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The Flora of Mount Taylor

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THE FLORA OF MOUNT TAYLOR

By

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INTRODUCTION

The increased interest and activity in floristic studies of New Mexico have demonstrated the need for detailed studies of certain areas that can be used as a base for comparisons with similar areas in the state. Mount Taylor is one area selected for detailed investigation because of its isolated position among the mountain chains of the state, its relatively small area, and its geographic position between the large mountain masses of northern and southern New Mexico. A detailed study of the flora of Mount Taylor will be used for a comparison with the floras of similar peaks in the state.

In the past, little floristic work has been attempted in the Mount Taylor area, but some collections have been made here by several investigators. Among the earliest of these were P. C. Standley and E. O. Wooton, who collected widely in New Mexico in the late 19th century. No complete floral check list of the Mount Taylor area has been compiled and the relationship of vegetation and physical factors has not been discussed.

The writer has attempted to determine what species occur on Mount Taylor. This information should reveal any deviations from the expected floristic pattern as well as general distributional trends. If deviations are detected, the writer will attempt to explain them in the general discussion. Most of the answers and conclusions are of

a speculative nature because of insufficient meteorologic information and comparative data from other regions.

Mount Taylor (11,389) is the highest peak in the San Mateo Mountains. I will hereafter avoid the term "San Mateo Mountains," used by the United States Forest Service, in order to prevent confusion with the San Mateo Mountains in Socorro and Sierra counties. Mount Taylor is located in the Cibola National Forest of north-central Valencia County in northwest New Mexico.

The mountain mass is of volcanic origin dating from Miocene times (Anderson, 1961). Mount Taylor and neighboring peaks form a horseshoe-shaped ridge that surrounds a large depression, the west end of Water Canyon. This ridge is the remains of an extinct volcanic cone; the depression is the old crater. Mount Taylor Peak, a cone 1000 ft high and the highest point on this ridge, was a secondary vent of the main volcano. The other peaks, such as La Mosca Peak, were also secondary vents (Anderson, 1961).

The only permanent waters in this mountain mass are the upper portion of Lobo Canyon, several small creeks in Water Canyon, and a few scattered springs throughout the range. Thus the only mesic areas are Water Canyon, upper Lobo Canyon, and the immediate areas around the various springs.

MATERIAL AND METHODS

The major collection areas were chosen on the basis of their direction and distance from Mount Taylor Peak, as well as their elevation and geological features. At least two study areas were selected from each life zone. Each collection area was then plotted on large United States Geological Survey topographic maps (Lobo Springs and Mount Taylor quadrangles), except the area north of Mount Taylor for which there is no topographic map. This northern portion was plotted on the New Mexico State Highway Department Map, Grants Quadrangle No. 39.

The writer selected 12 study areas that best represented the Mount Taylor area, based upon the criteria previously mentioned. Each study area was sampled a minimum of three times in order to observe the floristic changes of early summer, midsummer, and late summer-autumn. The mesic areas, presenting a greater number of species, were sampled a minimum of six times.

Sampling was done at regular intervals during June, July, and August of 1960 and 1961. The north and northeast approaches to Mount Taylor Peak, the peak itself, Lobo Canyon, and Water Canyon were studied in 1960. The southeast and southwest approaches to Mount Taylor Peak, as well as La Mosca Canyon, were first sampled in 1961. Mount Taylor Peak, upper Lobo Canyon, and Water Canyon were resampled in 1961.

At least two specimens of each species, with some exceptions, were collected from each study area. All plants were pressed and catalogued. The specimens were then determined, processed, and accessioned in the University of New Mexico Herbarium. A total of 1101 specimens,

representing 55 families and 301 species, were collected. The algae, fungi, mosses, liverworts, and lichens and the family Cactaceae were omitted from this study.

Plant keys used for identification of all specimens included general family descriptions (Benson, 1957; Martin, 1960), area and state floras (Coulter, 1909; Gould, 1951; Harrington, 1954; Hitchcock, 1950; Kearney and Peebles, 1951; Tidestrome, 1941; Vines, 1960; Wooton and Standley, 1915), and monographs and unpublished keys (Dunn, 1960; Martin, 1961; Nisbet, 1960).

LIFE ZONES OF MOUNT TAYLOR

It is difficult to assign upper limits to the life zones on Mount Taylor. This is especially true of the Upper Sonoran and Transition zones because of much intermingling between these two zones and the high extensions of the Transition Zone into the Canadian and Subalpine zones. Bailey (1913) and Oosting (1958) were considered the authorities for life-zone determination.

The Upper Sonoran Zone is exceeded in area only by the Transition Zone. The former covers all the lower mesas and lower slopes of the mountain. The lower portion of this zone is characterized by Atriplex canescens at an elevation of 7100 ft. This merges into Juniperus monosperma and then disappears at 7175 ft. Pinus edulis appears with Juniperus monosperma at an elevation of 7250 ft and Juniperus scopulorum first appears at 7600 ft.

The Upper Sonoran Zone merges with the Transition Zone at 8200-8300 ft on the north and south roads to La Mosca Peak and terminates at 8300-8500 ft where Pinus ponderosa becomes the dominant tree. Many of the characteristic species of the Upper Sonoran Zone persist at much higher elevations than the usual upper limits for this zone. Pinus edulis and Juniperus scopulorum are commonly found at elevations of 8500-8700 ft on the drier slopes and Pinus edulis is found on the west ridge of Water Canyon at 10,000-10,500 ft. Tetradymia, a common composite of the Upper Sonoran Zone, grows on the rocky slopes of Lobo Canyon at 8600 ft.

The Transition Zone, the largest zone on Mount Taylor, is characterized by Pinus ponderosa. This pine first appears as little islands around the Coalmine Campgrounds at an elevation of 7444 ft. It appears frequently also along the Lobo Creek stream bed at 7800 ft and, with the gradual disappearance of Pinus edulis, becomes the dominant tree at 8400-8600 ft. As Pinus ponderosa becomes more important, there is a more frequent occurrence of Quercus gambelii. Stands of Pinus ponderosa cover all the high mesas and the dry south-, west-, and southwest-facing slopes up to 9800-10,000 ft. On the more mesic north-, east-, and northeast-facing slopes, Pseudotsuga taxifolia invades Pinus ponderosa at 8600-8800 ft. The upper reaches of the Transition Zone end abruptly in dry, high meadows and thick stands of Picea engelmanni and Abies lasiocarpa var. arizonica.

The Canadian Zone, often termed the Mixed-Conifer Climax, is the least well-defined zone on Mount Taylor. Because this zone is so

fragmented, there is some doubt that it should be designated as a distinct life zone on Mount Taylor. Picea pungens, Abies concolor, and Pseudotsuga taxifolia, sometimes accompanied by Pinus ponderosa on the drier slopes, are the usual climax species of this zone. Populus tremuloides is the subclimax or postfire dominant. The Canadian Zone on Mount Taylor is unique with the absence of Abies concolor. The writer, after an intensive search, discovered no Abies concolor in the entire area.

The Canadian Zone appears in cool, moist canyons and ravines at elevations of 8700-9500 ft and is most extensive in upper Water Canyon at 9300-9500 ft where it appears as fragments mixed with Pinus ponderosa on the drier slopes. At 9300 ft and above, Picea pungens shows morphological characteristics intermediate between Picea pungens and Picea engelmanni. Above this elevation, Picea engelmanni soon replaces Picea pungens. Pseudotsuga taxifolia is uncommon above 9600 ft. In addition to the Canadian Zone at Water Canyon, small areas of the Canadian Zone are found at San Mateo Springs and in upper Lobo Canyon, Colorado Canyon, and numerous ravines on the north, northwest, and northeast slopes of Mount Taylor.

The Subalpine Zone (Engelmann Spruce-Alpine Fir Climax) is restricted to elevations above 9700 ft on the north and northeast exposures, above 10,000 ft on the northwest and west exposures, and above 10,400 ft on the south exposures. The climax species are Picea engelmanni and Abies lasiocarpa var. arizonica.

This zone is divided into two distinct communities, the dense climax forest and the postclimax, windswept grassland of Poa fendleriana, Poa interior, Danthonia californica, Festuca arizonica, Castilleja sp., Potentilla sp., and Pseudocymopterus montanus. Above 11,200 ft on Mount Taylor Peak, Picea engelmanni becomes stunted and gnarled at the forest edge on the east and west slopes.

The Alpine Zone is defined as that zone above upper timberline. That there is no Alpine Zone on Mount Taylor is evidenced by dense stands of Engelmann spruce growing within 20 ft in elevation of the summit. In addition, Mount Taylor is too low to be above timberline as upper timberline for this part of New Mexico usually begins above 12,000 ft. Draba cana, Solidago decumbens, and Carex siccata, alpine species according to Bailey (1913), were collected on the summit but were also found at elevations of 10,500-10,700 ft in the usual elevation range of the Subalpine Zone. All species found on the summit were also found as low as 10,500 ft with the exception of Lonicera involucrata and Vaccinium oreophilum, both of which are non-alpine species.

FLORISTIC PROBLEMS

Many genera typical of mesic areas of the Jemez and Sandia Mountains are absent from Mount Taylor. Such genera as Aconitum, Caltha, Delphinium, Dodecatheon, and Phleum and several genera of Umbelliferae are absent from the mountain. In addition, several species of Gentiana are absent from the collection.

Mount Taylor is a dry mountain. This is indicated by the predominance of more xerophytic species and the lack of many mesophytic species. Based on personal observation (no adequate rainfall records available), a lack of precipitation is probably not the reason for the xeric conditions. Heavy summer rains are common. In addition, daily showers occur during late July and throughout August. Mount Taylor Peak is heavily mantled with snow in the winter, yet by mid-June all snow is gone but for a few small, shaded snowbanks.

Factors which may influence the local climatic conditions on Mount Taylor include the size and altitude. As Mount Taylor is a small mass, it is probable that the drying effects of the sun and the west and southwest winds are increased. Daubenmire (1959) stated that rainfall increases with a rise in elevation up to a certain level and then decreases toward the summit because more air masses can pass through the saddles and canyons between the higher peaks. This could be especially true of Mount Taylor with only two outstanding peaks (Mount Taylor and La Mosca peaks) separated by a saddle. The writer often observed rain falling on the saddle between La Mosca and Mount Taylor peaks but not on the peaks.

The north and northwest sides are the only forested areas on Mount Taylor peak; the major part of the peak is grassland. This situation has led to the erroneous conclusion, based upon appearance rather than floristic composition, that the top of the peak is alpine. As explained in the discussion of the life zones, there is no Alpine Zone on Mount Taylor.

It is possible that a fire or fires destroyed much of the timber on the peak. If this is true, then severe erosion, because of the steep grade and constant grazing in modern times, prohibited reforestation. It is also possible that the unforested portions of Mount Taylor Peak have not been forested since Pleistocene times. There is a slight invasion of Picea engelmanni from the northwest slope of Mount Taylor into the grassland of the west slope of the peak, but the small, gnarled trees appear to be surviving only and there are no new seedlings.

Many Pinus edulis trees on the west ridge above Water Canyon at 10,000-10,200 ft have some 3-needled fascicles, characteristic of Pinus cembroides, among the typical 2-needled fascicles. Intensive search revealed no typical Pinus cembroides, but some influences of the latter appear to be present in the Pinus edulis in this area.

At San Mateo Springs during July, the writer discovered a population of hybrid Penstemon growing among Penstemon barbatus, P. oliganthus, and P. virgatus. One putative hybrid had many characteristics of P. barbatus, but the corolla was rose-purple rather than bright red. Other plants were similar to P. virgatus, but the corollas were shorter, more slender, and without the conspicuous purple lines characteristic of P. virgatus. The writer made no cytological comparisons or mass collection studies, so no information is available beyond these tentative morphological determinations. The writer returned to the same location July 13, 1961, to collect flower buds for chromosome smears but found no flowering Penstemon because of

heavy grazing.

One of the most surprising and puzzling facts revealed by this study is the absence of Abies concolor. Its niche is filled by Picea pungens and Pseudotsuga taxifolia. Vines (1961) states that the seed of Abies concolor is viable for a maximum of one year, while Pseudotsuga taxifolia seed is viable for a minimum of four years. Seed germination and growth of Abies concolor proceed best in sandy loam. Much of the soil of the Mixed-Conifer Climax is coarse. Thus a short seed viability, requiring constantly favorable environmental conditions to stimulate rapid germination, and a coarse soil may limit the opportunities for the establishment of Abies concolor.

Pinus aristata and Pinus flexilis are common in other similar mountainous areas. However, neither species was found on Mount Taylor. No explanation is offered for this.

Nearly all the windfalls in the spruce-fir forest are Abies lasiocarpa var. arizonica because of the small, shallow root systems. This species appears to be less resistant than Picea engelmanni to winter kill and disease as evidenced by many dead and dying trees. Few seedlings of alpine fir are present in these spruce-fir areas.

Studies on the north- and northeast-facing slopes above upper Lobo Canyon revealed a dense, uniform, young stand of Pseudotsuga taxifolia growing as an understory beneath a mature stand of Pinus ponderosa. As the old ponderosa pines die out, no seedlings are present to maintain a stand because the thick understory of Pseudotsuga taxifolia allows insufficient light for Pinus ponderosa seed germination.

DESCRIPTION OF COLLECTION AREAS AND SPECIES CHECK LIST

The descriptions herein indicate the geographic location, the elevation, the outstanding geological features, the life zones, and the dominant species of all collection areas. A check list of all species collected in each area is also included.

Lower Lobo Canyon (Elevation 7200-7700 ft)

The limits of this study area range from 1 mile west of Coalmine Campground, which is 7.5 miles west of Mount Taylor Peak, to 1 mile east of the campground. The walls of the canyon are very low at this point, rising no more than 10-15 ft above the stream bed. The stream is normally dry, flowing only after winter thaws and heavy rains. Except for a few annuals, the creek bed is barren of vegetation.

Atriplex is the dominant species in the western part of this area at 7200 ft. It is replaced by Juniperus monosperma at 7300 ft. Between 7300 and 7400 ft, mixed stands of Juniperus monosperma and Pinus edulis become the dominant species. These remain the dominant species except for an island of Pinus ponderosa at the campground and the occurrence of scattered Juniperus scopulorum and Quercus gambelii at 7600-7700 ft. Ponderosa pine gradually increases in number along Lobo Creek but never becomes the dominant species at this low elevation.

Species Check List

Capparidaceae

Cleome serrulata

Chenopodiaceae

Atriplex canescens
Chenopodium watsoni
Salsola kali

Compositae

Aster arenosus
Chrysothamnus pulchellus
Erigeron formosissimus
Grindelia aphanactis
Grindelia squarrosa
Gutierrezia sarothrae
Haplopappus parryi
Helianthus annus
Hymenoxys richardsoni
Psilostrophe tagetina
Senecio longilobus
Tetradymia canescens
Zinnia grandiflora

Cupressaceae

Juniperus monosperma
Juniperus scopulorum

Fagaceae

Quercus gambelii

Geraniaceae

Geranium caespitosum

Gramineae

Agropyron smithii
Agropyron trachycaulum
Hilaria jamesii
Koeleria cristata
Oryzopsis hymenoides
Poa interior

Sitanion hystrix
Sporobolus airoides

Leguminosae

Astragalus allochrous

Liliaceae

Allium cernuum
Yucca baccata
Yucca elata

Loasaceae

Mentzelia pumila

Loranthaceae

Phoradendron juniperinum

Malvaceae

Sphaeralcea digitata

Nyctaginaceae

Mirabalis multiflora

Onagraceae

Oenothera albicaulis

Pinaceae

Pinus edulis
Pinus ponderosa

Polemoniaceae

Gilia laxiflora

Polygonaceae

Eriogonum jamesii
Eriogonum racemosum

Rosaceae

Rosa neomexicana

Salicaceae

Salix exigua

Scrophulariaceae

Penstemon barbatus
Penstemon linarioides
Verbascum thapsus

Upper Lobo Creek (Elevation 8400-8800 ft)

This station, 1.5-3.0 miles southwest of Mount Taylor, included a large mesic area around Lobo Creek. The creek is supplied by several permanent springs of heavy flow. The creek flows through Lobo Canyon (Coalmine Canyon), the walls rising 200-350 ft above the canyon floor.

The dominant species on the floor of the canyon are *Pseudotsuga taxifolia*, *Salix* sp., *Populus tremuloides*, and *Acer glabrum*. In many places the creek bed is so overgrown with *Salix* that it is difficult to penetrate the dense growth. The dominant ground cover is *Carex* sp., *Juncus* sp., and *Ligusticum porteri*.

The south-facing slope of the canyon supports sparse stands of *Pinus ponderosa*, *Pinus edulis*, and *Quercus gambelii*. The soil is very thin with many rock outcroppings and rock slides upon which *Androsace septentrionalis* and *Pericome caudata* grow.

The north-facing slope is well covered with *Pseudotsuga taxifolia* and a few *Picea pungens*, the slope topping out into *Pinus porderosa*, *Juniperus scopulorum*, and *Quercus gambelii*. The soil on the north-facing slope is deeper than on the opposing slope and has a thin layer of humus. Rock outcroppings are frequent.

Species Check List

Aceraceae

Acer glabrum var. *neomexicanum*

Campanulaceae

Campanula rotundifolia

Compositae

Achillea lanulosa
Artemisia dracunculoides
Artemisia franserioides
Brickellia grandiflora
Cirsium ochrocentrum
Erigeron divergens
Erigeron superbus
Helianthella parryi
Helianthus annus
Pericome caudata

Cruciferae

Arabis fendleri

Geraniaceae

Geranium caespitosum
Geranium eremophilum
Geranium lentum
Geranium wislizeni

Caprifoliaceae

Symphoricarpos utahensis

Cornaceae

Cornus stolonifera

Cupressaceae

Juniperus communis
Juniperus scopulorum

Cyperaceae

Carex aurea

Equisetaceae

Equisetum arvense

Ericaceae

Pterospora andromedea

Euphorbiaceae

Euphorbia serpyllifolia

Gramineae

Agrostis alba
Agrostis exarata
Agrostis idahoensis
Agrostis palustris
Bromus ciliatus
Festuca ovina

Guttiferae

Hypericum formosum

Iridaceae

Iris missouriensis
Sisyrinchium demissum

Juncaceae

Juncus balticus
Juncus longistylis
Juncus marginatus

Labiatae

Prunella vulgaris

Lemnaceae

Lemna minor

Leguminosae

Lathyrus laetivirens
Vicia exigua
Vicia pulchella

Liliaceae

Smilacina racemosa
Smilacina stellata
Veratrum californicum
Zizadenus elegans

Malvaceae

Sidalcea candida

Onagraceae

Epilobium californicum

Pinaceae

Picea pungens
Pinus ponderosa
Pseudotsuga taxifolia

Polemoniaceae

Gilia aggregata

Polygonaceae

Rumex occidentalis

Ranunculaceae

Ranunculus cymbalaria
Thalictrum fendleri

Rosaceae

Holodiscus dumosa
Prunus virginianum var. *melanocarpa*

Salicaceae

Populus tremuloides
Salix irrorata
Salix lutea var. *ligulifolia*

Saxifragaceae

Ribes inebrians

Scrophulariaceae

Castilleja austromontana
Mimulus guttatus
Pedicularis grayi
Verbascum thapsus
Veronica americana

Umbelliferae

Ligusticum porteri
Pseudocymopterus montanus

Upper Lobo Canyon Above Lobo Creek (Elevation 8600-8900 ft)

This collection area consisted of the upper portion of the canyon walls and the mesa above the canyon along the road to Mirabel Springs, 3 miles southwest of Mount Taylor Peak. This road is on a ledge cut into the north-facing wall of the canyon.

The north-facing slope is covered with Pseudotsuga taxifolia and a few Picea pungens. The open areas of this slope are covered with Berberis fendleri. The south-facing slope supports an open stand of Pinus ponderosa and Pinus edulis. The slopes top out onto a mesa supporting Juniperus monosperma, a few Juniperus deppeana, Pinus edulis, Pinus ponderosa, and Bouteloua gracilis.

Species Check List

Aceraceae

Acer glabrum var. neomexicanum

Berberidaceae

Berberis fendleri
Berberis repens

Boraginaceae

Lithospermum cobrense

Campanulaceae

Campanula rotundifolia

Capparidaceae

Cleome serrulata

Caprifoliaceae

Symphoricarpos palmeri

Caryophyllaceae

Silene laciniata

Chenopodiaceae

Chenopodium fremontii
Kochia scoparia

Compositae

Artemisia ludoviciana
Artemisia pacifica
Aster pauciflorus
Bahia dissecta
Brickellia fendleri
Brickellia grandiflora
Cirsium wheeleri
Conyza canadensis
Erigeron flagellaris
Erigeron formosissimus
Helianthella parryi
Hymenoxys richardsoni
Pericome caudata
Solidago canadensis
Tetradymia canescens
Tragopogon pratensis
Viguiera longifolia

Cruciferae

Sisymbrium linearifolium

Cuppressaceae

Juniperus deppeana
Juniperus monosperma

Equisetaceae

Equisetum arvense

Fagaceae

Quercus gambelii
Quercus undulata

Geraniaceae

Geranium caespitosum

Gramineae

Blepharoneuron tricholepis
Bouteloua gracilis
Bromus ciliatus
Bromus emarginatus
Bromus polyanthus
Elymus canadensis var. *brachystachys*
Festuca arizonica
Glyceria striata
Hordeum brachyantherum
Melica porteri
Muhlenbergia longiligula
Muhlenbergia montana
Muhlenbergia wolfii
Poa fendleriana
Sitanion hystrix
Sporobolus cryptandrus

Iridaceae

Iris missouriensis

Labiatae

Agastache pallidiflora
Agastache wrightii

Leguminosae

Lotus wrightii
Vicia exigua
Vicia pulchella

Liliaceae

Anthericum torreyi

Allium cernuum var. *neomexicanum*
Allium cernuum var. *obtusum*
Yucca glauca

Nyctaginaceae

Mirabilis oxybaphoides
Oxybaphis comatus

Pinaceae

Picea pungens
Pinus edulis
Pinus ponderosa
Pseudotsuga taxifolia

Polygonaceae

Eriogonum jamesii
Eriogonum racemosum
Eriogonum rotundifolium

Primulaceae

Androsace septentrionalis

Ranunculaceae

Clematis bigelovii

Rosaceae

Cercocarpus montanus
Fallugia paradoxa
Holodiscus dumosus
Prunus virginiana var. *melanocarpa*
Rosa arizonica
Rosa fendleri

Saxifragaceae

Heuchera versicolor
Ribes leptanthum

Scrophulariaceae

Castilleja exilis
Orthocarpus purpureo-albus
Pedicularis centranthera
Penstemon barbatus

Umbelliferae

Ligusticum porteri
Pseudocymopterus montanus

The High Mesa of the Bosque Springs-Gooseberry Springs Area Along Road A-195 (Elevation 8900-9300 ft)

This area is a high mesa with open stands of *Pinus ponderosa* and patches of *Quercus gambelii* mixed with *Ribes inebrians* and *Ribes pinetorum*. A few *Populus tremuloides* grow in shallow depressions in the mesa at elevations of 9100 ft and above.

Road A-195 branches to the southwest off the road along upper Lobo Canyon, cuts across a steep north-facing slope of *Pinus ponderosa* with an understory of *Pseudotsuga taxifolia*, and then levels off onto the mesa. This was the only place the writer observed *Pseudotsuga taxifolia* growing under a cover of *Pinus ponderosa*.

Species Check List

Berberidaceae

Berberis fendleri

Boraginaceae

Cryptantha jamesii
Cryptantha micrantha

Caprifoliaceae

Symphoricarpos utahensis

Compositae

Bahia dissecta
Chrysothamnus nauseosus
Conyza coulteri
Helianthella parryi

Hymenoxys richardsoni
Verbesina encelioides

Cupressaceae

Juniperus monosperma

Fagaceae

Quercus gambelii

Gramineae

Aristida longiseta
Bouteloua gracilis
Bromus ciliatus
Festuca thurberi
Muhlenbergia torreyi
Sitanion hystrix

Leguminosae

Astragulus tephrodes
Lupinus kingii var. kingii
Lupinus palmeri

Liliaceae

Allium cernuum var. obtusum
Yucca elata

Malvaceae

Sphaeralcea digitata

Nyctaginaceae

Oxybaphus pumilus

Oxalidaceae

Oxalis stricta

Papaveraceae

Corydalis aurea

Pinaceae

Pinus ponderosa
Pseudotsuga taxifolia

Polygonaceae

Eriogonum alatum
Eriogonum racemosum

Rosaceae

Prunus virginiana

Rubiaceae

Galium aparine

Saxifragaceae

Heuchera versicolor
Ribes inebrians
Ribes pinetorum

Scrophulariaceae

Castilleja confusa

Urticaceae

Urtica gracilis

The Lower Portion of El Rito Canyon (Elevation 8300 ft)

The lower part of this canyon, 3.8 miles northwest of Mount Taylor Peak and 1 mile west of the Lower Lillies Spring, cuts across the south road to La Mosca Peak. The presence of *Pinus ponderosa* and *Quercus Gambelii* indicates that this study area is within the Transition Zone. This part of the canyon has no permanent water, but the topographic map indicates a permanent stream in the upper canyon.

Species Check List

Compositae

Hymenoxys richardsoni
Senecio neomexicanus

Convolvulaceae

Convulvulus incanus

Fagaceae

Quercus gambelii

Leguminosae

Lupinus argenteus var. *argenteus*

Pinaceae

Pinus ponderosa

Polemoniaceae

Gilia aggregata

Ranunculaceae

Clematis drummondi

Scrophulariaceae

Verbascum thapsus

The Lower Lillies Spring (Elevation 8600 ft)

The Lower Lillies Spring, 2.5 miles northwest of Mount Taylor Peak, is situated as an oasis in the midst of a mesa of *Pinus ponderosa* and *Quercus gambelii*. The spring, which derives its name from the abundant *Iris missouriensis* (locally called "lilies") that grew around it, and its seepage are about 100-150 yards in diameter. This local mesa area supports a grove of *Populus tremuloides* and a ground cover of *Poa*. The vegetation is heavily grazed and trampled around the spring making it difficult to collect specimens in flower.

The Area Around the Spring

Compositae

Erigeron flagellaris
Senecio neomexicanus

Gramineae

Poa sp.

Leguminosae

Vicia americana

Rosaceae

Fragaria ovalis

Salicaceae

Populus tremuloides

Saxifragaceae

Ribes pinetorum

The Mesa

Compositae

Hymenoxys richardsoni

Convulvulaceae

Convolvulus incanus

Cupressaceae

Juniperus scopulorum

Fagaceae

Quercus gambelii

Gramineae

Poa fendleriana

Iridaceae

Iris missouriensis

Pinaceae

Pinus ponderosa

La Mosca Canyon (Elevation 9700-9800 ft)

La Mosca Canyon is a short, narrow canyon aligned in a northeast-southwest direction 2 miles northeast of Mount Taylor Peak. The upper end of the canyon is supplied by one spring with a seepage area only 100 ft in diameter. The creek flows only after heavy rains and winter thaws.

The southwest-facing slope supports an open stand of *Pinus ponderosa*; *Festuca thurberi* and *Poa fendleriana* are the dominant grasses. The northeast-facing slope is heavily forested with *Abies lasiocarpa* var. *arizonica* and *Picea engelmanni*. The small clearings in the forest are overgrown with *Ribes pinetorum*. The writer found on this slope a pink carpet of *Calypso bulbosa*.

Species Check List

Aceraceae

Acer glabrum var. *neomexicana*

Berberidaceae

Berberis repens

Campanulaceae

Campanula rotudifolia

Caryophyllaceae

Stellaria longipes

Caprifoliaceae

Sambucus racemosa

Compositae

Achillea lanulosa
Antennaria aprica
Cirsium parryi
Erigeron flagellaris
Erigeron formosissimus
Taraxicum officinale

Cruciferae

Thlaspi fendleri

Cyperaceae

Carex siccata

Geraniaceae

Geranium fremontii
Geranium richardsoni

Gramineae

Bromus ciliatus
Festuca thurberi
Poa fendleriana
Poa pratensis

Iridaceae

Iris missouriensis

Leguminosae

Lathyrus arizonica
Lupinus argenteus
Vicia americana

Liliaceae

Smilacina racemosa
Smilacina stellata

Orchidaceae

Calypso bulbosa

Papaveraceae

Corydalis aurea

Pinaceae

Abies lasiocarpa var. *arizonica*
Picea engelmanni
Pinus ponderosa

Primulaceae

Androsace septentrionalis

Ranunculaceae

Actaea arguta
Aquilegia elegantula
Thalictrum fendleri

Rosaceae

Fragaria ovalis
Potentilla pulcherima
Rubus strigosus

Salicaceae

Populus tremuloides

Saxifragaceae

Ribes pinetorum

Scrophulariaceae

Castilleja confusa
Pedicularis centranthera

Umbelliferae

Pseudocymopterus montanus

Violaceae

Viola adunca
Viola canadensis

Valerianaceae

Valeriana acutiloba

San Mateo Springs (Elevation 9400 ft)

San Mateo Spring produces an everflowing supply of water which is piped into a metal stock tank. This spring and numerous seeps have their source in a small ravine 0.1 mile south of the stock tank. The ravine is heavily forested with Picea pungens and Pseudotsuga taxifolia and with an understory of Acer glabrum. The boggy areas around the seeps support a dense growth of Ligusticum porteri and Osmorhiza obtusa.

The east- and west-facing slopes of the ravine are covered with Picea pungens and Pseudotsuga taxifolia and support clumps of Populus tremuloides. The latter species is most abundant on the east-facing slopes where it forms an extensive stand under which young trees of Pseudotsuga taxifolia are growing. Where Pseudotsuga is absent, Poa interior is the dominant ground cover under the aspen.

The immediate area around the tank is open, heavily grazed and trampled as this is one of the main watering stations. The grass is an unidentifiable species of Poa; the shrubs, Ribes inebrians and Ribes pinetorum.

This is one of the most beautiful areas on Mount Taylor because of lush, green meadows containing large groves of white-barked aspen.

Species Check List

Aceraceae

Acer glabrum var. neomexicanum
Acer glabrum var. typicum

Berberidaceae

Berberis repens

Boraginaceae

Mertensia franciscana

Campanulaceae

Campanula rotundifolia

Caprifoliaceae

Sambucus racemosa
Symphoricarpos utahensis

Chenopodiaceae

Chenopodium fremontii

Compositae

Achillea lanulosa
Cirsium parryi
Erigeron formosissimus
Helianthus annua
Hymenoxys richardsoni
Trigopogon pratensis
Viguiera longifolia

Cruciferae

Capsella bursa-pastoris

Cupressaceae

Juniperus scopulorum

Cyperaceae

Carex festivella

Fagaceae

Quercus gambelii

Geraniaceae

Geranium caespitosum
Geranium richardsonii

Gramineae

Agropyron smithii

Agrostis idahoensis
Melica porteri
Poa interior
Trisetum montanum

Labiatae

Moldavica parviflora

Leguminosae

Lotus wrightii

Liliaceae

Smilacina racemosa
Zigadenus elegans

Malvaceae

Sidalcia candida

Onagraceae

Epilobium adenocaulon
Oenothera albicaulis

Orchidaceae

Corallorhiza maculata

Oxalidaceae

Oxalis amplifolia

Pinaceae

Picea engelmanni
Picea pungens
Pinus ponderosa
Pseudotsuga taxifolia

Plantaginaceae

Plantago major

Polemoniaceae

Gilia aggregata

Polygonaceae

Polygonum sawatchense
Rumex triangulivalvis

Polypodiaceae

Cystoptris fragilis

Primulaceae

Androsace septentrionalis

Ranunculaceae

Actaea arguta
Ranunculus inamoenus
Ranunculus macounii

Rosaceae

Fragaria bracteata
Fragaria ovalis
Holodiscus dumosa

Rubiaceae

Galium aparine

Salicaceae

Populus tremuloides
Salix bebbiana

Saxifragaceae

Ribes inebrians
Ribes pinetorum

Scrophulariaceae

Mimulus guttatus
Penstemon barbatus
Penstemon virgatus
Penstemon whippleanus
Veronica americana

Umbelliferae

Ligusticum porteri

Osmorhiza obtusa
Pseudocymopterus montanus

Urticaceae

Urtica gracilis

Violiaceae

Viola canadensis

Water Canyon (Elevation 9200-9650 ft)

Water Canyon is the largest mesic area on Mount Taylor but the area does not contain the large number of species expected. The canyon, surrounded on the west end by the old volcano ridge, levels off 17-19 miles to the east into Juniperus monosperma and Atriplex canescens. The writer collected only in the western end of this canyon from 9650 to 9200 ft.

Numerous springs and several creeks, 2-3 miles long, are in this canyon. This permanent water and deep, cool ravines create suitable conditions for Pseudotsuga taxifolia, Picea pungens, Populus tremuloides, and Acer glabrum. The drier slopes and knolls support stands of Pinus ponderosa. Picea pungens begins to merge with Picea engelmanni at 9400 ft and is replaced by Picea engelmanni at 9600-9700 ft, but Pseudotsuga taxifolia is always present, although less abundant, in Engelmann spruce-alpine fir forest of the higher elevations of Water Canyon.

The canyon has several large meadows of Festuca thurberi, Poa compressa, and Helenium hoopesii. Under the thickest stands of Picea pungens and Pseudotsuga taxifolia, Lathyrus arizonica forms dense mats of vegetation and Marchantia sp. forms a carpet along the streams.

Species Check List

Aceraceae

Acer glabrum var. *neomexicanum*
Acer glabrum var. *typicum*

Boraginaceae

Lithospermum cobrense
Mertensia franciscana

Compositae

Achillea lanulosa
Agoseris aurantiaca
Cirsium ochrocentrum
Cirsium parryi
Haplopappus parryi
Helenium hoopesii
Pericome caudata
Senecio neomexicanus

Cyperaceae

Carex festivella

Ericaceae

Pyrola elliptica

Fagaceae

Quercus gambelii

Geraniaceae

Geranium caespitosum
Geranium eremophilum
Geranium richardsonii

Gramineae

Bromus ciliatus
Elymus glaucus
Festuca thurberi
Poa annua
Poa bigelovii
Poa compressa

Hydrophyllaceae

Phacelia magellanica

Iridaceae

Iris missouriensis

Juncaceae

Luzula parviflora

Labiatae

Agastachys pallidiflora

Leguminosae

Lathyrus laetivirens
Vicia americana
Vicia pulchella

Liliaceae

Smilacina racemosa

Malvaceae

Sidalcea candida

Nyctaginaceae

Oxybaphus linearis

Pinaceae

Picea pungens
Pinus ponderosa
Pseudotsuga taxifolia

Polypodiaceae

Cystopteris fragilis
Pteridium aquilinum

Ranunculaceae

Actaea arguta
Aquilegia elegantua

Rosaceae

Fragaria bracteata
Geum macrophyllum
Holodiscus dumosa
Potentilla pulcherrima
Prunus virginiana var. *melanocarpa*

Salicaceae

Salix bebbiana

Saxifragaceae

Ribes inebrians
Ribes pinetorum

Scrophulariaceae

Castilleja austromontana
Mimulus guttatus
Penstemon barbatus
Penstemon whippleanus
Veronica americana

Umbelliferae

Ligusticum porteri
Osmorhiza obtusa
Pseudocymopterus montanus

Violaceae

Viola adunca
Viola canadensis
Viola nephrophylla

The Northwest Slope of Water Canyon (Elevation 9800-10,000 ft)

This portion of the old volcanic ridge is 1.4 miles northeast of La Mosca Peak. The top of the ridge is open grassland of *Festuca arizonica*, *Festuca thurberi*, *Poa fendleriana*, and scattered *Picea engelmanni*.

The slope, dropping 600-1100 ft into the canyon floor, is also open grassland of the same species as found on the top of the ridge.

The grass grows in hummocks that resist erosion. Except for these hummocks, the surface of the slope is covered with loose rocks, among which Campanula rotundifolia, Castilleja integra, Cirsium ochrocentrum, Linum lewisii, Sisymbrium linearifolium, and a few Picea engelmanni grow. A small clone of Populus tremuloides grows in a localized area about 200 ft from the top of this slope.

Several rocky knolls jut out from the top of the rim and support Holodiscus dumosa and gnarled Pinus edulis at elevations of 10,400-10,500 ft.

Species Check List

Boraginaceae

Lithospermum cobrense

Campanulaceae

Campanula rotundifolia

Compositae

Antennaria aprica
Cirsium ochrocentrum
Erigeron flagellaris
Helenium hoopesii

Cruciferae

Sisymbrium linearifolium

Cupressaceae

Juniperus communis

Cyperaceae

Carex siccata
Carex simulata
Carex wootoni

Fagaceae

Quercus gambelii

Gramineae

Agropyron subsecundum
Blepharoneuron tricholepis
Festuca arizonica
Festuca thurberi
Poa fendleriana
Poa interior

Iridaceae

Iris missouriensis
Sisyrinchium demissum

Juncaceae

Juncus marginatus

Leguminosae

Vicia pulchella

Liliaceae

Zygadenus elegans

Linaceae

Linum lewisii

Pinaceae

Abies lasiocarpa var. *arizonica*
Pinus edulis
Pseudotsuga taxifolia

Polemoniaceae

Gilia aggregata

Ranunculaceae

Ranunculus cymbalaria

Rosaceae

Cercocarpus montanus

Holodiscus dumosa
Rosa neomexicana
Rubus strigosus

Saxifragaceae

Ribes pinetorum

Scrophulariaceae

Castilleja integra

Umbelliferae

Pseudocymopterus montanus

Spruce Forest and Grassland (Elevation 10,300-10,600 ft)

This collecting site, 1.5-3.0 miles northeast of La Mosca Peak, included the climax forest of *Abies lasiocarpa* var. *arizonica* and *Picea engelmanni*, and a postclimax grassland of *Festuca arizonica*, *Poa fendleriana*, and *Poa interior*.

The soil of the grassland is thin and severely eroded, with many areas of exposed rocks covered with lichens. *Selagenella densa*, *Phlox austromontana*, and *Phlox caespetosa* grow in the crevices of the rock where soil has accumulated. In several areas of the meadow protected from grazing, seedlings of *Picea engelmanni* are firmly established but unprotected areas are heavily grazed, preventing any reforestation.

Species Check List

Caryophyllaceae

Stellaria longipes

Compositae

Agoseris aurantiaca

Antennaria aprica
Artemisia franserioides
Crepis glauca
Crepis occidentalis
Erigeron divergens
Erigeron flagellaris
Senecio uintahensis

Cruciferae

Draba brachycarpa
Sisymbrium linearifolium
Thlaspi fendleri

Cyperaceae

Carex bella

Ericaceae

Moneses uniflora
Pyrola secunda

Gramineae

Agropyron bakeri
Agropyron desertorum
Agropyron subsecundum
Bromus ciliatus
Elymus canadensis
Festuca arizonica
Hordeum jubatum
Koeleria cristata
Muhlenbergia montana
Poa bigelovii
Poa fendleriana
Poa interior
Poa longiligula
Poa nevadensis
Poa rupicola

Iridaceae

Iris missouriensis

Leguminosae

Lupinus alpestris
Vicia americana

Liliaceae

Smilacina stellata
Zigadenus elegans

Orchidaceae

Calypso bulbosa

Papaveraceae

Corydalis aurea

Pinaceae

Abies lasiocarpa var. *arizonica*
Picea engelmanni
Pinus edulis
Pseudotsuga taxifolia

Polemoniaceae

Phlox austromontana
Phlox caespitosa
Polemonium folissisimum

Primulaceae

Androsace septentrionalis

Ranunculaceae

Aquilegia elegantula
Ranunculus cardiophyllus
Ranunculus cymbalaria

Rosaceae

Cercocarpus montanus
Holodiscus dumosa
Potentilla arguta
Prunus virens

Salicaceae

Populus tremuloides

Saxifragaceae

Heuchera parvifolia

Ribes inebrians
Ribes montigenum

Scrophulariaceae

Castilleja confusa
Castilleja integra
Penstemon oliganthus

Selaginellaceae

Selaginella densa

Umbelliferae

Pseudocymopterus montanus

Violaceae

Viola canadensis

The Approaches to Mount Taylor Peak and the Peak

(Elevation 10,500-11,389 ft)

This study site, composed of La Mosca and Mount Taylor peaks and the saddles between the two peaks, is entirely within the Subalpine Zone. Dense forests of *Abies lasiocarpa* var. *arizonica* and *Picea engelmanni* and open meadows of *Danthonia californica*, *Festuca thurberi*, *Poa fendleriana*, and *Trisetum montanum* are the dominant species of this area.

La Mosca Peak is unforested, supporting only a sparse grassland because of heavy erosion. Mount Taylor Peak supports both climax forest and postclimax grassland. The forest is dense on the north and northwest sides of Mount Taylor Peak, the trees heavily festooned with lichens. The very top of the south and west sides of Mount Taylor Peak are open meadows with little evidence of invasion by the trees. There are a few scattered *Picea engelmanni* on the west slope but grazing,

thin soils, and erosion prevent any natural reforestation.

Species Check List

Boraginaceae

Mertensia franciscana

Campanulaceae

Campanula rotundifolia

Caprifoliaceae

Lonicera involucrata

Caryophyllaceae

Silene laciniata
Stellaria longifolia

Compositae

Achillea lanulosa
Agoseris glauca
Erigeron concinnus
Erigeron formosissimus
Haplopappus croceus
Helenium hoopseii
Hieracium fendleri
Senecio wootonii
Solidago decumbens
Solidago pallida
Viguiera longifolia
Viguiera multiflora

Cruciferae

Draba aurea
Draba helleriana
Draba rectifructa
Sisymbrium linifolium

Cupressaceae

Juniperus communis

Cyperaceae

Carex albo-nigra

Carex siccata

Ericaceae

Pyrola elliptica
Pyrola secunda
Vaccinium oreophilum

Gentiaceae

Gentiana affinis

Geraniaceae

Geranium richardsonii

Gramineae

Agropyron bakeri
Agropyron subsecundum
Blepharoneuron tricholepis
Bromus anomalis
Bromus ciliatus
Bromus frondosus
Bromus marginatus
Danthonia californica
Danthonia intermedia
Elymus glaucus
Festuca arizonica
Festuca thurberi
Koeleria cristata
Muhlenbergia montana
Sitanion hystrix
Trisetum montanum

Hydrophyllaceae

Phacelia magellanica

Iridaceae

Iris missouriensis
Sisyrinchium demissum

Labiatae

Agastache pallidiflora

Leguminosae

Lathyrus arizonicus

Lupinus alpestris
Lupinus ingratus
Vicia americana

Liliaceae

Smilacina stellata
Zigadenus elegans

Linaceae

Linum lewisii

Orchidaceae

Calypso bulbosa

Pinaceae

Abies lasiocarpa var. *arizonica*
Picea engelmanni
Pinus edulis

Polemoniaceae

Gilia aggregata

Polypodiaceae

Cystopteris fragilis
Woodsia oregana

Ranunculaceae

Aquilegia elegantula
Thalictrum fendleri

Rosaceae

Fragaria bracteata
Potentilla hippiana
Potentilla pulcherrima
Rosa fendleri

Salicaceae

Salix bebbiana

Saxifragaceae

Heuchera parvifolia
Ribes inebrians
Ribes leptanthum
Ribes montigenum
Ribes pinetorum
Saxifraga bronchialis

Scrophulariaceae

Castilleja austromontana
Penstemon oliganthus
Penstemon whippleanus

Selaginellaceae

Selaginella densa

Umbelliferae

Osmorhiza obtusa
Pseudocymopterus montanus

KEY TO THE FLORA OF MOUNT TAYLOR

1. Plant producing spores ..... Pteridophyta 2

1. Plants producing seeds ..... Spermatophyta 4

2. Sporangia borne on the ventral base of leaf; strobulus coneshaped; leaves not more than 4 mm long 3

2. Sporangia borne on leaf blades; strobulus not coneshaped; leaves much longer than 4 mm ..... Polypodiaceae

3. Leaves whorled, enclosing the stem in a sheath; stem jointed ..... Equisetaceae

3. Leaves not whorled or forming a sheath; stems not jointed ..... Selaginellaceae

4. Plants with flowers; seeds enclosed in an ovary ..... Angiospermae 6

4. Plants without flowers; seeds not enclosed in an ovary ..... Gymnospermae 5

5. Leaves scalelike or awlshaped; cones fleshy at maturity..Cupressaceae

5. Leaves needlelike, arranged spirally or in fascicles; cones dry and often woody at maturity ..... Pinaceae

6. Leaves parallel veined; flowers 3-merous; stem with scattered vascular bundles in a cylinder .....Monocotyledoneae

6. Leaves pinnately or palmately veined; flowers 2-, 4-, or 5-merous; vascular bundles in a cylinder ..... Dicotyledoneae

Equisetaceae

Equisetum arvense L.

Selaginellaceae

Selaginella densa Rydb.

Polypodiaceae

1. Rhizomes hairy, not scaly; sori linear and marginal .... 1. Pteridium

1. Rhizomes glabrous, scaly; sori ovate or oblong, dorsal on veins ... 2

2. Indusium enclosing the sori, breaking up into fimbriate projections..
..... 2. Woodsia

2. Indusium attached at a single point to the sori, oblong in
shape ..... 3. Cystopteris

1. Pteridium

Pteridium aquilinum (L.) Kuhn.

2. Woodsia

Woodsia oregana D.C. Eaton

3. Cystopteris

Cystopteris fragilis (L.) Bernh.

Cupressaceae

1. Juniperus

1. Leaves awllike, not imbricate; surface glaucous ..... J. communis L.

1. Leaves scalelike, imbricate; surface not glaucose 2

2. Bark regularly checking into rectangular plates; leaves with
large resinous dots ..... J. deppeana Steud.

2. Bark not checking into plates; leaves seldom with resinous dots ... 3

3. Foliage lacy; branches often drooping; leaves entire; fruit
usually 2-seeded ..... J. scopulorum Sarg.

3. Foliage coarse; branches erect and stout; leaves finely toothed;
fruit 1-seeded ..... J. monosperma (Engelm.) Sarg.

Pinaceae

1. Needles in fascicles; cone scales woody ..... 1. *Pinus*

1. Needles not in fascicles; cone scales thin, not woody 2

2. Cones erect; needles sessile ..... 2. *Abies*

2. Cones drooping; needles petiolate or if not, then young branches with raised leaf scars 3

3. Leaves 4-sided, deciduous upon drying; leaf scars raised ....3. *Picea*

3. Leaves flat, tapering into a slender petiole, not falling upon drying; leaf scars not raised ..... 4. *Pseudotsuga*

1. Pinus

1. Needles in fascicles of 2, 5 cm long or less, incurved .... *P. edulis* Engelm.

1. Needles in fascicles of 3, 10 cm long or more, straight .... *P. ponderosa* Lawson

2. Abies

Abies lasiocarpa (Hook) Nutt. var. *arizonica* (Merriam) Lemmon

3. Picea

1. Young twigs glabrous; leaves rigid and abruptly acute .... *P. pungens* Engelm.

1. Young twigs pubescent; leaves less rigid, obtuse .... *P. engelmanni* Parry

4. Pseudotsuga

Pseudotsuga taxifolia (Poir.) Britton

Monocotyledoneae

Key to Families

1. Perianth present 2
1. Perianth absent 5
2. Ovary superior 3
2. Ovary inferior 4
3. Perianth petaloid; stamens 6 ..... Liliaceae
3. Perianth scalelike, scarious or slightly herbaceous; stamens 3 or 6 ..... Juncaceae
4. Perianth regular or slightly irregular; flowers subtended by bracts; stamens 3 , not adnate to the style ..... Iridaceae
4. Perianth very irregular; flowers not subtended by bracts; stamens 1-2, adnate to the style ..... Orchidaceae
5. Plants floating aquatics; plant body without definite stems or leaves; flowers enclosed by a spathe ..... Lemnaceae
5. Plants terrestrial; plant body with definite stems and leaves; flowers not enclosed by a spathe 6
6. Stems jointed at the nodes, usually hollow and rounded; spikelet subtended by 2 glumes ..... Gramineae
6. Stems usually not jointed at the nodes, solid and triangular; spikelet not subtended by glumes ..... Cyperaceae

Liliaceae

1. Plants with a woody caudex; leaves many, narrow, rigid, spine-tipped, arranged in rosettes at the top of the caudex ..... 1. Yucca
1. Plants completely herbaceous; leaves not as above 2

2. Styles 3; flowers in racemes or panicles; perianth white or greenish 3

2. Styles 1; flowers not as above 4

3. Leaves linear or nearly so ..... 2. Zigadenus

3. Leaves broadly elliptic or ovate ..... 3. Veratrum

4. Flowers in terminal racemes or panicles, white; fruit berry-like; stem from a horizontal rhizome; leaves large, broadly lanceolate to ovate ..... 4. Smilacina

4. Flowers in racemes, orange or pink; fruit a capsule; stem from a bulb or corm; leaves all narrowly linear 5

5. Flowers orange, in a slender raceme not subtended by membranaceous bracts ..... 5. Anthericum

5. Flowers pink, in umbels subtended by membranaceous bracts ..6. Allium

1. Yucca

1. Plant with a short stem; leaves broad with coarse marginal fibers; inflorescence not surpassing the foliage; fruit indehiscent ..... Y. baccata Torr.

1. Plant with a definite stem, often treelike; leaves very slender with thin marginal fibers; inflorescence much surpassing the foliage; fruit dehiscent ..... Y. elata Engelm.

2. Zigadenus

Zigadenus elegans Pursh.

3. Veratrum

Veratrum californicum Durand.

4. Smilacina

1. Inflorescence a panicle of numerous flowers; perianth 2-4 mm long; leaves usually ovate ..... S. racemosa (L.) Deaf.

1. Inflorescence a raceme of few flowers; perianth 3-7 mm long; leaves usually lanceolate ..... S. stellata (L.) Deaf.

5. Anthericum

Anthericum torreyi Baker

6. Allium

Allium cernuum Roth.

1. Inner bulb scales white ..... var. neomexicanum (Rydb.) Macbr.

1. Inner bulb scales pink or red ..... var. obtusum Cockerell

Juncaceae

1. Plants glabrous; leaf sheaths open; seeds many; flowers not in a drooping panicle ..... 1. Juncus

1. Plants pilosely pubescent; leaf sheaths closed; seeds 3; flowers in a loose, drooping panicle ..... 2. Luzula

1. Juncus

1. Inflorescence lateral; leaves all basal ..... J. balticus Willd.

1. Inflorescence in terminal heads; leaves both basal and cauline 2

2. Stamens 3; perianth 2-3 mm long ..... J. marginatus Rostk.

2. Stamens 6; perianth 5-6 mm long ..... J. longistylis Torr.

2. Luzula

Luzula parviflora (Ehrh.) Desv.

Iridaceae

1. Sepals recurved; petals erect; style branches petaloid, filaments distinct .....1. Iris

1. Sepals and petals spreading; style branches not petaloid; filaments united ..... 2. *Sisyrinchium*

1. Iris

Iris missouriensis Nutt.

2. Sisyrinchium

Sisyrinchium demissum Greene

Orchidaceae

1. Plants purplish brown; leaves scalelike; flowers in racemes; corolla brownish, lip not saccate ..... 1. *Corallorhiza*

1. Plants green; leaf solitary, well developed; flower solitary; corolla pink or rose-pink, lip saccate ..... 2. *Calypso*

1. Corallorhiza

Corallorhiza maculata Raf.

2. Calypso

Calypso bulbosa (L.) Oakes

Lemnaceae

1. Lemna

Lemna minor L.

Gramineae

1. Inflorescence a panicle or spikelike panicle 2

1. Inflorescence a spike (a spikelike raceme in *Bouteloua*) 17

2. Spikelets 1-flowered 3

2. Spikelets 2-to several-flowered or 1-flowered with additional rudimentary florets 9

3. Fruit rounded, awned 4

3. Fruit thin or firm, not rounded, unawned 5

4. Glumes narrow, acute, sometimes awn-tipped; lemmas lanceolate, tapering into an awn column ending as a 3-parted awn .....1. Aristida

4. Glumes obtuse, awnless; lemmas oval, with a short, simple awn ..... 2. Oryzopsis

5. Glumes equal, longer than the lemmas ..... 3. Agrostis

5. Glumes usually unequal, as long as or shorter than the lemmas 6

6. Lemmas awned from the tip or mucronate ..... 4. Muhlenbergia

6. Lemmas awned from the back or awnless 7

7. Caryopsis remaining attached to the lemma and palea at maturity ..... 4. Muhlenbergia

7. Caryopsis falling from the lemma and palea at maturity 8

8. Lemmas 3-nerved; nerves silky or villous ; paleae villous throughout .....5. Blepharoneuron

8. Lemmas 1-nerved, glabrous; paleae glabrous ..... 6. Sporobolus

9. First glume usually longer than the first floret; lemmas awnless or awned from the back..... 10

9. First glume usually shorter than the first floret; lemmas awnless or awned from the apex 11

10. Rachilla extending beyond the terminal floret, villous; glumes less than 4 mm long ..... 7. Trisetum

10. Rachilla not extending beyond the terminal floret; glumes 9 mm long or more ..... 8. Danthonia

11. Spikelets 3-7-flowered; leaf blades with conspicuous scalariform secondary venation ..... 9. Poa

11. Spikelets 2-many flowered; leaf blades not as above 12

12. Lemmas awned 13

12. Lemmas awnless 14

13. Spikelets 2.5 cm long or longer, often nodding; awns of lemmas 2 mm long or more; blades flat and broad ..... 10. Bromus

13. Spikelets less than 2.5 cm long, seldom nodding; awns of lemmas 2 mm long or less; blades involute and narrow ..... 11. Festuca

14. Lemmas lanceolate, acuminate, not hyaline at the apex ...11. Festuca

14. Lemmas ovate-lanceolate to obovate, acute and hyaline toward the apex 15

15. Panicle contracted, spikelike; rachilla ending in a bristle beyond the last floret; glumes equal, one-half to three-fourths the length of the floret; lemmas 5-nerved ..... 12. Koeleria

15. Panicle open; rachilla not ending in a bristle beyond the last floret; glumes unequal, less than one-half the length of the floret; lemmas 7-9-nerved 16

16. Panicle branches drooping with the spikelets clustered at the ends; glumes obtuse, 1-nerved; lemmas obtuse, prominently 5-9-nerved ..... 13. Glyceria

16. Panicle branches upright or slightly spreading with the spikelets not clustered at the ends; glumes acute, 3-5-nerved; lemmas acute, obscurely 7-nerved ..... 14. Melica

17. Spikelets 1 at a node 18

17. Spikelets 2 or more at a node 19

18. Spikelets flattened, 2-ranked; glumes equal, several nerved..... ..... 15. Agropyron

18. Spikelets not flattened, arranged in 2 rows along 1 side of the rachis; glumes unequal, 1-nerved .....16. Bouteloua

19. Spikelets 3 at a node 20

19. Spikelets 2 at a node 21

20. Spikelets all 1-flowered; spikelets not falling from the rachis as a cluster; florets disarticulating above the glumes; glumes lanceolate, awned; lemmas long awned ..... 17. Hordeum

20. Central spikelet 1-flowered, lateral spikelets 2-flowered; spikelets falling from the rachis as a cluster; florets disarticulating below the glumes; glumes ovate, awnless; lemmas awnless ..... 18. Hilaria

21. Rachis continuous; glumes equal ..... 19. Elymus

21. Rachis disarticulating at each joint at maturity; glumes usually unequal ..... 20. Sitanion

1. Aristida

Aristida longiseta Steud.

2. Oryzopsis

Oryzopsis hymenoides (Roem. & Schult.) Ricker

3. Agrostis

1. Palea present 2

1. Palea absent 3

2. Panicle contracted; stolons often present ..... A. palustris Huds.

2. Panicle open; stolons absent ..... A. alba L.

3. Panicle contracted, the branches densely flowered; secondary branching absent ..... A. exarata Trin.

3. Panicle open, the branches not densely flowered; secondary branching present ..... A. idahoensis Nash.

4. Muhlenbergia

1. Plants annual ..... M. wolfii (Vasey) Rydb.

1. Plants perennial 2

2. Panicle open; culms growing in a broad basal tuft, often dying in the center ..... M. torreyi (Nutt.) Hitchc.

2. Panicle contracted; culms not growing in a basal tuft 3

3. Second glume 3-toothed; lemmas longer than the glumes..... ..... M. montana (Nutt.) Hitchc.

3. Second glume acute; lemmas shorter than the glumes..... ..... M. longiligula Hitchc.

5. Blepharoneuron

Blepharoneuron tricholepis (Nash.) Torr.

6. Sporobolus

1. Panicle contracted or open, densely flowered; sheath with tufts of white hairs around the collar... S. cryptandrus (Torr.) Gray

1. Panicle always open, not densely flowered; sheath without hairs or with a few white hairs around the collar ..... S. airoides Torr.

7. Trisetum

Trisetum montanum Vasey

8. Danthonia

1. Panicle spreading ..... D. californica Bolander

1. Panicle erect ..... D. intermedia Vasey

9. Poa

1. Plants annual..... 2
1. Plants perennial..... 3
2. Panicle narrow and contracted; lemmas webbed at the base.....
..... P. bigelovii Vasey & Schribn.
2. Panicle triangular, branches spreading; lemmas not webbed at the base..... P. annua L.
3. Spikelets not compressed..... P. nevadensis Vasey
3. Spikelets compressed..... 4
4. Rhizomes present..... 5
4. Rhizomes absent..... 6
5. Culms flattened..... P. compressa L.
5. Culms not flattened..... P. pratensis L.
6. Lemmas webbed at the base..... P. interior Rybd.
6. Lemmas not webbed at the base..... 7
7. Blades involute; panicle open..... 8
7. Blades flat; panicle contracted..... P. rupicola Nash
8. Ligule less than 1 mm long..... P. fendleriana (Steud) Vasey
8. Ligule 5-7 mm long..... P. longiligula Scribn. & Will.

10. Bromus

1. Spikelets flattened..... 2
1. Spikelets not flattened..... 3
2. Sheaths pilose; blades pubescent; lemmas pubescent.....
..... B. marginatus Nees.
2. Sheaths glabrous; blades hispidulous; lemmas glabrous.....
..... B. polyanthus Scribn.

3. Lemmas pubescent only along the margin and sometimes dorsally below ..... B. ciliatus L.

3. Lemmas evenly pubescent 4

4. Panicle 6-9 cm long, open and drooping; sheaths pilose to scabrous ..... B. anomalus Rupr.

4. Panicle 9-20 cm long, erect, sometimes drooping; sheaths glabrous ..... B. frondosus (Shear.) Woot. & Standl.

11. Festuca

. Ligule 2-4 mm long; lemmas awnless ..... F. thurberi Vasey

. Ligule less than 1 mm long; lemmas awned 2

. Blades seldom more than one-half the length of the culms; panicle spikelike; awn 2-4 mm long ..... F. ovina L.

. Blades nearly as long as the culms; panicle not spikelike; awn usually less than 1.5 mm long ..... F. arizonica Vasey

12. Koeleria

Koeleria cristata (L.) Pers.

13. Glyceria

Glyceria striata (Lam.) Hitchc.

14. Melica

Melica porteri Scribn.

15. Agropyron

. Plants with rhizomes ..... A. smithii Rydb.

. Plants without rhizomes 2

. Spikelets crowded and compressed on the rachis..... ..... A. desertorum (Fisch.) Schult.

2. Spikelets neither crowded nor compressed on the rachis..... 3

3. Spikelets awnless or slightly awned.....
.....A. trachycaulum (Link.) Malte.

3. Spikelets definitely awned..... 4

4. Awns straight..... A. subsecundum (Link.) Hitchc.

4. Awns divergent..... A. bakeri E. Nels.

16. Bouteloua

1. Spikes 20-50 per culm; rachis not recurving at maturity.....
..... B. curtipendula (Michx.) Torr.

1. Spikes fewer than 20 per culm; rachis recurving at maturity.....
.....B. gracilis (H.B.K.)Lag.

17. Hordeum

1. Spikes as long as broad; awns 2-5 cm long..... H. jubatum L.

1. Spikes much longer than broad; awns 1 cm long or less.....
..... H. brachyantherum Nevski.

18. Hilaria

Hilaria jamesii (Torr.) Benth.

19. Elymus

1. Glumes firm, long awned; lemmas pubescent..... E. canadensis L.

1. Glumes thin, acuminate or awn-tipped; lemmas glabrous.....
..... E. glaucus Buchl.

20. Sitanion

Sitanion hystrix (Nutt.) J.G. Smith

Cyperaceae

1. Carex

1. Stigmas 3; spikes blackish..... 2

1. Stigmas 2; spikes brownish 4

2. Spikes solitary ..... C. obtusata Lilj.

2. Spikes 2 or more 3

3. Lower spikes drooping on long peduncles; scales black without white hyaline margins ..... C. bella Bailey

3. Lower spikes erect; scales black with white hyaline margins..... C. albo-nigra Mackenz.

4. Perigynia few, golden colored..... C. aurea Nutt.

4. Perigynia many, yellow or straw-colored 5

5. Culms from creeping rhizomes 6

5. Culms not from creeping rhizomes 7

6. Perigynia flattened, wing-margined ..... C. siccata Dewey

6. Perigynia neither flattened nor wing-margined..... C. simulata Mackenz.

7. Perigynia wing-margined, strongly nerved, brown or blackish..... C.festivella Mackenz.

7. Perigynia not winged nor white-margined, nerveless, pale yellow or tan ..... C. wootoni Mackenz.

Dicotyledoneae

Key to Families

1. Ovary superior 2

1. Ovary inferior 38

2. Corolla present 3

2. Corolla absent 28

3. Petals free 4

3. Petals united, at least at the base 18

4. Flowers regular 5

4. Flowers irregular 16

5. Stamens 15 or more 6

5. Stamens less than 15 9

6. Stamens free 7

6. Stamens united, at least at the base 8

7. Leaves stipulate; stamens not attached on the receptacle; pistils 1 to numerous ..... Rosaceae

7. Leaves not stipulate; stamens spirally attached on the receptacle; pistils several to numerous ..... Ranunculaceae

8. Leaves alternate, not glandular-punctate, usually with stellate pubescence; stamens united to form a tube ..... Malvaceae

8. Leaves opposite, glandular-punctate, glabrous; stamens in 3-5 clusters; filaments united only at the base ..... Guttiferae

9. Sepals and petals 5 (petals 4 in some genera of Ericaceae)..... 10

9. Sepals and petals 4 or 6 14

10. Leaves opposite or basal 11

10. Leaves alternate, caulescent 12

11. Leaves palmately lobed or parted, stipulate; petals early deciduous; stamens 10, 5 longer than the other 5; style 5 parted, exerted ..... Geraniaceae

11. Leaves entire, non-stipulate; petals persistent; stamens 10, all the same length; styles 3, not exerted ..... Caryophyllaceae

12. Leaves simple, caulescent or acaulescent 13

12. Leaves compound and acaulescent; leaflets 3 or more, wedgeshaped ..... Oxalidaceae

13. Leaves sessile; petals early deciduous; stamens 5; styles 2-5 ..... Linaceae

13. Leaves petioled; petals persistent; stamens 8-12; style 1 .... Ericaceae

14. Sepals and petals 4; leaves not hollylike 15

14. Sepals and petals 6; leaves hollylike or nearly entire and spine-tipped ..... Berberidaceae

15. Stamens tetradynamous, not exerted; fruit a silicle or silique; ovary sessile ..... Cruciferae

15. Stamens not tetradynamous, exerted; fruit a capsule; ovary stalked ..... Capparidaceae

16. Leaves compound, not obovate or kidney shaped 17

16. Leaves simple, obovate or kidney shaped ..... Violaceae

17. Petals 5, not spurred; stamens usually 10; filaments often partially united; fruit a legume ..... Leguminosae

17. Petals 4; outer petals spurred; stamens 6; filaments not united; fruit a capsule ..... Fumariaceae

18. Perianth 4-merous; corolla scarious or scarious-margined; stamens 2 or 4 ..... Plantaginaceae

18. Perianth 5-merous; corolla not scarious or scarious-margined; stamens 4-12 19

19. Corolla regular 20

19. Corolla irregular 26

20. Stamens 8-12; style 1 ..... Ericaceae

20. Stamens 4-5; styles 1-2 21

21. Leaves alternate or basal, petiolate; stamens alternate or opposite the corolla lobes 22

21. Leaves opposite, sessile; stamens alternate with the corolla lobes .....Gentianaceae

22. Plants acaulescent; leaves in a basal rosette; stamens opposite the corolla lobes ..... Primulaceae

22. Plants caulescent; leaves basal and cauline; stamens alternate with the corolla lobes 23

23. Style 1; flowers never in scorpoid cymes 24

23. Styles 2; flowers often in scorpoid cymes ..... Hydrophyllaceae

24. Bracts subtending the flowers; fruit a cluster of 4 nutlets..... ..... Boraginaceae

24. Bracts not as above or absent; fruit otherwise 25

25. Leaves simple, entire; calyx and corolla subtended by a pair of bracts; stamens inserted equally on the corolla; style 2-cleft ..... Convolulaceae

25. Leaves compound, or if simple, then deeply pinnately dissected; bracts absent; stamens inserted unequally on the corolla; style 3-parted ..... Polemoniaceae

26. Stamens 2 or 4; stamen filaments separate; fruit not a legume 27

26. Stamens 10; stamen filaments at least partially united; fruit a legume ..... Leguminosae

27. Stems usually square; leaves opposite, simple; stamens 2 or 4; style 2-parted ..... Labiatae

27. Stems round; leaves alternate or whorled, simple or compound; stamens 4; style 1, entire (corolla regular and stamens 5 in Verbascum) ..... Scrophulariaceae

28. Small trees or shrubs 29

28. Herbs 32

29. Plants dioecious, producing catkins ..... Salicaceae

29. Plants monecious or dioecious, not producing catkins 30

30. Fruit a double samara; stamens arranged on a disc ..... Aceraceae

30. Fruit not a samara; stamens not arranged on a disc 31

31. Plants dioecious; bractlets of flowers enlarge and surround the fruit; pistil not exerted nor plumose (Atriplex)..Chenopodiaceae

31. Plants monecious; bractlets absent; pistil long exerted and plumose on the mature fruit (Cercocarpus)..... Rosaceae

32. Perianth petaloid, usually highly colored 33

32. Perianth caylxlike 35

33. Perianth united; stems without swollen nodes 34

33. Perianth free; stems with swollen nodes (except Eriogonum)..... ..... Polygonaceae

34. Perianth funnelform or salverform, pink or purple; (ovary appears to be inferior); stamens 3-5; style not plumose..... ..... Nyctaginaceae

34. Perianth free, usually white or purple; stamens numerous; style plumose (Clematis) ..... Ranunculaceae

35. Ovary 3-loculed; plants with milky sap ..... Euphorbiaceae

35. Ovary 1- or many-loculed; plants without milky sap 36

36. Plants pubescent; leaves simple; stamens shorter than the sepals 37

36. Plants glabrous; leaves ternately compound; stamens much longer than the sepals (Thalictrum) ..... Ranunculaceae

37. Pubescence of stinging hairs; panicle 4-5 cm long ..... Urticaceae

37. Pubescence not of stinging hairs, often scurfy; panicle 1-3 cm long ..... Chenopodiaceae

38. Corolla present; flowers perfect or staminate flowers not in catkins and pistillate flowers not enclosed in scalelike bracts ..39

38. Corolla absent; staminate flowers in catkins; pistillate flowers solitary, enclosed with scalelike bracts ..... Fagaceae

39. Petals free 40

39. Petals united 44

40. Sepals and petals 4 41

40. Sepals and petals 5 42

41. Plants herbaceous; flowers axillary or in terminal racemes; stigmas 4-lobed ..... Onagraceae

41. Plants shrubby; flowers in corymbs; stigmas entire ..... Cornaceae

42. Stems hollow; flowers in umbels; stamens 5, inserted on a disc; styles 2 ..... Umbelliferae

42. Stems solid; flowers not in umbels; stamens 10 or more, not always inserted on a disc; style 1 43

43. Ovary partially inferior; petals attached on a hypanthium; stems without exfoliating bark ..... Saxifragaceae

43. Ovary inferior; petals not attached to a hypanthium; stems with white, exfoliating bark ..... Loasaceae

44. Plants parasitic on trees, dioecious; stems jointed; perianth calyxlike ..... Loranthaceae

44. Plants not parasitic, monoecious; stems not jointed; perianth differentiated 45

45. Stamens 5 46

45. Stamens 3-4 48

46. Stamens distinct; flowers not in heads 47

46. Stamens united by the anther; flowers in heads surrounded by involucres of phyllaries; head composed usually of ray and disc flowers ..... Compositae

47. Leaves alternate, simple; corolla campanulate; stamens adnate to the corolla and opposite the lobes; stigmas 3 ..... Campanulaceae

47. Leaves opposite, simple or compound; corolla rotate, funnelform or bilateral; stamens adnate to the corolla and alternate with the lobes; stigmas 1-5, seldom 3 ..... Caprifoliaceae

48. Leaves opposite; stipules absent; corolla 4-5 lobed; stigma 1 ..... Valerianaceae

48. Leaves whorled; stipules present, leaflike; corolla 3-4 parted; stigmas 1-4 ..... Rubiaceae

Rosaceae

1. Fruit a 1-seeded drupe ..... 1. Prunus

1. Fruit other than a 1-seeded drupe 2

2. Plants spiny 3

2. Plants unarmed 4

3. Fruit pomelike.....2. Rosa

3. Fruit a compound drupe ..... 3. Rubus

4. Plants shrubby 5

4. Plants herbaceous 7

5. Corolla present; styles usually not exerted at maturity 6

5. Corolla absent; style exerted at maturity ..... 4. Cercocarpus

6. Flowers in panicles; styles not exerted at maturity ... 5. Holodiscus

6. Flowers solitary; styles exerted at maturity .....6. Fallugia

7. Leaves trifoliate; fruit of many achenes imbedded on a fleshy receptacle ..... 7. Fragaria

7. Leaves digitately or pinnately compound; achenes not imbedded on a fleshy receptacle 8

8. Style persistent on the mature achene ..... 8. Geum

8. Style deciduous from the mature achene ..... 9. Potentilla

1. Prunus

1. Leaf base rounded..P. virginiana L. var. melanocarpa (A. Nels.) Sarg.

1. Leaf base acute ..... P. virens (Woot. & Standl.) Shreve.

2. Rosa

1. Stem prickles straight, slender ..... R. fendleri Crepin.

1. Stem prickles curved, stout 2

2. Fruit globose ..... R. arizonica Rydb.

2. Fruit ellipsoid ..... R. neomexicana Cockerell

3. Rubus

Rubus strigosus Michx.

4. Cercocarpus

Cercocarpus montanus Raf.

5. Holodiscus

Holodiscus dumosa (Nutt.) Heller.

6. Fallugia

Fallugia paradoxa (D. Don.) Endl.

7. Fragaria

1. Leaves toothed only at the apex ..... F. ovalis (Lehm.) Rydb.

1. Leaves toothed to below the middle ..... F. bracteata Heller.

8. Geum

Geum macrophyllum Willd.

9. Potentilla

1. Styles lateral ..... P. arguta Pursh.

1. Styles terminal 2

2. Inflorescence leafy; petals not longer than the sepals.....
..... P. norvegica L.

2. Inflorescence scapose; petals much longer than the sepals 3

3. Basal leaves pinnate; leaves sericeous beneath..... P. hippiana Lehm.

3. Basal leaves digitate; leaves tomentose beneath..P. pulcherrima Lehm.

Ranunculaceae

1. Fruit a berry ..... 1. Actaea

1. Fruit a follicle or achene 2

2. Fruit a follicle; petals long spurred ..... 2. Aquilegia

2. Fruit an achene; petals without spurs 3

3. Petals present, yellow ..... 3. Ranunculus

3. Petals absent 4

4. Sepals white or purple, longer than the stamens; achenes with plumose tails ..... 4. Clematis

4. Sepals green, shorter than the stamens; achenes absent..5. Thalictrum

1. Actaea

Actaea arguta Nutt.

2. Aquilegia

Aquilegia elegantua Greene

3. Ranunculus

1. Basal leaves rotund ..... R. inamoenus Greene

1. Basal leaves other than rotund 2

2. Basal leaves cordate or reniform, about 1.0-1.5 cm wide, 2 cm long or less; stem leaves, if present, deeply 3-parted 3

2. Basal leaves digitately tri-foliate ..... R. macounii Britton

3. Stem leaves absent ..... R. cymbalaria Pursh.

3. Stem leaves linear ..... R. cardiophyllus Hook.

4. Clematis

1. Flowers numerous, in cymes, white ..... C. drummondii Torr. & Gray

1. Flowers solitary, purple 2

2. Tails of the achenes 2.5-3.0 cm long, glabrous.....C. bigelovii Torr.

2. Tails of the achenes 4-5 cm long, plumose .....C. palmeri Rose

5. Thalictrum

Thalictrum fendleri Engelm.

Guttiferae

1. Hypericum

Hypericum formosum H.B.K.

Geraniaceae

1. Geranium

1. Petals white 2

1. Petals purple, rose-purple or lavender 4

2. Petals 7-9 mm long; pedicels glandular-villous without purple glands 3

2. Petals 12-20 mm long; pedicels glandular-villous with purple glands ..... G. richardsonii Fisch. & Trautv.

3. Stems and petioles glandular-villous; style column 20-24 mm long, glandular pubescent ..... G. lentum Woot. & Standl.

3. Stems and petioles slightly pilose; style column 15-18 mm long, pilose ..... G. wislizeni Wats.

4. Petals lavender ..... G. fremontii Torr.

4. Petals rose-purple 5

5. Pedicel short-pubescent ..... G. caespitosum James

5. Pedicel glandular-pubescent ..... G. eremophilum Woot. & Standl.

Caryophyllaceae

1. Sepals united; petals clawed, red ..... 1. Silene

1. Sepals distinct; petals without claws, white ..... 2. Stellaria

1. Silene

Silene laciniata Cav.

2. Stellaria

Stellaria longipes Goldie

Oxalidaceae

1. Oxalis

1. Petals yellow; bulbs absent ..... O. stricta L.

1. Petals pink; bulbs present ..... O. amplifolia (Trel.) Knuth.

Linaceae

1. Linum

Linum lewisii Pursh.

Ericaceae

1. Plants saprophytic; chlorophyll absent ..... 1. Pterospora

1. Plants not saprophytic; chlorophyll present 2

2. Plants small, leafy shrubs; petals united ..... 2. Vaccinium

2. Plants herbaceous; leaves basal; petals distinct 3

3. Flowers in racemes ..... 3. Pyrola

3. Flowers solitary ..... 4. Moneses

1. Pterospora

Pterospora andromedea Nutt.

2. Vaccinium

Vaccinium oreophilum Rydb.

3. Pyrola

1. Raceme secund; style straight ..... P. secunda L.

1. Raceme not secund; style reflexed ..... P. elliptica Nutt.

4. Moneses

Moneses uniflora (L.) Gray

Berberidaceae

1. Berberis

1. Stems spiny; leaves simple ..... B. fendleri Gray

1. Stems unarmed; leaves compound; leaflets hollylike.. B. repens Lindl.

Cruciferae

1. Fruit compressed perpendicular to the narrow partition 2

1. Fruit compressed parallel to the narrow partition 3

2. Plants glabrous; leaves simple; stem leaves not auriculate, clasping ..... 1. Thlaspi

2. Plants hirsute; basal leaves pinnatifid; stem leaves auriculate, not clasping ..... 2. Capsella

3. Fruit more than twice as long as wide; petals purple 4

3. Fruit less than twice as long as wide; petals white or yellow ..... 3. Draba

4. Herbage glaucose ..... 4. Sisymbrium

4. Herbage pubescent with stellate or forked hairs ..... 5. Arabis

1. Thlaspi

Thlaspi fendleri Gray

2. Capsella

Capsella bursa-pastoris (L.) Medic.

3. Draba

1. Plants perennial, tall and leafy 2

1. Plants annual, short and scapose 3

2. Fruit erect; style 0.5-1.5 mm long ..... D. aurea Vahl.

2. Fruit spreading; style 2-3.5 mm long ..... D. helleriana Greene

3. Flowers yellow ..... D. rectifructa C.L. Hitchc.

3. Flowers white ..... D. brachycarpa Nutt.

4. Sisymbrium

Sisymbrium linearifolium (Gray) Payson

5. Arabis

Arabis fendleri (Wats.) Greene

Capparidaceae

1. Cleome

Cleome serrulata Pursh.

Violaceae

1. Viola

1. Petals white ..... V. canadensis L.

1. Petals purple 2

2. Plants acaulescent; spur much less than one-half as long as the petal ..... V. nephrophylla Greene

2. Plants caulescent; spur more than one-half as long as the petal ..... V. adunca J.E. Smith

Leguminosae

1. Leaves palmately divided; anther size varying greatly .... 1. Lupinus

1. Leaves not palmately divided; anther size uniform 2

2. Leaves with tendrils 3

2. Leaves without tendrils 4

3. Style round, apically tufted, pubescent on all surfaces .... 2. Vicia

3. Style flat, not apically tufted, pubescent only on the inner surface ..... 3. Lathyrus

4. Leaves pinnately compound, appearing digitate; stem leaves often reduced; stamens flattened ..... 4. Lotus

4. Leaves pinnately compound, never appearing digitate; stem leaves not reduced; stamens rounded ..... 5. Astragalus

1. Lupinus

1. Plants annual or biennual 2

1. Plants perennial 3

2. Leaflets pubescent on the upper surface ..... L. concinnus Agardh. var. orcuttii (Wats.) C.P. Smith

2. Leaflets glabrous on the upper surface .. L. kingii Wats. var. kingii

3. Petals purple 4

3. Petals white ..... L. parishii Eastw. Williams

4. Leaflets glabrous on the upper surface..... 5

4. Leaflets pubescent on the upper surface 6

5. Keel and banner glabrous ..... L. ingratus Greene

5. Keel and banner pubescent ..... L. argenteus Pursh. var. argenteus

6. Stem pubescence appressed; flowers orbicular in lateral view ..... L. alpestris A. Nels.

6. Stem pubescence spreading; flowers narrow in lateral view ..... L. palmeri Wats.

2. Vicia

1. Flowers 20-25 mm long, purple ..... V. americana Muhl.

1. Flowers less than 12 mm long, cream ..... V. pulchella H.B.K.

3. Lathyrus

1. Tendrils rudimentary, not prehensile ..... L. arizonicus Britton

1. Tendrils well developed, prehensile ..... L. laetivirens Greene

4. Lotus

Lotus wrightii (Gray) Greene

5. Astragalus

1. Plants caulescent; leaflets glabrous; pods much inflated.....
..... A. allochrous Gray

1. Plants nearly acaulescent; leaflets pubescent; pods
not inflated ..... A. tephrodes Gray

Fumariaceae

1. Corydalis

Corydalis aurea Willd.

Plantaginaceae

1. Plantago

Plantago major L.

Gentianaceae

1. Gentiana

Gentiana affinis Griseb.

Primulaceae

1. Androsace

Androsace septentrionalis L.

Hydrophyllaceae

1. Phacelia

Phacelia magellanica (Lam.) Cov.

Boraginaceae

1. Corolla blue ..... 1. Mertensia

1. Corolla yellow 2

2. Plants puberulent; stigma bifid; nutlets attached by their
base to the receptacle ..... 2. Lithospermum

2. Plants puberulent with scattered long hairs; stigma entire, nutlets attached laterally to the receptacle..... 3. Cryptantha

1. Mertensia

Mertensia franciscana Heller

2. Lithospermum

Lithospermum cobrense Greene

3. Cryptantha

1. Plants coarse, perennial; nutlets smooth .. C. jamesii (Torr.) Payson

1. Plants slender, annual; nutlets rough .. C. micrantha (Torr.) Johnst.

Convolvulaceae

1. Convolvulus

Convolvulus incana Vahl.

Polemoniaceae

1. Leaves pinnately compound; corolla purple ..... 1. Polemonium

1. Leaves simple, entire or pinnately dissected; corolla red, lavender, or white 2

2. Leaves entire, opposite; corolla white; plants growing in matted clumps ..... 2. Phlox

2. Leaves pinnately dissected, basal or stem leaves alternate or both, corolla lavender or red; plants not growing in matted clumps .....3. Gilia

1. Polemonium

Polemonium foliosissimus Gray

2. Phlox

1. Inflorescence, stem, and calyx glandular ..... P. caespitosa Nutt.

1. Inflorescence, stem, and calyx glabrous .... P. austromontana Coville

3. Gilia

1. Flowers in an open panicle; corolla light blue; lower leaves entire, linear ..... G. laxiflora (Coult.) Osterh.

1. Flowers in a contracted panicle; corolla red; lower leaves pinnatifid with narrow segments ..... G. aggregata (Pursh.) Spreng.

Labiatae

1. Floral bracts often scarious, margins non-ciliate, very conspicuous but shorter than the corolla 2

1. Floral bracts herbaceous, margins ciliate, not as conspicuous..... ..... 1. Agastache

2. Floral bracts spine-toothed, hollylike, not clasping, glabrous; corolla barely exceeding the calyx ..... 2. Moldavica

2. Floral bracts entire, membranous, clasping, ciliate; corolla greatly exceeding the calyx .....3. Prunella

1. Agastache

1. Calyx 7 mm long or less; corolla tube 6 mm long or less, purple ..... A.wrightii (Greene) Woot. & Standl.

1. Caylx 8 mm long or longer; corolla tube 10-16 mm long, rose-purple .....

A. pallidiflora (Heller) Rydb. var. neomexicana (Briq.) Lint & Epling.

2. Moldavica

Moldavica parviflora (Nutt.) Britton

3. Prunella

Prunella vulgaris L.

Scrophulariaceae

1. Corolla regular; fertile stamens 5 ..... 1. Verbascum
1. Corolla irregular, sometimes appearing regular; fertile stamens 2 or 4 2
2. Stamens 2; corolla regular or nearly so ..... 2. Veronica
2. Stamens 4; corolla definitely bilateral..... 3
3. Leaves alternate 4
3. Leaves opposite 6
4. Caylx bright orange, red or tinged with orange; flowers in densely leafy spikes ..... 3. Castilleja
4. Caylx green; flowers not as above 5
5. Anther cells equal; leaves petioled ..... 4. Pedicularis
5. Anther cells unequal; leaves sessile ..... 5. Orthocarpus
6. Corolla yellow; stigma 2-lobed; stamens 4, all fertile ....6. Mimulus
6. Corolla not yellow; stigma entire; stamens 5, 1 sterile..7. Penstemon

1. Verbascum

Verbascum thapsus L.

2. Veronica

Veronica americana (Raf.) Schwein.

3. Castilleja

1. Plants annual or sometimes biennual 2
1. Plants perennial 3
2. Stem slender, weak, sparsely villous; upper leaves linear or nearly so; lower lip of corolla a different color than the upper lip ..... C. minor Gray

2. Stem stout, villous; upper leaves lanceolate; lower and upper lips of the same color ..... C. exilis A. Nels.

3. Bracts entire or nearly so 4

3. Bracts deeply incised ..... C. confusa Greene

4. Plants gray tomentose; corolla 3-4 cm long .....C. integra Gray

4. Plants with sparse spreading hairs; herbage green; corolla 2.5-3.0 cm long ..... C. austromontana Standl. & Blumer

5. Orthocarpus

Orthocarpus purpureo-albus Gray

6. Mimulus

Mimulus guttatus DC.

7. Penstemon

1. Corolla red ..... P. barbatus (Cav.) Roth.

1. Corolla some shade of blue or purple 2

2. Leaves linear, 30 mm long or less ..... P. linarioides Gray

2. Leaves not linear, longer than 30 mm 3

3. Inflorescence glandular, not secund; corolla without conspicuous purple lines 4

3. Inflorescence never glandular, secund; corolla violet-blue or lavender with deep purple lines ..... P. virgatus Gray

4. Basal leaves not purple-tinged; stem leaves oblanceolate; corolla rose-purple to brown-purple ..... P. whippleanus Gray

4. Basal leaves purple-tinged; stem leaves linear-lanceolate; corolla mostly blue with the upper portion purple..... ..... P. oliganthus Woot. & Standl.

Salicaceae

1. Dormant bud scales several; stamens 15 or more ..... 1. Populus

1. Dormant bud scales 1; stamens 10 or less ..... 2. Salix

1. Populus

Populus tremuloides Michx.

2. Salix

1. Petioles 3 mm long or less ..... S. exigua Nutt.

1. Petioles more than 3 mm long 2

2. Leaf blades less than 4 times as long as broad, oblanceolate.....

..... S. bebbiana Sarg.

2. Leaf blade more than 4 times as long as broad, lanceolate.....3

3. Twigs glaucose, purple ..... S. irrorata Anders.

3. Twigs never glaucose, brown or reddish-brown.....

..... S. lutea Nutt. var. ligulifolia Ball.

Aceraceae

1. Acer

Acer glabrum Torr.

1. Leaves 3-lobed ..... var. typicum (Wesmael) Keller

1. Leaves 3-parted ..... var. neomexicanum (Greene) Kearney & Peebles

Chenopodiaceae

1. Plants shrubby, dioecious ..... 1. Atriplex

1. Plants herbaceous, monoecious 2

2. Leaves narrow, spine-tipped; stem much branched ..... 2. Salsola

2. Leaves rhombic, not spine-tipped; stems sparsely branched 3

3. Leaves narrow, pilose or villous; upper leaves of the

inflorescence not reduced ..... 3. Kochia

3. Leaves deltoid, scurfy;upper leaves of the inflorescence reduced .....4. Chenopodium

1. Atriplex

Atriplex canescens (Pursh.) Nutt.

2. Salsola

Salsola kali L.

3. Kochia

Kochia scoparia (L.) Schrad.

4. Chenopodium

1. Seeds wrinkled; leaves deltoid to rhombic, not longer than wide ..... C. watsoni A. Nels.

1. Seeds smooth; leaves linear to rhombic, longer than wide 2

2. Leaves linear ..... C. leptophyllum Nutt.

2. Leaves rhombic ..... C. fremontii Wats.

Polygonaceae

1. Stems with swollen joints 2

1. Stems without swollen joints ..... 1. Eriogonum

2. Perianth 6-parted, the 3 inner segments becoming enlarged with the mature fruit; styles 3 ..... Rumex

2. Perianth 5-parted, often enclosing the fruit but the inner segments not enlarging; style 1 ..... 3. Polygonum

1. Eriogonum

1. Plants annual; woody caudex absent ..... E. rotundifolium Benth.

1. Plants perennial; woody caudex present 2

2. Perianth yellow; achenes winged ..... E. alatum Torr.

2. Perianth cream or pink; achenes not winged 3

3. Flowers in cymes; bracts of the inflorescence not similar to the basal leaves; plants villous ..... E. jamesii Benth.

3. Flowers in racemes; bracts of the inflorescence similar to the basal leaves; plants tomentose ..... E. racemosum Nutt.

2. Rumex

1. Stems with axillary branches; leaves lanceolate, valves of the fruit with callosities ..... R. triangulivalvis (Danser) Rech.

1. Stem simple; leaves cordate; valves of the fruit without callosities ..... R. occidentalis Wats.

3. Polygonum

Polygonum sawatchense Small

Nyctaginaceae

1. Perianth 6-7 mm long, surrounded by a 3-parted involucre; bracts of the involucre 2.5-3.0 mm long ..... 1. Oxybaphus

1. Perianth 9-38 mm long, surrounded by a 4-5-parted involucre; bracts of involucre 12-28 mm long ..... 2. Mirabilis

1. Oxybaphus

1. Leaves linear; stem villous-glandular; perianth pubescent ..... O. linearis (Pursh) Robins

1. Leaves lanceolate; stem glabrous or nearly so; perianth glabrous ..... O. comatus (Small) Weatherby

2. Mirabilis

1. Perianth 9-10 mm long, 3-flowered ..... M. oxybaphoides Gray

1. Perianth 35-38 mm long, 4- or more flowered..... ..... M. multiflora (Torr.) Gray

Euphorbiaceae

1. Euphorbia

Euphorbia serpyllifolia Pers.

Urticaceae

1. Urtica

Urtica gracilis Ait.

Fagaceae

1. Quercus

1. Leaves deeply incised with narrow lobes ..... Q. gambelii Nutt.

1. Leaves shallowly crenately lobed ..... Q. undulata Torr.

Onagraceae

1. Corolla 3-6 mm long, purple ..... 1. Epilobium

1. Corolla 15-40 mm long, white or yellow .....2. Oenothera

1. Epilobium

1. Inflorescence glandular ..... E. adenocaulon Hausskn.

1. Inflorescence puberulent, never glandular... E. californicum Hausskn.

2. Oenothera

Oenothera albicaulis Pursh.

Cornaceae

1. Cornus

Cornus stolonifera Michx.

Umbelliferae

1. Corolla white; fruit terete; pedicel glabrous at the base of the umbel ..... 1. Ligusticum

1. Corolla purple, orange, or yellow; fruit flattened; pedicel pubescent at the base of the umbel ..... 2. Pseudocymopterus

1. Ligusticum

Ligusticum porteri Coult. & Rose

2. Pseudocymopterus

Pseudocymopterus montanus (Gray) Coult. & Rose

Saxifragaceae

1. Plants shrubby; fruit a berry ..... 1. Ribes

1. Plants herbaceous; fruit a follicle 2

2. Plants scapose; leaves simple, shallowly palmately lobed; flowers pink, in racemes ..... 2. Heuchera

2. Plants caulescent; leaves simple, linear; flowers white, in panicles .....3. Saxifraga

1. Ribes

1. Branches spiny at the nodes 2

1. Branches without spines at the nodes ..... R. inebrians Lindl.

2. Fruit spiny; leaves 3-4 cm wide; nodal spines thick and curved ..... R. pinetorum Greene

2. Fruit unarmed; leaves 1.0-2.5 cm wide; nodal spines slender and straight 3

3. Fruit red, glandular-bristly; branches with numerous clustered spines ..... R. montigenum McClatchie

3. Fruit red-purple or reddish-black, glabrous; branches sparsely spiny at the nodes ..... R. leptanthum Gray

2. Heuchera

Heuchera vericolor Greene

3. Saxifraga

Saxifraga bronchialis L.

Loasaceae

1. Mentzelia

Mentzelia pumila (Nutt.) Torr & Gray

Loranthaceae

1. Phoradendron

Phoradendron juniperinum Engelm.

Compositae

1. Flowers all hermaphroditic; corolla straplike, 5-toothed 2

1. Flowers not all hermaphroditic; hermaphroditic flowers, when present, tubelike, regular; ray flowers, if present, 2- or 3-toothed, pistillate or neutral 6

2. Pappus of plumose bristles; leaves grasslike .....1. Tragopogon

2. Pappus of capillary bristles; leaves broader 3

3. Achenes beaked 4

3. Achenes not beaked 5

4. Phyllaries in 2 unequal series; achenes 4-5 ridged ..... 2. Taraxacum

4. Phyllaries in several graduated series; achenes 10-15 ridged ..... 3. Agoseris

5. Leaves often in basal rosettes; phyllaries thickened; pappus white ..... 4. Crepis

5. Leaves not in basal rosettes; phyllaries not thickened; pappus brownish ..... 5. Hieracium

6. Ray flowers present; pappus present or absent 7

6. Ray flowers absent or vestigial; pappus present or absent 22

7. Pappus of capillary bristles 8

7. Pappus otherwise 12

8. Rays white, pink, or purple 9

8. Rays yellow or orange 10

9. Phyllaries graduated; rays usually broad ..... 6. Aster

9. Phyllaries equal; rays usually narrow ..... 7. Erigeron

10. Phyllaries in 1 equal series, often subtended by bractlets; style tips truncate ..... 8. Senecio

10. Phyllaries in several graduated series, not subtended by bractlets; style tips not truncate 11

11. Heads 2-5 mm long, numerous, in panicles or cymes ..... 9. Solidago

11. Heads 7-18 mm long, few, not in panicles or cymes....10. Haplopappus

12. Pappus of awns, squamella or paleae 13

12. Pappus absent 20

13. Rays pistillate ..... 11. Verbesina

13. Rays neutral 14

14. Achenes thickened 15

14. Achenes compressed 16

15. Pappus of scarious, deciduous awns; disc flowers brown..... ..... 12. Helianthus

15. Pappus of 2 persistent awns and short squamellae; disc flowers yellow ..... 13. Viguiera

16. Phyllaries in graduated series 17

16. Phyllaries equal or in 2 unequal series 18

17. Heads 1.5-4.0 mm wide, clustered; leaves linear .....14. Gutterrizia

17. Heads 15 mm wide, not clustered; leaves lanceolate..15. Helianthella

18. Rays persistent and papery 19

18. Rays not persistent nor papery ..... 16. Helenium

19. Rays 3-5, as long as wide; achenes linear and glabrous.....
..... 17. Psilostrophe

19. Rays 10 or more, longer than wide; achenes triangular
and hirsute ..... 18. Hymenoxys

20. Leaves opposite 21

20. Leaves alternate, broad, dissected ..... 19. Bahia

21. Leaves entire; rays sessile, persistent ..... 20. Zinnia

21. Leaves finely dissected; rays not sessile, not persistent.....
..... 21. Achillea

22. Pappus present 23

22. Pappus absent .....22. Artemisia

23. Pappus of capillary bristles 24

23. Pappus of awns or scales or both .....23. Pericome

24. Receptacle bristly; phyllaries spiny .....24. Cirsium

24. Receptacle not bristly; phyllaries not spiny 25

25. Plants dioecious, small, tomentose; basal leaves a rosette;
stem leaves much reduced; phyllaries scarious ..... 25. Antennaria

25. Plants monoecious, larger; basal leaves usually not in a
rosette; stem leaves not reduced; phyllaries herbaceous, at
least in the center 26

26. Plants shrubby 27

26. Plants herbaceous 28

27. Phyllaries 4-7, length equal; leaves 4-10 mm long ... 26. Tetradymia

27. Phyllaries more than 7, length unequal, in distinct vertical ranks; leaves 10-35 mm long ..... 27. Chrysothamnus

28. Pappus plumose ..... 28. Brickellia

28. Pappus not plumose 29

29. Outer flowers pistillate; center flowers hermaphroditic; corolla whitish ..... 29. Conyza

29. All flowers hermaphroditic (unless rays are present); corolla yellow ..... 30. Grindelia

1. Tragopogon

Tragopogon pratensis L.

2. Taraxacum

Taraxacum officinale Weber.

3. Agoseris

1. Beak of achene stout, less than one-half the length of the body ..... A. glauca (Pursh.) D. Dietr.

1. Beak of achene slender, more than one-half the length of the body ..... A. aurantiaca (Hook) Greene

4. Crepis

1. Plants glabrous, glaucous; usually scapose .... C. glauca (Nutt.) Torr. & Gray

1. Plants pubescent; stem leafy ..... C. occidentalis Nutt.

5. Hieracium

Hieracium fendleri Schultz. Bip.

6. Aster

1. Plant with a woody caudex; leaves 1 cm or less long, linear, strigose ..... A. arenosus (Heller) Blake

1. Plants not from a woody caudex; leaves much longer, grasslike.....
.....A. pauciflorus Nutt.

7. Erigeron

1. Plants 30 cm tall or more; heads 1 cm wide or more..... 2
1. Plants less than 30 cm tall; heads less than 1 cm wide 3
2. Inflorescence stem leafy ..... E. superbus Greene
2. Inflorescence stem naked ..... E. formosissimus Greene
3. Pubescence spreading; plants without runners 4
3. Pubescence appressed; plants with runners ..... E. flagellaris Gray
4. Plants annual or biennual; ray flowers drying blue.....
..... E. divergens Torr. & Gray
4. Plants perennial; ray flowers drying white or pink.....
..... E. concinnus (Hook & Arm.) Torr & Gray

8. Senecio

1. Leaves with linear lobes ..... S. longilobus Benth.
1. Leaves deeply pinnatifid, entire, or toothed..... 2
2. Leaves pinnatifid; upper leaves reduced; plants tomentose.....
..... S. uintahensis A. Nels.
2. Leaves entire or toothed; upper leaves not always reduced;
plants glabrous or tomentose 3
3. Plants glabrous and glaucose; leaves clasping .... S.wootonii Greene
3. Plants tomentose; leaves not clasping ..... S. neomexicanus Gray

9. Solidago

1. Stems glabrous ..... S. decumbens Greene
1. Stems pubescent 2

2. Leaves 1-nerved; heads not secund ..... S. pallida (Porter) Rydb.

2. Leaves 3-nerved; heads secund ..... S. canadensis L.

10. Haplopappus

Haplopappus parryi Gray

11. Verbesina

Verbesina encelioides (Cav.) Benth & Hook

12. Helianthus

Helianthus annuus L.

13. Viguiera

1. Plants perennial ..... V. multiflora (Nutt.) Blake

1. Plants annual ..... V. longifolia (Robins & Greene) Blake

14. Gutierrezia

Gutierrezia sarothrae (Pursh.) Britt. & Rusby.

15. Helianthella

Helianthella parryi Gray

16. Helenium

Helenium hoopesii Gray

17. Psilostrophe

Psilostrophe tagetina (Nutt.) Greene

18. Hymenoxys

Hymenoxys richardsoni (Hook.) Cockerell

19. Bahia

Bahia dissecta (Gray) Britton

20. Zinnia

Zinnia grandiflora Nutt.

21. Achillea

Achillea lanulosa Nutt.

22. Artemisia

1. Leaves entire or once pinnatifid 2
1. Leaves twice pinnatifid 3
2. Leaves linear, entire, usually glabrous .... A. dracunculoides Pursh.
2. Leaves broader, toothed or pinnately lobed, tomentose .....
..... A. ludoviciana Nutt.
3. Leaves pubescent beneath, green on upper surface and silvery
beneath ..... A. franserioides Greene
3. Leaves pubescent on both surfaces, green on both surfaces .....
..... A. pacifica Greene

23. Pericome

Pericome caudata Gray

24. Cirsium

1. Corolla greenish-yellow ..... C. parryi (Gray) Petrak.
1. Corolla purple or pink 2
2. Heads 4-6 cm wide; prickles of leaves and phyllaries stout
and stiff ..... C. ochrocentrum Gray
2. Heads less than 4 cm wide; prickles of leaves and phyllaries
slender and flexible 3
3. Corolla purple-tipped or yellowish; heads several per stem .....
..... C. drummondii T. & G.
3. Corolla purple; head 1 per stem ..... C. wheeleri (Gray) Petrak

25. Antennaria

Antennaria aprica Greene

26. Tetradymia

Tetradymia canescens DC.

27. Chrysothamnus

1. Stems glabrous or nearly so .....C. pulchellus (Gray) Greene

1. Stems densely tomentose ..... C. nauseosus (Pall.) Britton

28. Brickellia

1. Tips of outer phyllaries scarious, acute ..... B. fendleri Gray

1. Tips of outer phyllaries herbaceous, long and slender .....

..... B. grandiflora (Hook) Nutt.

29. Conyza

Conyza coulteri Gray

30. Grindelia

Grindelia aphanactis Rydb.

Campanulaceae

1. Campanula

Campanula rotundifolia L.

Caprifoliaceae

1. Leaves simple; flowers in axillary pairs 2

1. Leaves pinnately compound; flowers in cymes .....1. Sambucus

2. Corolla regular, funnelform; berry white, not subtended by bracts ..... 2. Symphoricarpos

2. Corolla irregular, not funnelform; berry black, subtended by conspicuous bracts ..... 3. Lonicera

1. Sambucus

Sambucus racemosa L.

2. Symphoricarpos

1. Plants erect; veins conspicuous on upper leaf surface .....
.....S. utahensis Rydb.

1. Plants decumbent; veins obscure on upper leaf surface .....
..... S. palmeri G.N. Jones

3. Lonicera

Lonicera involucrata (Richards) Banks

Valerianaceae

1. Valeriana

Valeriana acutiloba Rydb.

Rubiaceae

1. Galium

Galium aparine L.

CONCLUSIONS

The plant species studied have indicated that Mount Taylor is a xeric mountain. There is a predominance of xerophytic species over mesophytic species. One explanation for the prevailing dry conditions is the relatively small mountain mass which renders little protection from drying winds and evaporation. Also, the soil is thin and the substratrum appears to be somewhat porous so that surface water soon disappears.

Equivalent life zones begin at least 500 ft higher on this mountain than they normally do on similar mountains in central and north-central New Mexico. The Canadian Zone (8700-9500 ft), usually an important life zone in mountains of New Mexico, is very restricted and greatly altered because Abies concolor is not present. Pinus ponderosa, typical of the Transition Zone, is found on dry south- and southwest-facing slopes at 9800-10,000 ft. In central New Mexico the lower part of the Subalpine Zone usually occurs at this elevation. Pinus edulis, characteristic of the Upper Sonoran Zone, grows on the east-facing ridge above Water Canyon up to 10,500 ft, an elevation that is usually associated with the Subalpine Zone. Thus the zones on Mount Taylor are highly irregular.

The writer began this study with the unverified presumption that there would be a predominance of species with southern affinities over those species with northern affinities because of the xeric conditions on Mount Taylor. This investigation has shown this presumption to be erroneous. Most of the species growing on Mount Taylor are common in mountainous areas of both northern and southern New Mexico. Of the

26 species that do show definite affinities, those with northern affinities outnumber those with southern affinities ten to three.

Relatively few taxa are present on Mount Taylor when compared to other similar mountainous areas in New Mexico. There are several unusual gaps in the flora. Especially noticeable is the absence of the climax species Abies concolor and Pinus flexilis. The limited flora on Mount Taylor may be an influencing factor upon a limited fauna in this mountain (Schroeder, 1961).

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