

AN ABSTRACT OF THE THESIS OF

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(Degree) (Major)

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Title A TAXONOMIC STUDY OF THE VASCULAR FLORA ON ASHLAND PEAK
JACKSON COUNTY OREGON

Abstract approved Signature redacted for privacy.
(Major Professor)

This thesis is a systematic treatment of the vascular flora of Ashland Peak in southern Jackson County. Ashland Peak is in the Siskiyou Mountain Range.

Parts of the summers of 1957 and 1958 were spent in the field collecting the specimens. Voucher specimens are on file at the Oregon State College Herbarium.

Brief sections of this work are devoted to geology and soils, climate, historical factors and floral elements and a section to ecological notes. In the ecological section 3 zones were distinguished on Ashland Peak: Hudsonian, Canadian and Transition. Nine major plant associations were recognized as follows:

ZONE	EXPOSURE AND ELEVATION	ASSOCIATION
I. HUDSONIAN	Summit 7,500' North & East 7,500-7,200'	1. Subalpine 2. <u>Tsuga mertensiana</u> / <u>Festuca ovina</u>
II. CANADIAN	North & East 7,200-6,000' North 6,000-5,000' South 7,500-6,900' South 6,900-5,900' South 5,900-5,500' West 7,300-6,800'	3. <u>Abies magnifica</u> var. <u>shastensis</u> / <u>Arctostaphylos</u> 4. <u>Abies concolor</u> / <u>Ribes</u> 5. <u>Arctostaphylos patula</u> / <u>Ceanothus velutinus</u> 6. <u>Abies magnifica</u> var. <u>shastensis</u> / <u>Arctostaphylos patula</u> 7. <u>Abies concolor</u> / <u>Arctostaphylos patula</u> 8. <u>Artemisia tridentata</u> / <u>Lonicera conjugalis</u>
III. TRANSITION	South 5,500-5,000'	9. <u>Pinus ponderosa</u> / <u>Ceanothus velutinus</u>

The major part of the study is devoted to the taxonomic treatment of the vascular flora; 47 families, 155 genera and 234 species were studied and keys and descriptions were prepared for the families, genera and species.

A TAXONOMIC STUDY OF THE VASCULAR
FLORA ON ASHLAND PEAK
JACKSON COUNTY
OREGON

by

LA REA JUNE DENNIS

A THESIS

submitted to

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Dr. Franklin W. Sturges has been of assistance with the ecology of the area.

The thesis was written under the direction of Dr. Albert N. Steward for whose generous assistance, valuable suggestions and helpful criticisms the writer wishes to express her genuine appreciation. The committee members, Dr. Roy A. Young, Dr. Robert M. Storm and Dr. Frank H. Smith have been most cooperative.

To her parents, Mr. and Mrs. Joel A. Dennis and her grandmother, Mrs. Lillie J. Dennis the writer acknowledges her gratitude for constant encouragement and concern and for companionship in the field, without which the completion of this thesis would not have been possible.

An expression of appreciation is especially due Mary Lou Ivie and Patricia Kauffman for carefully typing the final manuscript.

A TAXONOMIC STUDY OF THE VASCULAR FLORA ON
ASHLAND PEAK, JACKSON COUNTY,
OREGON

INTRODUCTION

GEOGRAPHICAL LOCATION

Ashland Peak, elevation 7,532 feet, is located in the southwestern section of the state, in southern Jackson County; latitude $42^{\circ} 04' 51.174''$, longitude $122^{\circ} 42' 56.672''$. The peak is approximately 8 airline miles south of the city of Ashland, Oregon and about $5\frac{1}{2}$ miles north of the Oregon-California State Line. It is part of the Siskiyou Mountain Range that forms the east-west divide between the Klamath and Rogue River Basins.

Ashland Peak is located in two national forests; the portion south of the summit is in the Klamath National Forest and the summit and north is in the Rogue River National Forest. The peak is reached by a 14 mile drive from Ashland over an unsurfaced Forest Service road. The road is closed by snow from October until early July.

The limits of the study area are those of the peak itself. The area extends on the north and on the south down to an elevation of approximately 5,000 feet where it is intersected by various ridges. On the west the boundary is McDonald Peak, while to the east the area ends at approximately 6,500 feet.

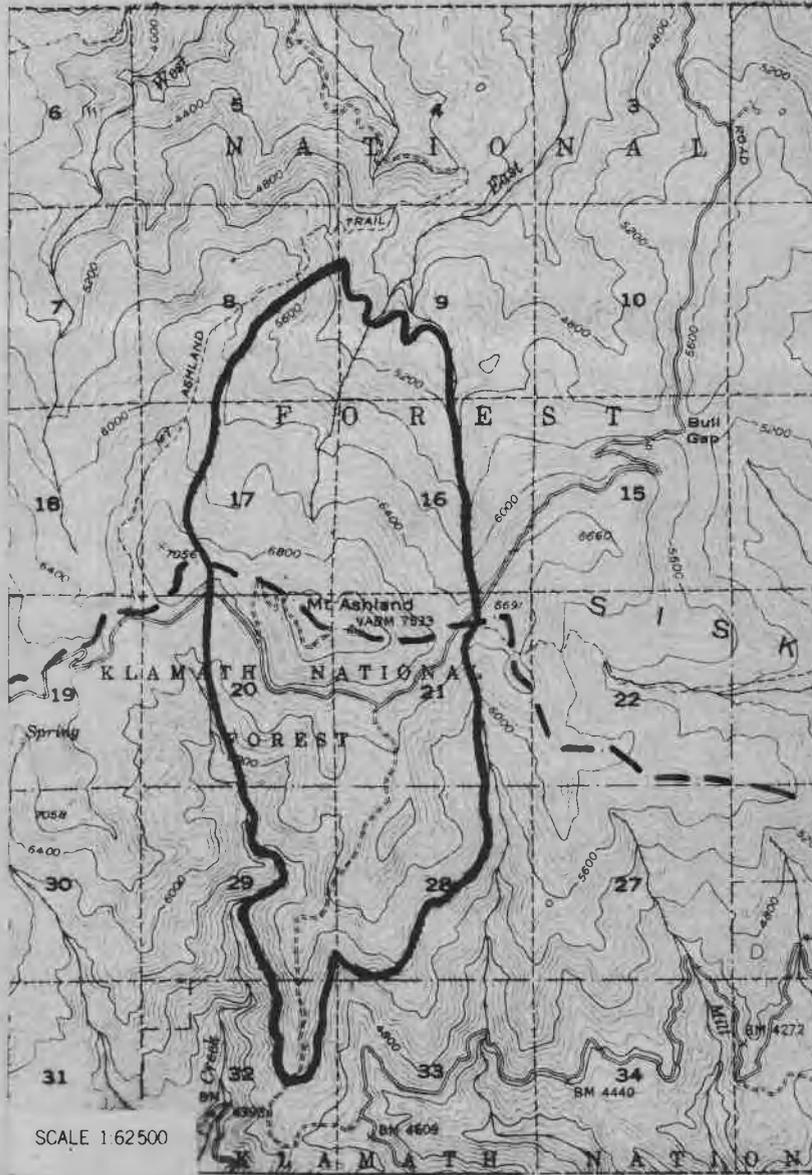
For a map of the general area see Plate I.

PLATE I

MAP OF THE GENERAL AREA

Black line denotes study area. Map taken from the Ashland Quadrangle topographic map from the U. S. Department of Interior Geological Survey. Township 40 S. Range 8 W.

The broken line is the boundary between the Klamath National Forest on the south and the Rogue River National Forest on the north.



ASHLAND PEAK AREA

OBJECTIVES

This study was undertaken as a contribution to our understanding of the flora of the Siskiyou Mountain region, and to insure that records from this area would be set down before the vegetation was too seriously altered by the activities of man.

The primary objectives were as follows:

1. to collect and identify representative specimens of all the species of vascular plants on Ashland Peak.
2. to construct keys and prepare descriptions for the families, genera and species of this area.

It is not supposed that the first objective has been completely met as undoubtedly some species have been overlooked in this study, but it is hoped that this number is small.

Voucher specimens are on file at the Oregon State College Herbarium.

GEOLOGY AND SOILS

The geologic formation in the area consists of great intrusive masses of granitic rocks. The body of the mountain is a white porphyritic granite with an average grain size of 0.05 inches. The rock also contains feldspar, orthoclase and a small amount of plagioclase and quartz. The characteristic dark minerals are greenish biotite and green hornblende.

The intrusive complex is pre-Cretaceous in age and is probably related to the general period of batholithic intrusion that took place in the Pacific Coast region during the Jurassic. According to Condon (6, P. 27) the western coastal region was once two islands, one the Blue Mountain region, the other extending over what is now the Siskiyou Mountain region. The nucleus of the Siskiyou was forming in the Triassic and development continued throughout the Cretaceous.

The rock of the Siskiyou Mountain region is older and harder than that of the Coast Range and similar to that of the Sierra Nevada region.

On the north Ashland Peak is drained by the East and West Forks of Ashland Creek which is a tributary of Bear Creek; Bear Creek in turn flows into the Rogue River. On the south Grouse Creek and Cottonwood Creek drain the peak and flow into the Klamath River.

CLIMATE

There are no weather records available for Ashland Peak proper. The nearest weather stations are located at Ashland and Siskiyou Summit. The Ashland station is presently located 1 mile north of the city of Ashland. This is approximately 9 airline miles north of the peak. Records have been kept for this station since 1879; however, the station itself has been moved three times since observations began. Elevations at the locations of these sites range from 1,750 to 1,970 feet. The weather station at Siskiyou Summit is located 12 miles south of Ashland and about 5 airline miles east of the peak. Records have been kept in this area since 1899.

This station too has changed location though the elevational change was only from 4,486 to 4,480 feet.

Climatological data from the Ashland station and the Siskiyou Summit station have been studied and the information summarized in Table I (14, 1-48; 15, 1-70).

Since neither of these stations approach the elevation of the peak they do not represent a true weather picture for the area. Snowfall during the winter months is considerably heavier than at either station. A small amount of snow remains in patches on the north slope throughout the summer months. Snowfall has important effects in the area, since it stores water and affects the length of the growing season.

The prevailing winds on Ashland Peak throughout the year are from the northwest.

TABLE I CLIMATOLOGICAL DATA FOR THE VICINITY OF ASHLAND, OREGON

Ashland station elevation 1750'	Length of Record	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL
Av. total ppt. in inches	74 yrs.	2.78	2.20	2.00	1.51	1.62	1.13	.35	.27	.84	1.68	2.61	3.11	20.07
Av. snowfall in inches	50 yrs.	5.9	3.5	2.5	.6	.05	.0	.0	.0	.0	.0	.5	2.9	15.9
Av. temp. °F.	69 yrs.	37.7	41.7	45.7	50.3	56.8	62.5	69.4	68.7	62.4	53.6	44.4	38.8	52.7
Av. max. temp.	60 yrs.	45.6	51.1	56.7	63.8	70.3	77.2	86.3	85.6	77.2	66.6	53.8	46.2	65.0
Av. min. temp.	60 yrs.	29.9	32.4	34.4	37.8	42.6	47.5	52.3	51.5	45.8	40.4	34.7	31.4	40.1
Highest temp.	60 yrs.	71	73	82	94	95	103	106	105	103	94	80	68	106
Lowest temp.	59 yrs.	-1	-1	15	21	26	32	36	35	27	20	12	-1	-1
Frost data	43 yrs.	Average date of last killing frost in spring April 23												
		Average date of first killing frost in autumn Oct. 22												
		Latest date of killing frost in spring May 31												
		Earliest date of killing frost in autumn Sept. 13												
		Average length of growing season 182 days												
Siskiyou summit elevation 4480'														
Av. total ppt.	18 yrs.	3.53	2.46	2.37	1.64	1.74	1.23	.33	.18	.71	2.06	2.77	3.68	22.70
Av. snowfall	42 yrs.	35.4	22.5	17.0	7.5	2.1	.2	.0	.0	T	1.2	9.3	25.7	120.7
Av. temp.	22 yrs.	33.1	34.4	40.0	43.8	50.9	56.0	64.6	63.4	59.2	50.1	40.4	34.4	47.6
Av. max. temp.	12 yrs.	38.3	40.1	45.9	52.1	59.8	64.8	75.6	75.6	71.2	59.3	46.1	39.8	55.7
Av. min. temp.	12 yrs.	25.4	27.1	29.8	33.4	39.3	44.4	52.5	51.8	48.2	41.1	32.1	28.6	37.8
Highest temp.	18 yrs.	57	64	78	81	94	93	98	100	96	85	86	59	100
Lowest temp.	18 yrs.	-5	10	12	19	23	27	35	30	32	22	17	13	-5

PLATE 2

SUMMIT AND UPPER SOUTH EXPOSURE OF ASHLAND PEAK

Arctostaphylos patula / Ceanothus velutinus association

Photo taken July 26, 1958



PLATE 2

9

PLATE 3

NORTHEAST SLOPE OF ASHLAND PEAK

Abies magnifica var. shastensis / Arctostaphylos

Photo taken July 26, 1958



PLATE 3

11

HISTORICAL FACTORS

In 1935 a Forest Service lookout was built at the summit of Ashland Peak. This was burned to the ground in 1945 and was not rebuilt. The nearest lookout at present is on Wagner Butte, 6 miles southwest of Ashland at an elevation of 7,140 feet.

There were serious fires in the Ashland Watershed, to the north of the peak in 1910, but none of these fires threatened Ashland Peak proper, and no records nor signs of fires can be found in the study area.

Grazing of domesticated animals is not permitted in the Ashland Watershed, however, several thousand head of sheep are driven over the road that passes by the peak and these sheep do graze and trample down vegetation on the south slope as they pass through. The permit to drive sheep through the area has been in affect for at least 80 years. Large herds of deer are found on the peak in the spring, summer and fall and they browse throughout the area, particularly on the north meadows.

No lumbering has been permitted in the area, but just south of the study area some lumbering occurs on privately owned land.

Several botanist have visited Ashland Peak and made collections there. Among them are Dr. Morton E. Peck, Mr. Thomas Howell and Prof. L. F. Henderson and more recently Dr. G. B. Rossbach. The specimens collected by Dr. Peck are in the Peck Herbarium, Willamette University. The Howell and Henderson collections are in the herbarium at the University of Oregon; the Rossbach specimens are at the

Dudley Herbarium, Stanford University. Duplicates of certain of these collections have been deposited in other herbaria. The Oregon State College Herbarium has some collections made by Howell and Henderson.

FLORAL ELEMENTS

The study area is located just south of the Rogue River, which is a definite botanical boundary in the southwestern part of Oregon. According to Jepson (9, P. 3)

"There are a large number of species of Washington and Oregon which extend south to, or nearly to, the Rogue River, while a very large number of species of California extend north to, or nearly to, the Rogue River: the significance of these two categories is markedly greater than that of those widely-ranging species which cross the Rogue. A number of California species, to be sure, cross the Rogue but extend northward only a short distance. Similarly a number of Oregon species cross the Rogue but extend southward only a limited distance. The Rogue, in addition, therefore, as to such species, represents a mean of physical conditions in a transition area."

Ashland Peak lies in this transition area. The flora has originated from both the north and south, but the southern element is by far the most important.

ECOLOGICAL NOTES

LIFE ZONES

In approaching the problem of vegetation classification for the area it seems reasonable to use the Life Zone concept as presented in Peck (12, P 20-22), Jepson (9, P. 4-8), and Piper (13, P. 33-72). Although the original temperature criterion as set forth by C. Hart Merriam in 1894 has been abandoned, the use of his terminology is still valuable and will give a connotation of the broad divisions of the flora in the area, providing also a basis for comparing this flora with other regions.

Three life zones can be recognized on Ashland Peak.

Hudsonian Zone

At the summit and down the north slope to an elevation of approximately 7,200 feet, or slightly lower in meadow and swampy situations, plants of the Hudsonian zone are found. These plants include:

Abies lasiocarpa (Hook.) Nutt.
Tsuga mertensiana (Bong.) Sarg.

Arabis lyallii Wats.
Anaphalis margaritacea (L.) B. & H.
Caltha biflora DC.
Castilleja arachnoidea Greenm.
Delphinium glaucum Wats.
Eriogonum umbellatum Torr.
Hackelia floribunda (Lehm.) Johnst.
Hypericum anagalloides C. & S.
Juncus mertensianus Bong.
Lupinus lyallii Gray
Luzula parviflora (Ehrh.) Desv.
Osmorhiza occidentalis Torr.
Pedicularis racemosa Dougl.

Penstemon davidsonii Greene
Phleum alpinum L.
Phlox diffusa Benth.
Polemonium pulcherrimum Hook.
Polygonum bistortoides Pursh
Polygonum davisiae Brew.
Ranunculus populago Greene
Ranunculus alismaefolius Geyer
Rubus lasiococcus A. Gray
Sedum divergens Wats.
Sedum oregonense (Wats.) Peck
Tofieldia occidentalis Wats.
Spiranthes romanzoffiana C. & S.
Valeriana sitchensis Bong.

The Hudsonian zone is characterized by a short growing season due to the heavy snow. Many plants are found growing close to the edges of the melting snow.

Canadian Zone

The largest and best defined zone on the peak is the Canadian zone. It extends from approximately 7,200 feet elevation to the border of the study area on the north slope. On the south it begins just below the summit, 7,450 feet, and extends to an elevation of about 5,500 feet. Plants characteristic of this zone are:

Abies concolor Lindl.
Abies magnifica Murr. var. *shastensis* Lem.
Pinus monticola Dougl. ex. D. Don

Arctostaphylos nevadensis A. Gray
Lonicera conjugalis Kell.
Ribes viscosissimum Pursh

Anemone deltoidea Hook.
Anemone lyallii Britt.
Arnica cordifolia Hook.
Calypso bulbosa (L.) Oakes
Chimaphila menziesii (R. Br.) Spreng.
Clintonia uniflora (Schult.) Kunth
Corallorhiza maculata Raf.

Corallorhiza mertensiana Bong.
Corallorhiza striata Lindl.
Hieracium cynoglossoides Arv.
Ipomopsis aggregata (Pursh) V. Grant
Listera convallarioides (Sw.) Torr.
Potentilla glandulosa Lindl.
Pterospora andromedea Nutt.
Pyrola secunda L.
Senecio triangularis Hook.
Stachys rigida Nutt.
Stellaria crispa C. & S.
Tiarella unifoliata Hook.
Viola glabella Nutt.

Transition Zone

The lower elevations on the south slope extend into what is the Transition zone. This begins approximately at an elevation of 5,500 feet. Plants characteristic of this zone are:

Libocedrus decurrens Torr.
Pinus ponderosa Dougl.
Pseudotsuga menziesii (Mirb.) Franco

Castanopsis chrysophylla A. DC.
Ribes sanguineum Pursh
Rosa gymnocarpa Nutt.
Rubus parviflorus Nutt.

Actaea arguta Nutt.
Adenocaulon bicolor Hook.
Collinsia parviflora Dougl.
Collinsia grandiflora Dougl.
Epilobium paniculatum Nutt.
Gayophytum diffusum T. & G.
Hieracium albiflorum Hook.
Pteridium aquilinum (L.) Kuhn var. *pubescens* Underw.
Senecio intergerrimus Nutt.
Viola purpurea Kell.

PLANT ASSOCIATIONS

In establishing the following associations no statistical methods were attempted for this brief presentation. These associations can thus be only tentative, for much subsequent study of the ecology of the Siskiyou region is needed. The zones have been broken down into associations which are the basic unit of vegetation classification, and each association is named for dominant plant species in it.

Subalpine Association

It has been stated earlier in this discussion that on the north slope from 7,200 feet up to and including the summit is considered the Hudsonian zone. Within this zone two plant associations can be found. The summit is above timberline and is characterized by a group of herbaceous plants, none of them being dominant or abundant enough to be singled out in naming the plant association. Here this assemblage is called the subalpine association. Plants commonly found here include:

Arabis lyallii Britt.
Arenaria congesta Nutt.
Castilleja arachnoidea Greenm.
Eriogonum incanum T. & G.
Eriogonum umbellatum Torr.
Lupinus lyallii A. Gray
Penstemon davidsonii Greene
Phlox diffusa Benth.
Sedum divergens Wats
Sedum oregonense (Wats.) Peck
Spraguea umbellata Torr.

Tsuga mertensiana / Festuca ovina Association

Just north and northeast of the summit one goes below timberline and encounters many shrubby snow-bent specimens of Tsuga mertensiana (Bong.) Sarg. Only one stand of Abies lasiocarpa (Hook.) Nutt. is found here and this may be considered a relic or an accidental. Large amounts of snow, some of which may remain the entire year, results in conditions which permit the growth of only a few herbs in the area. Most common of these are:

Festuca ovina L.
Juncus mertensianus Bong.
Luzula parviflora (Ehrh.) Desv.
Polemonium pulcherrimum Hook.

This association is designated as the Tsuga mertensiana / Festuca ovina association.

Wet meadows, and areas around springs even below 7,200 feet on the north exposure, have many plants characteristic of the Hudsonian zone, but with these exceptions the north and east exposures from 7,200 feet down to the limit of the study area are in the Canadian zone.

Abies magnifica var. shastensis / Arctostaphylos Association

Below 7,200 feet on the north and east exposures the characteristic plants are:

Abies magnifica Murr. var. *shastensis* Lem.
Tsuga mertensiana (Bong.) Sarg.
Pinus monticola Dougl.

Arctostaphylos nevadensis A. Gray
Arctostaphylos patula Greene

Arnica cordifolia Hook.
 Chimaphila menziesii (R. Br.) Spreng.
 Chimaphila umbellata (L.) Nutt.
 Pyrola secunda L.
 Stellaria crispa C. & S.

The Abies magnifica var. shastensis is by far the most common tree and therefore the association is called the Abies magnifica var. shastensis / Arctostaphylos association. This association continues down the slope to an elevation of approximately 6,000 feet, here the dominant tree becomes Abies concolor Lindl.

Abies concolor / Ribes Association

By 5,900 feet only a few Abies magnifica var. shastensis trees are present with Abies concolor being dominant. Much of the understory is composed of two species of Ribes, R. lobbii Gray and R. lacustre (Pers.) Poir. The northern exposure from 6,000 feet to 5,000 feet will be termed the Abies concolor / Ribes association. At 5,600 feet the first trees of Pseudotsuga menziesii (Mirb.) Franco appear. There are several areas at this elevation where springs are found. The plants characteristic of these moist situations are:

Aconitum columbianum Nutt.
 Alnus rubra Bong.
 Montia cordifolia (Wats.) Raf. & Hoffm.
 Smilacina racemosa (L.) Desf.
 Smilacina sessilifolia (Baker) Nutt.
 Trillium ovatum Pursh

Arctostaphylos patula / Ceanothus velutinus Association

Turning now to the south slope one finds only a few trees between the summit and an elevation of 6,900 feet. These trees are

Abies magnifica var. shastensis and rarely a specimen of Pinus monticola Dougl. The principle vegetation consists of:

Arctostaphylos patula Greene
Ceanothus velutinus Dougl.
Haplopappus greenel A. Gray
Prunus emarginata (Dougl.) Walp.
Ribes cereum Dougl.

Achillea millefolium L.
Bromus marginatus Nees
Castilleja miniata Dougl.
Chaenactis douglasii H. & A.
Eriogonum umbellatum Torr.
Ipomopsis aggregata (Pursh) V. Grant
Ipomopsis congesta (Hook.) V. Grant
Melica bulbosa Geyer
Monardella odoratissima Benth.

Among these Arctostaphylos patula and Ceanothus velutinus are dominant, the herbaceous layer changing with the season. This association is here called the Arctostaphylos patula / Ceanothus velutinus association. This association is one of topoedaphic climax since the vegetation is distinct from the climatic climax due to steepness of slope, exposure and soil differences.

Abies magnifica var. shastensis / Arctostaphylos patula Association

At approximately 6,800 feet and below, trees become common on the southern exposure. The dominant one is Abies magnifica var. shastensis, but there is also an occasional stand of Pinus monticola and Pinus lambertiana Dougl. The understory is primarily of Arctostaphylos patula, Lonicera conjugalis Kell. and Prunus emarginata (Dougl.) Walp. The herbs are various, some of the abundant ones being:

Calochortus tolmiei H. & A.
Collinsia torreyi A. Gray var. *latifolia* News.
Descurainia pinnata (Walt.) Brit.
Erysimum asperum (Nutt.) DC.
Lupinus polyphyllus Lindl.
Phacelia heterophylla Pursh

This association is designated as the Abies magnifica var. shastensis / Arctostaphylos patula association, and these plants remain dominant down to an elevation of 6,200 feet where Abies concolor appears along with Pseudotsuga menziesii and Libocedrus decurrens Torr. The line of demarcation between this association and the next is not distinct, for a large ecotonal belt is found between the associations.

Abies concolor / Arctostaphylos patula association

At approximately 5,800 feet Abies concolor becomes dominant, while Pinus lambertiana is second in abundance. The main understory is Arctostaphylos patula with some Castanopsis chrysophylla A. DC. The strip from 5,800 feet to 5,500 feet is designated the Abies concolor / Arctostaphylos patula association.

Pinus ponderosa / Ceanothus velutinus Association

From 5,500 feet to the lowermost elevation of the study area at 5,000 feet the dominant tree is Pinus ponderosa Dougl. This marks the beginning of the Transition zone, and is the only association of that zone included in the study. Principle plants of this Pinus ponderosa / Ceanothus velutinus association are:

Libocedrus decurrens Torr.
Pinus ponderosa Dougl.
Pseudotsuga menziesii (Mirb.) Franco

Castanopsis chrysophylla A. DC.
Ceanothus velutinus Dougl.

Collinsia parviflora Dougl.
Hieracium albiflorum Hook.
Senecio integerrimus Nutt.

Artemisia tridentata / *Lonicera conjugalis* Association

On the west slope from the summit to the point where the study area is met by McDonald Peak the characteristic vegetation is composed of the following:

Abies magnifica Murr. var. *shastensis* Lem.
Pinus monticola Dougl.

Arctostaphylos patula Greene
Artemisia tridentata Nutt.
Lonicera conjugalis Kell.
Prunus emarginata (Dougl.) Walp.

Annenaria rosea (D.C. Eaton) Greene
Bromus marginatus Nees
Chaenactis douglasii H. & A.
Delphinium decorum F. & M.
Eriogonum umbellatum Torr.
Galium aparine L.
Mimulus nanus H. & A.
Potentilla glandulosa Lindl.

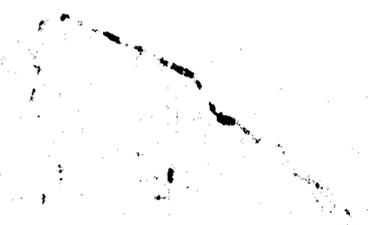
The number of trees is very small and there is some gradation of the shrubs down the slope but the association has been named *Artemisia tridentata* / *Lonicera conjugalis* because these two shrubs stand out in this dry, well drained west slope. The *Prunus emarginata* is found at the upper limits of the association only. This area though it lacks an abundance of trees is somewhat transitional between the *Abies magnifica* var. *shastensis* / *Arctostaphylos* association of the north and east slopes and the *Abies magnifica* var. *shastensis* / *Arctostaphylos patula* association of the

south exposure.

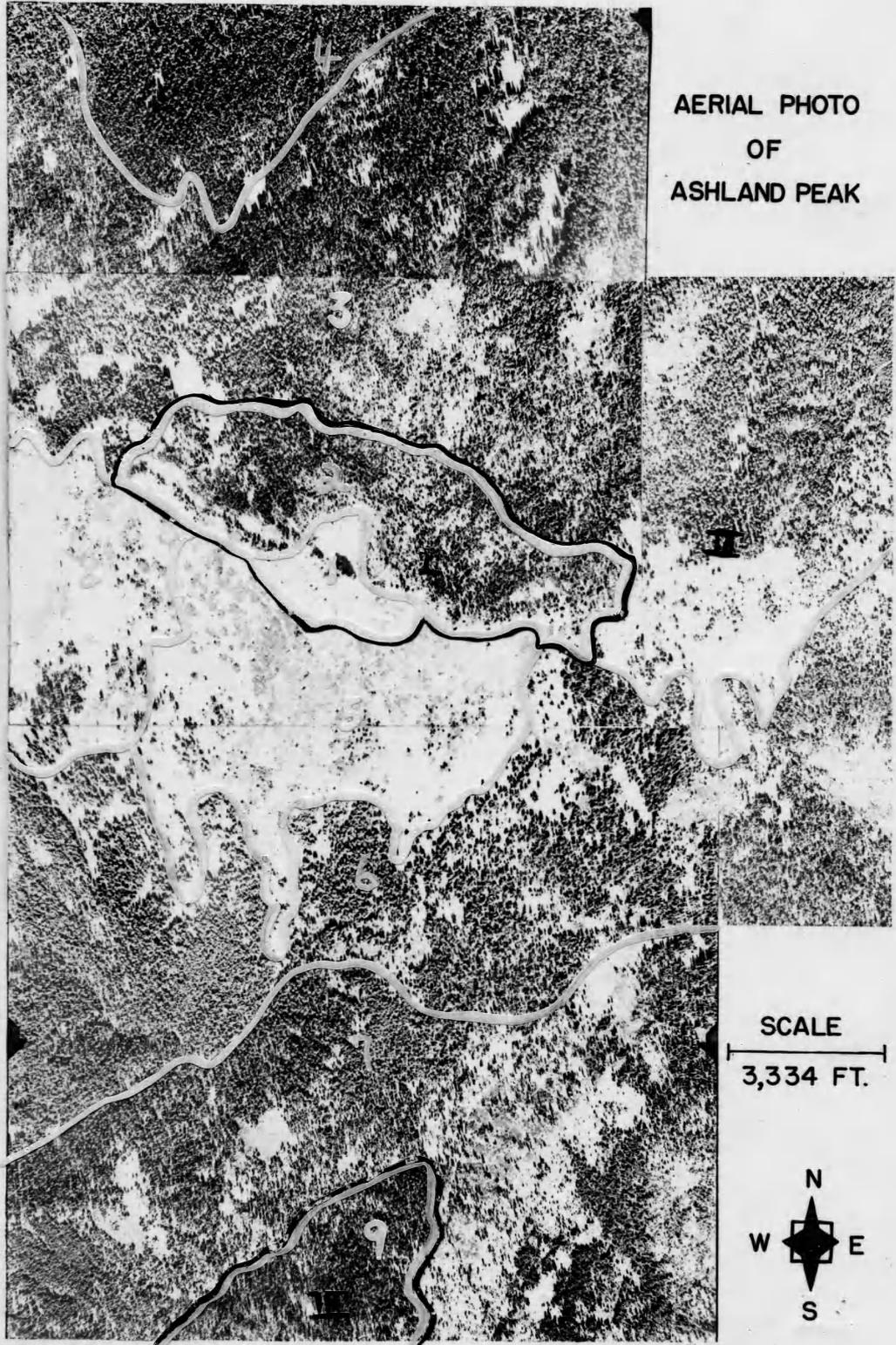
The following aerial photograph and overlay show the approximate locations of the zones and the associations and their relationships to each other.

PLATE 4

ZONE	EXPOSURE AND ELEVATION	ASSOCIATION
I. HUDSONIAN	Summit 7,500*	1. Subalpine
	North & East 7,500-7,200	2. <u>Tsuga mertensiana</u> / <u>Festuca ovina</u>
II. CANADIAN	North & East 7,200-6,000	3. <u>Abies magnifica</u> var. <u>shastensis</u> / <u>Arctostaphylos</u>
	North 6,000-5,000	4. <u>Abies concolor</u> / <u>Ribes</u>
	South 7,500-6,900	5. <u>Arctostaphylos patula</u> / <u>Ceanothus velutinus</u>
	South 6,900-5,900	6. <u>Abies magnifica</u> var. <u>shastensis</u> / <u>Arctostaphylos patula</u>
	South 5,900-5,500	7. <u>Abies concolor</u> / <u>Arctostaphylos patula</u>
	West 7,300-6,800	8. <u>Artemisia tridentata</u> / <u>Lonicera conjugalis</u>
III. TRANSITION	South 5,500-5,000	9. <u>Pinus ponderosa</u> / <u>Ceanothus velutinus</u>



AERIAL PHOTO
OF
ASHLAND PEAK



SCALE
3,334 FT.



TAXONOMIC TREATMENT

The following is a systematic treatment of the vascular flora on Ashland Peak. The descriptions and keys have for the most part been written for the plants of this area and their use is thus limited.

In this treatment the following texts have been most useful:

Peck, Morton Eaton. A manual of the higher plants of Oregon. Portland, Oregon, Binford & Mort, 1941. 866 p.

Jepson, Willis Linn. A manual of the flowering plants of California. Independent Pressroom and William Printing, San Francisco, 1923-1925. 1238 p.

Abrams, Leroy. Illustrated flora of the Pacific States. Stanford University Press, Stanford University, California, 1940-1951. 3 vols.

Cronquist, Arthur. Vascular plants of the Pacific Northwest. University of Washington Publications in Biology, Vol. 17, Part 5: Compositae. University of Washington Press, Seattle, Washington, 1955. 343 p.

In addition numerous monographs of the various groups have been employed.

The study includes 47 families, 155 genera and 234 species.

KEY TO THE FAMILIES

Plants without seeds; reproducing by spores borne in sporangia.....

.....DIVISION I. PTERIDOPHYTA

Plants reproducing by seeds.....DIVISION II. SPERMATOPHYTA

DIVISION I. PTERIDOPHYTA

1. POLYPODIACEAE

DIVISION II. SPERMATOPHYTA

Plants with seeds not enclosed in carpels, often borne on open scales
of cones.....CLASS I. GYMNOSPERMAE

Plants with seeds enclosed in an ovary.....CLASS II. ANGIOSPERMAE

CLASS I. GYMNOSPERMAE

Fruit drupe-like, 1-seeded.....2. TAXACEAE

Fruit a cone with several seed-bearing cone scales.

Cone scales numerous, spirally arranged...3. PINACEAE

Cone scales few, paired.....4. CUPRESSACEAE

CLASS II. ANGIOSPERMAE

Flower parts commonly in 3's; leaves usually parallel-veined; seeds
with 1 seed leaf.....SUBCLASS MONOCOTYLEDONEAE

Flower parts commonly in 4's or 5's; leaves usually netted-veined;
seeds with 2 seed leaves.....SUBCLASS DICOTYLEDONEAE

SUBCLASS MONOCOTYLEDONEAE

Perianth parts reduced or lacking; fruit a caryopsis or an achene.

Leaves 2-ranked; stems hollow; fruit a caryopsis.....

.....5. GRAMINEAE

Leaves 3-ranked; stems solid; fruit an achene.....

.....6. CYPERACEAE

Perianth parts well developed; fruit a capsule or a berry.

The perianth parts brown or greenish, scarious, inconspicuous....

.....7. JUNCACEAE

The perianth usually colored, often showy.

Ovary superior.....8. LILIACEAE

Ovary inferior.

Flowers regular, or essentially so; stamens 3.....

.....9. IRIDACEAE

Flowers irregular; stamens 1-2.....

.....10. ORCHIDACEAE

SUBCLASS DICOCTYLEDONEAE

Petals lacking.

Flowers, at least the staminate ones, in catkins; trees or shrubs.

Staminate and pistillate flowers occurring in catkins.

Plants dioecious.....11. SALICACEAE

Plants monoecious.....12. BETULACEAE

Staminate flowers in catkins; pistillate flowers solitary or
in few-flowered clusters.....13. FAGACEAE

Flowers not in catkins; herbs or shrubs.

Ovary inferior; calyx adnate to the ovary.....
.....14. ARISTOLOCHIACEAE

Ovary superior.

Leaves with sheathing stipules; stems swollen at the
nodes.....15. POLYGONACEAE

Leaves without stipules; stems not swollen at the nodes
.....18. RANUNCULACEAE

Petals present.

The petals distinct.

Ovary superior.

Stamens hypogynous.

Pistils simple, 1-many.

Flowers irregular; pistils 1.....
.....25. LEGUMINOSAE

Flowers regular; pistils 1 to many.

Plants succulent; carpels somewhat
united.....21. CRASSULACEAE

Plants not succulent.

Stamens numerous.....
.....18. RANUNCULACEAE

Stamens 6...19. BERBERIDACEAE

Pistil 1, compound.

Plants saprophytic or anthers opening by
pores.....35. ERICACEAE

Plants not saprophytic or anthers not
opening by pores.

Sepals 2 or 4.

Sepals 2.....16. PORTULACACEAE

Sepals 4.....20. CRUCIFERAE

Sepals 5.

Leaves opposite.

The leaves glandular dotted.....

.....31. HYPERICACEAE

The leaves not glandular dotted..

.....17. CARYOPHYLLACEAE

Leaves alternate or basal.

The leaves palmately tri-

foliolate.....

.....27. OXALIDACEAE

The leaves not palmately tri-

foliolate.

Flowers regular.....

..26. LINACEAE

Flowers irregular.....

..32. VIOLACEAE

Stamens perigynous or epigynous.

Fruit of samaras.....28. ACERACEAE

Fruit not of samaras.

Stamens 5.....29. RHAMNACEAE

Stamens mostly 10 or more.....

.....24. ROSACEAE

Ovary inferior.

Flowers in umbels.....34. UMBELLIFERAE

Flowers not in umbels

Perianth parts mostly in 5's.

Fruit a capsule.....

.....22. SAXIFRAGACEAE

Fruit a berry; ovary wholly inferior..

.....23. RIBESACEAE

Perianth parts mostly in 4's.....

.....33. ONAGRACEAE

The petals united, at least at the base.

Stamens more than 5.

The stamens 5-10, distinct.....

.....35. ERICACEAE

The stamens more than 10, filaments united into

a column.....30. MALVACEAE

Stamens 5 or less.

Ovary superior.

Corolla more or less irregular.

Leaves alternate.

Plants parasitic, without green

leaves 42. OROBANCHACEAE

Plants not parasitic, with green
leaves...41. SCROPHULARIACEAE

Leaves opposite.

Fruit of 2-4 nutlets.....

.....40. LABIATAE

Fruit a capsule.....

.....41. SCROPHULARIACEAE

Corolla regular or essentially so.

Ovary 4-lobed; fruit of 4 nutlets...

.....39. BORAGINACEAE

Ovary not 4-lobed nor fruit nutlets.

Stamens opposite the corolla

lobes...36. PRIMULACEAE

Stamens alternate with the

corolla lobes.

Carpels 2.....

...38. HYDROPHYLLACEAE

Carpels 3.....

...37. POLEMONIACEAE

Ovary inferior.

Stamens united by the anthers into a tube;

calyx reduced to a pappus or lacking...

.....47. COMPOSITAE

Stamens not united by the anthers; calyx

usually well developed.

Anthers opening by pores or plants parasitic

.....35. ERICACEAE

Anthers opening by slits; plants not
parasitic.

Leaves alternate.....

.....46. CAMPANULACEAE

Leaves opposite or in whorls.

Stamens 1 to 3; corolla irregular

.....45. VALERIANACEAE

Stamens 4 or 5.

Leaves opposite; plants

shrubby.....

..44. CAPRIFOLIACEAE

Leaves whorled; herbs.....

..43. RUBIACEAE

1. POLYPODIACEAE (Fern Family)

Ferns with simple to decomposed fronds showing circinnate venation; sporangia usually in dorsal or marginal sori; annulus incomplete and opening transversely.

Fronds delicate; sori dorsal and borne on the veins.....

.....1. Athyrium

Fronds coarse; sori marginal.....2. Pteridium

1. ATHYRIUM Roth

Tufted ferns with 1-3-pinnate fronds, the sori dorsal, lunate to roundish; indusium, if present, superior and the same shape as the sorus. Characteristically found in moist situations.

Indusia conspicuous; sori oblong.....1. A. filix-femina

Indusia minute; sori small and round.....2. A. americanum

1. Athyrium filix-femina (L.) Roth Common Lady-fern.

Fronds tufted, deciduous, up to 2 m. high, oblong-lanceolate, pinnately 2-3-compound; pinnules sessile and acute; indusia crenate or toothed on the free edge. A variable species. Common in damp or swampy areas.

2. Athyrium americanum (Butters) Maxon Alpine Lady-fern.

Fronds up to 90 cm. in height, closely tufted, oblong-lanceolate, tripinnatifid; sori numerous, roundish; indusium not evident. Common at high elevations in rocky areas.

2. PTERIDIUM Scop.

Large coarse ferns with decomposed solitary fronds, and creeping rhizomes; sori linear, marginal, covered by a false indusium (reflexed leaf-margin).

Pteridium aquilinum (L.) Kuhn var. pubescens Underw.

Western Brake-fern or Bracken Fern.

Fronds tough, leathery, up to 2.5 m. high, and mostly 3-compound, somewhat triangular-shaped, the undersurface often grey pubescent; sori on the margins of the pinnules.

2. TAXACEAE (Yew Family)

Trees or shrubs with alternate 2-ranked leaves, these linear to linear-lanceolate, 1-3 cm. long; stamens 3-14, borne on scales; ovule solitary; seed nutlike, surrounded by an aril.

TAXUS L.

Dioecious trees or shrubs with horizontal or drooping branches; leaves flat and mucronate; ovules solitary and axillary; staminate cone of 7-12 stamens; seed surrounded by a fleshy red aril.

Taxus brevifolia Nutt. Western Yew.

A small tree, 4-15 m. high, with red scaly bark; foliage evergreen, dark yellow-green above and light yellow-green below; leaves horizontal, 1.5-2.5 cm. long, ridged on both surfaces.

3. PINACEAE (Pine Family)

Monoecious trees or shrubs, usually with persistent leaves spirally arranged, linear, needle-like or scale-like; buds scaly; ovulate cones woody at maturity; seeds winged, usually 2 per scale.

Leaves (the secondary ones) in fascicles, needle-like.....

.....1. Pinus

Leaves attached singly along the branches.

The leaves sessile; cone scales deciduous.....

.....4. Abies

The leaves petioled; cone scales persistent.

Branchlets roughened by persistent leaf-bases.....

.....2. Tsuga

Branchlets smooth.....3. Pseudotsuga

I. PINUS [Tourn.] L.

Evergreen trees with the primary leaves reduced to scales and the secondary leaves needle-like and borne in fascicles of 2-5; staminate cones axillary; ovulate cones woody, the scales persistent.

Leaves 5 to a fascicle.

Mature ovulate cones 10-20 cm. long..1. P. monticola

Mature ovulate cones 30-45 cm. long..2. P. lambertiana

Leaves 3 to a fascicle.....3. P. ponderosa

1. Pinus monticola Dougl. ex. D. Don Western White Pine.

Trees up to 50 m. high with smooth or shallow-scaled bark;

needles mainly in clusters of 5's, 6-7 cm. long, glaucous; ovulate cones 10-20 cm. long, narrow.

2. Pinus Lambertiana Dougl. Sugar Pine.

Trees up to 60 m. in height with deeply furrowed bark; needles in 5's, 6-9 cm. long; ovulate cones 30-45 cm. long, narrow, sometimes curved.

3. Pinus ponderosa Dougl. Western Yellow Pine.

Trees up to 70 m. high with reddish brown bark divided into plates; leaves in 3's, 12-13 cm. long; ovulate cones 7-15 cm. long.

2. TSUGA (Endl.) Carr.

Slender trees with flat 2-ranked needles having 1 resin duct; petioles on a woody base that remains after leaf-fall; seed-bearing cones pendent, the scales thin, persistent.

Tsuga mertensiana (Bong.) Sarg. Mountain Hemlock.

An alpine tree up to 40 m. high and 1 m. in diameter; the branches rather drooping with a slight upsweep at the ends; ovulate cones up to 7 cm. long, violet-purple when immature, the scales numerous; staminate cones up to 8 mm. long.

3. PSEUDOTSUGA Carr.

Large evergreen trees with flattened needles spirally arranged, but appearing 2-ranked; ovulate cones pendent, maturing in one year, the scales persistent, with long exserted trifold bracts.

Pseudotsuga menziesii (Mirb.) Franco Douglas Fir.

Trees up to 80 m. in height, with a diameter up to 3 m., the bark deeply grooved; needles 2-3 cm. long, tapering to a slightly twisted base, the lower surfaces glaucous, ridged; buds red, pointed; ovulate cones 5-8 cm. long, with conspicuous bracts.

4. ABIES [Tourn.] Hill

Symmetrical trees with branches in regular whorls; needles linear, 2-ranked, leaving a circular leaf-scar; seed-bearing cones upright on the branches, maturing the first year, at which time the scales are deciduous.

Needles 4-angled; bracts of the cones surpassing the scales....

.....3. A. magnifica
var. shastensis

Needles flat; bracts concealed.

Bark white, smooth except for resin blisters.....

.....1. A. lasiocarpa

Bark grey, deeply furrowed.....2. A. concolor

1. Abies lasiocarpa (Hook.) Nutt. Alpine Fir

Conical trees with numerous rigid branches; bark white, smooth except for resin blisters; young twigs brownish-puberulent; needles flat, ridged on the undersurface, grooved above; ovulate cones dark purple.

2. Abies concolor Lindl. White Fir.

Trees up to 75 m. high with short branches; bark grey and

deeply furrowed; young branches smooth; needles 5-7 cm. long, ridged below, glaucous; ovulate cones 7-12 cm. long, greenish.

3. Abies magnifica Murr. var. shastensis Lem. Shasta Fir.

A tree up to 70 m. in height with reddish furrowed bark on the lower trunk, other bark smooth and silvery; needles ridged, appearing 4-angled, acute, sessile, curving upwards; cones 10-20 cm. long when mature; bracts exerted and reflexed.

4. CUPRESSACEAE (Cypress Family)

Trees or shrubs with opposite or verticillate scale-like leaves; staminate and ovulate cones terminal on the branchlets, the latter made up of scales, woody or berry-like at maturity.

LIBOCEDRUS Endl.

Trees with flattened branchlets, the leaves scale-like, opposite, in 4 rows, successive pairs unlike. Staminate cones of 12-16 stamens; ovulate cones of 4-8 scales, only 1 pair bearing ovules; mature scales spreading.

Libocedrus decurrens Torr. Incense Cedar.

Trees up to 45 m. in height, the bark reddish, shredding; leaves imbricate; ovulate cones with 3 main pairs of scales and usually a smaller lateral pair.

5. GRAMINEAE (Grass Family)

Culms with hollow internodes; leaves 2-ranked; ligule at collar, between blade and sheath; florets usually perfect,

without a distinct perianth, arranged in spikelets consisting of a rachilla and 2-many 2-ranked bracts, the lower pair empty (glumes); stamens 1-6, usually 3; pistil 1; fruit a caryopsis.

Key to the Tribes

Spikelets sessile on the rachis; spike terminal and solitary...

.....tribe 2. Hordeae

Spikelets pedicellate, in panicles.

Spikelets 1-flowered.....tribe 3. Agrostideae

Spikelets 2-many-flowered.....tribe 1. Festuceae

Tribe 1. FESTUCEAE

Spikelets 2-many-flowered, in open or closed panicles; lemmas awned or awnless; glumes shorter than the first floret; the disarticulation above the glumes.

Lemmas awned from a bifid apex; spikelets large.....

.....1. Bromus

Lemmas awnless or not awnless or not awned from a bifid apex.

Glumes papery; upper florets sterile; spikelets usually purplish.....5. Melica

Glumes not papery; upper florets fertile.

Lemmas keeled on the back, awnless.....

.....4. Poa

Lemmas rounded on the back.

Awns present; lemmas acute.2. Festuca

Awns wanting; lemmas obtuse.....

.....3. Glyceria

Tribe 2. HORDEAE

Spikelets in a terminal solitary spike, sessile on opposite sides of the rachis; blades of the leaves with auricles at their bases.

Spikelets 1-flowered, 3 at a node, the lateral pair pedicelled and reduced.....8. Hordeum

Spikelets 2-several-flowered, usually 2 at a node.

Rachis disarticulating; glumes bristle-like, extending into several awns.....7. Sitanion

Rachis continuous, glumes not bristle-like.....
.....6. Elymus

Tribe 3. AGROSTIDEAE

Spikelets 1-flowered, in panicles, often modified; glumes various; articulation above or below the glumes.

Awns geniculate; caryopsis indurate.....12. Stipa

Awns not geniculate; caryopsis not indurate.

Glumes compressed-carinate; panicle spike-like.....
.....10. Phleum

Glumes not compressed-carinate; panicle open.

Palea small or obsolete; glumes longer than the lemma.....9. Agrostis

Palea developed; glumes shorter than the lemma.....

.....11. Muhlenbergia

1. BROMUS L.

Annual or perennial grasses with flat blades. Inflorescence a panicle, open or contracted, the spikelets several-many-flowered; glumes unequal, acute; lemmas usually keeled, awned from a bifid apex.

Bromus marginatus Nees Large Mountain Brome-grass

Perennials with stout culms, 6-12 dm. high; sheaths retrorsely pilose; spikelets 7-8-flowered, flattened; lemma keeled and pubescent; awns 4-7 mm. long.

2. FESTUCA L.

Spikelets few- to several-flowered; upper florets reduced; glumes narrow, acute, unequal; lemmas rounded on the back, acute, awned from the tip, rarely awnless.

Culms reddish at the base, somewhat decumbent.....

.....1. F. rubra

Culms not reddish at base, erect.....2. F. ovina

1. Festuca rubra L. Red Fescue.

Culms decumbent, loosely tufted, reddish, with mostly involute smooth blades; panicles erect and narrow, 3-20 cm. long; spikelets 4-6-flowered, often purplish; lemmas 5-7 mm. long; awns up to 4 mm. long.

2. Festuca ovina L. Sheep Fescue.

Densely tufted perennials with the blades mostly less than half as long as the culms; panicles narrow, few-flowered, less than 10 cm. long; lemmas 4-5 mm. long; awn less than 5 mm. long.

3. GLYCERIA R. Br.

Mainly tall aquatic or marsh perennials with rhizomes; spikelets in panicles, few-many-flowered; glumes unequal; lemmas prominently 5-9-nerved, scarious, especially towards the apex.

Glyceria elata (Nash) Hitchc. Tall Manna-grass.

Culms 90-180 cm. high; blades 4-10 mm. wide, scabrous; spikelets 6-8-flowered; first glume 1 mm. long or less; second glume 2 mm. long; tip of the lemma erose.

4. POA L.

Leaf-blades narrow, flat, folded or involute, boat-shaped at the tip; spikelets 2-many-flowered, the upper floret often reduced; glumes acute, keeled, unequal; lemmas keeled, acute, awnless, 5-nerved.

Florets converted into bulblets; culms bulb-like at the base...

.....1. P. bulbosa

Florets normal, culms not bulbous at base.2. P. longiligula

1. Poa bulbosa L. Bulbous Bluegrass.

Culms densely tufted, bulbous at base, 30-60 cm. high; panicle ovoid, the florets converted into bulblets, purple at the base.

2. Poa longiligula Scribn. and Will. Long-tongue Mutton Grass.

Culms tufted, erect, scabrous, 30-50 cm. high; ligules up to 7 mm. long; panicle loose; spikelets 4-6-flowered; lemmas pubescent on the keel and the nerves.

5. MELICA L.

Perennials with the base often swollen into a corm; leaf-blades flat; sheaths closed. Spikelets 2-several-flowered, usually purplish; glumes often papery, scariously margined, strongly nerved.

- Culms definitely bulbous at base.....1. M. bulbosa
- Culms not bulbous at the base.....2. M. harfordii

1. Melica bulbosa Geyer Onion-grass.

Perennial 60-120 cm. high, decumbent and bulbous at base; panicle branches short, appressed; glumes thin, indistinctly nerved; spikelets broad; lemmas obtuse, awnless.

2. Melica harfordii Boland. Harford's Melic.

Perennials 60-120 cm. high, not cormose at base; leaves scabrous or pubescent; panicles narrow, 12-20 cm. long; spikelets 3-7-flowered; glumes unequal; lemmas awnless or very short-awned.

6. ELYMUS L.

Tall perennial or rarely annual grasses; spikelets sessile, 2 or more at a node, 2-6-flowered; glumes equal, equaling the floret, entire, acute; lemmas rounded on the back, acute or awned.

Elymus glaucus Buckl. Blue Wild-rye

Perennials up to 120 cm. high; blades 5-10 mm. wide, scabrous; spikes 5-15 cm. long, glaucous; glumes lanceolate, thin; lemma with an awn 1 to 2 times as long as the body.

7. SITANION Raf.

Tufted perennials with bristly spikes, the rachis disarticulating at each node; spikelets 2-6-flowered, usually 2 at a node; glumes narrow, tapering into 1 to several awns; lemmas indurate, long-awned.

Spike 2-8 cm. long; glumes lanceolate, 1-2-nerved.....

.....2. S. hystrix

Spike 8-20 cm. long; glumes lanceolate, 2-3-nerved.....

.....1. S. hanseni

1. Sitanion hanseni (Scrib.) J.G. Sm. Hansen's Squirrel-tail

Loosely tufted perennials with slender nodding spikes, the spikelets loosely arranged; awns of the glumes up to 4 cm. long; awns of the lemmas up to 4.5 cm. long, the awns making the spike bristly.

2. Sitanion hystrix (Nutt.) J.G. Sm. Squirrel-tail.

Culms scabrous, 10-30 cm. tall; leaves somewhat glaucous; spike erect, 2-8 cm. long; glumes entire, 1-2-nerved; lemmas with widely spreading awns up to 4 cm. long.

8. HORDEUM L.

Annuals or perennials with dense terminal cylindrical spikes;

spikelets 1-flowered, 3 at a node, the middle one sessile, the lateral ones pedicelled and imperfect; glumes narrow; lemmas rounded, usually tapering to a long awn.

Hordeum jubatum L. Foxtail Barley.

Perennials up to 60 cm. high; spike 5-10 cm. long, nodding, the rachis disarticulating at maturity; lateral spikelets reduced to 1-3 awns.

9. AGROSTIS L.

Tufted, usually perennial grasses with 1-flowered spikelets in panicles; disarticulation above the glumes, glumes longer than the lemma; palea small or obsolete.

Plants with creeping rhizomes.....1. A. diegoensis

Plants without rhizomes.....2. A. exarata

1. Agrostis diegoensis Vasey Leafy Bent-grass.

Erect culms up to 1 m. in height from creeping rhizomes; blades flat, 2-6 mm. wide; panicle branches stiff, ascending; spikelets 2.5-3 mm. long; glumes equal; lemma awnless or with a minute awn; palea obsolete.

2. Agrostis exarata Trin. Spike Bent.

Tufted culms 30-90 cm. in height; panicle branches crowded, 5-30 cm. long; glumes subequal; lemma 1.7-2 mm. long, acute to awn-tipped; palea minute.

10. PHLEUM L.

Perennials with a dense spike-like panicle; spikelets boat-shaped, 1-flowered; glumes compressed-carinate, ciliate on the keel.

Panicle 8-20 cm. long.....1. P. pratense

Panicle 2-5 cm. long.....2. P. alpinum

1. Phleum pratense L. Common Timothy.

Erect perennial; culms 60-150 cm. in height, often from swollen bases; leaf-blades up to 8 mm. wide; panicle cylindric, the spikelets 2-5 mm. long, crowded; glumes about 3.5 mm. long, with a stout awn 1 mm. long, ciliate on the keel.

2. Phleum alpinum L. Mountain Timothy.

Culms 20-60 cm. high; panicle oblong, 2-5 cm. long; glumes long-ciliate on the keel. Found in alpine meadows.

11. MUHLENBERGIA Schreb.

Mostly perennials with small 1-flowered spikelets; glumes diverse; lemma surpassing the glumes, usually awned; seed not falling from lemma and palea.

Muhlenbergia filiformis (Thurb.) Rydb. Pull-up Muhly.

Culms 10-25 cm. high, loosely tufted; panicles narrow, up to 2.5 cm. long; spikelets 2 mm. long; lemma mucronate.

12. STIPA L.

Tufted perennials with 1-flowered spikelets in narrow panicles;

glumes narrow, scarious, acuminate; lemma indurate, tipped by a long, bent and twisted awn.

Stipa californica Merr. and Davy California Stipa.

Clustered culms up to 125 cm. tall; leaf-blades flat, becoming involute, ligule 1-3 mm. long. Panicle narrow; glumes up to 14 mm. long, unequal; lemma 7 mm. long, villous, the awn up to 3.5 cm. long, plumose on the first and second segments.

6. CYPERACEAE (Sedge Family)

Annual or perennial herbs with solid culms and 3-ranked leaves; flowers arranged in spikelets, usually 1 in the axil of each scale; perianth of bristles or scales or wanting; fruit of achenes.

Flowers, at least most of them, perfect...1. Scirpus

Flowers unisexual.....2. Carex

5. SCIRPUS [Tourn.] L.

Small to very large annual or perennial herbs; spikelets terete to slightly flattened; scales spirally imbricated, the lower 1-3 occasionally empty; perianth of 1-6 bristles or wanting; stamens 2-3; achene triangular or lenticular.

Scirpus microcarpus Presl Small-fruited Bulrush.

Perennial herbs with triangular culms from 60-150 cm. high; leaves often exceeding the inflorescence, rough-margined; inflorescence subumbellate; spikelets in clusters; scales brown with a green midrib; bristles 4; achenes whitish. Common in swampy areas.

2. CAREX L.

Perennial grass-like herbs with 3-ranked leaves; culms mostly triangular; flowers unisexual, solitary in the axils of scales; perianth wanting; stamens 2-3; achenes triangular, plano-convex or lenticular.

Achenes triangular; stigmas 3.

Culms less than 20 cm. in height; scales whitish.....

.....5. C. brevipes

Culms over 25 cm. high; scales reddish-brown.....

.....6. C. luzulina

Achenes lenticular; stigmas 2.

Scales purplish-black.....7. C. gymnoclada

Scales brownish.

Beak of the perigynium (the bract enclosing the carpel)

flat, serrulate.....3. C. subfusca

Beak of the perigynium terete, entire.

Scales covering the perigynia.....

.....4. C. phaeocephala

Scales shorter than the perigynia.

Perigynia thin-walled.1. C. festivella

Perigynia firm, thick-walled.....

.....2. C. teneraeformis

1. Carex festivella Mackenzie Mountain Meadow Sedge.

Abundant clustered culms, 30-100 cm. high, triangular; leaf-blades

2-6 mm. wide; scales ovate, brown to brownish-black, midrib light; perigynium longer than the scales; stigmas 2; achenes lenticular.

2. Carex teneraeformis Mackenzie Sierra Slender Sedge.

Tufted slender culms, 20-40 cm. in height; leaf-blades 1-2.5 mm. wide; scales brownish with hyaline margins; perigynium ovate, thick; stigmas 2; achenes lenticular.

3. Carex subfusca W. Boott Rusty Sedge.

Slender culms, 20-60 cm. high, nearly smooth; leaf-blades 1.5-3 mm. wide; scales ovate and acute, brownish with a light midrib and hyaline margins; perigynium ovate, thick, winged at base; stigmas 2; achenes lenticular.

4. Carex phaeocephala Piper Mountain Hare Sedge.

Densely tufted culms, 10-30 cm. high, roughened above; leaf-blades 1-2 mm. wide; scales ovate, brownish, midrib lighter; perigynium broadly winged; stigmas 2; achenes lenticular.

5. Carex brevipes W. Boott Short Sedge.

Densely clustered culms, up to 18 cm. high, usually much shorter; leaf-blades 1-3 mm. wide, shorter than the culms; scales whitish, midrib green, margin with a dark brown stripe; perigynium 2.5-3 mm. long, thin; stigmas 3; achenes triangular.

6. Carex luzulina Olney Luzula-like Sedge.

Culms 25-80 cm. high; leaf-blades 3-7 mm. wide; scales reddish-brown; perigynium 3.5-4 mm. long; stigmas 3; achenes triangular.

7. Carex gynoclada Holm Sierra Alpine Sedge.

Culms solitary or in small tufts, 25-60 cm. high; leaf-blades

2.5 mm. wide, the margins revolute; scales purplish-black, shorter than the perigynium; perigynium thin; stigmas 2; achenes lenticular.

7. JUNCACEAE (Rush Family)

Annual or perennial grass-like herbs; leaves terete or flat; flowers small; perianth 6-parted, brown or greenish; stamens 3-6; style 1, stigmas 3; ovary superior; fruit a 3-celled capsule.

Capsules many-seeded; leaf-sheaths open....1. Juncus

Capsules 1-3-seeded; leaf-sheaths closed...2. Luzula

1. JUNCUS [Tourn.] L.

Mainly perennial herbs with pithy culms and terete leaves; inflorescence paniculate or corymbose; perianth parts distinct; stamens 3 or 6; capsule many-seeded.

Inflorescence appearing lateral due to the continuation of the lowest leaf of the inflorescence; perianth parts light brown to greenish.....1. J. effusus

Inflorescence terminal; perianth parts dark brown or blackish..
.....2. J. mertensianus

1. Juncus effusus L. Common Rush.

Densely tufted culms from stout rhizomes; inflorescence many-flowered; lower leaf of the inflorescence terete, appearing as a continuation of the stem; perianth pale brown to greenish, the segments 2-3 mm. long.

2. Juncus mertensianus Bong. Mertens' Rush.

Culms tufted, 13-50 cm. in height; leaves 0.5-2 mm. wide; heads mostly solitary, rarely 3, many-flowered; perianth parts dark brown to blackish, 3-3.5 mm. long; stamens 6.

2. LUZULA DC.

Perennial herbs with hollow stems and flat leaves; flowers in panicles, spikes, or corymbs, often congested; stamens usually 6; capsule 1-3 seeded. Plants of drier situations than Juncus.

Inflorescence loosely paniculate.....1. L. parviflora

Inflorescence capitate.....2. L. multiflora

1. Luzula parviflora (Ehrh.) Desv. Small-flowered Wood-rush.

Tufted stems from short rhizomes; leaves pilose at the collar, 5-10 mm. wide; panicles open, the branches sometimes drooping, flowers usually solitary; perianth parts 1-2 mm. long, light brown or green.

2. Luzula multiflora (Retz.) Lejeune

Slender tufted stems, 20-50 cm. in height; leaves slightly villous, 2-4 mm. wide; flowers in congested head-like clusters, heads 5-10 mm. long; spikelets peduncled; perianth parts dark brown, 2.5-3.5 mm. long.

8. LILIACEAE (Lily Family)

Mostly perennial plants from bulbs, corms or root-stocks; flowers regular, 3-merous, the perianth segments in 2 sets; stamens

usually 6, opposite the perianth segments; ovary superior; fruit a capsule or a berry.

Fruit a capsule.

Stems from root-stocks.

Leaves 3 in a whorl at the top of the stem; fruit a berry-like capsule.....9. Trillium

Leaves more than 3; capsule thin-walled.

Stems leafy; leaves broad and plaited; plant tall and stout.....2. Veratrum

Stems not leafy; leaves linear and sedge-like, mostly basal.....1. Tofieldia

Stems from bulbs or corms.

Flowers with scarious bracts.

Plants having an odor and taste of onion (alliaceous); perianth parts distinct or united only at the base...3. Allium

Plants not alliaceous; perianth parts united to form a tube.....4. Brodiaea

Flowers without scarious bracts.

Stems evident, leafy, from a scaly bulb.

Plants tall, 6-15 dm. in height; nectary a basal groove.....5. Lilium

Plants short, 3-6 dm. high; nectary a basal pit.....6. Fritillaria

Stems not evident; bulbs not scaly.

Perianth-parts unlike; leaves narrow,
surpassing the flowers.....

.....8. Calochortus

Perianth-parts alike; one pair of wide leaves
attached to the stem below the ground....

.....7. Erythronium

Fruit a berry.

Plants acaulescent.....10. Clintonia

Plants caulescent; leaves sessile.

Stems simple; inflorescence a terminal raceme or
panicle of several to many minute white flowers....

.....11. Smilacina

Stems branched above; inflorescence terminal; flowers
1-4, larger and greenish or whitish.....

.....12. Disporum

1. TOFIELDIA Huds.

Slender perennial herbs with horizontal rhizomes; leaves narrow,
mostly basal; flowers small, capitate or in a terminal raceme;
perianth persistent, 6-parted; stamens 6; styles 3; capsule beaked;
seeds numerous.

Tolfieldia occidentalis Wats. Western Tolfieldia

Herbs 10-30 cm. high; flowers white, in a dense raceme; dark
glands present on the stems and in the inflorescence; fruit reddish-

purple. Common in bogs and moist situations.

2. VERATRUM L.

Perennial herbs with stout leafy stems from thick rhizomes; leaves broad, prominently parallel-veined, plaited; flowers whitish or greenish, in large terminal panicles; stamens 6, opposite the perianth segments; fruit a 3-lobed capsule.

Flowers green; panicle loosely branched, some of the branches drooping.....2. V. viride

Flowers white to greenish-white; panicle pyramidal, none of the branches drooping.....1. V. californicum

1. Veratrum californicum Dur. California False Hellebore or Corn Lily.

Stems 1-2 m. high, stout and leafy; leaves 2-3 dm. long, glabrous above and tomentose beneath; panicles nearly triangular; perianth-parts white to greenish-white with a Y-shaped green gland at base. Found in moist situations.

2. Veratrum viride Ait. Green False Hellebore.

Panicle narrow and loosely branched, with the lower branches drooping; perianth-parts definitely green; bracts herbaceous. Found in wet swampy areas; not as common as V. californicum.

3. ALLIUM [Tourn.] L.

Stem a scape from a scaly bulb; inflorescence in a head or umbel subtended by scarious bracts; perianth segments distinct or

united only at the base; stamens 6, attached at the base of the perianth-parts. Plants with an odor of onion.

Allium validum Wats. Tall Swamp Onion.

Scapes 40-80 cm. high; leaves narrow, linear to lanceolate, sheathing at the base; flowers densely clustered in an umbel; perianth segments 6-10 mm. long, deep rose-colored; stamens exserted. Common in moist mountain meadows.

4. BRODIAEA Sm.

Scapes arising from a bulb-like corm; leaves linear and few; flowers in umbels subtended by membranaceous bracts; perianth segments united; fertile stamens 3, alternating with staminodia, or all 6 fertile.

Brodiaea crocea (Wood) Wats. Yellow Brodiaea.

Leaves 5-10 mm. wide, 20-30 dm. long; scapes 15-60 cm. high, bearing a 3-12-flowered umbel subtended by scarious bracts; perianth segments deep yellow with a dark-green or purplish median stripe; perianth funnelform; stamens in 2 rows.

5. LILIUM L.

Tall herbs with simple stems from scaly bulbs; leaves numerous, narrow and sessile; flowers showy, 1-several; perianth funnelform, yellow, red, or white, often spotted; seeds numerous, in a loculicidally dehiscent capsule.

Lilium washingtonianum Kell. Cascade Lily.

Stems 1-2 m. high, from rhizomatous bulbs; leaves mostly verticillate; flowers white, usually with purple mottling, turning all purple with age.

6. FRITILLARIA [Tourn.] L.

Simple leafy stems from scaly bulbs; leaves numerous, narrow, sessile, alternate or whorled; flowers racemose or solitary, nodding; perianth campanulate, segments distinct, each with a basal nectariferous pit; seeds numerous, in a 6-angled capsule.

Fritillaria adamantina Peck Diamond Lake Fritillaria

Stout stems from scaly bulbs surrounded by many small bulblets; leaves linear and verticillate; perianth segments rust-colored, mottled with purple; stamens included; capsule winged.

7. ERYTHRONIUM L.

Stems short, scapose, from a corm; leaves usually 2, appearing basal; flowers 1 to several, nodding; perianth parts alike; fruit an erect 3-angled capsule.

Erythronium grandiflorum Pursh var. pallidum St. John

Yellow Adder's Tongue or Lamb's Tongue.

Leaves acute, not mottled, 7-14 cm. long; scape 1-3-flowered; perianth golden-yellow, with a pale center; anthers white.

8. CALOCHORTUS Pursh

Stem from a corm; leaves few; flowers showy, terminal or umbellate; perianth segments unlike; sepals greenish; petals usually with a conspicuous basal gland; capsule 3-angled or 3-winged.

Calochortus tolmiei H. & A. Cat's Ear.

Plant 15-30 cm. high, the basal leaf usually exceeding the flowers; sepals greenish to purple; petals purple to white, villous on the outer tips; capsule winged.

9. TRILLIUM L.

A solitary stem with a whorl of three leaves at the top; flowers solitary; the sepals green; the petals white or purple; fruit a red berry-like capsule.

Trillium ovatum Pursh Western Trillium or Wake-Robin.

Stem 15-70 cm. high, from a tuberous rhizome; leaves sessile, broadly ovate and acuminate; petals white, 3-7 cm. long; capsule ovate with the angles narrowly winged.

10. CLINTONIA Raf.

Herbs with creeping rhizomes and erect solitary scapes; leaves few, all basal; perianth segments all alike, distinct; fruit a berry.

Clintonia uniflora (Schult.) Kunth. Queen's Cup or Queencup

Beadlily.

Leaves 2-3, thin, with ciliate margins, 7-15 cm. long; scapes

slender, shorter than the leaves; flowers usually solitary, white; fruit a blue berry.

II. SMILACINA Desf.

Stems unbranched, from rhizomes; leaves sessile, alternating up the full length of the stem; small flowers in racemes or panicles; perianth segments alike; fruit a 1-2-seeded berry.

Flowers numerous and small, in panicles....1. S. racemosa

Flowers few and larger, in racemes.....2. S. sessilifolia

1. Smilacina racemosa (L.) Desf. False Solomon's Seal.

Stems from creeping rhizomes; leaves 8-16, elliptic to lanceolate, sessile and somewhat clasping; flowers white, small, numerous, borne in dense pyramidal panicles at the end of the nodding stem; berries red, black-mottled.

2. Smilacina sessilifolia (Baker) Nutt. Few-flowered False Solomon's Seal.

Stems 20-50 cm. high, from slender rhizomes; leaves elliptical-lanceolate, acute, sessile, ciliate on margins; flowers 5-10, in a raceme; fruit a deep red to purple berry.

12. DISPORUM Salisb.

Stems, leafy, branched, from slender rhizomes, the leaves alternate, sessile or clasping; flowers solitary or in terminal umbels of up to 3 flowers; perianth campanulate; segments whitish or greenish-yellow; fruit a berry.

Disporum hookeri (Torr.) B. & H. Hooker's Fairy Bells.

Stems up to 60 cm. in height, rusty-pubescent; leaves ovate to oblong-ovate, acuminate, margins ciliate; flowers in umbels of 2-6; perianth campanulate, white to greenish; berry obovoid, 8 mm. long, 6-seeded.

9. IRIDACEAE (Iris Family)

Perennial herbs with 2-ranked parallel-veined sheathing leaves; flowers terminal, 3-merous, extending from a spathe; the ovary inferior; fruit a capsule.

IRIS L.

Large-flowered, the 3 sepals reflexed and the 3 petals erect; stamens distinct, the filaments uniting with the perianth to form a tube; fruit a many-seeded 3-6-angled capsule.

Iris chrysophylla Howell Slender-tubed Iris.

Stems up to 20 cm. in height, the leaves up to 40 cm. long; floral bracts broad, 4-10 cm. long; flower usually solitary; perianth yellowish-white, but occasionally varying to pale purple; tube slender, 3-7 cm. long.

10. ORCHIDACEAE (Orchid Family)

Perennial herbs from corms, tubers or rhizomes. Flowers irregular; 3 sepals and 3 petals, 2 petals alike and the third modified into a lip, pollen in pollinia; stamens 1 or 2, united with the style into a single column; ovary inferior; fruit a capsule with numerous

minute seeds.

Plants heterotrophic; leaves reduced.

Herbage and perianth white.....6. Cephalanthera

Herbage yellowish or reddish-brown or purplish, never
white.....5. Corallorhiza

Plants autotrophic; leaves normal.

Leaves 1 or 2, never more.

Flower solitary, large; 1 leaf...7. Calypso

Flowers several, inconspicuous; leaves 2, opposite....
.....4. Listera

Leaves more than two, alternate or basal.

The leaves all basal, white-mottled (in this region).
.....3. Goodyera

The leaves alternate, the stem more or less leafy.

Spikes spiral; flowers spurless.....
.....2. Spiranthes

Spikes not spiral; flowers spurred.....
.....1. Habenaria

1. HABENARIA Willd.

Solitary stems from thick tuberous bases, leafy at least near the base; flowers greenish, yellowish or white, in spikes or racemes; sepals and lateral petals much alike; lip flat, with a long spur.

Habenaria leucostachys (Lindl.) Wats. White-flowered Bog Orchid
or White Rein-orchid.

Stem thickened below, leafy, 30-120 cm. tall; leaves linear to lanceolate, reduced upward; perianth white, showy; spur thin, curved and longer than the lip.

2. SPIRANTHES Rich.

Stems from a cluster of thickened tubers, leafy at least at base and with leaves bract-like above; flowers small, white, spurless, verticillate in 1-3 ranks; sepals and lateral petals united at base; lip widened at base; capsule erect.

Spiranthes romanzoffiana C. & S. Hooded Ladies' Tresses or Twisted Orchid.

Stem robust, 10-50 cm. high, with 3-5 basal leaves, the cauline leaves reduced; raceme dense, 5-8 cm. long; bracts exceeding the flowers, flowers white or greenish-white. Plants of moist situations.

3. GOODYERA R. Br.

Solitary scapes from rhizomes; thick evergreen leaves in a basal cluster, those of this region marked with white; flowers small, the sepals and 2 petals united to form a hood above the lip; column straight and short.

Goodyera oblongifolia Raf. Rattlesnake Plantain.

Leaves basal, ovate, acute, and broad-petioled; scape 10-30 cm. high, glandular-puberulent; spike densely many-flowered, bracteate; sepals and petals greenish-white; lip obtuse, the tip recurved.

4. LISTERA R. Br.

Low herbs from short rhizomes; leaves 2, opposite and near the middle of the stem; flowers small, in a terminal raceme; sepals and 2 petals nearly alike, the lip notched; column bearing the anther on the back.

Listera convallarioides (Sw.) Torr. Broad-lipped Tway-blade.

Stems 10-25 cm. high; leaves ovate to orbicular, obtuse; inflorescence glandular, the raceme 6-12-flowered; flowers yellowish-green, the lip bifid. Found in moist woods.

5. CORALLORHIZA (Hall.) R. Br.

Saprophytes or root-parasites without chlorophyll; stems scapose, the leaves reduced to sheathing bracts; flowers in a raceme; sepals and 2 petals alike, the lip broad.

Perianth distinctly 3-striped with purple or reddish lines.....

.....1. C. striata

Perianth not distinctly striped.

Lip entire, not mottled with red.....3. C. mertensiana

Lip 3-toothed, red-mottled.....2. C. maculata

1. Corallorhiza striata L. Striped Coral-root.

Stems 25-50 cm. in height, often clustered, with 3-4 sheathing leaves; perianth segments reddish to pink, conspicuously 3-striped with reddish or purple lines; lip dark purplish-red, nearly entire.

2. Corallorhiza maculata Raf. Spotted Coral-root.

Stems 20-50 cm. high; stem and perianth segments, except the lip, brownish-purple; lip dark purplish-red; column narrow and shorter than the petals.

3. Corallorhiza mertensiana Bong. Purple Coral-root.

Stems 20-50 cm. high; whole plant pale reddish; raceme many-flowered; perianth parts 7-10 mm. long, the lip concave.

6. CEPHALANTHERA Rich.

Stems from a creeping rhizome; those of this area completely white; leaves reduced to sheathing bracts; sepals and lateral petals similar, the petals united to form a hood; lip free and 3-toothed; pollen masses separate.

Cephalanthera austinae (Gray) Hel. Phantom Orchid.

Whole plant white; stem 20-50 cm. in height; leaves few and reduced to sheaths; flowers in a terminal raceme; sepals and lateral petals similar and united. Found in dense woods.

7. CALYPSO Salisb.

Low solitary scapes from bulb-like corms; flowers large and solitary; sepals and lateral petals alike; lip saccate; plant with a single basal leaf.

Calypso bulbosa (L.) Oakes Calypso.

Stem 8-15 cm. in height; the stem and the single basal leaf from a corm; sepals and lateral petals purplish, saccate lip pinkish and

mottled with dark red.

II. SALICACEAE (Willow Family)

Dioecious trees or shrubs with simple alternate leaves; flowers in catkins; perianth none; stamens 1 to many; stigmas 2-4; fruit a 2-4-valved capsule with many seeds, each bearing a coma.

Bud scales one; stamens few.....2. Salix

Bud scales several; stamens numerous.....1. Populus

1. POPULUS [Tourn.] L.

Trees with scaly and often resinous buds; leaves long-petioled, broad; coma of seed conspicuous.

Populus tremuloides Michx. American Aspen or Quaking Asp.

A slender tree up to 18 m. tall; leaves round-ovate, acuminate, 3-6 cm. long, on long petioles; stigmas 2; capsule ovoid; seed small.

2. SALIX [Tourn.] L.

Trees or shrubs usually with narrow, short-petioled leaves; winter buds with 1 scale; each flower bearing 1-2 glands at the base; stamens often 2, but occasionally up to 10; capsule 2-valved.

Salix commutata Bebb Variable Willow.

Shrub up to 2 m. high; leaves entire, pubescent at least when young, green on both surfaces; catkins appearing with the leaves (coetaneous); scales brownish, villous. Found in moist situation at high altitudes.

12. BETULACEAE (Birch Family)

Monoecious trees or shrubs with alternate, deciduous leaves; staminate flowers in catkins, the pistillate ones in clusters or spike-like catkins; stamens 2-10 to a bract; ovary 2-loculed; fruit a 1-seeded nut or nutlet.

ALNUS Hill

Trees or shrubs with dentate to serrate leaves; staminate flowers in drooping catkins; pistillate catkins erect, becoming persistent woody cones.

Alnus rubra Bong. Red Alder or Oregon Alder.

Trees up to 25 m. in height; bark smooth, light-colored; leaves doubly serrate, dull green; female cones oblong-ovoid, 15-25 mm. long, sessile or on short peduncles.

13. FAGACEAE (Oak Family)

Monoecious trees or shrubs with alternate leaves, the staminate flowers in catkins; stamens 4-12; pistillate flowers 1-3 in involucre; fruit a nut.

CASTANOPSIS Spach.

Trees and shrubs with evergreen leaves; staminate flowers 3 to a cluster, in erect catkins; stamens 6-12; pistillate flowers 1-3 in an involucre, borne in short catkins or at the base of the staminate catkins; fruit a nut maturing in 2 years; nuts 1-3, enclosed by a spiny involucre.

Castanopsis chrysophylla A. DC. Golden Chinquapin.

Evergreen shrubs or trees; leaves acute, lanceolate, 6-12 cm. long, powdery yellow on the under surface; fruit a spiny involucre containing 1-2 nuts.

14. ARISTOLOCHIACEAE (Birthwort Family)

Herbs with alternate, mostly cordate or reniform entire leaves; petals wanting; calyx conspicuous, 3-lobed; stamens 5-12, united with the style; fruit a capsule or a berry.

ASARUM L.

Perennial herbs with branched rhizomes and large cordate or reniform leaves; flowers solitary, terminal; stamens 12; styles 6, united; fruit a thick capsule.

Asarum caudatum Lindl. Western Wild Ginger.

Plants having an odor of ginger, the rootstocks elongated and bearing a pair of leaves 5-10 cm. broad on long petioles; calyx lobes ovate, purplish; sepals attenuate, surpassing the calyx. Found in moist shady areas.

15. POLYGONACEAE (Knotweed Family)

Herbs or shrubs usually with entire alternate leaves and sheathing stipules; joints of the stem often swollen; flowers small; petals wanting; sepals often petal-like; ovary superior, unilocular; fruit an achene, 3-4-angled or -winged.

Stipules wanting.....3. Eriogonum

Stipules present and sheath-like.

Perianth segments unequal, the inner larger.....

.....1. Rumex

Perianth segments equal.....2. Polygonum

1. RUMEX L.

Herbs with numerous inconspicuous flowers in panicles; sepals 6, the 3 inner ones petal-like; achene 3-angled.

Rumex acetocella L. Red Sorrel.

Dioecious plants with slender stems from rhizomes; leaves hastate; flowers yellowish to reddish, 1-5 mm. long. Along roadsides only; native of Europe.

2. POLYGONUM [Tourn.] L.

Herbs or shrubs with alternate leaves and conspicuous scarious stipules; flowers inconspicuous, sepals usually 5, colored; stamens 3-9.

Flowers in a dense terminal raceme.....1. P. bistortoides

Flowers not in a dense terminal raceme.

Plants perennial, with large fleshy rootstocks; leaves

broad, ovate.....2. P. davisiae

Plants annual with slender tap roots; leaves linear.....

.....3. P. douglasii

1. Polygonum bistortoides Pursh Mountain Meadow Knotweed.

Perennials from woody rhizomes; stems unbranched, 15-60 cm. high; leaves mostly basal, long-petioled, the cauline reduced, sessile; inflorescence a dense raceme, spike-like, 2-3.5 cm. long; perianth white; stamens 8, exserted.

2. Polygonum davisiae Brew. Davis' Knotweed.

Stems leafy from a stout fleshy rootstock; leaves glaucous, nearly sessile; flower culsters in the axils of the upper leaves; achenes brown and shiny.

3. Polygonum douglasii Greene Douglas' Knotweed.

Stems slender, 10-50 cm. in height, the branches erect; leaves oblong to linear, reduced upwards; flowers 1-3 at a node; sepals white to pink with a green or red midrib; achenes black.

3. ERIOGONUM Michx.

Herbs or shrubs with alternate or whorled entire leaves; flowers in heads, umbels, panicles or spikes; perianth 6-parted, often showy, the inner 3 parts unlike the outer; stamens 9; achenes mostly triangular.

Leaves densely white-tomentose on both surfaces; mat-forming...

.....2. E. incanum

Leaves tomentose on undersurface only; stems shrubby, spreading

.....1. E. umbellatum

1. Eriogonum umbellatum Torr. Sulphur-flower.

Stem shrubby, 60-150 cm. high; leaves oblanceolate, white-tomentose on under surface, nearly glabrous above; perianth yellow, tinged with red.

2. Eriogonum incanum T. & G. White Dwarf Eriogonum.

Stems somewhat woody, forming dense mats; leaves densely white-tomentose on both surfaces; umbels capitate; perianth yellow, tinged with red.

16. PORTULACACEAE (Purslane Family)

Succulent herbs, usually with 2 sepals and 3-16 petals, commonly 5; stamens 3-20; ovary superior; fruit a capsule.

Sepals scarious; leaves all in a basal rosette.....

.....2. Spraguea

Sepals herbaceous; plant caulescent.....1. Montia

1. MONTIA [Mich.] L.

Annuals or perennials from fibrous roots, rhizomes, or stolons; sepals 2; petals 3-5, unequal and often united at base; stamens of the same number as the petals and opposite them.

The pair of cauline leaves united to form an involucrel disk...

.....3. M. perfoliata

The pair of cauline leaves distinct.

Leaves orbicular; petals white.....1. M. cordifolia

Leaves ovate; petals with pink stripes.....

.....2. M. sibirica

1. Montia cordifolia (Wats.) Pax. & Hoffm. Broadleafed Montia.

Succulent herbs from slender rootstocks; basal leaves orbicular, 2.5-4 cm. long, petioled, the one pair of cauline leaves sessile below the raceme; sepals 3-4 mm. long; petals three times as long, white.

2. Montia sibirica L. Western Spring Beauty.

Perennials 10-50 cm. in height; basal leaves ovate to lanceolate, long-petioled, the single pair of cauline leaves similar but sessile; inflorescence a raceme with numerous bracts; petals emarginate, white to pink and with pink stripes.

3. Montia perfoliata (Donn) How. var. depressa Gray

Miner's Lettuce.

Small herbs with rhombic to ovate basal leaves, the pair of cauline leaves united into an involucrel disk, cleft on one side; whole plant more or less reddish; petals white to pink, surpassing the sepals.

2. SPRAGUEA Torr.

Perennial herbs with the leaves forming a basal rosette; sepals 2, scarious; petals 4, unequal; stamens 3; fruit a few-seeded capsule.

Spraguea umbellata Torr. Pussy-paws.

Low plants with numerous succulent spatulate leaves; inflorescence of umbellately arranged spikes; sepals white to reddish, scarious; petals 4, white to pinkish, shorter than the sepals.

17. CARYOPHYLLACEAE (Pink Family)

Herbs with mainly opposite entire leaves and stems usually swollen at the nodes; flowers 4-5-merous, petals sometimes wanting; ovary superior; fruit a capsule, utricle or achene.

Stipules present, scarious.....1. Spergularia

Stipules wanting.

Petals 5, entire or merely emarginate.2. Arenaria

Petals wanting or deeply 2-cleft.....3. Stellaria

1. SPERGULARIA Pers.

Annual or perennial herbs with narrow opposite leaves bearing scarious stipules; sepals and petals 5; stamens 2-10; fruit an ovoid capsule.

Spergularia rubra (L.) J. & C. Presl Sand Spurry.

Stems much branched from the base, leafy, prostrate; leaves 5-18 mm. long, linear, with conspicuous silvery-scarious stipules; flowers in the axils of the leaves; sepals glandular-puberulent, acute; petals pink.

2. ARENARIA L.

Annual or perennial herbs with sessile, exstipulate leaves; sepals 5; petals 5, white; stamens 10.

Leaves linear or filiform.....2. A. congesta

Leaves lanceolate.....1. A. macrophylla

1. Arenaria macrophylla Hook. Large-leaved Sandwort.

Puberulent slender-stemmed plants 5-15 cm. high; leaves lanceolate, acute, 1-6 cm. long; sepals acute, 3-5 mm. long, just shorter than the petals.

2. Arenaria congesta Nutt. Dense-flowered Sandwort.

Stems woody at the base, spreading; leaves glaucous, stiff, 3-7 cm. long, linear, pungent-tipped; inflorescence congested; sepals with scarious margins; petals longer than the sepals.

3. STELLARIA L.

Annual or perennial herbs with opposite exstipulate leaves; flowers axillary or cymose; petals, if present, white, 2-cleft; stamens 3-10.

Stellaria crista C. & S. Crisped Starwort.

Slender perennials with decumbent or prostrate stems; leaves lanceolate or ovate, acute, the margins crisped; flowers axillary; sepals with scarious margins; petals wanting or minute.

18. RANUNCULACEAE (Buttercup Family)

Annual or perennial herbs (occasionally woody). Sepals usually 5; petals often reduced or modified; stamens numerous and spirally arranged; carpels 1 to many, usually distinct; fruit of achenes, follicles or berries.

Petals wanting; sepals often petal-like.

Leaves mostly basal; fruit of follicles.....

.....3. Caltha

Leaves in a whorl of 3 on the stem; fruit a head of

achenes.....2. Anemone

Petals present.

Fruit a berry; flowers in a terminal raceme.....

.....7. Actaea

Fruit of achenes or follicles.

Fruit of achenes; petals with a nectary at the base;

sepals not petal-like.....1. Ranunculus

Fruit of follicles; sepals petal-like.

Upper sepal hood-like, spurless.....

.....6. Aconitum

Upper sepal not hood-like; flower spurred.

Petals 5, spurred; leaves mostly basal.....

.....4. Aquilegia

Petals 2-4; sepals spurred; leaves alternate

.....5. Delphinium

I. RANUNCULUS L.

Annual or perennial herbs with entire or variously parted leaves; flowers commonly yellow; sepals and petals commonly 5, rarely more or less; each petal with a nectariferous pit at the base covered by a scale; stamens numerous; fruit of achenes.

Basal leaves ovate to orbicular.....2. R. populago

Basal leaves narrower, mainly lanceolate...1. R. alismaefolius

1. Ranunculus alismaefolius Geyer var. alismellus Gray

Plantain-leaved Buttercup.

Stems slender, up to 30 cm. in height; leaves narrowly ovate to lanceolate, mainly basal, long-petioled; petals light yellow, 5-8 mm. long; beaks of the achenes flattened. Common in wet meadows.

2. Ranunculus populago Greene

Stems stout, 10-20 cm. high; basal leaves ovate to orbicular, long-petioled, the cauline narrower; petals deep yellow, 4-7 mm. long; achenes with a short straight beak.

2. ANEMONE [Tourn.] L.

Perennial herbs with rhizomes; basal leaves long-petioled, cauline leaves usually in a whorl of 3 below the long-peduncled flower; sepals 4 or more, usually 5; petals wanting; stamens numerous; achenes numerous, each having a long plumose persistent style.

Calyx white, 20-40 mm. across.....1. A. deltoidea

Calyx white with purple tinge, 8-15 mm. across.....

.....2. A. lyallii

1. Anemone deltoidea Hook. Western White Anemone or Wind-flower.

Stems arising from slender rhizomes; basal leaves 3-foliolate, arising singly from the rhizome; stem leaves a whorl of 3 borne halfway up on the stem; leaflets coarsely toothed; sepals large, white, unequal; achenes pubescent. Found in moist shady areas.

2. Anemone lyallii Britt. Little Mountain Anemone.

Stems slender, from short rhizomes; basal leaves and the 3 cauline leaves similar, ternate or 5-foliolate, the leaflets ovate, incised; sepals white with purple tinge.

3. CALTHA [Rupp.] L.

Perennial herbs with simple crenate, ovate to reniform leaves, mostly basal; sepals 5-15, petal-like, white, blue or yellow; petals lacking; stamens numerous; fruit of many-seeded follicles.

Caltha biflora DC. Broad-leaved Caltha or White Marsh Marigold.

Scape 5-25 cm. high; leaves orbicular-reniform, broader than wide, crenate to entire; sepals 7-12, white, often reddish-tinged on the outside; stamens numerous; follicles beaked and short-stalked.

4. AQUILEGIA [Tourn.] L.

Perennial herbs with ternately compound mainly basal leaves and large bright flowers; sepals 5 and petal-like; petals 5, spurred; stamens numerous; pistils 5, becoming follicles in fruit.

Aquilegia formosa Fisch. Western Columbine.

Stems 30-90 cm. high; leaflets cleft and lobed, glaucous on undersurface, glabrous or puberulent above. Flowers nodding; sepals scarlet, spreading or reflexed; petals yellow, long-spurred.

5. DELPHINIUM [Tourn.] L.

Annual or perennial herbs with alternate palmately-parted leaves; flowers irregular; sepals 5, colored and petal-like; one

sepal spurred at the base; petals 2-4, if 4, the pairs unlike;
fruit of 1-5 several-seeded follicles.

Plants 2-5 dm. in height from a tuber-like base.

Follicles erect, glabrous, 12-15 mm. long.....

.....2. D. decorum

Follicles recurved, pubescent, 10-12 mm. long.....

.....1. D. menziesii

Plant 7-20 dm. tall from coarse fibrous root.....

.....3. D. glaucum

1. Delphinium menziesii Hook. Menzies' Larkspur.

Stems from a stout tuber; herbage usually pubescent below,
otherwise glabrous and somewhat glaucous; racemes open, 5-15 flowered,
the lower pedicels longer than the flowers; sepals deep blue, acute,
pubescent; upper petals white to blue; follicles divergent from the
base, pubescent.

2. Delphinium decorum F. & M. Low Larkspur.

Stems from tuber-like roots; herbage usually glabrous; basal
leaves thick, round in outline, 3-5-parted; racemes many-flowered;
sepals purplish blue, glabrous; petals white to blue, pubescent within;
follicles glabrous, erect.

3. Delphinium glaucum Wats.

Stems erect, 7-20 dm. high, stout and fistulose, glabrous and
more or less glaucous; leaves and flowers often pubescent; leaves
5-7 parted, the lobes toothed, acute; flowers in long racemes;

sepals dark blue; petals blue-tinged; follicles spreading.

6. ACONITUM [Tourn.] L.

Tall perennial herbs with palmately-divided leaves and irregular racemose flowers; sepals 5, petal-like, the upper hooded; the 2 upper petals enclosed by the hood, the others, if present, reduced; fruit of many-seeded follicles.

Aconitum columbianum Nutt. Western Monkshood.

Stem robust and erect, 6-15 dm. tall, usually glandular-pubescent, at least above; leaves numerous, the lower long-petioled, the upper sessile, all deeply 3-7-cleft, the divisions toothed; racemes loose; sepals blue, the hood 1.5-2 cm. long; fruit of 2-6 follicles 1-2 cm. long.

7. ACTAEA L.

Perennial herbs with short branching rhizomes and ternately 3-compound leaves; small white flowers in a terminal raceme; petals, if present 4-10; sepals 3-5, petal-like; fruit a many-seeded red or white berry.

Actaea arguta Nutt. Western Baneberry.

Stems 30-90 cm. high; leaves all cauline, 1-3, 15-60 cm. long; leaflets thin, ovate or lanceolate, toothed or lobed. Racemes terminal, densely flowered, 2-3 cm. long; petals 4-10, minute; berries usually red.

19. BERBERIDACEAE (Barberry Family)

Herbs or shrubs with alternate or basal leaves; sepals and petals 6, each in two sets; anthers opening by valves; fruit a berry or a capsule.

BERBERIS L.

Shrubs with simple or compound spiny evergreen leaves; flowers racemose, yellow; sepals 6, petal-like; fruit a berry.

Berberis nervosa Pursh Long-leaved Oregon Grape.

Shrubs 15-45 cm. high with dark green spiny leaves of 9-15 leaflets, these palmately veined; berries blue.

20. CRUCIFERAE (Mustard Family)

Herbs with acrid juice and alternate leaves; sepals and petals 4, in the form of a cross; stamens 6, 2 short and 4 long; flowers in terminal racemes; ovary superior; fruit of a silique or silicle.

Leaves pinnately lobed.....1. Descurainia

Leaves entire or merely dentate or lobed.

Pubescence of stellate or forked hairs.

Flowers not yellow or orange.....4. Arabis

Flowers yellow or orange.....2. Erysimum

Pubescence, when present, of simple unbranched hairs.....

.....3. Dentaria

1. DESCURAINIA Webb & Barth.

Annuals (in this region) with pubescence of branched hairs; leaves pinnatifid to tripinnately dissected; flowers small, yellow; fruit of beakless terete siliques.

Descurainia pinnata (Walt.) Brit. Tansy-mustard.

Stems 20-60 cm. in height; leaves pinnate or bipinnate; petals light yellow, 2-2.5 mm. long, surpassing the sepals; siliques erect, linear, 6-10 mm. long.

2. ERYSIMUM [Tourn.] L.

Coarse biennial or perennial herbs with pubescence of 2-branched hairs; flowers usually showy, yellow to orange; fruit a 4-sided or flattened silique.

Erysimum asperum (Nutt.) DC. Rough Wall Flower.

Stout perennials, usually with unbranched stems to 50 cm. high; leaves lanceolate, thick and firm, entire or toothed; flowers yellow to orange; siliques with pubescence of 2-branched hairs.

3. DENTARIA L.

Perennial herbs with thickened rhizomes or tubers; cauline leaves few; inflorescence a raceme; flowers white, pink or purplish; fruit of beaked siliques.

Dentaria tenella Pursh Spring Beauty.

Stems 10-25 cm. high, from slender tuberous rhizomes; basal

leaves orbicular, crenate or lobed, rarely 3-5-foliolate, the aculine 3-5-cleft; racemes few-flowered; petals 8-12 mm. long, white to purple.

4. ARABIS L.

Annual or perennial herbs; pubescence of stellate hairs; leaves entire to dentate, the cauline usually clasping; flowers white or purple; siliques flattened.

Pods reflexed or pendulous at maturity.....1. A. holboellii

Pods erect to slightly spreading but never reflexed or pendulous.

Siliques 1.5-2 mm. wide, 3-5 cm. long.2. A. lyallii

Siliques 3-4 mm. wide, 4-6 cm. long...3. A. platysperma

1. Arabis holboellii Hornem. Holboell's Rock Cress.

Stems up to 30 cm. tall; cauline leaves usually clasping; racemes 1-sided, elongated; flowers white to purplish; siliques pendulous or reflexed.

2. Arabis lyallii Wats.

Perennial herb, often woody at the base; stems 3-10 cm. high; basal leaves 0.5-3 cm. long; petals 6-8 mm. long, white to purplish; siliques 3-5 cm. long, 1.5-2 mm. wide.

3. Arabis platysperma A. Gray Flat-pod Rock Cress.

Stems 5-30 cm. high; basal leaves spatulate to oblanceolate; petals white to purplish; siliques nearly erect, 4-5 cm. long, 3-4 mm. wide.

21. CRASSULACEAE (Stonecrop Family)

Succulent herbs with flowers in cymes or panicles; usually 5-merous, but rarely 3-30-merous; stamens of the same number or twice as many as the petals. Found mostly in rocky areas that receive occasional moisture.

SEDUM L.

Mostly perennial fleshy herbs with leafy stems; flowers cymose; perianth segments in 5's; stamens 10; fruit a many-seeded follicle.

Leaves mostly opposite, obovoid.....1. S. divergens

Leaves alternate, oblong to spatulate.....2. S. oregonense

1. Sedum divergens Wats. Spreading Stonecrop.

Flowering stems leafy, 5-10 cm. high, from slender rhizomes; leaves thick, obovoid, obtuse, green to reddish; petals bright yellow, separate, 6-7 mm. long; sepals 3 mm. long.

2. Sedum oregonense (Wats.) Peck Creamy Stonecrop.

Plant with a basal rosette of leaves in addition to a leafy flowering stem; petals cream-colored to light yellow, about 10 mm. long; sepals 2-3.5 mm. long.

22. SAXIFRAGACEAE (Saxifrage Family)

Mainly perennial herbs with alternate or basal leaves; flowers usually inconspicuous; calyx 5-lobed; petals 5 or wanting; stamens 5 or 10, borne on the calyx-tube; fruit a capsule or a follicle.

Stamens 5.

Flowers in a terminal raceme; acaulescent.....

.....4. Mitella

Flowers in panicles; caulescent.....2. Boykinia

Stamens 10.

Petals linear.....3. Tiarella

Petals broader.....1. Saxifraga

1. SAXIFRAGA [Tourn.] L.

Herbs with basal or alternate leaves; calyx 5-lobed; petals 5; stamens 10; ovary superior to inferior; fruit a capsule.

Leaves with long petioles.....2. S. arguta

Leaves without well defined petioles.....1. S. oregana

1. Saxifraga oregana How. Oregon Saxifrage.

Acaulescent herbs from short rhizomes; leaves without well defined petioles, entire to denticulate. Inflorescence glandular; calyx lobes acute; petals elliptic.

2. Saxifraga arguta D. Don Mountain Meadow Saxifrage.

Perennials from elongated rhizomes; leaves all basal, long-petioled, reniform, evenly dentate, glabrous. Inflorescence glandular-puberulent; calyx purplish, the lobes reflexed; petals orbicular, white; capsule 8 mm. high.

2. BOYKINIA Nutt.

Perennial herbs from scaly rhizomes; leaves alternate and stipulate; flowers in panicles; sepals, petals, and stamens 5; capsule opening between 2 beaks.

Boykinia major A. Gray Mountain Boykinia

Robust herbs 30-80 cm. high, glandular-puberulent; cauline leaves reduced upwards, basal and lower cauline leaves petioled, with conspicuous stipules; blades reniform, deeply cleft; sepals 2-3 mm. long; petals white, 5-7 mm. long.

3. TIARELLA L.

Perennial herbs from scaly rootstocks; leaves mainly basal, long-petioled; inflorescence racemose or paniculate; sepals 5; petals 5, entire, white; stamens 10, exserted.

Tiarella unifoliata Hook. Western Coolwort.

Unbranched stems 15-40 cm. high, basal leaves ovate, 3-7-lobed, crenate to dentate; cauline leaves 1-3; sepals glandular-puberulent, petal-like; petals small, white, linear.

4. MITELLA [Tourn.] L.

Low perennials with basal leaves and a slender scape; flowers in a terminal raceme, small; petals white or greenish.

Mitella pentandra Hook. Five-point Mitrewort.

Leaves basal, cordate to orbicular, often lobed, crenate-dentate,

2-5 cm. long; inflorescence glandular-puberulent above; flowers green; petals 7-9-parted.

23. RIBESACEAE (Gooseberry Family)

Shrubs with alternate leaves; flowers variously arranged; calyx 5-lobed; petals 5, small; stamens 5; ovary inferior; fruit a berry.

RIBES L.

Shrubs, often spiny, the alternate leaves palmately-veined; flowers 5-merous; fruit a many-seeded berry.

Stems prickly; peduncles few-flowered.

Spines weak, numerous; stems prostrate or decumbent.....

.....2. R. lacustre

Spines stiff; stems erect.....1. R. lobbii

Stems without prickles; inflorescence a raceme.

Calyx lobes bright red; racemes densely flowered.....

.....2. R. sanguineum

Calyx lobes white to light pink.

Berry red; calyx broader than long.....

.....5. R. cereum

Berry black; calyx longer than broad.....

.....4. R. viscosissimum

1. Ribes lobbii A. Gray Pioneer Gooseberry.

Shrub up to 15 dm. high, with stiff thorny stems; leaves 3-5-lobed, the lobes cleft, puberulent above, glandular below,

3-6 cm. wide; flowers pendulous; calyx dark red, twice as long as the petals; petals white; berries purplish-red, covered by glandular prickles.

2. Ribes lacustre (Pers.) Poir. Prickly Currant.

Stems prostrate or decumbent, 1-2 m. long, densely armed with weak bristles; leaves glabrous, 3-5-cleft, the lobes dentate; racemes 5-10-flowered; berry black.

3. Ribes sanguineum Pursh Red-flowering Currant.

Erect shrubs; leaves 3-5-lobed, the lobes dentate, leaf 3-8 cm. wide, pubescent; racemes densely flowered; calyx bright red, twice as long as the pink petals; berries black, glaucous and glandular.

4. Ribes viscosissimum Pursh Sticky Currant.

Shrub up to 2 m. tall; leaves 4-8 cm. wide, 3-5-lobed, the lobes crenate-dentate, glandular-puberulent; calyx white to pinkish, twice as long as the white petals; berries black, glaucous and puberulent-glandular.

5. Ribes cereum Dougl. Squaw Currant.

A dense shrub up to 1.5 m. tall; leaves 3-5-lobed or dentate, pale green, glandular-pubescent; racemes few-flowered; calyx white to pinkish, much longer than the petals; berry red.

24. ROSACEAE (Rose Family)

Herbaceous or woody plants with alternate stipulate leaves; calyx usually 5-cleft; petals 5, inserted on the calyx-tube; stamens numerous; fruit of achenes, follicles, drupes, drupelets or pomes.

Ovary superior; herbs or shrubs; fruit not a pome.

Fruit of achenes.

Receptacle fleshy.

Leaves trifoliolate; herbs..4. Fragaria

Leaves odd-pinnate; spiny shrubs.....

.....6. Rosa

Receptacle dry.

Style persistent, often becoming plumose;

leaves lyrate.....5. Geum

Style deciduous; leaves not lyrate.

Stamens 5-10; petals white.....

.....3. Horkelia

Stamens more than 10; petals yellow.....

.....2. Potentilla

Fruit follicles, drupes or drupelets, never achenes.

Plants herbaceous or somewhat woody at the base.....

.....7. Rubus

Plants small trees or shrubs.

Fruit of 1-seeded follicles..1. Holodiscus

Fruit a drupe.....9. Prunus

Ovary inferior; fruit a berry-like pome....8. Amelanchier

1. HOLODISCUS Maxim.

Shrubs with simple serrate or lobed leaves and small white
paniculate flowers; sepals and petals 5; stamens 20; ovary superior;

fruit of 1-seeded follicles.

Holodiscus discolor (Pursh) Maxim. Ocean-spray.

Shrubs up to 5 m. tall with triangular-ovate leaves; the leaves green above, white-tomentose on the lower surface; panicle large, pyramidal, often drooping; petals 1.5-2 mm. long.

2. POTENTILLA L.

Usually perennial herbs, rarely shrubby, with compound stipulate leaves; flowers usually yellow; sepals 5, with 5 bractlets; petals 5; stamens 10 to many; fruit of achenes.

Herbage glandular-villous.....1. P. glandulosa

Herbage not glandular.....2. P. ashlandica

1. Potentilla glandulosa Lindl. Sticky Cinquefoil.

Perennials 30-100 cm. tall; glandular-villous; leaflets 5-9, obovate to orbicular; flowers 10-15 mm. in diameter, yellow; stamens 25.

2. Potentilla ashlandica Greene Mt. Ashland Cinquefoil.

Perennials 20-40 cm. in height, short-villous but not glandular; leaflets 5-9, obovate, dentate; petals yellow 10 mm. in length.

3. HORNELIA C. & S.

Perennial herbs with pinnately divided or compound leaves; calyx 5-parted, with 5 bractlets; petals white or rarely yellow; fruit of achenes borne on a dry receptacle.

Horkelia hendersoni How. Henderson's Horkelia.

Stems somewhat woody below; 10-15 cm. in height, covered by coarse spreading hairs; leaves with 11-19 leaflets, white-silky on both surfaces; petals white to pink-tinged, surpassing the calyx.

4. FRAGARIA L.

Acaulescent perennial and often stoloniferous herbs with 3-foliolate stipulate leaves; flowers cymose; sepals and bractlets 5; petals 5, usually white; stamens about 20; receptacle enlarged in fruit, bearing scattered achenes.

Leaflets not serrate below the middle; scapes more than

2-flowered.....1. F. bracteata

Leaflets serrate to below the middle; scapes 1-2-flowered.....

.....2. F. californica

1. Fragaria bracteata Hel. Western Wood Strawberry.

Scapes erect from stout rhizomes usually surpassing the leaves, several-flowered; leaflets pubescent on both surfaces; receptacle bright red.

2. Fragaria californica C. & S. California Strawberry.

Leaves long-petioled, nearly equaling the scape; leaflets ovate, crenate-serrate more than half way round, pubescent, at least beneath; scapes 1-2-flowered.

5. GEUM L.

Perennial herbs with pinnately-divided leaves; flowers solitary or in cymes; sepals 5, with 5 bractlets; petals 5; stamens numerous; fruit of achenes, the styles persistent, often becoming plumose.

Geum macrophyllum Willd. Large-leaved Avens.

Stems erect, 30-90 cm. in height, stiff-hairy; leaves lyrate-pinnate, the large terminal segment 3-7-lobed; lateral leaflets small; cauline leaves reduced; petals obovate, bright yellow; achenes pubescent, each with a hooked persistent style.

6. ROSA L.

Spiny shrubs with odd-pinnate stipulate leaves and solitary or corymbose flowers; sepals, bractlets and petals 5; stamens numerous; fruit of achenes enclosed in a fleshy receptacle.

Rosa gymnocarpa Nutt. Little Wild Rose.

Spiny shrubs 0.5-2 m. tall; leaflets 5-9, oval, doubly serrate with gland-tipped teeth; flowers up to 2 cm. in diameter, light pink; fruit bright red, ellipsoid.

7. RUBUS [Tourn.] L.

Herbaceous or somewhat woody perennials, erect or trailing; stems usually prickly, with simple or compound stipulate leaves; petals 5, conspicuous; stamens numerous; fruit an aggregate of 1-seeded drupelets.

Leaves 3-5-foliolate; stems prickly.....2. R. leucodermis

Leaves merely lobed or cleft; stems without prickles.

Stems erect; leaves over 10 cm. long..3. R. parviflorus

Stems trailing; leaves less than 8 cm. long.....

.....1. R. lasiococcus

1. Rubus lasiococcus A. Gray Dwarf Bramble.

Plants trailing 10-100 cm. long; leaves orbicular to reniform, 3-5-lobed or -cleft, serrate; flowers white, solitary, 1 cm. in diameter; fruit of 2-5 pubescent red drupelets.

2. Rubus leucodermis Dougl. Balckcap Raspberry.

Shrubs with prickly stems, glaucous; leaves 3-5-foliolate, ovate, dentate, white-tomentose beneath and glabrous above; fruit black, slightly pubescent.

3. Rubus parviflorus Nutt. Thimble Berry.

Woody at the base, erect, up to 3 m. tall; leaves orbicular, 5-7-lobed, the lobes dentate, variously pubescent; flowers in panicles, up to 3.5 cm. in diameter; fruit of bright red drupelets.

8. AMELANCHIER Medic.

Shrubs or small trees; leaves simple, serrate; flowers white, in terminal racemes; ovary inferior; fruit a berry-like pome.

Leaves pale dull green, finely tomentose...1. A. pallida

Leaves bright green, glabrous to variously pubescent.....

.....2. A. alnifolia

1. Amelanchier pallida Greene Pale Serviceberry.

A stout shrub up to 2 m. in height; leaves nearly obovate, usually toothed near the apex; tomentose or becoming glabrous, pale dull green, 2-4 cm. long; flowers racemose; petals 6-10 mm. long.

2. Amelanchier alnifolia Nutt. Western Serviceberry.

Shrubs up to 3 m. in height; leaves elliptic, usually serrate near the apex, 2-3.5 cm. long; racemes short and densely flowered; petals oblong to ovate; fruit purple.

9. PRUNUS [Tourn.] L.

Shrubs or small trees; leaves simple, serrate and stipulate; flowers usually white, rarely pink; sepals and petals 5; stamens numerous; fruit a drupe.

Prunus emarginata (Dougl.) Walp. Bitter Cherry or Wild Cherry.

Shrub or small tree with reddish brown bark, smooth, except for the conspicuous lenticels; leaves serrate, ovate or elliptic, usually with 1 or 2 glands between the blade and the petiole; flowers corymbose; fruit of bright red drupes.

25. LEGUMINOSAE (Pea Family)

Herbaceous or woody plants with alternate compound stipulate leaves; flowers irregular; calyx 5-parted; petals usually 5, the upper one large (standard), the lateral ones (wings), the lower two united (keel); stamens usually 10, monadelphous or diadelphous; fruit a legume.

Leaves pinnately compound, usually with tendrils.....

.....3. Lathyrus

Leaves palmately compound or 3-foliolate.

The leaflets 3, not entire.....2. Trifolium

The leaflets 5-16, entire.....1. Lupinus

1. LUPINUS [Tourn.] L.

Annual or perennial herbs, often shrubby at the base; leaves palmately compound; flowers racemose; calyx bilabiate; stamens monadelphous; pods narrow, somewhat flattened.

Pods 10-12 mm. long; leaflets 5-7.....1. L. *lyallii*

Pods 30-50 mm. long; leaflets 9-16.....2. L. *polyphyllus*

1. Lupinus *lyallii* A. Gray Low Mountain Lupine.

Perennial, woody at the base; densely silvery pubescent throughout; leaves numerous, leaflets 5-7, oblanceolate, long-petioled; racemes densely flowered; corolla blue, the standard white in the middle; pods 10-12 mm. long.

2. Lupinus *polyphyllus* Lindl. Large-leaved Lupine.

Stems robust, 50-120 cm. high; leaflets 9-16, 8-15 cm. long; racemes elongated; corolla deep purple to nearly white, turning brown; pods 3-5 cm. long, villous.

2. TRIFOLIUM [Tourn.] L.

Annual or perennial herbs, usually with trifoliolate leaves; flowers in dense heads; calyx regular; stamens diadelphous; pods

small, 1-6-seeded.

Trifolium longipes Nutt. Long-stalked Clover.

Stems slender, 10-30 cm. high; leaves 3-foliolate, leaflets 2-4 cm. long, glabrous above and pubescent below; stipules dentate; corollas yellow to white, turning to light purple, 10-12 mm. long.

4. LATHYRUS [Tourn.] L.

Climbing or trailing stems; leaves even-pinnate, stipulate and bearing tendrils; flowers racemose, rarely solitary; calyx 5-toothed, nearly regular; stamens 10, diadelphous (9 & 1); styles flattened above and pubescent on the inner face.

Lathyrus polyphyllus Nutt. Leafy Pea.

Stems 50-100 cm. high; leaflets 5-9 pairs, thin mucronate; stipules hastate, nearly as large as the leaflets; racemes 5-12-flowered; corolla purplish-blue, 15-20 mm. long; pods 4 cm. long.

26. LINACEAE (Flax Family)

Herbs or rarely shrubs; leaves simple and entire (in this region). Sepals and petals usually 5; stamens 5, united at the base. Fruit a capsule.

LINUM L.

Herbs with tough fibrous bark. Flowers 5-merous; petals early deciduous, the sepals persistent.

Linum lewisii Pursh Western Blue Flax.

Perennial herbs with a woody base; stems leafy, branched above. Corolla brilliant blue; capsule globose, acute, dehiscent by 10 valves.

27. OXALIDACEAE (Wood-sorrel Family)

Low herbs (in this region) with trifoliolate leaves and acid juice. Flowers 5-merous; ovary superior; fruit a capsule.

OXALIS L.

Low perennial herbs with obcordate leaflets, folding at night; flowers 1-several; Stamens usually united at the base; the membranous capsule 5-angled, opening on the angles.

Oxalis trilliifolia Hook. Great Oxalis.

Leaves basal from scaly rhizomes; scapes not exceeding the leaves, 10-50 cm. high, 4-15 flowered; petals nearly white, emarginate; capsule linear, erect, long-beaked.

28. ACERACEAE (Maple Family)

Trees or shrubs with opposite leaves; sepals 4-5; petals, if present, the same number as the sepals; stamens 3-12; ovary superior; fruit a pair of 1-seeded samaras, splitting at maturity.

ACER [Tourn.] L.

Trees or shrubs with opposite petioled deciduous leaves; flowers small, in pendent clusters; samaras long-winged.

Acer glabrum Torr. var. douglasii (Hook.) Piper Douglas Maple.

Shrub or small tree with smooth gray bark; leaves 3-5-lobed, the lobes dentate; flowers in panicles; sepals and petals yellowish.

29. RHAMNACEAE (Buckthorn Family)

Prostrate or erect shrubs or small trees with simple leaves and small flowers; calyx 4-5-lobed, petals of the same number as the sepals, or wanting; stamens 4-5; fruit a 1-seeded capsule or drupe.

CEANOOTHUS L.

Shrubby plants with coriaceous leaves, these usually 3-nerved; flowers white, blue or pink, in small umbels; petals 5, hooded or clawed; stamens 5; fruit a capsule, splitting at maturity into 3 nutlets.

Shrubs prostrate; leaves opposite.....2. C. prostratus

Shrubs erect; leaves alternate.....1. C. velutinus

1. Ceanothus velutinus Dougl. Sticky Laurel or Mountain Balm.

Shrubs up to 3 m. in height; leaves oval, obtuse, 3-nerved, glandular above, puberulent on under surface, 5-8 cm. long; flowers in terminal panicles, white; capsule 3-lobed.

2. Ceanothus prostratus Benth. Squaw Carpet.

Stout rigid prostrate shrub, rooting at the main branches, mat forming; leaves rigid, whitish on the under surface; usually 3-toothed at the apex; flowers in umbels, blue.

30. MALVACEAE (Mallow Family)

Herbaceous plants; leaves alternate, stipulate; flowers usually showy; sepals and petals 5; stamens many, united in a column.

SIDALCEA A. Gray

Herbs with leaves orbicular in outline; flowers in spikes or racemes; corolla white to purple; stamen-tube of 2 rows of stamens.

Sidalcea spicata (Regel) Greene Spiked Sidalcea.

Stem erect, 40-80 cm. high, hirsute below to finely pubescent above; basal leaves lobed or cleft, the cauline parted into linear segments; racemes spike-like; petals rose-colored.

31. HYPERICACEAE (St. John's-wort Family)

Herbs (in this region) with opposite or whorled, entire, glandular-dotted leaves; perianth parts in 4's or 5's; hypogynous stamens numerous. Ovary superior; fruit a many-seeded septicidal capsule.

HYPERICUM L.

Herbs (in this region) with sessile, opposite, dotted leaves; perianth 5-merous, petals golden-color; capsule with many small seeds.

Hypericum anagalloides C. & S. Bog St. John's Wort.

Low, often mat-forming, herbs with weak and prostrate stems; leaves opposite, sessile, 5-10 mm. long; flowers small, 3-4 mm. long, mainly terminal.

32. VIOLACEAE (Violet Family)

Herbs (in this region) with alternate stipulate leaves and solitary flowers; flowers usually spurred or saccate; sepals, petals and stamens 5, the anthers united; fruit a capsule or a berry.

VIOLA [Tourn.] L.

Mostly perennial herbs with solitary nodding flowers; petals and sepals unequal, the lower petal spurred; fruit a 3-angled capsule.

Herbage glabrous; leaves not prominently veined.....

.....1. V. glabella

Herbage pubescent; leaves prominently veined.....

.....2. V. purpurea

1. Viola glabella Nutt. Johnny-jump-up.

Erect stems, 10-30 cm. tall, from rhizomes, the stems naked below; leaves cordate or reniform, acuminate, crenate-serrate; flowers 1-3 to a stem, bright yellow, purple-veined, short-spurred.

2. Viola purpurea Kell. Mountain Violet.

Low clustered herbs from deep rootstocks; leaves ovate, coarsely toothed, prominently veined; petals yellow, tinged with purple or brown outside.

33. ONAGRACEAE (Evening Primrose Family)

Herbs or rarely shrubs with simple leaves; flowers usually 4-merous; ovary inferior; fruit a capsule or rarely nutlike.

Seeds with a silky coma at the summit; leaves mainly opposite

.....1. Epilobium

Seeds naked; leaves alternate.....2. Gayophytum

1. EPILOBIUM L.

Annual or perennial herbs; flowers racemose; sepals and petals 4; stamens 8; capsule 4-valved; seeds with a coma at the summit.

Petals 15-18 mm. long; stems 1-3 m. high..1. E. angustifolium

Petals less than 10 mm. long; plants lower.

Annual species; bark loose and papery.....

.....4. E. paniculatum

Perennial species; bark not papery.

Herbage more or less glandular-pubescent.....

.....2. E. glandulosum

Herbage not glandular-pubescent.....

.....3. E. lactiflorum

1. Epilobium angustifolium L. Fire-weed.

Simple erect stems 1-3 m. high; glabrous at least below; leaves numerous, alternate, lanceolate, sessile; racemes many-flowered; flowers rose-purple, 2-3 cm. in diameter; capsules white-tomentose.

2. Epilobium glandulosum Lehm. Common Willow-herb.

Stems usually solitary, up to 1 m. tall, slightly 4-angled, glabrous below to glandular above; leaves lanceolate or ovate; denticulate; inflorescence glandular-pubescent; flowers numerous, purple to whitish. Common in rather moist areas.

3. Epilobium lactiflorum Haussk.

Stems slender, erect, up to 30 cm. in height; leaves ovate-lanceolate, 2-4 cm. long; at least the upper ones alternate; corolla whitish, 3-5 mm. long.

4. Epilobium paniculatum Nutt. Tall Annual Willow-herb.

Stems annual, 2-10 dm. tall, the bark loose and papery; leaves linear, 2-4 cm. long; flowers numerous, paniculate; petals rose-purple.

2. GAYOPHYTUM Juss.

Slender annuals with narrow entire leaves and axillary flowers; sepals and petals 4; stamens 8, in 2 lengths; capsule linear, terete; seeds naked.

Stamens and style shorter than the petals.....

.....1. G. nuttallii

Stamens and style about equalling the petals.....

.....2. G. diffusum

1. Gayophytum nuttallii T. & G. Nuttall's Gayophytum.

Stem stout at base, freely branched; leaves linear, petioled,

1-4 cm. long; petals pink to purplish; stamens and style exserted.

2. Gayophytum diffusum T. & G. Spreading Gayophytum.

Much-branched stems 2-4 dm. in height; leaves linear, 1-2.5 cm. long; petals white but turning purple with age; stamens and style equalling the petals.

34. UMBELLIFERAE (Parsley Family)

Herbs with hollow stems and basal or alternate, usually compound leaves, often with winged petioles; flowers in umbels or rarely heads, usually with an involucre; petals, sepals and stamens 5; ovary inferior; fruit of 2 seed-like carpels.

Fruit armed with bristles.

Flowers of 2 kinds, perfect and staminate; fruit with hooked bristles.....1. Sanicula

Flowers all perfect; fruit retrose-woolly on the angles.....2. Osmorhiza (1.)

Fruit without bristles.

Mature fruit linear; short-beaked, not winged.....
.....2. Osmorhiza (2.)

Mature fruit not linear; some of the ribs winged.

Inflorescence of compact heads, densely pubescent....
.....6. Sphenosciadium

Inflorescence in compound umbels, not densely pubescent.

Flowers yellow; leaves mostly basal.....

.....5. Lomatium

Flowers white; caulescent robust plants.

Stems pubescent, 1-2 m. tall; marginal

flowers enlarged....3. Heracleum

Stems glabrous; marginal flowers not

enlarged.....4. Angelica

1. SANICULA [Tourn.] L.

Glabrous perennials; leaves few, irregularly compound; flowers of 2 kinds, perfect and staminate; fruit covered with hooked bristles.

Sanicula nevadensis Wats. Sierra Snake-root.

Short primary stems with numerous ascending branches; leaves bipinnately to tripinnately parted, the divisions sharply dentate; umbels 2-6-rayed; flowers yellow; fruit armed with bristles.

2. OSMORHIZA Raf.

Perennial herbs with aromatic roots; leaves mainly basal, pinnately decomposed; flowers in few-rayed compound umbels; petals white, green, or purplish; fruit linear, short-beaked, often bristly.

Fruit bristly on the angles, beaked.....1. O. chilensis

Fruit not bristly, not beaked.....2. O. occidentalis

1. Osmorhiza chilensis H. & A. Western Sweet Cicely.

Stems up to 80 cm. tall; basal leaves biternate; leaflets ovate,

crenate-dentate or cleft, variously pubescent; cauline leaves few and reduced upward; umbels 3-8-rayed; petals white; fruit 14-20 mm. long, bristly below and on the angles throughout; apex beaked.

2. Osmorhiza occidentalis Torr. Mountain Sweet Cicely.

Robust stems up to 120 cm. tall; leaves bipinnate, leaflets ovate to lanceolate, incised, puberulent; umbels up to 16-rayed; fruit 12-17 mm. long, glabrous, not beaked.

3. HERACLEUM L.

Robust perennials with large ternately compound leaves and white flowers in large many-rayed compound umbels; fruit nearly obovate, dorsally flattened and laterally winged.

Heracleum lanatum Michx. Cow Parsnip.

Stout hollow stems up to 3 m. in height; leaflets 3, these lobed and dentate, tomentose on the under surface; petioles broadly sheathing, densely tomentose; umbels 10-30-rayed, the outer flowers enlarged; fruit obovate, 8-12 mm. long, emarginate at the apex.

4. ANGELICA L.

Large perennials with robust leafy stems and compound leaves; flowers white, in large many-rayed umbels; fruit dorsally flattened, laterally winged.

Angelica arguta Nutt. Shining Angelica.

Stems stout, often purplish, up to 1.5 m. tall; leaves ternate, then pinnate; leaflets dentate, glabrous; involucre wanting; fruit

with wide lateral wings.

5. LOMATIUM Raf.

Perennial herbs with tuberous roots and ternate, pinnate or decomposed leaves; flowers white, yellow or purplish, in compound umbels; fruit dorsally flattened, the dorsal ribs prominent and with lateral wings.

Lomatium californicum (Nutt.) Math. & Const.

Cauliscent, glabrous and glaucous herbs from stout roots, with a fibrous clump of sheaths at the base of the stem; rays numerous, 3-8 cm. long; flowers yellow; fruit oblong to oval, glabrous.

6. SPHENOSCIADIUM A. Gray

Perennials from thick roots; stems stout, tall; leaves compound with dilated petioles; flowers usually white, in compact heads, densely tomentose; fruit dorsally flattened, the ribs winged.

Sphenosciadium capitellatum A. Gray Swamp White-heads.

Stout herbs up to 150 cm. tall, glabrous except in the inflorescence which is densely tomentose; leaves ternate then bipinnate; leaflets variable from dentate to cleft or entire; heads white or pinkish.

35. ERICACEAE (Heath Family)

Herbs, shrubs or trees, usually with alternate leaves; flowers often irregular; sepals 4-5; petals 4-5, often united, rarely wanting;

stamens 4-10, anthers opening by slits or pores; ovary superior or inferior; fruit a capsule, drupe or berry.

Plants herbaceous or rarely woody at the base.

Herbs that are saprophytic or parasitic (without chlorophyll).

Whole plant reddish-brown; not succulent.....

.....4. Pterospora

Whole plant white or yellowish; succulent.....

.....3. Hypopitys

Herbs that are not saprophytic or parasitic (with chlorophyll).

Flowers in racemes; leaves mostly basal.....

.....2. Pyrola

Flowers corymbose or umbellate; stems leafy.....

.....1. Chimaphila

Plants not herbaceous; shrubs or trees.

Ovary superior; fruit a drupe.....5. Arctostaphylos

Ovary inferior; fruit a berry.....6. Vaccinium

1. CHIMAPHILA Pursh

Herbs, often woody at the base; leaves opposite or whorled, rarely alternate, coriaceous, serrate; calyx 5-parted; petals white or purplish; stamens 10, anthers opening by pores; fruit a 5-lobed capsule.

Stems 6-10 cm. tall; flowers 1-3.....2. C. menziesii

Stems over 15 cm. high; flowers 3-8.....1. C. umbellata

1. Chimaphila umbellata (L.) Nutt. Western Prince's Pine

Erect or decumbent stems 15-30 cm. high; leaves whorled, nearly oblanceolate, sharply serrate, 4-8 cm. long; flowers in terminal corymbs, 3-8; petals pinkish.

2. Chimaphila menziesii (R. Br.) Spreng. Little Prince's Pine.

Stems 6-10 cm. high; leaves ovate to elliptic, the margins dentate or entire, 2-4.5 cm. long; flowers 1-3; petals white or pink.

2. PYROLA [Tourn.] L.

Perennial herbs with slender rhizomes; leaves broad, mainly basal; flowers solitary or racemose; sepals and petals 5; stamens 10, anthers opening by pores; fruit a 5-lobed capsule.

Leaves white-mottled along the veins.....2. P. picta

Leaves uniformly dull green.....1. P. secunda

1. Pyrola secunda L. One-sided Pyrola.

Stems from slender rhizomes; leaves ovate, crenate, petioled; flowers in one-sided racemes; petals 4-5 cm. long, greenish.

2. Pyrola picta Smith White-veined Pyrola.

Leaves coriaceous, crenulate-denticulate, conspicuously white-mottled, 3-7 cm. long; flowers in 10-20-flowered racemes; petals greenish-white, 5-7 mm. long.

3. HYPOPITYS Hill

Saprophytic herbs, white, yellowish or reddish; roots in a fibrous mat; leaves simple; flowers racemose, small, 3-4-5-merous; fruit a capsule.

Hypopitys lanuginosa Nutt. Pinesap.

Stems fleshy, white or yellowish, 10-25 cm. high; leaves imbricate at least below; raceme dense.

4. PTEROSPORA Nutt.

A reddish brown saprophyte with a tall scape from matted fibrous roots; leaves narrow; flowers in an elongated raceme; calyx 5-parted; corolla 5-lobed, white; stamens 10, anthers 2-awned; capsule 5-lobed.

Pterospora andromedea Nutt. Pine Drops.

Stems stout, 20-120 cm. high, glandular-pubescent; leaves scale-like; racemes many-flowered; flowers whitish, drooping.

5. ARCTOSTAPHYLOS Adans.

Evergreen shrubs, erect or prostrate; leaves alternate, coriaceous; bark reddish brown, deciduous; flowers in terminal panicles; sepals 5; corolla urceolate, 5-lobed; fruit a drupe.

Shrubs prostrate and mat-forming; corollas white or light

pink.....l. A. nevadensis

Shrubs erect, 1-2 m. high; corollas bright pink.....

.....2. A. patula

1. Arctostaphylos nevadensis A. Gray Pine-mat Manzanita.

Low creeping and rooting, mat-forming shrub; leaves obovate to oblanceolate, mucronate, bright green, 1.5-3 cm. long; flowers white or pinkish; fruit bright red.

2. Arctostaphylos patula Greene Green Manzanita.

Erect shrub 1-2 m. in height, more or less glandular-puberulent on the young branches and in the inflorescence; leaves 3.5 cm. long, half as wide; sepals white; corolla bright pink; fruit brown or black.

6. VACCINIUM L.

Shrubs with alternate evergreen or deciduous leaves; flowers solitary or in racemes; corolla urceolate to globose, 4-5-lobed; ovary inferior; fruit a many-seeded berry.

Vaccinium occidentale A. Gray Western Huckleberry.

Erect and profusely branched shrub 20-40 cm. high; leaves obovate to oblanceolate; 1-2.5 cm. long, entire, glaucous; flowers solitary or in pairs; corolla urceolate, white or pinkish; berry black.

36. PRIMULACEAE (Primrose Family)

Herbs with simple leaves; flowers regular, 4-8-merous, more often 5-merous; stamens as many as the corolla lobes and opposite

them; fruit a capsule.

Leaves all basal; petals reflexed.....2. Dodecatheon

Leaves in a whorl at the summit of the stem; petals

spreading.....1. Trientalis

1. TRIENTALIS L.

Small perennials from tuberous roots; stems simple; leaves crowded at the summit; flowers in umbellate clusters or solitary; calyx 5-parted, corolla 5-9-parted; fruit a few-seeded capsule.

Trientalis latifolia Hook. Broad-leaved Star-flower.

Delicate stems 6-20 cm. high; leaves crowded at the summit, 4-8 mm. long; corolla pink or white, 8-12 mm. in diameter.

2. DODECATHEON L.

Perennial herbs with basal leaves; flowers on long scapes; calyx 5-cleft; corolla 4-5-cleft the lobes reflexed; fruit a many-seeded capsule.

Dodecatheon alpinum Greene Alpine Shooting Star.

Leaves oblanceolate to linear-oblanceolate, nearly entire, glabrous, broad-petioled; scape 20-35 cm. in height; umbel 1-7-flowered, the flowers 4-merous; corolla purplish, white, yellow and deep purple banded.

37. POLEMONIACEAE (Phlox Family)

Herbs, rarely woody at the base, with opposite or alternate

leaves; flowers 5-merous; corolla sympetalous; ovary superior; fruit a capsule.

Corolla light blue with a white throat.....1. Polemonium

Corolla other than blue.

Leaves entire, lobed or parted, not pinnatifid.

Plants annual.

Calyx lobes rupturing at maturity.....

.....3. Microsteris

Calyx lobes not rupturing at maturity.....

.....5. Collomia

Plants perennial.....2. Phlox

Leaves pinnatifid.....4. Ipomopsis

1. POLEMONIUM [Tourn.] L.

Mostly perennial herbs with alternate pinnate leaves; inflorescence corymbose, paniculate or racemose; corolla funnelform to campanulate, 5-lobed; fruit a few-seeded capsule.

Polemonium pulcherrimum Hook. Showy Polemonium.

Stems several to many, from long rhizomes; leaflets numerous, pubescent; inflorescence glandular; corolla campanulate, blue with a white throat.

2. PHLOX L.

Mostly perennial herbs, sometimes woody at the base; leaves opposite, entire; corolla salverform, constricted at the throat;

stamens with short filaments.

Phlox diffusa Benth. Spreading Phlox.

Stems woody at the base, spreading to form large mats; leaves linear, sharp pointed; flowers solitary at the end of the branches; corolla with shades of white and light purple.

3. MICROSTERIS Greene

Annuals with leaves opposite below, often alternate above; flowers axillary; corolla salverform; filaments unequally inserted on the corolla tube.

Microsteris humilis Dougl.

Stems profusely branched, glandular-pubescent; corolla minute, the tube yellow, the lobes purplish; fruit a 3-seeded capsule.

4. IPOMOPSIS Mich.

Herbs (in this region) with a basal rosette of leaves and well developed cauline leaves; herbage gray green to bluish green; bracts subtending the individual flowers; corolla salverform or tubular.

Flowers in a dense capitate cluster; corolla small.....

.....1. 1. congesta

Flowers loosely arranged; corolla large...2. 1. aggregata

1. Ipomopsis congesta (Hook.) V. Grant

(Gilia congesta Hook.)

Slender tomentose stems from 10 to 20 cm. in height; flowers in

dense capitate clusters; calyx about equaling the corolla; flowers white; stamens somewhat exserted.

2. Impomopsis aggregata (Pursh) V. Grant Skyrocket.

(Gilia aggregata (Pursh) Spreng.)

Perennial or biennial herbs with erect and usually simple stems from 30-100 cm. tall; herbage variously pubescent; leaves crowded, pinnate or bipinnate; corolla salverform, up to 3 cm. long, white to scarlet.

5. COLLOMIA Nutt.

Mostly annual herbs with alternate leaves; calyx scarious between the ribs; corolla funnelform or salverform; filaments unequal.

Corolla 10 mm. long or less.....1. C. tinctoria

Corolla 16-22 mm. long.....2. C. grandiflora

1. Collomia tinctoria Kell.

Stems 7-15 cm. tall; herbage glandular-pubescent; leaves linear or lanceolate, entire; corolla funnelform; stamens exserted, equally inserted on the corolla-tube but unequal in length.

2. Collomia grandiflora Dougl. Large-flowered Collomia.

Annual herbs with numerous entire leaves; inflorescence glandular, subtended by leafy bracts; corolla trumpet-shaped, salmon-colored, 16-22 mm. long; anthers blue.

38. HYDROPHYLLACEAE (Waterleaf Family)

Herbs (in this region) with mostly alternate leaves; sepals 5; corolla sympetalous, 5-lobed; stamens 5; flowers in racemes or spikes; fruit a capsule.

Inflorescence in scorpioid racemes.....2. Phacelia

Inflorescence in umbelliform or capitate panicles.....

.....1. Hydrophyllum

1. HYDROPHYLLUM [Tourn.] L.

Perennial herbs with alternate pinnately divided or parted leaves; flowers in head-like clusters or umbelliform panicles; corolla campanulate, with appendages enclosing a nectary; fruit a 2-valved capsule with 1-4 seeds.

Hydrophyllum occidentale A. Gray Western Waterleaf.

Robust hirsute stems up to 40 cm. high; leaves pubescent particularly beneath, 5-11-parted, long petioled; flowers pale blue.

2. PHACELIA Juss.

Annual or perennial pubescent herbs; flowers in scorpioid racemes; sepals distinct; corolla rotate, campanulate, or funnel-form; stamens usually exerted.

Leaves entire; filaments glabrous above, villous in the middle.

.....2. P. leucophylla

Leaves with several small divisions; filaments villous above...

.....1. P. heterophylla

1. Phacelia heterophylla Pursh Varied-leaved Phacelia.

Stems up to 100 cm. high from a stout taproot; herbage hirsute; leaves lanceolate to elliptical with 2-6 segments below the main-blade; corolla campanulate, white or purplish; stamens exerted, filaments villous above.

2. Phacelia leucophylla Torr. White-leaved Phacelia.

Stems up to 50 cm. high; herbage with a gray or whitish pubescence; leaves mostly entire; inflorescence in panicles; corolla pale blue to white; filaments villous in the middle.

39. BORAGINACEAE (Borage Family)

Herbs (in this region) with mainly simple alternate entire leaves; flowers in scorpioid racemes or spikes; sepals 4 or 5; corolla sympetalous, 5-lobed, often with appendages in the throat; ovary superior; fruit of 1-4 nutlets.

Nutlets smooth, shiny.....1. Cryptantha

Nutlets with glochidiate projections.....2. Hackelia

1. CRYPTANTHA Lehm.

Annual or perennial hirsute herbs; lower leaves opposite, the upper alternate, mainly linear; sepals nearly separate; corolla salverform, often minute, white or rarely yellow, the throat having 5 appendages; nutlets 1-4.

Cryptanthe simulans Greene

Stems slender, 15 to 40 cm. high; leaves oblanceolate to spatulate with a dense appressed pubescence; calyx 4-7 mm. long, the midrib bristly; corolla minute; nutlets ovate, densely muriculate.

2. HACKELIA Opiz

Tall biennial or perennial herbs; flowers with recurved pedicels; calyx 5-lobed; corolla small, white, pink or blue; nutlets bearing glochidiate projections.

Hackelia jessicae (McGreg.) Brand Jessica's Tickweed.

Stems 30-60 cm. in height; basal leaves numerous, pubescent, petioled, upper cauline leaves clasping; calyx lobes 3 mm. long; corolla blue; nutlets 4-5 mm. long with wide marginal spines, a few stout spines on the back.

40. LABIATAE (Mint Family)

Aromatic herbs or rarely woody at the base; stems square; leaves opposite; flowers usually irregular, more or less bilabiate; calyx 5-lobed; stamens 2 or 4 and didynamous; ovary superior, 4-lobed; fruit of 4 nutlets.

Corolla nearly regular; flowers in terminal heads.....

.....3. Monardella

Corolla distinctly bilabiate.

Calyx lobes pungent-tipped.....2. Stachys

Calyx lobes not pungent-tipped.....1. Agastache

1. AGASTACHE Clayt.

Robust perennial herbs with broad serrate leaves; flowers in a spike-like panicle; calyx 5-cleft; corolla bilabiate, upper lip 2-lobed, lower lip 3-lobed; stamens exserted.

Agastache urticifolia (Benth.) Kuntze Nettled-leaved Giant-Hyssop.

Clustered stems from short rhizomes, 50-100 cm. in height; leaves ovate, crenate-dentate; inflorescence spicate, corolla white to purplish, exceeding the calyx a little.

2. STACHYS [Tourn.] L.

Stout herbs with flowers in interrupted spikes or axillary clusters; calyx lobes prickly-pointed; lower lip of the corolla 3-lobed, exceeding the upper lip.

Stachys rigida Nutt. Hedge Nettle.

Stems simple, 40-110 cm. high, hirsute; leaves oblongovate, crenate-serrate, villous; corolla pink with red markings.

3. MONARDELLA Benth.

Slender perennial herbs; flowers in a terminal solitary head subtended by colored bracts; corolla white to purplish; stamens 4, exserted.

Monardella odoratissima Benth. Western Balm.

Strongly aromatic perennials, woody at the base; leaves lanceolate-linear, glandular-pubescent; calyx pubescent; corolla light

purple.

41. SCROPULARIACEAE (Figwort Family)

Herbs or shrubs with opposite or alternate leaves; flowers usually irregular; calyx 4-5-lobed; corolla sympetalous, usually 2-lipped; stamens commonly 4, rarely 2 or 5; ovary superior, 2-loculed; fruit a capsule.

Staminodium wanting.

Galea wanting; leaves mainly opposite.

Stamens 4; corolla 5-lobed.....3. Mimulus

Stamens 2; corolla 4-lobed.....4. Veronica

Galea present; leaves mainly alternate.

Anther sacs equal and parallel...7. Pedicularis

Anther sacs unequal.

Plants perennial; upper lip longer than the
lower.....5. Castilleja

Plants annual; corolla lips nearly equal.....
.....6. Orthocarpus

Staminodium present.

Plants annual; sterile stamen obsolete, scale or gland-like
.....1. Collinsia

Plants perennial; sterile stamen evident.....
.....2. Penstemon

1. COLLINSIA Nutt.

Annual herbs with opposite leaves; flowers axillary or in terminal racemes; corolla bilabiate, the lips usually of different colors; stamens 4, the fifth reduced to an inconspicuous gland or scale-like structure.

Capsule about equaling the calyx; calyx 4-8 mm. long.....

.....1. C. parviflora

Capsule shorter than the calyx; calyx 3-5 mm. long.....

.....2. C. torreyi

1. Collinsia parviflora Dougl. Small-flowered Collinsia.

Stems much branched from the base, erect or spreading; lower leaves ovate to oblong, petioled, the upper linear-oblongate, sessile, often in whorls; calyx 4-8 mm. long; corolla 6-10 mm. long; tube white; limb blue.

2. Collinsia torreyi A. Gray var. latifolia News. Torrey's Collinsia.

Stems 10-20 cm. high, glandular-pubescent; leaves few, reduced upwards; calyx glandular, 3-5 mm. long; corolla 6-9 mm. long, upper lip pale, lower lip bright blue.

2. PENSTEMON (Mitch.) Ait.

Perennial herbs, often shrubby at the base; leaves opposite; flowers irregular; calyx 5-parted; corolla more or less bilabiate, the upper lip 2-lobed; lower lip shorter and 3-lobed; functional

stamens 4; staminodium present.

Anther sacs not pubescent.

The anther sacs opening across the contiguous apices

(proximal).....4. P. parvulus

The anther sacs opening the entire length (distally).....

.....3. P. anguineus

Anther sacs pubescent.

Plant to 1 m. in height; cauline leaves 5-10 cm. long,

serrate, ovate to lanceolate, thin..2. P. nemorosus

Plant shrubby, less than 25 cm. high; leaves 1.5 cm. long,

spatulate, thick.....1. P. davidsonii

1. Penstemon davidsonii Greene Davidson's Penstemon.

(Penstemon menziesii Hook. var. davidsonii Piper)

Stems shrubby, densely matted; leaves spatulate, obtuse, mainly entire, glabrous; flowers 1-4, corolla bluish-purple, 2.5-3 cm. long; sterile stamen equaling the other 4, bearded.

2. Penstemon nemorosus (Dougl.) Trautv. Woodland Penstemon.

Stems erect, woody at the base; leaves ovate, sharply dentate, 5-10 cm. long, thin, glabrous above, puberulent below; inflorescence few-flowered; corolla purplish, 2.5-3 cm. long; anthers densely woolly, sterile stamen bearded.

3. Penstemon anguineus Eastw.

Stems woody at the base; leaves nearly glabrous, serrate to denticulate; flowers in clusters; corolla 16-20 mm. long, light

blue to purplish; sterile stamen sparsely hairy.

4. Penstemon parvulus (A. Gray) Krautter

Stems woody at the base, 20-35 cm. high; herbage very glaucous; basal leaves oblanceolate to spatulate, cauline lanceolate, oblong or ovate; corolla 14-20 mm. long, deep-blue.

3. MIMULUS L.

Annual or perennial herbs with opposite leaves; calyx 5-angled and 5-toothed; corolla more or less bilabiate; stamens 4; capsule many-seeded.

Corolla yellow; plants 10-60 cm. high.....1. M. guttatus

Corolla crimson; plants 3-12 cm. high.....2. M. nanus

1. Mimulus guttatus DC. Common Monkey-flower.

Variable plants with elliptic, ovate or orbicular dentate leaves; flowers in terminal racemes; calyx campanulate; corolla yellow, the throat red-spotted, pubescent.

2. Mimulus nanus H. & A. Dwarf Monkey-flower.

Annual herb 3-12 cm. high; leaves oblanceolate, the lower often spatulate, mainly entire; corolla crimson with 2 yellow stripes, villous.

4. VERONICA [Tourn.] L.

Annual or perennial herbs with opposite leaves and small flowers; calyx 4-parted; corolla unequally 4-parted; stamens 2, exserted.

Veronica serpyllifolia L. Thyme-leaf Speedwell.

Stems slender, 5-15 cm. high; leaves elliptic to ovate, short-petioled, denticulate, 5-10 mm. long; calyx 2-3 mm. long; corolla light blue to white; capsule just exceeding the calyx, broader than long, emarginate at the summit.

5. CASTILLEJA Mutis

Mainly perennial herbs, sometimes woody below, often partly root-parasites; leaves alternate; flowers in a spike or a terminal raceme, subtended by colored bracts; calyx 4-lobed; corolla bilabiate, the galea exceeding the lower lip; stamens 4.

Bracts yellow; plants 10-20 cm. high.....1. C. arachnoidea

Bracts reddish; plants 30-100 cm. high.

Herbage glabrous; lower lip bright green, 1-2 mm. long....

.....2. C. miniata

Herbage slightly to densely scabrous-pubescent; lower

lip not green, 2 mm. long.....3. C. affinis

1. Castilleja arachnoidea Greenm.

(Orthocarpus pilosus Wats.)

Perennial plants with numerous leafy stems; leaves mainly 3-5-parted; bracts yellow; corolla whitish, lower lip 3-lobed, saccate and shorter than the galea.

2. Castilleja miniata Dougl. Common Paint-brush.

Stems 30-100 cm. in height, glabrous or only slightly pubescent

below; leaves lanceolate to linear, mostly entire; bracts broad, the lower entire, the upper lobed or toothed, scarlet or red; corolla 2-3 cm. long, the lower lip 1-2 mm. long, bright green.

3. Castilleja affinis H. & A.

Stems 30-60 cm. high, leafy below; herbage scabrous-pubescent, some of the hairs branched; leaves entire, 2.5-10 cm. long; bracts scarlet, 3-parted; corolla yellowish, galea villous, lower lip 2 mm. long.

6. ORTHOCARPUS Nutt.

Annual herbs with alternate sessile leaves and flowers in terminal spikes subtended by colored bracts; calyx 4-cleft; corolla tubular, the galea nearly equaling the 3-saccate lower lip.

Orthocarpus cuspidatus Greene Broad-scaled Orthocarpus.

Stems erect, short-branched above, 10-35 cm. high; leaves entire or with a pair of lateral lobes; bracts broadly ovate-oblong, with a basal pair of lobes, 12-20 mm. long; corolla rose-purple, the lower lip white to yellowish, much inflated, 3-toothed.

7. PEDICULARIS [Tourn.] L.

Perennial herbs with alternate or basal leaves; flowers in terminal leafy racemes or spikes; calyx 2-5-lobed; corolla bilabiate; galea arched, the lower lip 3-lobed; stamens 4.

Pedicularis racemosa Dougl. Leafy Pedicularis.

Slender clustered stems up to 45 cm. high; leaves lanceolate, doubly crenate-serrate; upper flowers racemose, the lower axillary;

corolla white to pinkish; galea incurved.

42. OROBANCHACEAE (Broom-rape Family)

Root-parasites, lacking chlorophyll; leaves alternate, reduced to scales; flowers perfect and irregular; corolla bilabiate; fertile stamens 4; ovary superior; fruit a many-seeded capsule.

BOSCHNIAKIA C.A. Meyer

Reddish or yellow-brown plants with stout stems arising from a tuberous growth at the point of attachment of the roots to the host; leaves imbricate; fruit a globose 4-valved capsule.

Boschniakia strobilacea A. Gray Ground Cone.

Dark red to purplish herbs, 12-25 cm. tall; 3.5-6 cm. in diameter; parasitic on species of Arctostaphylos and Arbutus.

43. RUBIACEAE (Madder Family)

Herbs or woody plants with opposite or whorled entire stipulate leaves; calyx and corolla 3-5-parted; stamens of the same number as the corolla lobes and alternate with them; ovary inferior; fruit various.

GALIUM L.

Annual or perennial herbs with square stems and whorled leaves (in this region) and large stipules; flowers minute, terminal or axillary; corolla 3-4-lobed; fruit a pair of nutlets.

Galium aparine L. Cleavers.

Stems weak and prostrate, 30-150 cm. long, retrose bristly on the angles; leaves 6-8 in a whorl, linear to oblanceolate, 2-5 cm. long; corolla white, 2-3 mm. across; fruit covered by stiff hooked bristles.

44. CAPRIFOLIACEAE (Honeysuckle Family)

Perennial herbs, shrubs or trees with opposite leaves; flowers regular or irregular; corolla rotate or tubular; stamens 4 or 5; fruit a berry, berry-like drupe or a capsule.

Corolla rotate; leaves compound.....1. Sambucus

Corolla tubular; leaves simple.

Fruit a berry or a berry-like drupe; plants woody, erect or twining.

Fruit white; corolla regular.....3. Symphoricarpos

Fruit red or black; corolla irregular.....

.....4. Lonicera

Fruit a capsule; plants trailing, herbaceous or slightly woody at the base; flowers in pairs.2. Linnaea

1. SAMBUCUS L.

Shrubs or trees with odd-pinnate leaves and small white cymose flowers; calyx 3-5-lobed; corolla regular, rotate, 3-5-lobed; stamens 5; fruit a small berry-like drupe.

Sambucus callicarpa Greene Red Elderberry.

Shrub 2-5 m. in height; leaves of 5-7 leaflets, these lanceolate to ovate, acuminate, serrate; inflorescence nearly pyramidal; fruit crimson.

2. LINNAEA [Gronov.] L.

Perennial herbs; stems slender, trailing, with opposite evergreen leaves; flowers in pairs; calyx 5-lobed; corolla campanulate, 5-lobed; stamens 4; fruit dry, 1-seeded.

Linnaea borealis L. var. americana (Forbes) Rehder American Twinflower.

Stems slender, trailing, with obovate leaves; corolla funnel-form, 12-15 mm. long, whitish to pinkish.

3. SYMPHORICARPOS Juss.

Erect or spreading shrubs with simple short-petioled leaves; flowers racemose; calyx 4-5-parted; corolla mainly campanulate, 4-5-lobed; stamens of the same number as the corolla lobes; fruit a berry-like drupe.

Symphoricarpos albus (L.) Blake Snowberry.

A much branched shrub 60-150 cm. high; leaves variable; corolla campanulate, 4-5 mm. long, pinkish, pubescent within; fruit white.

4. LONICERA L.

Erect or twining shrubs with opposite simple entire leaves; calyx 5-toothed; corolla 5-lobed, tubular to campanulate, often gibbous at the base; stamens 5; fruit a berry.

Corolla dark red, 6-8 mm. long; berry dark red to black.....

.....1. L. conjugalis

Corolla reddish orange, 25-30 mm. long; berry bright red.....

.....2. L. ciliosa

1. Lonicera conjugalis Kell. Wedded Honeysuckle.

A shrub up to 150 cm. in height with obovate-oblong leaves, these acute; corolla dark red, 6-8 mm. long, bilabiate; fruit dark red to black.

2. Lonicera ciliosa (Pursh) Poir. Orange Honeysuckle.

Stems slender, woody, twining; leaves elliptic, entire, green above, glaucous beneath, ciliate on the margins; corolla reddish orange, 25-30 mm. long, tubular-funnelform; berry bright red.

45. VALERIANACEAE (Valerian Family)

Annual or perennials with opposite leaves; plants monoecious or dioecious; flowers mainly cymose or paniculate; corolla sympetalous, tubular or funnelform, 3-5-cleft; stamens 1-4; ovary inferior; fruit 1-seeded, indehiscent.

VALERIANA [Tourn.] L.

Perennial herbs with opposite leaves and small flowers; calyx-lobes of plumose bristles; corolla funnelform, salverform or almost regular; stamens 3.

Basal leaves mostly entire; corolla 3-5 mm. long.....

.....1. V. sylvatica

Basal leaves mainly with 3-9 segments; corolla 6-9 mm. long....

.....2. V. sitchensis

1. Valeriana sylvatica Banks Wood Valerian.

Stems simple and erect; basal leaves mainly entire, obovate; cauline leaves divided; corolla white to pink, 3-5 mm. long. Found in moist situations.

2. Valeriana sitchensis Bong. Northern Valerian.

Stems erect, from stout rhizomes, 60-120 cm. tall; basal leaves mainly 3-foliolate; leaflets dentate; cauline leaves 3-5-foliolate; flowers numerous; corolla funnelform, white to pinkish, 6-9 mm. long.

46. CAMPANULACEAE (Bellflower Family)

Annual or perennial herbs or shrubs, usually with milky juice; leaves simple and alternate; calyx and corolla 3-5-lobed; stamens 5, alternate with the corolla lobes; ovary inferior; fruit a many-seeded capsule.

CAMPANULA [Tourn.] L.

Herbs, usually with conspicuous blue or whitish flowers, solitary, racemose or paniculate; corolla campanulate or rotate, 5-lobed; stamens 5, with dilated filaments; ovary 3-5-chambered; capsule short and roundish, opening on the side by 2-5 pores.

Leaves mainly sessile, coarsely serrate; corolla bright blue...

.....1. C. prenanthoides

Leaves petioled, nearly sessile; corolla pale blue or whitish..

.....2. C. scouleri

1. Campanula prenanthoides Dur. California Hare-bell.

Stems simple or little-branched, 20-80 cm. high; leaves mainly sessile, ovate to lanceolate, acute, coarsely serrate; flowers in axillary clusters or racemes; corolla 10-12 mm. in length, a brilliant blue; style exserted.

2. Campanula scouleri Hook.

Stems slender and clustered, often decumbent at the base, 10-30 cm. tall; leaves petioled, ovate to lanceolate, acute, slightly serrate, reduced upwards; corolla pale blue to whitish, the lobes recurved; style exserted.

47. COMPOSITAE (Sunflower Family)

Herbs or shrubs; flowers in a head on a common receptacle subtended by an involucre; heads discoid (all disk flowers), ligulate (all ray flowers) or radiate (both disk and ray flowers); anthers united to form a tube; ovary inferior; fruit an achene bearing a pappus (the modified calyx-limb).

Heads composed only of ligulate flowers; plants with milky juice.

Achenes without beaks.

Plants scapose.....16. Microseris

Plants with leafy stems.....19. Hieracium

Achenes with definite beaks.

The achenes 4-5-ribbed or -nerved.....
.....17. Taraxacum

The achenes 10-20-ribbed or -nerved.....
.....18. Agoseris

Heads discoid or radiate, not ligulate; plants without milky juice.

Heads composed of ligulate and disk flowers.

Pappus wanting; rays 5-10.

Leaves finely dissected...11. Achillea

Leaves entire or slightly dentate.....
.....7. Madia

Pappus present.

The pappus of scales.

Plants densely lanate.....
8. Eriophyllum

Plants densely glandular; never lanate....
10. Helenium

The pappus of capillary bristles.

Rays other than yellow in color.

Involucral bracts usually strongly
 imbricated in several series, some-
 leaf-like.....2. Aster

Involucral bracts usually little
 imbricated, usually in one series,
 at least not leaf-like.....
3. Erigeron

Rays yellow to yellow-orange.

Leaves opposite at least below.....
14. Arnica

Leaves alternate.

Involucral bracts in two or more
 series....1. Haplopappus

Involucral bracts in one series.

Heads several to many.....

....15. Senecio

Heads solitary.....

.....3. Erigeron

Heads of disk flowers only.

Pappus absent.

Leaves deltoid-cordate; inflorescence with
prominent stalked glands.....

.....6. Adenocaulon

Leaves toothed or dissected; inflorescence
without stalked glands..12. Artemisia

Pappus present.

The pappus of awns or scales.....

.....9. Chaenactis

The pappus of plumose bristles.

Plants monoecious....13. Raillardella

Plants dioecious.

Leaves mostly equal.....

.....4. Anaphalis

Leaves mostly basal, the cauline
greatly reduced.....

.....5. Antennaria

1. HAPLOPAPPUS Cass.

Herbs or shrubs with mainly alternate leaves; heads usually
radiate, the ligules mainly yellow, the disk-flowers few to many;
pappus of unequal bristles.

Haplopappus greenii A. Gray

Low shrubs up to 30 cm. high; herbage glandular; leaves oblanceolate to linear; heads narrow; bracts subequal or imbricate; rays 1-7 or wanting, disk flowers 7-20; achenes villous.

2. ASTER L.

Perennial herbs with simple alternate leaves; heads radiate; rays white, blue or purple; disk flowers yellow; bracts mainly herbaceous, at least at the tip; pappus white, of capillary bristles; achenes 4-5-nerved.

Aster canescens Pursh Hoary Aster.

Stems 10-80 cm. in height; herbage canescent-puberulent, somewhat glandular; leaves nearly entire to sharply toothed; bracts in 3-4 series; rays 8-15, rarely wanting, bright purplish, 6-8 mm. long.

3. ERIGERON L.

Annual or perennial herbs with simple alternate leaves; heads radiate or discoid, many-flowered; bracts of almost equal length, usually not foliaceous; pappus of fragile bristles; achenes 2-nerved.

Leaves trifid.....3. E. compositus

Leaves entire or toothed, not divided.

Heads solitary; leaves glabrous or nearly so.....

.....1. E. peregrinus

Heads several; leaves hirsute.....2. E. aliciae

1. Erigeron peregrinus (Pursh) Greene Foreign Erigeron.

Stems leafy, up to 70 cm. high; heads solitary to few; the upper leaves clasping; involucre 8 mm. high, the bracts long-acuminate; rays 40-60, pink or purplish, 12-16 mm. long.

2. Erigeron aliceae How.

Perennial herbs from a woody rhizome, 30-80 cm. high; leaves entire to coarsely toothed, pubescent; heads large and showy; rays 60-70, 10 mm. long, light purplish to pink; achenes pubescent.

3. Erigeron compositus Pursh Dwarf Mountain Erigeron.

Woody at the base; leaves hirsute-glandular, palmately 2-4-cleft; scapes 3-10 cm. high; heads solitary; rays white to purplish, 5-8 mm. long.

4. ANAPHALIS DC.

Perennials with slender rhizomes; leaves sessile, narrow; heads discoid; pappus of capillary bristles; bracts scarious, white.

Anaphalis margaritacea (L.) B. & H. Pearly Everlasting.

Tall leafy perennials; leaves linear to lanceolate, sessile white-lanate below, green above; heads numerous; bracts of the involucre white. A variable species.

5. ANTENNARIA Gaertn.

Perennial dioecious herbs with alternate sessile and entire leaves; heads discoid; involucre bracts scarious, often colored.

Antennaria rosea (D.C. Eaton) Greene Rosy Everlasting.

Stems slender, tomentose, ranging from 10-30 cm. high; leaves linear-spatulate to spatulate, tomentose on both surfaces; outer involucre bracts brownish, the inner rose-colored.

6. ADENOCAULON Hook.

Annual or perennial herbs with alternate leaves; involucre bracts herbaceous; flowers white, the outer pistillate, the inner staminate; anthers sagittate; pappus lacking; achenes glandular.

Adenocaulon bicolor Hook.

Perennial herbs with fibrous roots; leaves mostly basal, long-petioled, glabrous above, densely tomentose beneath; achenes 5-8 mm. long.

7. MADIA Molina

Glandular herbs with simple narrow leaves; heads radiate; involucre bracts enfolding to completely enclosing the achenes; pappus wanting or scale-like. Plants strongly tar-scented.

Madia glomerata Hook. Stinking Tarweed.

Glandular annual herbs with linear leaves; heads clustered at the end of branches; ray flowers 2-5 or rarely wanting; disk-flowers 4-8. Found in very dry ground.

8. ERIOPHYLLUM Lag.

Annual or perennial tomentose herbs; heads radiate or discoid; involucre bracts broad and widely spreading; pappus scale-like or

wanting; achenes 4-angled.

Eriophyllum lanatum (Pursh) Forbes Common Woolly Sunflower.

Perennial herbs 10-60 cm. high, very tomentose; leaves variable; rays yellow; pappus reduced to scales or wanting.

9. CHAENACTIS DC.

Annual or perennial herbs with alternate leaves; heads discoid; involucre bracts equal; flowers white, yellow or pinkish; pappus of unequal scales or lacking.

Chaenactis douglasii H. & A. Hoary Chaenactis.

Usually biennial more or less white-tomentose herbs; leaves 1-3 times pinnatifid, the lower petioled, the upper sessile; flowers white; pappus of cuneate scales.

10. HELENIUM L.

Annual or perennial herbs with alternate glandular leaves; heads radiate or discoid; involucre bracts in 1-3 series; pappus of toothed scales.

Helenium bigelovii A. Gray Tall Sneezeweed.

Erect stems up to 120 cm. tall; leaves lanceolate, the lower petioled, the upper sessile and sometimes decurrent; rays 12-16 mm. long, yellow.

11. ACHILLEA L.

Perennial herbs with alternate, usually pinnate leaves; heads

radiate or occasionally discoid; involucre bracts in more than one series, scarious at least on the margins; achenes glabrous; pappus wanting.

Achillea millefolium L. Yarrow.

Perennial aromatic herbs with pinnately dissected leaves; inflorescence corymbiform; rays 3-5, white or rarely pinkish; disk-flowers 10-30. A variable species.

12. ARTEMISIA L.

Aromatic herbs or shrubs with alternate leaves and numerous small heads, mainly discoid; involucre bracts in several series, scarious; pappus wanting.

Artemisia tridentata Nutt. Sagebrush.

Shrub 0.5-4 m. high; leaves variable, widest above the middle, from 3-5-cleft or -parted; inflorescence paniculate, heads sessile; achenes glandular.

13. RAILLARDELLA A. Gray

Perennials with entire basal or alternate leaves; involucre bracts nearly equal; heads discoid or radiate; pappus of plumose bristles; achenes narrow.

Raillardella argentea A. Gray

Perennial herbs with mainly basal leaves, these silvery-villous; involucre bracts glandular; plumose pappus silvery white.

14. ARNICA L.

Perennial glandular herbs with mostly opposite leaves and large, usually radiate heads; rays yellow; pappus of white or brownish sub-plumose or barbellate capillary bristles; achenes 5-10-ribbed.

Arnica cordifolia Hook. Heart-leaved Arnica

Solitary stems 20-50 cm. high, from slender rhizomes; leaves more or less cordate, entire or dentate; heads usually solitary or up to 3; rays bright yellow, 20-25 mm. long; pappus white, barbellate.

15. SENECIO [Tourn.] L.

Herbs (in this region) with alternate leaves; involucre bracts nearly equal, herbaceous; heads radiate or discoid; flowers usually yellow; pappus of entire or barbellulate bristles; achenes 5-10-ribbed.

Cauline leaves well developed, reduced only slightly upwards..

.....1. S. triangularis

Cauline leaves greatly reduced upwards.....2. S. integerrimus

1. Senecio triangularis Hook. Spear-head Senecio.

Stems usually simple, leafy, the leaves variable, lanceolate to triangular, acute; rays 5-10, yellow, 7-13 mm. long. Found in moist situations.

2. Senecio integerrimus Nutt. Tall Western Senecio.

Solitary stems from 20-100 cm. high; leaves entire to dentate, the cauline reduced upwards; involucre bracts black-tipped;

rays 5-10 or rarely wanting. A variable species.

16. *MICROSERIS* D. Don

Annual or perennial herbs with stout taproots; plants with milky juice; leaves entire to pinnatifid; flowers ligulate, yellow; pappus various; achenes not prominently beaked.

Microseris alpestris (A. Gray) Q. Jones

Perennial herbs from stout tap roots; leaves mainly basal, mostly toothed or pinnatifid; heads solitary; pappus of unequal bristles; achenes 5-8 mm. long.

17. *TARAXACUM* [Hal.] Ludw.

Acaulescent perennial herbs with entire to pinnatifid leaves; flowers ligulate, yellow (in this region); pappus of capillary bristles; achenes spiny at least above, usually long-beaked.

Taraxacum officinale L. Dandelion.

Scape 5-50 cm. high; leaves laciniately pinnatifid and lyrate; heads large; rays bright yellow; pappus white; achenes blunt-spiny above, beak more than twice as long as the body.

18. *AGOSERIS* Raf.

Annual or perennial herbs with milky juice; heads solitary, ligulate, the rays yellow to orange; achenes 10-nerved, beaked.

Beak of achene shorter than the body.....1. *A. glauca*

Beak of achene as long or longer than the body of the achene.

Achene narrowed abruptly to the slender beak; achene body with

8-10 shallow ribs.....3. A. aurantiaca

Achene tapering rather gradually to the slender beak; body

with over 20 deep ribs.....2. A. elata

1. Agoseris glauca (Pursh) Raf.

Perennial herbs 10-70 cm. high; leaves oblanceolate to linear, entire or more often pinnatifid; flowers yellow; achenes 5-12 mm. long, including the stout striated beak.

2. Agoseris elata (Nutt.) Greene Tall Agoseris.

Perennial herbs 20-70 cm. high; leaves entire to pinnatifid; flowers yellow; achenes with a slender beak as long as the body.

3. Agoseris aurantiaca (Hook.) Greene

Perennial herbs 10-60 cm. tall; leaves mostly entire; flowers orange, turning purple with age; achene with a slender beak.

19. HIERACIUM L.

Perennial herbs with milky juice; leaves mainly basal, the cauline reduced and alternate; inflorescence usually paniculate; flowers ligulate; pappus of stiff bristles; achenes 4-5-angled and 10-15-ribbed.

Rays yellow; stellate hairs on the involucre.....

.....2. H. cynoglossoides

Rays white; stellate hairs lacking.....1. H. albiflorum

1. Hieracium albiflorum Hook. White-flowered Hawkweed.

Erect slender stems 30-120 cm. high, hirsute at the base, becoming glabrous above; leaves hirsute, entire to denticulate, reduced upwards and becoming sessile; stellate hairs wholly wanting; ligules white, 3-4 mm. long; pappus white or brownish.

2. Hieracium cynoglossoides Arv.

Stems one to several, 30-60 cm. high; leaves mainly basal, the few cauline leaves reduced into bracts; involucre finely stellate-pubescent and with black glandular bristles; flowers yellow.

SUMMARY

Ashland Peak, elevation 7,532 feet, is located in the southwestern section of the state, in Jackson County; it is part of the Siskiyou Mountain Range. The northern half of Ashland Peak is located in the Rogue River National Forest and the southern half in the Klamath National Forest. The boundaries of the study area are those of the peak. The geologic formation in the area consists of great intrusive masses of granitic rocks, which are pre-Cretaceous in age. During the winter months there is heavy snowfall on the peak and some snow is perennial. No records nor signs of fire can be found in the study area. Grazing is not permitted, however several thousand head of sheep are driven over the southside road. No lumbering has been permitted in the area. Several botanists have made collections on Ashland Peak. They include: Dr. M. E. Peck, Mr. Thomas Howell, Prof. L. F. Henderson and Dr. G. B. Rossbach. The flora of the area has originated from both the north and south, but the southern element is by far the most important.

In approaching the problem of vegetation classification, zones, as used by Peck, Jepson, and Piper, were distinguished. Three zones were found on the peak: Hudsonian, Canadian, and Transition. Within these zones nine major associations were recognized. The summit is characterized by a group of herbaceous plants and called the Subalpine association. On the north and east exposures from 7,500'-7,200' is the Tsuga mertensiana / Festuca ovina association. These same exposures from 7,200'-6,000' are designated Abies magnifica

var. shastensis / Arctostaphylos association. On the north from 6,000'-5,000' is the Abies concolor / Ribes association. South from the summit to 6,900' is the Arctostaphylos patula / Ceanothus velutinus association. Below this from 6,900'-5,900' is the Abies magnifica var. shastensis / Arctostaphylos patula association, and from 5,900'-5,500' is the Abies concolor / Arctostaphylos patula association. From 5,500'-5,000' is the Pinus ponderosa / Ceanothus velutinus association. On the west exposure from 7,300'-6,800' is an association designated Artemisia tridentata / Lonicera conjugal is.

The main section of the thesis is devoted to the taxonomic treatment of the vascular flora of Ashland Peak. Keys and descriptions for the 47 families, 157 genera, and 234 species are presented.

BIBLIOGRAPHY

1. Abrams, Leroy. Illustrated flora of the Pacific States. Vol. 1. Stanford University Press, Stanford University, California, 1940. 538 p.
2. Abrams, Leroy. Illustrated flora of the Pacific States. Vol. 2. Stanford University Press, Stanford University, California, 1950. 635 p.
3. Abrams, Leroy. Illustrated flora of the Pacific States. Vol. 3. Stanford University Press, Stanford University, California, 1951. 866 p.
4. Baker, William Hudson. A taxonomic and ecologic comparison of the floras of Iron and Fairview Mountain in Oregon. Ph.D. thesis. Corvallis, Oregon State College, 1949. 218 numb. leaves.
5. Condon, Thomas. The two islands and what came of them. Portland, J. K. Gill, 1902. 211 p.
6. Cronquist, Arthur. Vascular plants of the Pacific Northwest. University of Washington Publications in Biology, Vol. 17, Part 5; Compositae. University of Washington Press, Seattle, Washington, 1955. 343 p.
7. Daubenmire, Rexford. Merriam's life zones of North America. The quarterly Review of Biology 13:327-332. 1958.
8. Hitchcock, A. S. Manual of the grasses of the United States. 2nd ed., rev. by Agnes Chase. Washington D. C., 1951. 1051 p. (United States Department of Agriculture. Miscellaneous Publication No. 200)
9. Jepson, Willis Linn. A manual of the flowering plants of California. Independent Pressroom and William Printing, San Francisco, 1923-1925. 1238 p.
10. Lawrence, George H. M. Taxonomy of vascular plants. New York, Mamillan, 1951. 823 p.
11. Little, Elbert L. Check list of native and naturalized trees of the United States. Washington D. C., U. S. Department of Agriculture, 1953. 472 p. (Agriculture Handbook No. 41).
12. Peck, Morton Eaton. A manual of the higher plants of Oregon. Portland, Oregon, Binfords and Mort, 1941. 866 p.

13. Piper, Charles V. Flora of the State of Washington. U. S. National Museum. Contributions from the U. S. National Herbarium 11:1-637. 1906.
14. United States Department of Agriculture. Climatic summary of the United States, Section 3 - Western Oregon. Washington D. C., United States Department of Agriculture, 1936. 48 p.
15. United States Department of Commerce. Climatic summary of the United States - Supplement for 1931 through 1952. Oregon. Washington D. C., United States Department of Agriculture, 1956. 70 p.
16. Wells, Francis G. Preliminary geologic map of the Medford quadrangle, Oregon. Portland, Oregon, State Department of Geology and Mineral Industries, 1939. 1 sheet.
17. Wynd, F. Lyle. The flora of Crater Lake National Park. The American Midland Naturalist 17:881-949. 1936.