 13-15-nerved. Upper lip of corolla notched and concave; lower lip 3-cleft, with middle division largest and notched at end. Stamens 4; anther-cells divergent. Ovary deeply 4-parted.

1. **D. parviflorum** Nutt. Rather stout and coarse; pubescent; stem erect, biennial, 6-20 inches high. Leaves petioled; lanceolate or elliptical; incisely dentate or pinnatifid. Bracts awn-toothed. Corolla bluish or pinkish; slender, but little longer than calyx. May-August.

3. **PRUNELLA.** (Brunella.) Self-heal; All-heal.

Perennials, with smooth and unbranched or sometimes branched stems. Leaves petioled. Calyx tubular-bell-shaped, sometimes 10-ribbed; upper lip broadly 3-toothed, the teeth short; lower lip with 2 longer teeth; closed in fruit. Upper lip of corolla upright, arched and entire; lower lip spreading, reflexed, 3-cleft and fringed. Stamens didynamous, each 2-toothed at apex of filament, with only 1 tooth anther-bearing; the lower pair the longer. Ovary 4-parted.

1. **P. vulgaris** L. Carpenter-weed. Leaves oblong-ovate, entire or toothed; smooth or with a few scattered hairs. Calyx purplish or green; shorter than corolla. Corolla purplish, bluish or sometimes white. In grassy places near streams. May-October.

4. **LAMIUM.** Henbit; Dead Nettle.

Leaves crenate, dentate or incised; usually cordate. Inflorescence terminal or axillary; clustered. Flowers rather small; white, red or purplish. Calyx 5-toothed. Corolla with its tube longer than calyx, its limb strongly 2-lipped. Stamens 4, didynamous, the anterior pair the longer; anthers 2-celled. Ovary 4-parted; style 2-cleft, the branches equal. Nutlets smooth or tuberculate.

Upper leaves sessile or clasping..... 1. **L. amplexicaule**
All the leaves petioled..... 2. **L. purpureum**

1. **L. amplexicaule** L. Annual or biennial, sparingly pubescent. Stems slender, weak, branched, 6-18 inches long. Leaves round or nearly so; coarsely crenate, cordate at base. Calyx pubescent, its teeth acute. Corolla purplish or red, the middle lobe of the lower lip notched and spotted with dark purple; the upper lip pubescent. In waste places. Introduced. February-October.

2. **L. purpureum** L. Calyx-teeth narrowly lanceolate, acuminate, longer than the tube. Lateral lobes of lower lip of corolla reduced to 1 or 2 short teeth. Otherwise much as in No. 1. Introduced. April-October.

5. **MARRUBIUM.** Horehound.

Branching, woolly perennials. Leaves petioled, crenate-toothed, wrinkled. Flowers small, in compact axillary spikes. Calyx tubular, 5-10-nerved.

1. **M. vulgare** L. Bitter-tasting plant. Stems erect, 1-3 ft. high, several from the same root. Leaves oval to round, with obtuse apex; upper surface whitish and lower surface white-woolly. Corolla whitish. Calyx-teeth 10, becoming hooks in fruit. In waste places. Introduced. May-September.

SOLANACEÆ. Nightshade Family.

Herbs or shrubs with alternate exstipulate leaves. Flowers regular, sympetalous, consisting of 5 sepals, 5 petals, 5 stamens and 1 pistil. Stigma 1; style 1; ovary 1, "superior," 2- (rarely 3-5-) celled with axile placentae; ripening into a many-seeded berry or capsule.

Corolla wheel-shaped; fruit a berry..... 1. *Solanum*
Corolla salverform; fruit a capsule..... 2. *Nicotiana*

1. **SOLANUM.** Nightshade.

Annuals or perennials, with slender roots. Corolla 5-parted or cleft. Stamens with filaments much shorter than anthers; exserted. Anthers erect, converging around the style; the pollen discharged through an opening at their apex. Fruit a berry.

1. *S. triflorum* Nutt. Cut-leaved Nightshade. Annual; glabrous or sparingly-pubescent. Leaves pinnately-lobed to divided; 2-4 inches long. Inflorescence axillary, the peduncles 1-3-flowered. Flowers white, small, star-shaped. Berry green, even when mature. In waste dry grounds. May-October.

2. **NICOTIANA.** Tobacco.

Herbs, mostly clammy pubescent. Flowers in racemes or panicles. Calyx tubular; campanulate, 5-cleft. Stigma capitate. Capsule 2-celled; 2-4-valved from the apex. Seeds small.

1. *N. attenuata* Torr. Annual. Stem slender, erect, 1-2 ft. high. Leaves petioled; linear or lanceolate, tapering to a long point. Corolla greenish-white, the tube 1-1½ inches long and the border ½ inch across. Stamens included. Dry sandy places. June-September.

SCROPHULARIACEÆ. Figwort Family.

Herbs (rarely shrubs or trees) with exstipulate leaves. Calyx of 4-5 parts. Corolla 2-lipped or nearly regular. Stamens didynamous, diandrous, or sometimes pentandrous; inserted on the corolla and alternate with its lobes. Pistil 1, entire or 2-lobed, with a 1- or usually 2-celled "superior" ovary bearing numerous ovules on axile placentae. Fruit usually a capsule.

Upper lip of corolla external in the bud.

Stamens 5. 1 being a sterile filament or a gland.

Sterile filament conspicuous..... 1. *Pentstemon*

Sterile filament inconspicuous; represented by a

Gland at base of corolla..... 2. *Collinsia*

Scale on upper side of corolla..... 3. *Scrophularia*

Stamens 4, all anther-bearing; calyx prismatic.. 4. *Mimulus*

Lower lip of corolla external in bud.

Stamens 4, all anther-bearing; calyx tubular.. 5. *Castilleja*

Stamens 2 only..... 6. *Veronica*

1. **PENTSTEMON**. Beard-tongue; Foxglove.

Perennial herbs with opposite leaves (the upper sessile and mostly clasping). Inflorescence terminal; racemose, cymose or paniced. Flowers showy. Calyx 5-parted. Corolla 2-lipped, more or less inflated. Stamens 5, included; 4 being didynamous, the fifth sterile and often bearded; anther-sacs divergent or confluent. Style filiform. Stigma capitate. Capsule septi-
cidal. Seeds angled.

Anther-cells splitting their entire length or nearly so.

Anther-cells not confluent.

Stem somewhat stout; leaves broadly lanceolate to ovate or subcordate..... 1. **P. cyananthus**

Stem strict, rather slender; leaves narrowly lanceolate 2. **P. utahensis**

Anther-cells confluent.

Stems glabrous..... 3. **P. brevifolius**

Stems puberulent or pubescent..... 4. **P. collinus**

Anther-cells splitting only at apex; their bases closed and sac-like 5. **P. Kingii**

1. **P. cyananthus** Hook. (*P. glaber cyananthus* Gray). Blue Bells. Stems several from one root, 8-24 inches high, rather glaucous. Basal leaves mostly elliptical-ovate; stem-leaves subcordate. Panicle thyrsoid, dense, many-flowered; very showy. Flowers from pale to dark blue. Sepals narrow, acuminate. Anthers and sterile filament from hirsute to nearly glabrous. On hillsides and in mountain valleys. May-July. 4,500-9,000 ft.

2. **P. utahensis** (Gray) A. Nels. (*P. glaber utahensis* A. Gray.) Stem 12-40 inches high. Basal leaves crowded, on long petioles; stem-leaves remote, becoming sessile toward the apex. Thyrsus elongated. Sepals ovate-acuminate, narrowly scarious-margined. Anthers and sterile filament sparsely bearded with short hairs. Dry rocky soil. June-July.

3. **P. brevifolius** (Gray) A. Nels. (*P. humilus brevifolius* A. Gray). Stems 4-12 inches high; weak, slender, diffuse, freely branching; several to many from a woody caudex. Basal leaves numerous, oblong to nearly round, with entire margins, on petioles as long as the blades; stem-leaves oblong-spatulate, nearly sessile. Inflorescence obscurely glandular-pubescent. Flowers dark-blue. In clefts of rocks in mountains. June-August.

4. **P. collinus** A. Nelson. Plant caespitose. Stems 8-16 inches high; erect, numerous, from a matted, much-branched root-stalk. Basal leaves numerous, glabrous, elliptic-oblong with entire margins, on slender petioles as long as the blades; stem-leaves narrowly oblong or spatulate at length becoming bracts above. Thyrsus strict, interrupted. Corolla deep-blue. Gravelly hills. June-August.

5. **P. Kingii** Wats. Hoary or glandular-pubescent, at least below. Stems ascending; 4-20 inches high; numerous from a woody base. Lower leaves short-petioled, spatulate with entire margins and acute apex; upper leaves sessile and oblanceolate with erose margins and acuminate apex. Inflorescence somewhat unilateral. Corolla lilac-purple, short-bilabiate, dilated above. Anthers glabrous, but hairy-margined; sterile filament glabrous and flattened toward the apex. Exposed cliffs and mountain sides. June-July.

2. **COLLINSIA.** Innocence; Blue-eyed Mary.

Low annuals with simple, sessile leaves. Calyx 5-cleft. Corolla declined; deeply 2-lipped; often 2-colored. Stamens declined; 4 with anthers, the fifth represented by a gland at the base of the corolla; filaments long and thread-like, the lower pair inserted higher on the corolla than the others.

1. **C. tenella** (Pursh) Piper. (*C. parviflora* Dougl.) Stem slender, at length diffuse or spreading; 4-10 inches high; minutely downy. Leaves lanceolate or elliptical; entire or sparingly toothed; opposite, or the upper sometimes in whorls of 3-5. Pedicels solitary or 2-5 in a whorl; mostly axillary. Flowers small. Corolla blue or whitish. Gland small; capitate; short-stipitate. In shaded moist places, especially on mountain-sides. April-June.

3. **SCROPHULARIA.** Figwort.

Coarse perennial herbs with opposite leaves and small, proterogynous flowers in loose, terminal cymes. Calyx 5-cleft. Corolla short; lobes 5, unequal (4 erect and the fifth reflexed or spreading). Sterile stamen represented by a scale on the upper side of the throat of the corolla. Anthers transverse, 1-celled. Capsule ovoid with septicial dehiscence.

1. **S. occidentalis** (Rydb.) Bickn. (*S. nodosa occidentalis* Rydb.) Stems stout, square, 3-5 ft. high; glandular, especially on the upper part. Leaves ovate or slightly heart-shaped at the base; doubly and sharply serrate. Corolla greenish; gibbous at the base. Sterile stamen very broad; kidney-shaped on a claw. June-August. In mountain valleys in exposed, sunny places.

4. **MIMULUS.** Monkey-flower.

Erect or decumbent herbs, mostly hydrophytes. Leaves opposite; usually toothed. Inflorescence usually solitary in the axils. Flowers often showy; peduncled. Calyx 5-angled and 5-toothed. Corolla 2-lipped. Stamens didynamous; not inclosed in the upper lip. Stigmas 2-lobed.

Flowers about 1 inch long; upper leaves much shorter than peduncles..... 1. **M. Langsdorffii**
Flowers about $\frac{1}{2}$ inch long; leaves not shorter than peduncles 2. **M. glabratus**

1. **M. Langsdorffii** Donn. (*M. luteus* L.; *M. guttatus* DC.) Perennial from stolons. Stems smooth; erect or sometimes decumbent with spreading branches. Stem-leaves ovate; the upper much shorter than the peduncles in fruit; sessile or clasping; the lowermost long-petioled. Corolla lemon-yellow, often blotched with red or purple. In wet places near springs and streams. June-September.

2. **M. glabratus Jamesii** (T. & G.) Gray. (*M. Jamesii* T. & G.) Perennial from stolons. Stems smooth, diffusely spreading and creeping. Stem-leaves sessile or nearly so, as long as the peduncles; roundish or obscurely kidney-shaped. Peduncles slender, longer than the calyx in fruit. Corolla yellow. In swamps and clear streams. June-September.

5. **CASTILLEJA.** Indian Paint Brush.

Herbs (some species root-parasites), sometimes suffruticent, with alternate sessile leaves. Inflorescence terminal; spicate and leafy-bracted. Bracts and calyx usually brightly-colored, generally with red. Calyx tubular, cleft in front or behind or both; the lobes entire or 2-toothed. Corolla with a 2-lipped limb; the upper lip arched, entire, enclosing the 4 didynamous stamens; lower lip short, 3-lobed. Corolla often pale-yellow and inconspicuous. Anther-sacs unequal; the outer attached to filament by its middle, the inner by its end.

Leaves and bracts cleft into linear lobes..... 1. **C. angustifolia**
 Leaves and bracts entire..... 2. **C. miniata**

1. **C. angustifolia** (Nutt.) G. Don. Painted Cup; Red Feather; Mountain Indian Pink. Stems unbranched; 4-15 inches high; several from a long yellow root; weak, the outer ones decumbent; densely pilose, at least at base. Leaves slender, spreading. Bracts scarlet. Calyx about equally cleft above and below. Galea about equalling the corolla-tube; the lip very short. Gravelly soil on dry plains and hillsides. May-June. This species has been confused with *C. parviflora* Bong, a very distinct species. It is very variable, among its many forms being:

1a. **C. angustifolia collina** (A. Nels.) Distinguished from the type by the galea being longer than the tube, and by the calyx being less deeply cleft above than below.

2. **C. miniata** Dougl. Stems erect from a short, stout caudex, 1-2 ft. high. Leaves glabrous, rather thin. Spike very dense. Bracts scarlet. Galea a little longer than the corolla-tube. Same habitat and time of flowering as preceding species.

2a. **C. miniata chromosa** (A. Nels.) A form with puberulent leaves.

6. **VERONICA.** Speedwell.

Herbs with opposite, alternate or rarely whorled leaves. Inflorescence terminal or axillary; racemose, spicate or solitary. Flowers mostly small. Calyx 4 or rarely 5-lobed. Corolla blue, pink or white; nearly regular. Stamens 2; divergent. Ovary 2-celled; style slender; stigma capitate. Capsule compressed; emarginate, obcordate or 2-lobed.

Perennials; flowers in racemes, mostly opposite.

Capsule roundish; racemes axillary..... 1. **V. Anagallis**

Capsule strongly flattened; racemes terminal 2. **V. serpyllifolia**

Annuals; flowers axillary and solitary, mostly alternate.

Flowers short-pedicelled; white..... 3. **V. peregrina**

Flowers long-pedicelled; blue..... 4. **V. Tournefortii**

1. **V. Anagallis** L. Water Speedwell. Stem smooth, creeping and rooting at the base, curving upward at apex; 4-40 inches high. Stem-leaves opposite; oblong-lanceolate to ovate; acute; entire or serrate; petioled or sessile and mostly clasping by a heart-shaped base. Petals pale-blue, longitudinally striped with purple. Capsule somewhat flattened, with a shallow notch at apex. In water of shallow streams from springs. May-October.

2. *V. serpyllifolia* L. A smooth, slender-stemmed perennial; much-branched at the creeping base; 2-5 inches high. Leaves opposite; obscurely crenate; the lowermost petioled and rounded, changing upward to ovate or oblong, and finally becoming bracts. Flowers white or pale-blue with darker stripes. Fruit broadly kidney-shaped, about the length of the calyx. In moist places. May-Sept.

3. *V. peregrina* L. Neckweed; Purslane Speedwell. Smooth annual; stems erect, much-branched, 4-9 inches high. Leaves mostly alternate; the lowermost petioled, toothed; the upper ones sessile, oblong and entire. Flowers white (or rarely pink); solitary and nearly sessile in the axils. Capsule round-heart-shaped, usually shorter than the calyx. In moist places. May-October.

4. *V. Tournefortii* C. C. Gmel. (*V. byzantina* (S. & S.) B. S. P.; *V. Buxbaumii* Tenore). A pubescent annual with diffusely branched stems; 6-16 inches high. Leaves ovate or elliptical; short-petioled; mostly crenate-dentate; opposite below and alternate above. Flowers solitary in the axils of the leaves. Corolla showy; sky-blue or sometimes paler, the upper petals darker than others. Capsule slightly emarginate. Along roadsides and in fields. May-September.

OROBANCHACEÆ. Broom-rape Family.

Herbs completely parasitic upon the roots of other plants, and hence entirely destitute of chlorophyll. Stems erect, from nearly white to brownish or purplish. Leaves alternate, reduced to appressed scales. Flowers complete; irregular; in terminal, bracted spikes. Calyx of 4-5 united sepals. Corolla 2-lipped. Stamens didynamous; borne on the tube of the corolla and alternate with its lobes. (A fifth rudimentary stamen is sometimes present). Ovary "superior," 1-celled, with 4 parietal placentae, ripening into a capsule.

1. **OROBANCHE.** (Aphyllon). Cancer-root.

Glandular or viscid-pubescent. Flowers long-peduncled, often scape-like. Calyx nearly equally 5-cleft. Stamens included; the base of each anther-cell mucronate. Stigmas shield-shaped.

Corolla conspicuously 2-lipped; calyx-lobes shorter than tube 1. **O. fasciculata**
 Corolla obscurely 2-lipped; calyx-lobes longer than tube 2. **O. uniflora**

1. **O. fasciculata** Nutt. (*Aphyllon fasciculatum* A. Gray; *Thalesia fasciculata* (Nutt.) Britton). Stem 2-4 inches high, densely glandular-pubescent. Peduncles 1-4 inches long, 1-flowered. Flowers pale yellowish or purplish, with darker spots and veins of the same color. In dry sandy or gravelly soil, parasitic on the roots of *Artemesia*, *Eriogonum*, and other plants. April-August.

2. *O. uniflora* L. (*Thalesia uniflora* (L.) Britton; *Aphyllon uniflorum* A. Gray). Much smaller than the preceding (usually an inch or less high); the scaly stem short and nearly subterranean. Peduncles 1-4, slender, erect. Flowers an inch long. Calyx-lobes usually much longer than tube; acuminate. Corolla white, often violet-tinged; its lobes obovate and rather large for the size of the plant; obscurely 2-lipped; its tube curved. Grassy places in mountain valleys. April-August.

BIGNONIACEÆ. Bignonia Family.

Trees, shrubs or woody vines with large, mostly opposite leaves. Inflorescence terminal or axillary. Flowers mostly showy; more or less irregular. Corolla of 5 united petals. Stamens 2 or 4, borne on the tube of the corolla and alternate with its lobes; anthers 2-celled. Ovary mostly 2-celled. Seeds flat, winged.

1. CATALPA.

Trees with large, simple, petioled leaves. Corolla-tube swollen; the limb 2-lipped. Capsule brown; 2-celled; cylindrical, slender; loculicidally dehiscent. Seeds flat, many, winged; the wings fringed at the ends.

Lower lobe of corolla entire..... 1. *C. bignonioides*
Lower lobe of corolla notched..... 2. *C. speciosa*

1. *C. bignonioides* Walt. (*C. Catalpa* (L.) Karst.) Indian Bean. A thin-barked tree with spreading branches; 60 ft. high or less. Leaves broadly ovate; entire or sometimes 3-lobed. Flowers many, in terminal, erect panicles. Corolla white, 1-1½ inches long, densely blotched with purple and yellow; its tube narrowly bell-shaped. Capsules drooping; cylindrical-fusiform; about a foot long. Cultivated. June-July.

2. *C. speciosa* Warder. Candle- or Catawba-tree. A thick-barked tree, sometimes over 100 ft. high. Leaves broadly ovate; usually entire and acuminate. Inflorescence paniculate; few-flowered. Corolla 2 inches long; white, slightly blotched with purple and yellow within; its tube inflated-bell-shaped. Capsule 10-20 inches long. Cultivated. May-June.

ORDER PLANTAGINALES.

PLANTAGINACEÆ. Plantain Family.

Acaulescent or short-stemmed herbs with basal and often prominently ribbed leaves. Inflorescence spicate, or rarely solitary. Flowers inconspicuous; perfect, polygamous or monoecious. Calyx of 4 united sepals. Corolla hypogynous, scarious or membranous, of 4 united petals. Stamens usually 4 (2 in some species), borne on the corolla and alternate with its lobes. Style filiform. Ovary "superior," 1-2-celled, ripening into a transversely-splitting capsule or an indehiscent nutlet.

1. **PLANTAGO.** Plantain; Rib-grass.

Flowers greenish or purplish, in terminal scape-like spikes or heads. Petals veinless, withering-persistent. Ovary 2-celled, ripening into a transversely-splitting capsule.

Leaves not silky-pubescent; introduced.

Pod 8-18 seeded; leaves ovate or subcordate.... 1. **P. major**

Pod 2-seeded; leaves lanceolate..... 2. **P. lanceolata**

Leaves silky-pubescent; indigenous..... 3. **P. Purshii**

1. **P. major** L. Common Plantain. Perennial. Leaves all basal; glabrous or nearly so; ovate and usually subcordate. Petioles long, channeled, with conspicuous vascular bundles. Spike dense. Flowers perfect; proterogynous. Stamens 4. Capsule circumscissile near the middle. Along ditches and in moist places. May-September. A common weed.

2. **P. lanceolata** L. English Plantain; Rib-grass. Perennial or biennial, usually pubescent with scattered hairs. Leaves basal, 2-12 inches long; narrowly elliptical-lanceolate. Spike dense; at first capitate, then becoming cylindrical. Flowers perfect; proterogynous. Stamens 4. Along streams and in fields. April-November.

3. **P. Purshii** R. & S. (*P. Patagonica gnaphalioides* Gray). Annual, densely woolly- or silky-pubescent. Leaves basal; broadly linear; acute or acuminate; entire. Flowers perfect; heterogynous and sometimes cleistogamous. Sepals scarious. Bracts not exceeding the calyx. Stamens 4. Capsule splitting to discharge the seeds at or near its middle. On dry plains. May-August.

ORDER RUBIALES.

RUBIACEÆ. Madder Family.

Annual or perennial herbs (or some species shrubs or trees). Leaves connected by interposed stipules, or in whorls without apparent stipules. Calyx adnate to the ovary. Corolla regular, of 4-5 united lobes. Stamens borne on the corolla, as many as its lobes and alternate with them. Style simple or lobed. Ovary 1-10-celled, ripening into a capsule, a drupe or a berry.

1. **GALIUM.** Bedstraw; Cleavers.

Stems slender, 4-angled (with a woody base in some species). Leaves apparently whorled. Inflorescence axillary or terminal; mostly cymose or paniculate. Flowers mostly inconspicuous; perfect or rarely dioecious. Corolla rotate, 4-lobed. Stamens 4, with short filaments and exerted anthers. Styles 2, short; stigmas capitate. Ovary 2-celled, 2-seeded. Fruit dry, usually in pairs; smooth or hooked.

Annual; leaves in fours, the alternate ones much the smaller 1. **G. biflorum**
Perennial; leaves in sixes, all about the same size 2. **G. triflorum**

1. *G. bifolium* Wats. Stem smooth, erect, but little branched; 4-12 inches high. Leaves linear to oblanceolate. Flowers perfect; on solitary, naked peduncles. Fruit hispid, curved downward at the end of the peduncle. In light shade along streams, often in dense patches. May-June.

2. *G. triflorum* Michx. Sweet-scented Bedstraw. Stems weak; bristly-roughened backward on the angles; unbranched; 1-3 ft. long. Leaves 1-nerved; narrowly elliptical or slightly oblanceolate, cuspidate at the apex. Peduncles terminal and axillary; 3-flowered or branched into three 3-flowered pedicels. Flowers greenish. Fruit hispid with hooked hairs. Along mountain streams in rich soil. May-August.

CAPRIFOLIACEÆ. Honeysuckle Family.

Shrubs. or sometimes herbs, with opposite, usually exstipulate leaves. Inflorescence mostly cymose. Calyx of 3-5 united sepals. Corolla of 5 united petals, the tube often gibbous at the base. Stamens 5, borne on the corolla and alternate with its lobes. Style slender. Stigma capitate, or 2-5-lobed. Ovary "inferior," 1-6-celled, ripening into a 1-6-celled berry, drupe or capsule.

Leaves pinnately-compound; corolla mostly rotate. 1. *Sambucus*
Leaves simple.

Corolla bell-shaped; regular..... 2. *Symphoricarpos*
Corolla tubular; irregular..... 3. *Lonicera*

1. *SAMBUCUS*. Elderberry.

More or less tree-like shrubs with smooth bark and prominent pith in the new growth. Leaves large, pinnately-compound; decussately-opposite; leaflets 3-11, serrate. Inflorescence a compound cyme of small white or cream-colored, fragrant flowers. Stigmas and cells of ovary 3-5. Fruit a berry-like drupe.

1. *S. decipiens* Jones. Bushy or tree-like, 6-15 ft. high, sometimes with a trunk as much as 9 inches in diameter; bark finely fissured. Winter buds small. Leaves glabrous, with 3-9 leaflets, sharply serrulate except the abruptly acuminate apex. Cyme flat-topped, 3-6 inches broad. Fruit blue with a white bloom. In mountain valleys. June-July. (This species has heretofore been confused with *S. glauca* Nutt.)

2. *SYMPHORICARPOS*. Buck Bush; Snowberry; Waxberry.

Bushy shrubs, less than 5 ft. high. Stems erect or ascending. Leaves short-petioled. Inflorescence a short spike or axillary. Flowers white or pink-tinged, each accompanied by 2 small bracts. Calyx-teeth short. Corolla narrowly bell-shaped or funnelform; regularly 4-5-lobed. Stamens short. Ovary 4-celled, only 2 of the cells being fertile. Fruit 4-celled, but 2-seeded; ovoid; white in our western species.

Leaves decidedly pubescent beneath..... 1. *S. rotundifolius*
Leaves puberulent or glabrous on both surfaces 2. *S. vacinioides*

1. **S. rotundifolius** Gray. Partridge Berry. Bush 3-4 ft. high, much-branched; often puberulent. Leaves rotund or ovate-rotund; obtuse; entire or often repand or the lowermost of the branch lobed; very pubescent. Flowers solitary in the axils. Corolla oblong-campanulate, about 1/8 inch long. Mountain sides and valleys. June.

2. **S. vaccinioides** Rydb. (*S. rotundifolius vaccinioides* (Rydb.) A. Nelson.) Bush 2-4 ft. high, much-branched; bark of older stems grayish-brown and shreddy, that of young branches very light yellowish-brown and shining. Leaves elliptical, acute at both ends; dark-green above and more or less glaucous beneath. Corolla oblong-campanulate or cylindrical-funnelform, about 1/8 inch long. Seeds slightly acutish at lower end. Same habitat and time of flowering as No. 1.

3. **LONICERA.** Honeysuckle; Twinberry.

Bushy or climbing shrubs. Leaves entire. Flowers showy; fragrant; regular or 2-lipped; often swollen at base. Stigma capitate. Ovary 2-3-celled, ripening into a many-seeded berry.

1. **L. involucrata** Banks. Black Twinberry. Stems erect, branching; 4-7 ft. high. Leaves glossy, petioled; 2-5 inches long; elliptical-lanceolate to ovate. Peduncles axillary; each bearing a pair of opposite, sessile, nearly regular flowers. Each pair of flowers is contained in a 2-bracted involucre which becomes much enlarged and reddish-purple in fruit. Corolla yellowish, or the outer surface sometimes tinged with red; swollen at base; viscid-pubescent. Fruits in pairs, blue-black; globose; not palatable. In moist mountain valleys. 6,000-9,000 ft. May-June.

VALERIANACEÆ. Valerian Family.

Herbs with opposite and exstipulate leaves. Flowers usually small; perfect or polygamo-dioecious; in corymbed, paniced or capitate cymes. Corolla tubular or funnel-form; somewhat irregular; mostly 5-lobed. Stamens 1-4, distinct; borne on the corolla-tube. Style slender; stigmas 1-3. Ovary "inferior." 1-3-celled, but only 1 cell fertile, and that is 1-ovuled. Fruit indehiscent.

Tall perennials; calyx-limb plumose in fruit.... 1. **Valeriana**
 Low annuals or biennials; calyx-limb, if present, not
 plumose 2. **Valerianella**

1. **VALERIANA.** Valerian.

Herbs with ill-smelling roots and basal or opposite leaves. Stamens 3, inserted on the corolla and alternate with its lobes.

Stem stout; leaves thick; obscurely netted-veined 1. **V. ceratophylla**
 Stem weak; leaves thin; distinctly netted-veined.. 2. **V. acutiloba**

1. *V. ceratophylla* (Hook.) Piper. (*V. edulis* Nutt.) Tobacco Root. Stems smooth, erect; 1-4 ft. high from thick tap-roots. Leaves mostly basal; oblanceolate to spatulate, narrowed into a long-margined petiole; entire or laciniate-pinnatifid. Flowers yellowish-white; very small; polygamodioecious; in a long, slender, interrupted panicle. Fruit small. In moist places in mountain valleys. April-August.

2. *V. acutiloba* Rydb. Perennial from a horizontal or ascending rhizome. Stems 12-20 in. high. Basal leaves entire, spatulate or obovate, with a short, wing-margined petiole. Stem-leaves usually 3 pairs on the pistillate plants and 2 pairs on the staminate ones; pinnately divided, the divisions narrow and long-acuminate. Cyme dense, glandular-puberulent. Corolla funneliform with very short tube. Ovary and fruit smooth. In rather dense shade in rich moist soil in the mountains. May-August.

2. VALERIANELLA. Corn Salad; Lamb's Lettuce.

Dichotomously-branched. Basal leaves tufted and entire; stem-leaves sessile, usually dentate. Calyx-limb wanting or nearly so. Corolla white, blue or pink; its tube narrowed at the base. Stamens 3. Style minutely 3-lobed at apex. Ovary 3-celled.

1. *V. macrocera* (Torr. & Gray) A. Gray. (*Plectritis macrocera* T. & G.) Stem slender, 3-8 inches high; unbranched or slightly branched. Leaves linear to narrowly oblong. Spur of corolla longer than its tube. Fruit with conspicuous, broad wings; obscurely keeled on back; more or less hispid. In dry soil. May-June.

ORDER CAMPANULALES.

CAMPANULACEÆ. Bell-flower Family.

Herbs with milky juice. Leaves simple; alternate; exstipulate. Corolla sympetalous, regular, 5-lobed. Stamens 5; distinct. Style 1, usually hairy above; stigmas 2 or more. Ovary "inferior." Capsule 2-several-celled, many-seeded.

1. *SPECULARIA*. (*Legouzia*). Venus' Looking Glass. Annual. Flowers sessile; axillary; blue or purplish; dimorphous (the earlier small and cleistogamous). Calyx 5- (or 3-4-) lobed. Corolla wheel-shaped. Filaments hairy, shorter than the anthers. Capsule prismatic or slender-cylindrical; 3-celled, opening by 3 lateral valves.

1. *S. perfoliata* (L.) A. DC. (*L. perfoliata* (L.) Britton). Erect, somewhat hairy. $\frac{1}{2}$ -3 ft. high. Leaves ovate or roundish, clasping by the heart-shaped base. Flowers solitary or 2-3 in the axils; all but the upper ones cleistogamous. Capsule ellipsoid, short, straight, opening at or below the middle. Rather dry, open, stony ground. May-July.

COMPOSITÆ. Composite Family.

Herbs or shrubs (or trees in some tropical genera). Leaves exstipulate. Inflorescence a close, flower-like, involucrate head, which is solitary or corymbed or cymose. Flowers on a common receptacle, all alike or of 2 kinds; those with strap-shaped corollas (e. g., the yellow outside petal-like flowers of the Sunflower, or all the flowers of the Dandelion) are called ray-flowers, while those with tubular corollas (the brown flowers forming the cushion-like part of the Sunflower) are the disk-flowers. Calyx-limb, if present (called the pappus, and modified usually for dispersion), crowning the summit of the ovary in the form of awns, bristles, scales or teeth, or cup-shaped. Corolla 5-lobed or toothed. Stamens epipetalous; 5 (or rarely 4); their anthers united in a tube enclosing the 2-cleft style (or nearly distinct in some of the tribe Heliantheae). Ovary "inferior," ripening into an achene.

For illustrations of the characters of anthers and style-branches in the different tribes, see p. 111 of Miss Eastwood's Key and Flora (published with the Bergen series of botanies).

Heads consisting of ray-flowers only; plants usually with milky juice. (Subfamily Ligulæfloræ).

Flowers pink or purple.

Pappus-bristles plumose..... 1. **Tragopogon**

Pappus-bristles not plumose..... 2. **Lygodesmia**

Flowers yellow (sometimes purplish on outside).

Pappus-bristles plumose..... 3. **Microseris**

Pappus-bristles simple.

Leaves all, or nearly all, basal; heads solitary, scapose.

Achenes smooth throughout..... 4. **Agoseris**

Achenes rough-spinulose near the apex..... 5. **Taraxacum**

Leafy-stemmed plants; heads corymbose.. 6. **Crepis**

Heads consisting of both ray and disk-flowers or of disk-flowers only. The disk-flowers are perfect; ray-flowers pistillate or neutral; plants usually without milky juice. (Subfamily Tubulifloræ.)

Anthers tailed at the base.

Heads dioecious; involucre bracts not spiny-tipped..... 7. **Antennaria**

Heads perfect; involucre bracts spiny-tipped 8. **Cirsium**

Anthers not tailed at the base.

Ray-flowers wanting.

Stamens nearly distinct..... 9. **Iva**

Stamens syngenesious.

Shrubs or woody herbs; pappus

capillary..... 10. **Chrysothamnus**

- Herbs, not woody; pappus wanting or scaly.
 Annual; receptacle very convex..... 11. **Matricaria**
 Perennial; receptacle flat..... 12. **Chaenactis**
- Ray-flowers present and pistillate.
 Rays yellow.
 Leaves opposite..... 13. **Arnica**
 Leaves alternate (or all basal).
 Stems usually bearing a single head.
 Pappus none..... 14. **Balsamorhiza**
 Pappus a deeply lobed crown..... 15. **Wyethia**
 Stems bearing more than a single head.
 Involucres viscid..... 16. **Grindelia**
 Involucres not viscid.
 All of stem-leaves sessile.. 17. **Chrysopsis**
 Only upper stem-leaves sessile. 18. **Senecio**
- Rays white, pink or purple.
 Rays few (4-15).
 Rays 4-5..... 19. **Achillea**
 Rays 8-15.
 Rays wedge-shaped, 3-lobed..... 20. **Layia**
 Rays linear; minutely 5-toothed..... 21. **Aster**
 Rays many (over 30)..... 22. **Erigeron**

1. TRAGOPOGON. Goats-beard.

Smooth biennial or perennial herbs from fleshy tap-roots. Leaves entire, sessile; linear-lanceolate, tapering to a long point. Heads large; yellow or purple. Ray-flowers truncate and 5-toothed; their pappus of plumose bristles, in 1 series. Disk-flowers none. Achenes long-beaked, at least all but the outermost.

1. **T. porrifolius** L. Salsify; Oyster-plant. Tall (2-4 ft. high). Flowers purple, on thick, hollow peduncles; involucre bracts usually much longer than the rays. Pappus with brownish hairs. Escaped from cultivation. June-October.

2. LYGODESMIA. Rush Pink.

Smooth-stemmed, rigid and branching herbs from thick tap-roots. Leaves linear, becoming reduced to scales above. Heads erect at the ends of the branches; solitary or sometimes racemose; 3-12-flowered. Involucre cylindrical; receptacle flat; naked. Rays truncate and 5-toothed at apex. Achenes smooth or striate.

1. **L. grandiflora** T. & G. Stems perennial; simple below, branched above. Heads few, more than an inch across, each 5-10-flowered. Involucres $\frac{3}{8}$ -1 inch high. Pappus light-brown. On gravelly hills. 4,300-7,000 ft. June-July.

3. MICROSERIS.

Acaulescent or subacaulescent herbs, glabrous or nearly so. Heads several to many flowered, on simple scape-like peduncles. Flowers yellow, all ligulate. Corolla mostly with a hairy tube. Pappus white; its bristles or awns plumose, or naked with chaffy base. Achenes 8-10 ribbed.

1. **M. major** A. Gray. (*Ptilocalais major* (A. Gray) Greene). Leaves entire. Heads on long peduncles, nodding in the bud. Pappus of plumose bristles. Achenes truncate at the apex, not beaked. Receptacle naked. Dry gravelly soil. April-May. (Under the name of *Ptilocalais macrolepis*, Dr. Rydberg has recently separated our form from the above.)

4. **AGOSERIS.** (Troximon). False Dandelion.

Herbs with mostly basal leaves and yellow flowers (sometimes purplish on outside). Bracts of the bell-shaped involucre imbricated. Achenes terete; usually distinctly 10-ribbed or nerved; expanding in fruit and forming a globose head; beaked or beakless. Pappus-bristles fine and copious, capillary; white or nearly so.

Beak of achene 3-4 times its length..... 1. **A. heterophylla**
Beak about as long or somewhat longer than achene.

Plants low; rays purplish-tinged on the outside 2. **A. arachnoidea**

Plants tall; rays yellow throughout..... 3. **A. elata**

Beak decidedly shorter than achene.

Leaves smooth at least in age.

Leaves 2-ranked..... 4. **A. parviflora**

Leaves not 2-ranked..... 5. **A. glauca**

Leaves more or less pubescent even in age.... 6. **A. villosa**

1. **A. heterophylla** (Nutt.) Greene. (*T. heterophyllum* Nutt.) A small annual. Leaves all basal or sometimes alternate; villous-pubescent; linear to spatulate or elliptical; with entire, dentate or sinuate-pinnatifid margins. Peduncles slender, 4-12 inches high; often several. Heads quite small. Bracts lanceolate; acuminate. Achenes ribbed on the inner surface or merely nerved; their beaks filiform. Pappus silky; white. On dry plains and mountain ridges. May-June. 4,300-6,000 ft.

2. **A. arachnoidea** Rydb. Perennial from a tap-root, more or less woolly throughout. Leaves oblanceolate, more or less runcinate-lobed, long-acuminate; densely pubescent. Heads not more than $\frac{3}{4}$ inch broad; bracts in about 3 series, long-acuminate. Flowers becoming purplish in age. Beak as long as body of achene. Grassy plains. May-June.

3. **A. elata** (Nutt.) Greene. (*T. elatum* (Nutt.) A. Nels.; *T. Nuttallii* A. Gray). Annual, erect; pubescence sparse and hirsute or none. Leaves oblanceolate or the lowest pinnatifid; densely pubescent. Head when mature more than an inch in diameter; rays large; involucre woolly. Pappus brownish. Achenes with beak from $\frac{1}{2}$ to $\frac{3}{8}$ inch long. Dry gravelly hillsides. May-June.

4. **A. parviflora** (Nutt.) Dietr. (*T. glaucum parviflorum* A. Gray). A glabrous perennial. Leaves narrowly linear; entire and acuminate. Scape much longer than leaves. Head not over an inch broad. Achenes about $\frac{1}{4}$ inch long. Rather dry plains. May-July.

5. **A. glauca** (Pursh) Greene. (*T. glaucum* Pursh). A glaucous and glabrous perennial. Leaves linear, lanceolate or elliptical; entire, dentate or pinnatifid. Scape longer than the leaves. Head 1-2 inches broad. Achenes about $\frac{1}{2}$ inch long. Dry plains. May-July.

5a. **A. glauca pumila** (Nutt.) (Agoseris *Leontodon* Rydb.) Low and tufted; pubescent with ashy-gray hairs when young, but becoming glabrate in age. Leaves lanceolate in outline, more or less laciniate-pinnatifid. Outer rays usually purplish on the outside. Beak striate throughout. Rather dry hills. May.

6. **A. villosa** Rydb. Stem stout, hairy when young, but becoming nearly smooth; about 8 inches high. Leaves broadly lanceolate, entire or laciniately toothed; rather thick; long-hairy. Heads as much as an inch in diameter. Involucre densely hairy; outer bracts oblong or ovate, the inner lanceolate. Achenes brown; scarcely striate.

5. TARAXACUM. Dandelion.

Perennial herbs from a deep, thick tap-root. Leaves all basal, forming a rosette; runcinate-pinnatifid or lyrate. Scape naked and hollow. Flowers yellow; involucre reflexed at maturity. Pappus soft and capillary, neither plumose nor with a woolly ring at base; in fruit expanded and raised on an elongated beak.

1. **T. officinale** Weber. (*T. Taraxacum* Karst; *T. Dens-leonis* Desf.) Leaves usually triangular-lobed. Bracts linear Achenes abruptly contracted into a conical or pyramidal apex, which is prolonged into a filiform beak of 2 times the length of the achene. On lawns and in waste places; a very troublesome weed. March-November.

6. CREPIS. Hawks-beard.

Annual, biennial or perennial herbs; glabrous or sparingly tomentose. Leaves basal or alternate. Involucre of a single row of equal bracts, or sometimes with smaller ones at the base. Flowers yellow. Achenes usually 10-20 ribbed or striate. Pappus copious; white and silky.

Involucral bracts more or less tomentose.

Bristly hairs glandular..... 1. **C. occidentalis**

Bristly hairs not glandular..... 2. **C. scopulorum**

Involucre smooth and glabrous..... 3. **C. acuminata**

1. **C. occidentalis** Nutt. Perennial; sparingly tomentose and often glandular-hirsute above, especially the inflorescence. Stems stout; branching; one or several from a strong tap-root. Leaves from runcinately-toothed to pinnatifid, more or less crisped at the margins. Involucre with a set of small bracts at base. Achenes from orange to brown, 10-18 striate. Dry plains. May-June.

2. **C. scopulorum** Coville. Perennial, 4-16 inches high. Stem single, or rarely 2 from the same caudex, bearing 1-5 cymose heads. Leaves rather firm; cleft almost to midrib, the divisions linear-lanceolate and deeply lobed or toothed. Achenes usually olive-green and not ribbed at maturity. Dry hillsides, usually near their summits. May-June.

3. **C. acuminata** Nutt. Perennial; pubescence minutely cinerous below. Stem usually single from a tap-root, unbranched to the inflorescence; 1-3 ft. high. Leaves elliptical-lanceolate in outline, laciniate-pinnatifid, slender-petioled. Involucre narrow-cylindric. Flowers 5-10. Achenes beaked, faintly striate. In light shade in rich soil on plains and in mountain valleys. June-July.

7. ANTENNARIA. Everlasting.

Perennial, white-woolly dioecious or polygamous herbs. Leaves basal or alternate, entire. Involucre of several rows of white, pink or brown scarious scales. Heads small, the flowers all tubular. Flowers whitish on a naked receptacle.

Pappus of capillary bristles; the bristles of the staminate flowers more or less thickened above. Achenes oblong; terete or slightly compressed.

1. **A. dimorpha** Torr. & Gray. Two inches high or less, caespitose. Leaves forming a small rosette; spatulate. Heads solitary and subsessile at the crown, or raised on a sparsely-leaved stem. Bracts of the involucre brownish. Bristles of staminate flowers scarcely thickened by minute barbs; those of fertile flowers long and smooth, white. Dry plains. April-June. 4,000-6,000 ft.

8. **CIRSIUM.** (Carduus). Thistle.

Herbs with alternate, sessile, spiny-tipped leaves. Heads many-flowered; involucre much-imbricated; outer bracts or all of them spiny-tipped. Flowers (in most species) all perfect; reddish-purple, pink, whitish or rarely yellow. Anthers long-appendaged at tip. Receptacle densely bristly. Pappus-bristles plumose, numerous, united into a ring at the base.

1. **C. undulatum** (Nutt.) Spreng. Erect, white-woolly throughout, from a biennial root; 1-4 ft. high. Leaves partly clasping; wavy-pinnatifid or sometimes pinnately-parted with lanceolate or triangular lobes; rather prickly; white-woolly on both sides. Heads single at the end of the branches; bracts with a glandular dorsal ridge; flowers purplish to nearly white. Dry plains. June-August.

9. **IVA.** Marsh Elder.

Annual or perennial herbs with thick opposite (or the upper alternate) leaves. Inflorescence axillary. Flowers greenish, nodding, perfect. Involucre of a few rounded bracts. Marginal flowers 1-6. pistillate, fertile; central flowers perfect but sterile, with funnellform corollas. Anthers scarcely coherent.

1. **I. axillaris** Pursh. Perennial by woody roots; stems branched or unbranched. Leaves sessile; obscurely 3-nerved; from linear-oblong to obovate; mostly entire; obtuse. Heads solitary in the axils, short-peduncled. In alkaline soil. May-September.

10. **CHRYSOTHAMNUS,** (Bigelovia). Rabbit-brush.

Shrubs with narrow, entire leaves. Heads with 5-30 yellow disk-flowers. Style-branches subulate or filiform, usually long-exserted. Achenes terete or slightly angled; narrow; pubescent. Pappus soft, copius; usually dull-white.

1. **C. graveolens** (Nutt.) Greene. Rayless Golden-rod. Plant widely bushy-branched, green and smooth or nearly so; 2-5 ft. high. Leaves numerous, green on both sides; ascending, linear, obscurely 3-nerved. Flowers orange-yellow; heads many in a rounded cymose corymb. Dry places. June-August.

11. **MATRICARIA.** Camomile.

Herbs with finely 1-3-divided leaves. Heads peduncled; with white, pistillate rays (in some species wanting), and yellow, perfect disk-flowers on an elongated conical and naked receptacle. Achenes 3-5 ribbed. Pappus none.

1. *M. suaveolens* (Pursh) Buchenau. (*M. discolor* DC.; *M. matricarioides* (Less.) Porter). Pine-apple Weed; Green or Rayless Dog-fennel. Annual, glabrous and homely aromatic plants with a very leafy and at length much-branched stem; 6-18 inches high. Leaves thickish; 2-3 pinnately-dissected into linear lobes; rosette-forming at base. Heads numerous. Rays none. Achenes faintly nerved. A familiar weed of waste places. March-November.

12. CHAENACTIS.

Herbs with alternate, mostly pinnately-dissected leaves. Inflorescence solitary or corymbose; heads bearing disk-flowers only. Bracts in 1 series; linear, equal. Flowers yellowish or tinged with pink. Receptacle flat. Pappus of entire, persistent nearly transparent scales. Achenes angled.

1. *C. Douglasii* H. & A. Grayish-white or sometimes glabrate, perennial; 6-12 inches high from a short and erect caudex. Heads corymbose, short-peduncled.

13. ARNICA.

Leaves simple, mostly opposite. Heads many-flowered; usually large and radiate; solitary or corymbed. Flowers yellow. Rays (if present) pistillate. Receptacle flat. Pappus a single row of somewhat rigid, minutely barbed bristles.

1. *A. cordifolia* Hook. Stem 6-24 inches high, more or less villous and glandular above. Basal and lower stem-leaves strongly heart-shaped to ovate, coarsely toothed, on long petioles; upper stem-leaves on short petioles or nearly sessile. Heads usually solitary (sometimes 2-8) on slender peduncles. Involucral bracts villous; lanceolate to oblong, acuminate. Rays about 15. Achenes minutely barbed. In rich, moist soil in mountain valleys, in light shade or in exposed places. June-August. 6,000-11,000 ft.

14. BALSAMORRHIZA. Balsam Root.

Low perennial herbs with thick tap-roots. Leaves mostly basal; large and long-petioled. Heads large and showy, mostly solitary on long peduncles. Involucre broad, the outer bracts leafy. Rays yellow, each with a distinct tube, pistillate. Achenes without pappus; those of disk 4-angled.

Leaves sagittate with entire margins..... 1. *B. sagittata*
Leaves pinnately cleft, parted or divided.

Herbage canescent..... 2. *B. Hookeri*

Herbage green; glandular-viscid..... 3. *B. macrophylla*

1. *B. sagittata* Nutt. Arrow-leaved Balsam Root or "Big Sunflower." Silvery-canescence; the involucre white-woolly. Basal leaves entire; hastate; 4-9 inches long, on still longer petioles; cauline few, from linear to spatulate. Scape at length a foot or more high. Rays 11-16. From a woody and rough-barked tap-root often 3 feet or more in length. Dry hills. April-June. 4,000-6,000 ft.

2. *B. Hookeri* Nutt. (*B. Balsamorhiza* (Hook.) Heller). Grayish-white with fine hairs. Root fusiform with smooth bark; 8 inches or less in length. Leaves 8-12 inches long; lanceolate, once or twice pinnately-parted into lanceolate or linear lobes, or some of them with only a few lobes or coarse teeth. Dry gravelly plains. May.

3. **B. macrophylla** Nutt. Green and glabrate, slightly glandular-viscid. Leaves usually large (as much as a foot long), ovate or oblong, more or less pinnately-parted into broadly lanceolate entire-margined lobes. Heads large on scape-like and leafy-bracted peduncles 1-2 ft. long. In rich soil in mountain valleys. June-August.

15. **WYETHIA.**

Stout perennial simple-stemmed herbs with large, erect, alternate leaves. Heads large; usually solitary. Involucral bracts imbricated in 3 rows, the outer ones leafy. Rays long, yellow, pistillate. Receptacle flat. Pappus with a chaffy crown.

1. **W. amplexicaulis** Nutt. 1-2 ft. high; balsamic-viscid. Leaves elliptical-lanceolate; entire or denticulate; the basal often a foot or more long. Dry hills, often in immense "patches." May-July. 4,500-7,000 ft.

14. **GRINDELIA.** Gum Plant.

Coarse biennial or perennial herbs (more or less woody at base). Leaves leathery; alternate; sessile or clasping; spinulose-dentate. Heads many-flowered; solitary on the ends of leafy branches. Bracts of the hemispheric involucre imbricated in several series; their tips slender and more or less spreading or recurved. Ray-flowers pistillate (or rarely wanting). Disk-flowers yellow; perfect or sometimes staminate only. Pappus of 2-8 deciduous awns or bristles. Achenes 4-5 ribbed.

1. **G. squarrosa** (Pursh) Dunal. Glabrous, erect or ascending, 10-24 inches high. Leaves obtuse; linear-oblong to spatulate. Involucral bracts recurved at tips; pappus-awns 2-3. Achenes truncate, not toothed. An abundant weed of dry plains and waste places. Jan.-Nov. Locally called "Arnica."

17. **CHRYSOPSIS.** Golden Aster.

Annual, biennial or perennial herbs, with pubescence from hispid to silky. Leaves alternate; sessile; entire or few-toothed. Flowers yellow, in many-flowered heads. Rays numerous or wanting; pistillate if present. Achenes flattened, hairy. Pappus double; that of the outer flowers of short and somewhat chaffy bristles, while that of the inner is of long capillary bristles.

1. **C. foliosa** Nutt. (*C. villosa foliosa* Eaton). 1-2 ft. high, grayish-white with appressed silky pubescence. Leaves short, from oblong or elliptical to lanceolate. Heads rather numerous and clustered. Rays numerous. Dry hillsides and plains. June-July.

18. **SENECIO.** Groundsel; Ragwort; Squaw-weed.

Annual or perennial herbs (sometimes woody). Leaves basal or alternate. Heads solitary, cymose or paniculate, of mostly yellow flowers; ray-flowers wanting or pistillate and fertile; disk-flowers perfect and fertile, with tubular corollas. Pappus of many soft-capillary bristles. Involucre usually of a single row of equal, erect scales. Receptacle flat, without scales.

- Leaves entire..... 1. **S. perplexus**
- Leaves lobed or pinnatifid.
- Plant glabrate; leaves light-green, leathery. 2. **S. uintahensis**
- Plant glabrous; leaves darker-green, not leathery 3. **S. pseudauricus**

1. *S. perplexus dispar* A. Nelson. (*S. dispar* A. Nels.) Perennial from a short rootstalk, which produces a single, erect, rather stout stem; floccose-woolly when young, but becoming glabrate in age. Leaves from oblanceolate or broader and petioled to triangular and sessile above; entire or minutely dentate; usually leathery. Inflorescence with a short-peduncled terminal head and long-peduncled lateral heads. Bracts usually black-tipped. In moist, rich soil. 5,500-10,500 ft. May-Aug.

2. *S. Uintahensis* (A. Nels.) Greene. An erect perennial. Basal leaves long-petioled, deeply divided, the lobes irregularly and incisely dentate; stem-leaves fewer, similar to the basal but on shorter petioles toward the top until finally sessile. Bracts thin, black-tipped. Dry, gravelly plains and in the mountains. May-August. 4,500-9,000 ft.

3. *S. pseud aureus* Rydb. Stems a foot high or less; glabrous and glaucescent, from a branching caudex. Leaves obovate in outline, coarsely serrate, about an inch long; tapering to the long, slender petioles. Heads in a close terminal flat-topped corymb. Bracts linear, abruptly acuminate. Rays few, golden-yellow. In light shade near streams. May-June. 5,000-7,000 ft.

19. *ACHILLEA*. Yarrow; Milfoil.

Strong-scented herbs, usually with unbranched stems; perennial from slender rhizomes. Leaves alternate, pinnately dissected. Heads many; corymbose. Flowers small; ray-flowers 4-5; pistillate, white or pinkish, short; disk-flowers yellow. Involucre several rows of small, narrow scales. Pappus none. Achenes flattened, margined. Receptacle chaffy.

1. *A. millefolium* L. Stem simple or sometimes branched above; pubescence arachnoid or nearly smooth. Leaves lanceolate in outline, bipinnately dissected into many small linear segments. Corymbs cymose, flat-topped, very compound. Involucral bracts green, becoming brownish-margined when the plant is growing in exposed places. May-September.

1a. *A. millefolium lanulosa* (Nutt.) Piper. (*A. lanulosa* Nutt.) Distinguished from the type by the decidedly convex corymb, by the woolly pubescence of the herbage, and by the uniformly green bracts.

1b. *A. millefolium alpicola* (Rydb.) is like *A. millefolium lanulosa* except that it has dark-brown or almost black involucral bracts. It grows at high altitudes (11,000-12,000 ft.) All possible intergradations between these forms can be found.

20. *LAYIA*. (Blepharipappus).

Annuals, with alternate leaves and usually showy flowers in terminal heads. Bracts herbaceous. Ray-flowers 8-20; white or yellow; pistillate; the rays 3-toothed or lobed. Disk-flowers yellow. Ray-achenes flattened and without pappus; those of the disk-flowers with a pappus of 5-20 capillary bristles.

1. *L. glandulosa* H. & A. (*Blepharipappus glandulosus* Hook.) Branching from the base; 8-14 inches high. Leaves (and stems) with dark stipitate glands, especially near the flowers; linear or lanceolate; the lower pinnatifid or toothed, the upper entire. Rays large and conspicuous; clear white (or rose-tinged). On dry plains, often under sage-brush. May-June. Locally called "Daisy."

21. **ASTER.**

Mostly perennial, branching herbs. Leaves alternate. Heads many-flowered; usually corymbose or paniced. Bracts of the involucre firm; more or less imbricated. Ray-flowers pistillate; white, blue or purple. Disk-flowers perfect; usually yellow, changing to red, brown or purple. Pappus mostly of simple, capillary bristles. Achenes more or less flattened.

1. **A. ericaefolius** Rothrock. (*Leucelene ericoides* (Torr.) Greene). Stems several from deep roots; 3-12 inches high; canescent and glandular-scabrous. Leaves hispid-ciliate; spatulate; narrowing at base. Rays 12-15, white or drying to red. Disk-flowers perfect, white. Pappus a single row of slender white bristles. Dry plains and hillsides. May-August.

22. **ERIGERON.** Flea-bane.

Herbs with entire or toothed, usually sessile leaves. Heads solitary or corymbose. Involucral bracts narrow, equal, imbricated, usually in 1 row; seldom leathery or green-tipped. Ray-flowers narrow; white, violet or purple; usually very many; pistillate. Disk-flowers yellow, not fading to purple. Pappus scanty, of dull-white bristles. A genus much resembling *Aster*, from which it is distinguished by the involucral bracts and the constant color of the disk-flowers.

Ray-flowers inconspicuous..... 1. **E. minor**
Ray-flowers conspicuous.

Perennials; heads large, rays white.

Pappus double..... 2. **E. pumilus**

Pappus single..... 3. **E. Engelmannii**

Annual or biennial; heads many, small; rays colored.

Rays about 100; pappus double..... 4. **E. divergens**

Rays 30-65; pappus single..... 5. **E. Bellidiastrum**

1. **E. minor** (Hook.) Rydb. Stems weak, hairy, branched, 5-12 inches high; often several from the same root. Leaves entire, those of the stem sessile. Bracts or involucre narrow, abruptly acute, never glandular. Rays white. Wet meadows. June-August.

2. **E. pumilus** Nutt. "Wild Daisy." Perennial from a tap-root; a foot or less high, conspicuously hispid or hirsute with spreading bristly hairs. Leaves petioled or upper stem leaves sessile; from linear-spatulate to lanceolate (the upper linear), entire. Involucre hispid. Rays 50-80. Achenes pubescent. Dry gravelly plains. May-July.

3. **E. Engelmannii** A. Nels. Stem slender, ascending, weak, several from the same root. Leaves many, linear, slender-petioled, 1-nerved. Heads 1-3 on each stem smaller than those of No. 2. Bracts ciliolate. Rays about 40. Hillsides. May-June.

4. **E. divergens** T. & G. Stems several from a stout tap-root, 6-15 inches high, diffusely branched above; densely ashy-pubescent or hirsute. Heads numerous, slender-pedicelled, $\frac{1}{2}$ -1 inch broad. Rays narrow, about 100; purplish or violet. Pappus double.

5. **E. Bellidiastrum** Nutt. A much-branched grayish-pubescent annual, about a foot high. Leaves spatulate. Heads small, numerous, with lilac or light-bluish rays. Dry sandy plains. May-June.

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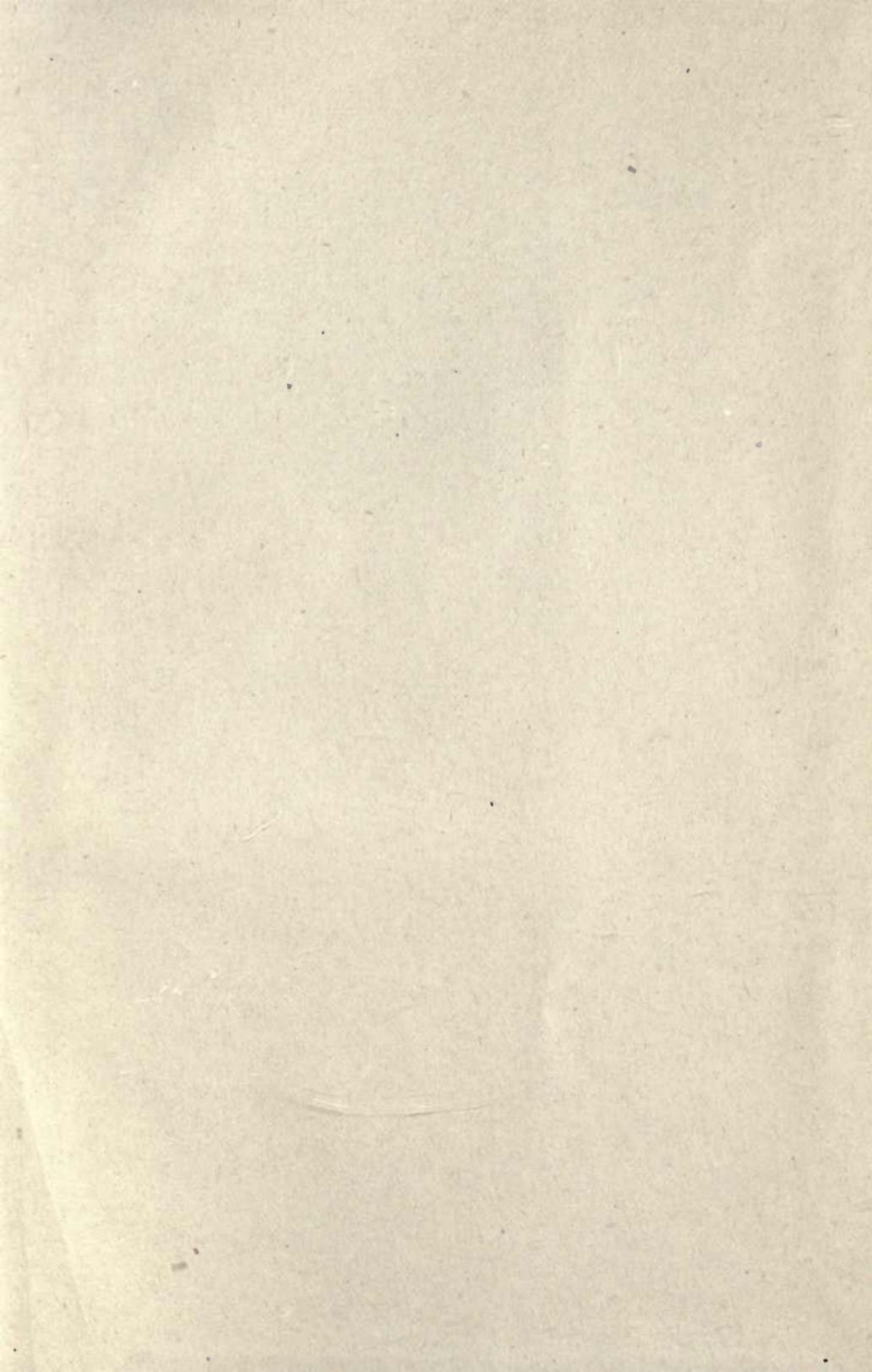
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