

FLORA AND PHYTOGEOGRAPHY OF THE BODIE HILLS  
OF MONO COUNTY, CALIFORNIA  
AND MINERAL COUNTY, NEVADA, USA

by

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A Thesis

Presented to

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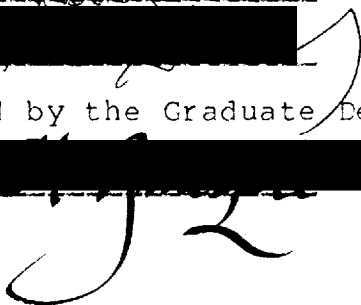
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We certify that we have read this study and that it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Arts.

 Major Professor

  
  
  
Approved by the Graduate Dean  
  


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## ABBREVIATIONS

BP	before present
C	Celcius (degrees)
ca.	circa (approximately)
CA	California
Ck.	Creek
cm	centimeter(s)
Cn.	Canyon
dm	decimeter(s)
ft	feet
Mdw.	Meadow
mi	mile(s)
mm	millimeter(s)
Mt.	Mount
Mtn.	Mountain
MY	million years
NV	Nevada
Pk.	Peak
sect.	section
ssp.	subspecies
subg.	subgenus
var.	variety
vs.	versus (as opposed to)

For the abbreviations of author's names, consult Munz (1959: 1551-1576).

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## INTRODUCTION

This thesis presents a flora of the vascular plants of the Bodie Hills, a small mountain range adjacent to the Sierra Nevada on the western edge of the Great Basin. Keys are provided for the identification of all taxa, and voucher specimens are cited. It also presents a discussion of the region's phytogeography, based on a review of historical events and an analysis of present distributional patterns in the flora.

The Bodie Hills are of floristic and biogeographic interest for a variety of reasons. They have been briefly visited several times in the past by botanical collectors, but the area has never been subjected to intensive floristic scrutiny. They are an area in which two major floristic elements (Sierran and Great Basin) have intermingled under the influence of frequent and rapid geological and climatic changes since the Pliocene. The range also lies in an area of high neoendemism among plant species (Stebbins & Major 1965). Although numerous rare plants had been reported from the area prior to the beginning of this study, the distribution and status of all were poorly known.

Here, as elsewhere, there are increasing threats to the



integrity of the natural vegetation. It is hoped that the present study will facilitate the protection and management of this resource as well as contribute to the floristic knowledge of eastern California and the western Intermountain Region.

## Description of the Study Area

### Physiography

The Bodie Hills are a range of low mountains and large hills east of the central portion of California's Sierra Nevada Mountains, on the western edge of the Great Basin (Fig. 1). The range is a roughly triangular area between  $38^{\circ}04'$  and  $38^{\circ}25'$  north latitude; and  $118^{\circ}46'$  and  $119^{\circ}14'$  west longitude. Approximately two-thirds of the area is in Mono County, California. Except for a very small area in Lyon County, Nevada, in the extreme north, the remaining third is in Mineral County, Nevada. The area is covered by four U. S. Geological Survey topographic quadrangles in the 15-minute (1:62,500) series: Aurora (NV/CA), Bodie (CA), Bridgeport (CA/NV), and Trench Canyon (CA/NV). It is also

found on the Topaz Lake (NV/CA) map in the 1:250,000 series.

Immediately south of the Bodie Hills is Mono Basin, containing Mono Lake (about 6400 ft above sea level). To the west lies Bridgeport Valley (6500 ft) and the town of Bridgeport. Between these two depressions the southwest corner of the thesis area is joined to the Sierra Nevada by Conway Summit at 8140 ft. The canyon of the East Walker River separates the Bodie Hills from the Sweetwater Mountains to the northwest and from the Bald Mountain - Pine Grove Hills area to the north. To the northeast Mud Spring Valley separates the Bodie Hills from the southern Wassuk Range. To the southeast the Bodie Hills are separated from the Anchorite Hills by Alkali Valley and from Cedar Hill by Trench Canyon.

As a topographic unit, the Bodie Hills encompass about 390 square miles of terrain. Elevations within this area range from 6000 ft, in the far north, to 10,236 ft, with most of the country being between 7000 and 9000 ft. Six prominent peaks exceed 9000 ft. These are in descending order: Potato Peak (10,236 ft), Bodie Mountain (10,195 ft), the Brawley Peaks (middle summit 9545 ft, east and west summits ca. 9450 ft), Mount Hicks (9413 ft), Masonic Mountain (east summit 9217 ft, west summit ca. 9150 ft), and Beauty Peak (9018 ft). A prominent north-south axis through the

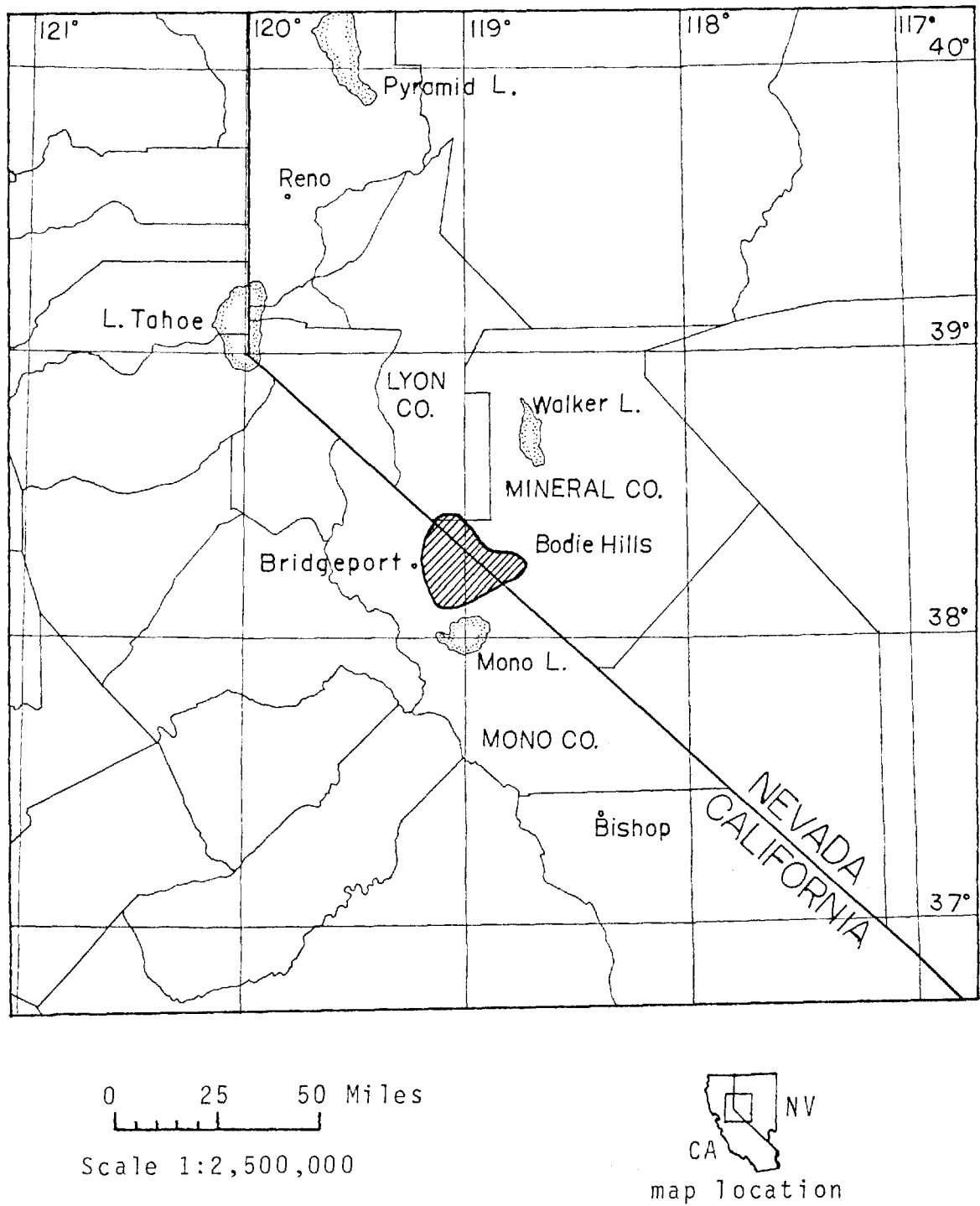
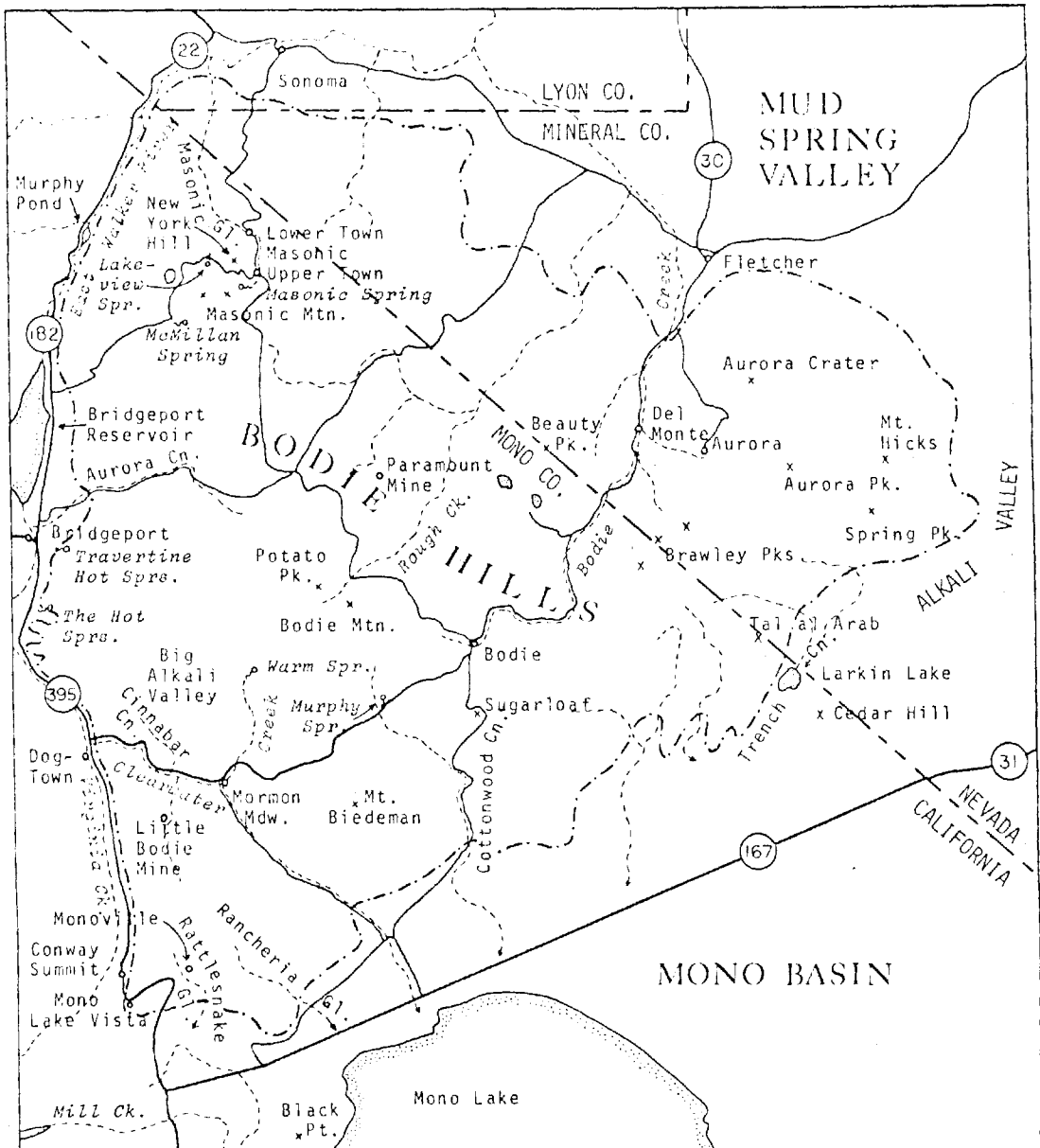


Figure 1. Map showing location of the thesis study area.



0 5 10 Miles

0 5 10 Kilometers

Scale approx. 1:203,600

- Thesis Area Boundary
- Paved Roads
- - - Unpaved Roads
- - - Streams & Rivers
- - - State Boundary
- - - County Boundary

Figure 2. Map of the Bodie Hills.



Fig. 3. Bodie from the northeast on Geiger Grade. Mono Basin and White Mountains in distance.



Fig. 4. Bodie Mountain (north slope) from Geiger Grade.



Fig. 5. Potato Peak from north slope of Bodie Mountain.  
Hulsea algida in foreground.



Fig. 6. Clearwater Canyon.



Fig. 7. Mormon Meadow.

center of the Bodie Hills is created by (north to south) Masonic Mountain, Potato Peak and Bodie Mountain.

There are two principal watersheds in the Bodie Hills. The southern periphery drains into Mono Basin, while the central and northern areas (divided into eastern and western components by the Masonic Mountain - Bodie Mountain axis) drains into the East Walker River and thence to Walker Lake. There are many streams in the area. Most are intermittent, however, and even the largest may become sluggish or stagnant in the late summer. The larger streams include Rough Creek, draining northeastward from Potato Peak and Bodie Mountain; Clearwater Creek, draining southwestward from the same two peaks; and Bodie Creek, which arises above the town of Bodie and flows through the east-central Bodie Hills. Springs of various sizes occur throughout the range. In addition to those shown on the topographic maps are many perennial seeps. Two sets of hot springs near Bridgeport are heavily mineralized. A small lake near the Chemung Mine at the northwest base of Masonic Mountain retains water throughout the year, but is much reduced in size by late summer. A pair of playas southwest of Beauty Peak dry out completely in most years.

The exact boundaries of the thesis area are as follows (cf. Fig. 2): The southern edge conforms roughly to the 7000



ft contour. It is defined by the northern limits of the lacustrine deposits (and their accompanying distinct vegetation) of Mono Basin, Trench Canyon and Alkali Valley. The western boundary is defined by the eastern shoulders of Highways 395 and 182 and toward the north by the eastern edge of the riparian vegetation along the East Walker River. Minor deviations occur mainly near Bridgeport, where the meadow vegetation east of Highway 395 is excluded. Valley and riparian habitats occurring along the western boundaries and not representative of the Bodie Hills proper have been strictly excluded from the flora. The northern and northeastern boundaries are vague, as there are no clear physical or vegetational discontinuities between the Bodie Hills and the adjacent valleys. They conform roughly to the 6000 ft contour in Lyon County and the 6400 ft contour in Mineral County, and generally exclude areas below the pinyon-juniper forest. Unavoidably there is some mingling of valley and hills species here. The extreme eastern boundary follows the road from Mud Spring to Alkali Lake.

#### Climate and Weather

The Great Basin is a temperate, continental zone of semiaridity. In the summer and fall, it experiences a long period of drought, resulting mainly from the rain shadow ef-

fect of the Sierra Nevada. Winters are very cold, due to the basin's generally high altitude and its separation from the ameliorating influences of an ocean. The climate is more arid than that of true steppes, such as those of easternmost Europe, but less arid than deserts such as the Mojave, and is therefore transitional between the two (Walter 1979). The climate of the Bodie Hills is also transitional in a third important dimension. Situated as they are so close to the Sierra Nevada, they occasionally experience weather systems centered in a different climatic region -- high mountains in a Mediterranean zone. The Bodie Hills also experience frequent strong, gusty winds which rush down the east side of the Sierra Nevada and across the adjacent Great Basin.

A summary of climatic conditions for both Bodie and Bridgeport is presented in Tables 1 and 2. These data are compiled from U. S. Weather Bureau annual summaries for the years 1965 through 1979, a fifteen year period (U. S. Weather Bureau 1966-1980). The average maximum summer daytime temperatures are actually somewhat higher than those indicated in the table -- perhaps 6 to 10 C higher in both places. This discrepancy is due to the fact that observations at both stations were recorded at 5:00 p.m., three to four hours after the warmest temperatures of the day.

The salient features of these data are as follows. The

Table 1. Climatic averages for Bodie and Bridgeport,  
1965-1979.

	Jan	Mar	May	Jul	Sep	Nov	Ann
Temperature (°C)							
Bodie							
Mean	-5.4	-2.3	5.2	13.2	8.7	-0.8	2.8
Bridgeport							
Mean	-4.2	0.6	1.8	15.7	10.9	1.4	5.2
Precipitation (mm)							
Bodie							
Mean	55	37	18	34	15	36	369
S.D.	46	32	15	27	18	38	121
Bridgeport							
Mean	41	22	10	16	12	31	245
S.D.	49	21	12	15	13	31	81

Table 2. Mean annual temperature extremes (°C).

	Low	High
Bodie	-30.1	29.6
Bridgeport	-30.7	32.5

mean July temperatures (at 5:00 p.m.) for Bodie and Bridgeport are 13.2°C and 15.7°C respectively, with summer heat waves reaching an average of 29.6°C and 32.5°C respectively. Mean January temperatures (again at 5:00 p.m.) are -5.4°C in Bodie and -4.2°C in Bridgeport. Winter cold waves average -30.1°C and -30.7°C respectively.

Precipitation is extremely variable, not only from month to month, but also in annual totals. Yearly precipitation consistently averages higher in Bodie (36.9 cm) than Bridgeport (24.5 cm). Seasonal precipitation comes mostly in the winter as snow and remains unavailable to the soils and plants until the spring thaw. The variability indicated by the high standard deviations is somewhat misleading. It indicates not so much a variation in the amount of storm activity as the restricted influence of each storm. Summer storms in the Bodie Hills are generally not as frequent as those in the high Sierra and are often quite localized.

## Vegetation

The vegetation of the Bodie Hills can be divided into two very general types based upon Küchler's (1977) classification of the natural vegetation of California. One is the juniper-pinyon woodland, dominated by species of Juniperus

and Pinus. The other is sagebrush steppe, dominated by species of Artemisia and Agropyron. Within and in addition to these broad categories a very large number of alliances and associations could be described if one were to analyze the vegetation in detail. Such was not the intent of this study, however, so I shall restrict my comments on vegetation to brief discussions of the dominant and more notable, rather than attempt a comprehensive classification.

### Shrub Vegetation

Kuchler's sagebrush-steppe is the most widespread vegetation type in the Bodie Hills. Within it one can easily recognize three types based upon the species of sagebrush involved. Most widespread is that dominated by the big sagebrush or basin sagebrush, Artemisia tridentata. It occurs on well drained soils of a rocky, loamy or sandy consistency. Species composition varies widely with changes in moisture, exposure and elevation. Shrubs or subshrubs which are commonly codominant with with A. tridentata include the following: Chrysothamnus nauseosus, C. viscidiflorus, Eriogonum microthecum, E. umbellatum, Leptodactylon pungens, Lupinus andersonii, L. caudatus, Purshia tridentata, Symphoricarpos oreophilus, and Tetradymia canescens. Occasionally one of these species will assume dominance over A. tridentata in a small area, but the sagebrush is rarely excluded.

A second type of sagebrush vegetation is that dominated by Artemisia cana. Structurally this plant is much like A. tridentata, so that from a distance the two species may not be distinguishable; but A. cana occurs in a different and much more restricted habitat. It is found only around the margins of moist to dry, subalkaline meadows, and often forms a narrow, irregular band of vegetation transitional between the meadow and A. tridentata. Codominants include other species tolerant of moisture and alkalinity, such as Chrysothamnus nauseosus and Elymus triticoides. Here, too, one may find such infrequent annuals as Hymenolobus procumbens and Monolepis spathulata.

The third and perhaps most distinctive type of sagebrush vegetation is that dominated by low sagebrush, Artemisia nova. This species is also very selective as to substrate, but has its habitat very widely distributed, mostly on upper slopes and crests. It grows on soils which are predominantly clay mixed with large amounts of gravel- to cobble-sized rocks. It is a vegetation very rich in species, with the composition again varying with moisture, exposure and elevation. The usual codominants include Arenaria aculeata, Aster scopulorum, Castilleja chromosa, Chrysothamnus viscidiflorus ssp. puberulus, Erigeron aphanactis, E. clokeyi, Leptodactylon pungens, Poa sandbergii and Trifolium andersonii. One also finds here the greatest vari-

ety of geophytes, including Allium anceps, A. atrorubens, Lewisia rediviva and Muilla transmontana. The commonest annuals include Calyptridium pygmaeum, Gayophytum diffusum, Layia glandulosa, Linanthus septentrionalis and Navarretia breweri.

Two other shrubby vegetation types occurring within the sagebrush-steppe zone deserve mention. Neither is dominated by sagebrush. The first of these is characterized by winter-fat, Ceratoides lanata and occurs infrequently on isolated dry, rocky hilltops and upper slopes. Codominants commonly include Erigeron clokeyi and Senecio canus, and rarely the spiny sagebrush, Artemisia spinosa.

The other shrubby non-sagebrush type is characterized by Haplopappus suffruticosus, and is much more widespread. Throughout the range there are many dozens of sites where snow accumulates to a depth of several m on the lee side of a hill or ridge. Since this is usually also the north or northeast side, the snowbank persists late into the spring. The habitat is thus much colder and moister than in the surrounding sagebrush. Frequently these snow accumulation sites are also places where sandy volcanic ash has accumulated from Pleistocene volcanic activity to the south of Mono Lake. In snow accumulation sites which are also sandy, Lupinus meionanthus is usually codominant with H.

suffruticosus.

Evergreen Woodlands

While sagebrush-steppe dominates the interior of the Bodie Hills, Kuchler's juniper-pinyon woodland typifies most of the periphery. It would be more appropriate to call it a pinyon-juniper woodland in this area, though, since the single-leaf pinyon, Pinus monophylla is dominant over Utah juniper, Juniperus osteosperma, in most parts of the range. Coverage by these two trees is usually less than 50%, allowing shrubs to dominate much of the intervening space. Most commonly these include Artemisia tridentata, Chrysothamnus nauseosus, C. viscidiflorus, Ephedra viridis, Grayia spinosa, Purshia tridentata and Tetradymia canescens.

In addition to the widespread pinyon-juniper woodland, there are three more evergreen woodlands of very localized occurrence. Most noticable are the small, isolated stands of Jeffrey pine, Pinus jeffreyi, which are scattered throughout the range. Nearly all of them are restricted to sandy, light-colored soils derived from the weathering of hydrothermally altered andesites. Associated species are few in number and the groundcover is very sparse. These stands appear to be similar to the disjunct groves of Jeffrey pine described by Billings (1950) from the Virginia Range near



Reno, Nevada. Billings concluded that the surrounding sagebrush vegetation was unable to succeed on these soils because of "pronounced multiple nutrient deficiencies coupled with extreme acidity." The Jeffrey pine, which is normally a Sierran species, survives here only by virtue of the improved water-holding capacity of these sandy soils and the tree's tolerance of acidity and nutrient deficiencies.

Less common in the Bodie Hills are stands of limber pine, Pinus flexilis. They are found only on Brawley Peaks (the easternmost of the three), on Mount Hicks, just south of Mount Hicks, and on Bodie Mountain. Their tolerance of wind and desiccation allow them to occupy exposed sites on ridges and high slopes. On east Brawley Peak they form two large groves just below the summit. Around Mount Hicks there are a few smaller groves. On Bodie Mountain there are only two or three individuals on the ridge running eastward from the summit at 10,000 ft. Characteristic associates within the larger groves include the shrubs Haplopappus suffruticosus and Ribes cereum, the herb Lupinus laxiflorus and the grass Poa nervosa.

Even more restricted in the Bodie Hills is the lodgepole pine, Pinus contorta. This tree persists only under a favorable combination of edaphic and microclimatic factors: there must be a perennial supply of fresh water at or near

the ground surface, and there must be some protection from the heat in the warmest weeks of the year. Thus we find a large grove in a narrow, unnamed canyon descending the north slope of Brawley Peaks, and a few scattered individuals (three mature trees and a dozen saplings) beneath a very large snowbank at 9800 ft on the north slope of Bodie Mountain. The Brawley Peaks population is accompanied by an impressive undergrowth of Ledum glandulosum. This is the only place in the range where Ledum is found. Little else of a distinguishing nature occurs in the lodgepole stands.

#### Deciduous Woodlands

Deciduous woodland communities also are present in the Bodie Hills. The most widely encountered of these is the hillside grove of quaking aspen, Populus tremuloides. These, like the Haplopappus suffruticosus--Lupinus meionanthus community mentioned earlier, occur most often in sandy, snow-accumulation areas. In fact, the two communities are frequently adjacent to one another. Wherever not excessively disturbed by grazing or resting cattle, these aspen groves harbor a variety of annual herbs, including Collinsia parviflora, Collomia linearis, Cryptantha ambigua, Eriogonum spergulinum and Phacelia humilis. The most abundant perennial is usually the onion Allium bisceptrum. One of the best places to observe this pair of habitats is on the ridge 1.5

miles south-southeast of Bodie, between the roads from Highway 395 and Mono Lake.

Another deciduous woodland community of moist sites is the riparian woodland. It occurs around some springs and along perennial streams, particularly in canyons. It is composed of two different, but intergrading phases. The first is much like the hillside aspen community just described. It too is dominated by Populus tremuloides, but the trees are much taller than those of the hillside habitat, since there is more moisture, less wind and less pressure on the trees from creeping masses of snow. There is a greater variety of associated perennials, including Aconitum columbianum, Bromus carinatus, Geum macrophyllum, Hackelia micrantha, Osmorhiza occidentalis, Ribes inerme, R. velutinum and Vicia americana. Aspen groves frequently alternate with the other riparian woodland habitat, characterized by dense growths of large willows, especially Salix exigua, S. lasiolepis and S. myrtillofolia. The willows are often accompanied by a treacherous undergrowth of Rosa woodsii. Where these willow woodlands adjoin a meadow, Ribes cereum often marks the boundary, as in upper Mormon Meadow. The largest riparian woodlands in the Bodie Hills occur at Lakeview Spring, along Masonic Gulch and along Bodie Creek from the state line to below Del Monte.

There is a single type of dry-site deciduous woodland widely scattered through the Bodie Hills. It is dominated by the mountain mahogany, Cercocarpus ledifolius, which here grows to the stature of a low, spreading tree. It grows in tight groves, most often on rocky spurs and upper slopes. The scanty undergrowth may include Arabis spp., Balsamorhiza sagittata, Castilleja chromosa and Phacelia humilis. Some of the largest stands grow on the northwest slopes of Masonic Mountain, Potato Peak and the east Brawley Peak. More accessible stands are found on New York Hill and near the head of Aurora Canyon.

#### Meadows

Meadows probably contain the greatest number of recognizably different plant associations in the Bodie Hills. This complexity is largely due to continuous variation along two environmental gradients: the meadow soils range from very dry to very wet and from very low in salts to very heavily mineralized. Additionally, elevation and exposure also exert an influence on some meadows.

Dry meadows tend to be dominated by Carex douglasii, Juncus balticus, and/or Muhlenbergia richardsonis. As moisture increases, so too does the diversity of species. Moist meadows which are not appreciably saline may be variously

dominated by one or more of Eleocharis pauciflora, Hesperochiron californicus, Hordeum brachyantherum, Iris missouriensis, Muhlenbergia asperifolia, Poa cusickii, P. nevadensis or Potentilla millefolia. Wet, nonsaline or sub-saline meadows acquire a dense turf of Carex lanuginosa, C. nebraskensis and Deschampsia cespitosa. Other plants indicative of wet meadows include Arnica chamissonis var. incana, Aster ascendens, Carex rostrata, Senecio hydrophilus and Ranunculus cymbalaria.

One very wet meadow beneath the white cliffs in Cinna-bar Canyon is of particular interest for its extensive accumulation of the peat moss Sphagnum fimbriatum. Rooted in the peat are Carex rostrata, Deschampsia cespitosa and the Bodie Hills' only known (very depauperate) population of Kalmia microphylla.

Moist meadows which are too saline for the majority of species are usually dominated by Puccinellia lemmonii and may contain Distichlis spicata, P. nuttallii or Scirpus nevadensis as codominants. Wet and saline meadows, such as those at the hot springs near Bridgeport, may be locally dominated by Haplopappus racemosus, Scirpus americanus and Triglochin concinnum.

### Additional Vegetation Types

There are many types of vegetation in the Bodie Hills which do not fit into any of the above-mentioned categories. A few of these deserve brief comment, especially for their phytogeographic implications, because they are of very limited extent and contain numerous species found nowhere else in the range.

High on the north side of Bodie Mountain, from about 9800 to 10,100 ft, is a steep, gravelly slope on which a large snowbank usually persists late into the summer. Like the snowbank habitats mentioned earlier, it contains large numbers of Haplopappus suffruticosus and Lupinus meionanthus. Because of its large size and high elevation, this site contains a few alpine species which occur nowhere else in the range. These are Draba breweri, Hulsea algida and Ranunculus eschscholtzii. A few more species occur here and in a similar but smaller habitat at 10,100 ft on the north side of Potato Peak. These include Carex helleri, Juncus parryi and Poa suksdorfii. Other species which typify these sites, but which have a slightly wider distribution, include Phacelia frigida, Potentilla fruticosa, P. glandulosa, Rumex paucifolius, Salix orestera, Sibbaldia procumbens and Trisetum spicatum. Thus, while there is no true alpine zone in the Bodie Hills, a few alpine species

persist under the unusual conditions of the Bodie Mountain snowbank.

Aquatic communities are poorly represented in the Bodie Hills since perennial bodies of water are rare. The three small lakes in the region (two southwest of Beauty Peak and one at the northwest base of Masonic Mountain) evaporate during the summer and become almost completely dry in most years, yet they support a modest growth of aquatic and emergent species. These include Elatine rubella, Eleocharis palustris, Limosella aquatica and a Potamogeton, probably P. gramineus. Another aquatic community is well developed at Warm Spring, north of Mormon Meadow. Here, in addition to the above species, there are Callitriche heterophylla, Lemna minuta, Polygonum amphibium, Ranunculus aquatilis and Sagittaria cuneata.

The travertine deposits southeast of Bridgeport at The Hot Springs and Travertine Hot Springs support a flora which is very different from that of the Bodie Hills in general. Found only on travertine were: Atriplex patula, Bassia hyssopifolia, Cleomella parviflora, Erysimum argillosum, Kochia americana, Mentzelia torreyi, Minutaria nuttallii, Scirpus nevadensis and Suaeda occidentalis. Species not restricted to the travertine, but most abundant on it were Haplopappus racemosus, Sarcobatus vermiculatus, Scirpus

americana, Triglochin concinnum and T. maritimum.

#### Rare Plants

During the course of field work for this flora, no plants were found which appeared to be undescribed. The only potential range extension -- a very minor one -- is that of Malacothrix sonchoides var. torreyi into California at Mormon Meadow. This variety was not listed by Munz (1959, 1968) as occurring in the state. It is, however, common in Mud Spring Valley only a short distance to the northeast in Nevada. There were doubtless several elevational extensions, but these are of only minor significance and are very laborious to verify.

My explorations did, happily, reveal many new populations of several rare plants. All of the rarities in the Bodie Hills are less rare now than they were thought to be only a few years ago, because of new populations found here or elsewhere. In the following paragraphs are brief summaries of the current status and my findings on each species in the Bodie Hills which is now listed as rare, or which is under consideration for listing, according to the California Native Plant Society (CNPS) or the Northern Nevada Native Plant Society (NNNPS). None is federally listed or proposed,



although several are currently under review by the Fish and Wildlife Service (Federal Register 1980).

Arabis cobrensis is rare in California, but common elsewhere in the west (Smith et al. 1980). Collections were made from four new populations, although two of these were close to earlier collections on Potato Peak. It appears to be a fairly common plant in the Bodie Hills.

Arabis fernaldiana var. stylosa is listed as "rare but not endangered" in California (Smith et al. 1980). It has not been listed in Nevada, but probably has the same status there. I did not collect it, but it has been found recently on Masonic Mountain by Matt Lavin (pers. comm.).

Arabis microphylla var. microphylla is listed as "rare but not endangered" in California (Smith et al. 1980). Other states do not list it. It has long been known from the Masonic Mountain area, but during my field work it also appeared near upper Rough Creek. It is probably not rare, endangered or threatened in the Bodie Hills.

Astragalus johannis-howellii is of limited distribution in California and Nevada, but seems to be abundant wherever it occurs. CNPS has it listed as "rare and endangered" (Smith et al. 1980), although there is now a proposal to de-

lete it from the lists altogether (Smith & York 1982). NNNPS has proposed its addition to the threatened or endangered list in Nevada (Pinzl 1981). Until very recently this species was known only from Long Valley in southern Mono County. On 27 June 1978 it was found in southeastern Mud Spring Valley by Kenneth Genz (Ann Pinzl pers. comm.). On 28 June 1981 I found it to be very abundant on the gently sloping terrain around Beauty Peak in the Bodie Hills. This does not constitute a range extension, since the Mud Spring Valley population is slightly more distant from Long Valley. It is, however, an elevational extension, taking the species up to 8600 ft. It also increases significantly the number of known living individuals. From what we now know about the range and habitat of this species, it seems likely that more populations will be found among the remote valleys and low mountains of western Mineral and Esmeralda Counties and east-central Mono County. Heavy grazing appears to decrease the vigor of these populations, so we should probably consider it threatened throughout part or most of its range.

Draba douglasii var. crockeri is being reviewed for possible listing as a threatened plant in Nevada (Mozingo & Williams 1980, Pinzl 1981). It is now considered "rare in California, common elsewhere" by CNPS (Smith & York 1982). I collected or observed it at several locations in the Bodie Hills in a habitat which is quite widespread. It does not

appear to be rare or threatened in this area.

Draba quadricostata is listed by CNPS as "rare but not endangered" (Smith et al. 1980), although it may be promoted to a "rare and endangered" status (Smith & York 1982). Since its discovery in Nevada it has been proposed for listing in that state (Pinzl 1981). In 1967 there were but six or seven known populations of this species. Most had been discovered in the 1940's and all but one were on or near Masonic Mountain. During the following four summers I discovered many new populations in the western and southern Bodie Hills and confirmed reports that it had been found near Beauty Peak. In 1980 Kenneth Genz found the species in the Wassuk Range, northeast of the Bodie Hills, making it no longer a Bodie Hills endemic. Presently, the Bodie Hills appear still to be the center of distribution for the species. It is abundant here, but development or the potential for development threaten it with extirpation in some areas.

Eriogonum beatleyae is listed by CNPS as "rare in California, but not elsewhere" (Smith et al. 1980). This status is still appropriate, as the population south of Mormon Meadow is still the only one known from the state. It has been deleted from the rare lists in Nevada, where many more populations have now been found (Mozingo & Williams 1980, Ann Pinzl pers. comm.). It has been listed as threatened by the

Smithsonian Institution, but with the demise of plans for deployment of the MX Missile System in Nevada, it is doubtful whether this listing is still deserved.

Eriogonum nutans nutans is considered rare in California (Smith 1981, Smith & York 1982) because only a single population is known from the state. It was found in the Bodie Hills in 1967 by Clare Hardham, determined by James Reveal, and published by him (Reveal & Ertter 1980) as a range extension from 46 miles to the east in Nevada. My several attempts to locate the plant where Hardham collected it were unsuccessful.

Heuchera duranii is considered "rare but not endangered" in California (Smith et al. 1980). Like Eriogonum beatleyae, it is no longer considered rare in Nevada. New populations were found on Bodie Mountain, Potato Peak, Masonic Mountain and Mount Hicks.

Phacelia monoensis was described by Richard Halse (1981) in a revision of Phacelia section Miltitzia. The type specimens had been collected sporadically over the years 1932 to 1951 and were mostly identified as Miltitzia lutea (R. Halse pers. comm.). Since no one had collected P. monoensis since 1951, it was listed as "presumed extinct" by CNPS in 1980 (when it had been described, but not yet pub-

lished). During the summer of 1980 Matt Lavin collected it near Masonic Lower Town in the Bodie Hills and sent the specimen to Halse, who confirmed the rediscovery. I located three additional populations in 1981. At this writing, none of the previously reported populations has been relocated. P. monoensis is restricted to a particular set of edaphic conditions and is very easy to overlook until one has established a "search image" for it. Future field work should reveal many more populations in Mono and Mineral Counties, but it would appear that some have already been lost to overgrazing. At present, P. monoensis should be considered rare in both California and Nevada and threatened throughout most of its range.

Streptanthus oliganthus is listed by CNPS as "rare and endangered" (Smith et al 1980), but may be reclassified as "rare, but not endangered" (Smith & York 1982). It is listed as threatened in Nevada (Mozingo & Williams 1980). In the Bodie Hills it appears to be common in the pinyon-juniper forests at the north end of the range, and not threatened here. Several new populations were found in the East Walker River Canyon and near Masonic. It will probably be found commonly, but localized in the pinyon forests of western Mineral and southern Lyon Counties, without major threats.

## History of Botanical Collecting

One of the reasons for choosing the Bodie Hills as the subject for a local flora was the apparent scarcity of botanical collecting here in the past. To determine just how much there has actually been, I have attempted to reconstruct a chronology of botanical collecting in the area. Most of the information for this chronology has come from the labels of specimens cited in monographs or in the rare plant data files compiled by the California Native Plant Society. Information about recent collectors has generally come via personal communication. Unavoidably, there will be some omissions, but the following list very likely identifies all of those people whose collections were most significant, either because they were numerous or included new or rare species.

1. August 1898: Joseph W. Congdon; "along the Bodie to Bridgeport road" (Ward 1953).
2. June 1943: H. Dwight Ripley and Rupert C. Barneby.
3. July 1944, June-July 1945: Annie M. Alexander and Louise Kellogg; Masonic Mountain, Geiger Grade, Bodie Canyon, Mormon Meadow, etc.; the most extensive collections prior

to the present study, including the type specimens for Phacelia monoensis.

4. August 1945: Ira L. Wiggins and Reed C. Rollins; Masonic Mountain; type specimens of Draba quadricostata and Streptanthus oliganthus, and range extensions of Arabis cobrensis, A. fernaldiana stylosa and A. microphylla (Rollins 1946).
5. 1962-66: Jack Reveal; southern Bodie Hills (pers. comm.).
6. July 1967: Clare B. Hardham; Masonic Mountain, western foothills, Geiger Grade (Reveal & Ertter 1980, C. Hardham pers. comm.).
7. August 1971: James L. Reveal; Mormon Meadow (Reveal 1972).
8. May 1973: R. W. Spjut; Travertine Hot Springs.
9. mid-1970's, 1980-81+: Dean W. Taylor; Potato Peak, Bodie Canyon, Masonic, Mt Hicks, etc. (pers. comm.).
10. August 1978: Kenneth R. Genz; Toiyabe National Forest.

11. 1978-81+: Tim Messick; throughout the range; collecting for the present study.
12. 1980-81: Matt Lavin; Toiyabe Natinal Forest (pers. comm.).

## Methods

In all, 1170 specimens were collected and deposited at the herbarium of Humboldt State University (HSC) in Arcata, California. Field work was conducted during the summers of 1979, 1980 and 1981. Collecting began in mid-June of each year and continued into early September. Forays were made in the form of day hikes from many points along the several roads crossing the thesis area.

As previously stated, the total area covered by the thesis is somewhat less than 400 square miles. There will no doubt be objections that such an area is unreasonably large for treatment in a local flora of the present scale. After all, I have not been able to visit each ravine, meadow and hilltop. But the Bodie Hills contain large areas which are vegetationally and geographically uniform in character. The



region as a whole is floristically depauperate compared to other more botanically familiar areas of equal size in the far west. While the area is crossed by national forest and state boundaries, drainage, map and elevational boundaries, none provide a logical or convenient means by which to reduce the size of the area.

Accordingly, collections were made throughout the Bodie Hills with the intention of visiting as many different habitats and substrates as possible several times through the season. Additionally, a special attempt at thoroughness was made in several areas chosen for their floristic richness, diverse character and relative ease of access. These areas were around Mormon Meadow, the hot springs and travertine deposits near Bridgeport, the Bodie Mountain - Potato Peak area, Bodie Canyon (along Bodie Creek), and the Masonic Mountain region.

## PHYTOGEOGRAPHY OF THE BODIE HILLS

### Geology and Geologic History

#### Geologic Literature

The geology of the Bodie Hills is complex, but fairly well known. There has been no all-inclusive treatment of the geology of this area, but numerous regional and local studies deal with portions of the subject.

Some of these describe the three principal mining districts in the range. Johnson (1948) described the geology, history and mineralogy of the Masonic mining district. Lunby (1957) studied the geology and history of an area just north of Aurora, and Green (1964) described the structure and mineralization of the Aurora mining district itself. The geochronology of the Bodie mining district has been discussed by Chesterman et al. (1969) and Silberman and Chesterman (1972).

Two regional studies deal specifically with the Bodie Hills. Chesterman (1968) described the volcanic formations in the southwestern part of the range, while Kleinhampl et

al. (1975) discussed the geology of the entire range.

Several other workers have discussed portions of the Bodie Hills along with adjoining areas. Ross (1961) reviewed the geology and mineral resources of Mineral County. Gilbert et al. (1968) described the structural and volcanic history of Mono Basin. Al-Rawi (1970) discussed the Cenozoic history of the northern part of Mono Basin, emphasizing the southern Bodie Hills. Sharp (1972) detailed the Pleistocene history of Bridgeport Basin and the southwestern Bodie Hills.

The most complete geologic map of the Bodie Hills is that in Kleinhampl et al. (1975), though it unfortunately lacks color-coding. For the southwestern third of the area, excellent detail is provided by Chesterman and Gray (1968) in their geologic map of the Bodie quadrangle. Smaller scale and less detailed is the Walker Lake sheet of the California Geological Atlas (Koenig 1963).

#### Paleozoic and Mesozoic Metamorphic Rocks

The area that is now eastern California was occupied during most or all of the Paleozoic era by a small ocean basin lying between the continent and an arc of volcanic islands (Burchfiel & Davis 1972). During this time, perhaps in the Ordovician or Silurian, sediments were deposited which

remain today as the oldest rocks in the Bodie Hills. These are the highly metamorphosed quartzite and quartzofeldspathic hornfelz in the vicinity of Mormon Meadow (Chesterman & Gray 1975).

Sedimentation and volcanism continued during the Mesozoic era. East of the Rattlesnake Gulch area near Conway Summit are vestiges of two units of Triassic age. One is composed of interbedded quartzofeldspathic hornfelz, quartzite and metachert. The other is interbedded tuff, chert and pillow lava and is a part of the Excelsior Formation (Muller & Ferguson 1939) from the Excelsior Mountains east of Mono Basin (Chesterman & Gray 1975). Mesozoic rocks of undifferentiated age are found in two other areas. South of Aurora Peak there are porphyroblastic metavolcanics and west of Masonic Mountain there is gneiss and schist (Kleinhampl et al. 1975).

As these sediments and volcanic deposits accumulated, their tremendous weight forced the depression of a trough, or geosyncline, creating great stresses within the crust. Some of the crustal material was melted and later recrystallized under conditions that made the new rocks granitic in nature. Several times during the early to late Mesozoic, magma intruded into Paleozoic or early Mesozoic sediments, forming granitic plutons. Some of these contributed to the

vast Sierran batholith, while others to the east were more isolated. The entire region was then uplifted by the Nevadan Orogeny (Busby et al. 1980).

The sedimentary and volcanic rocks deposited in the Bodie Hills region during the Mesozoic have been almost completely eroded away. Wherever small amounts remain, they are in contact with the granites that intruded them.

### Mesozoic Plutonic Rocks

Granitic rocks play a minor role in the surface geology of the Bodie Hills. Their total exposed area is less than 12 square miles. Although granite underlies much of the range, most of it is hidden beneath Cenozoic volcanic rocks. Much larger areas of granite are exposed in nearby ranges to the west, north and east.

Four separate granitic units appear in the Bodie Hills. The southern-most, in the Rattlesnake Gulch area, is a coarse biotite of mid-Triassic age (Chesterman 1968, Evernden & Kistler 1970). Another much smaller unit is exposed south of Aurora Peak. It is a quartz monzonite (Kleinhampl et al. 1975), possibly of the middle or upper Cretaceous (Evernden & Kistler 1970). The largest granitic exposures in the range are in the vicinity of Masonic. Masonic Mountain

itself and several square miles of hills to the east of it are built of a porphyritic biotite granodiorite, rich in veins of aplite, pegmatite and quartz. The fourth unit is the Murphy Creek biotite granodiorite, which extends northward from Murphy Pond along the east side of the East Walker River Canyon (Johnson 1948). Ages have yet to be determined for these two northern units.

### Tertiary Rocks

The early Tertiary in the Bodie Hills was a time of continued erosion, with little or no deposition of new volcanic rocks. This has left a major unconformity between pre-Tertiary and late-Tertiary rocks in the area. The Oligocene, Miocene and early Pliocene epochs brought a renewal of volcanic activity, however. It was during this time, from about 28 to 2 million years before the present (MYBP), that most of the topographic entity which we now call the Bodie Hills was formed (Kleinhampl et al. 1975).

The earliest of these volcanic units is Oligocene to early Miocene, or about 28 to 22 MY old. They are visible in only a few places, and hardly at all in the Bodie Hills, because they are mostly covered by later units (Kleinhampl et al. 1975).

The oldest volcanics which are widely visible are the andesite and dacite lavas, breccias and intrusive bodies which cover much of the range northeast of Bridgeport and between Bodie and Aurora (Kleinhampl et al. 1975). Within this unit are several formations separated from one another by minor unconformities. These formations include the Red Wash and Masonic Gulch volcanics near Masonic (Johnson 1948), and the Aurora and Bodie Canyon volcanics near Aurora (Green 1964). The rocks at Aurora are 15.4 to 13.5 MY old, while those at Masonic have not been dated (Kleinhampl et al. 1975).

Later during the Miocene, from about 13 to 8 MYBP, extensive volcanism produced the hills and mountains of the central and southwestern Bodie Hills. Six separate volcanic formations have been identified here, each associated with a different eruptive center (Kleinhampl et al. 1975). All are variously composed of flows, dikes and plugs of andesite, dacite and rhyolite. Several areas, most notably in the Willow Springs Formation between Mormon Meadow and Aurora Canyon, have experienced extensive hydrothermal alteration (Chesterman 1968).

Also during the late Miocene, about 9.4 MYBP, much of the Bodie Hills was covered by a thick layer of volcanic ash. Its depth ranged up to 250 ft and it was so intensely

not that in some areas it became welded into massive deposits of ignimbrite, or welded tuff (Kleinhampl et al. 1975). These welded tuffs are very similar to those of the Stanislaus Formation northwest of the Bodie Hills near Sonora Pass (Gilbertson et al. 1968), and like them, probably originated from a collapse caldera near the Little Walker River, between Sonora Pass and the Sweetwater Mountains (Noble et al. 1968). They were the result of not one, but several separate eruptions. They are seen today in relatively small exposures three miles north and east of Bodie, and west of Masonic Mountain on both sides of the East Walker River (Kleinhampl et al. 1975).

At the same time that the Bodie Hills were being built up by volcanism, they were being worn down by erosion. The resulting debris was carried into the valleys between the ranges to create what are now the oldest non-metamorphosed sediments in the region. They are visible on the lower slopes of the eastern and northern Bodie Hills in Mud Spring Valley and south of Sonoma. Ross (1961) assigns them to his Esmeralda formation. They contain a few fossils of terrestrial plants and mammals, and it was from corresponding beds at the west base of the Wassuk Range that Axelrod (1956) described his Aldrich Station Flora. From the presence of several interbedded ash layers, it is inferred that these sediments and the fossils they include are 11 to 9 MY old



(Kleinhampl et al. 1975).

During the late Miocene to mid-Pliocene, about 7.5 to 4.5 MYBP, there was little or no volcanic activity in northern Mono County (Gilbert et al. 1968). Then, during the middle to late Pliocene, new mountains and hills appeared in and near the eastern Bodie Hills. Between about 3.6 and 3.2 MYBP the eruptions which created Cedar Hill also deposited andesite southeast of Cottonwood Canyon and northward from Tal al Arab (Al-Rawi 1970). At Mount Hicks there are rhyolites aged 3.6 MY (Gilbert et al. 1968) and andesites aged 1.6 MY (Al-Rawi 1970). Beauty Peak and the volcanic tablelands surrounding it are about 2.8 MY old (Al-Rawi 1970).

#### Quaternary Events

The most recent volcanic event in the Bodie Hills was the formation of Aurora Crater about 250,000 years ago (Kleinhampl et al. 1975). Since then the only materials of volcanic origin to appear in the range have been the small amounts of ash blown northward from periodic eruptions in and south of Mono Basin. These are easily seen today as thin layers in Quaternary meadow deposits which have been dissected by their streams.

West of the Bodie Hills, the Sierra Nevada experienced

its greatest uplift during the early Pleistocene. In the Yosemite region, this uplift totalled 6500 to 7000 ft, lifting the Sierran crest to near its present altitude (Axelrod 1962). During this time also, climatic conditions slightly cooler and moister than at present caused the formation of montane glaciers in the Sierra Nevada which advanced and receded many times.

During these stages of glacial advance, the precipitation:evaporation ratio favored the accumulation of runoff in basins throughout the Intermountain Region, giving rise to numerous pluvial lakes. Lake Russel was the Pleistocene lake of which Mono Lake is a very small remnant. During the Tioga glaciation, 50,000-30,000 years ago, Lake Russell filled Mono Basin and Alkali Valley to the (present) 7200 ft contour (Putnam 1949).

There was no glaciation in the Bodie Hills. The peaks were too low and the snowfall not heavy enough for this to occur. There were probably several large, perennial snowfields associated with nivation cirques, however, and some periglacial phenomena creating patterned ground. Only along the western edge of the range were the effects of the Sierran glaciation directly felt.

At the maximum extent of the Sherwin glaciation, about

750,000 years ago, glaciers flowed out of the many Sierran canyons west of the Bodie Hills to coalesce and form an extensive ice sheet filling most of Bridgeport Valley. Great depths of morainal materials were deposited from Conway summit northward as far as Bridgeport Reservoir. At Conway Summit these are more than 350 ft deep and compose much of the ridge immediately east of the Summit. Additionally, outwash gravels were deposited all along the western margin of the range, remnants of which are particularly abundant from Aurora Canyon to the East Walker River Canyon (Sharp 1972).

Smaller remnants of these outwash gravels south of Clearwater Creek and around Mormon Meadow are evidence that the boundary between the Mono Basin and East Walker River watersheds has changed significantly since Sherwin times. These particular gravels were deposited by a stream (perhaps Virginia Creek) flowing southeastward in the vicinity of lower Clearwater Creek and from Mormon Meadow to Lake Russell via Bridgeport Canyon. Today, however, water flows in the opposite direction along the northern half of this route. The change was brought about by a relative downwarping of Bridgeport Valley and Mono Basin due in part to the great weight of glacial debris deposited within them (Sharp 1972). The axis of this warp extends from near Conway Summit in a northeasterly direction to Bodie and perhaps as far as Mount Hicks (Al-Rawi 1970).

The most recent rocks in the Bodie Hills are the Holocene travertine deposits at The Hot Springs and Travertine Hot Springs southeast of Bridgeport. These are among the most interesting from a biological standpoint because of the strong edaphic control they exert over the plants growing on them.

### Vegetational and Climatic History

The vegetational history of the Bodie Hills began in the late Cretaceous or Paleocene, when the region was lifted out of the oceans and first colonized by terrestrial plants. The climate at this time was warm-temperate or subtropical and the vegetation, at least in some parts of the Great Basin, was a forest of palms, cycads and woody dicots. Climatic conditions changed during the Tertiary and most of the Cretaceous genera became extinct in this area (Cronquist 1978, Tidwell et al. 1972), so that today there are no relicts of the Cretaceous flora in the Bodie Hills.

The events which molded the present flora and vegetation of the Great Basin began in the early Tertiary, some 50 MYBP. Tidwell et al. (1972), Cronquist (1978) and Reveal

(1980) have discussed these events and their effects in detail. I shall summarize only the major points as they relate to the history of the Bodie Hills in particular.

During the Eocene, the Bodie Hills region was still under the influence of a coastal climate and was probably characterized by a forest of broad-leaved evergreens and conifers (Tidwell et al. 1972). Farther inland the vegetation included evergreen sclerophyll forests, pinyon-juniper forests and, particularly toward the south, chaparral adapted to a somewhat drier climate. Many of the genera represented in modern floras appeared in the region at this time (Reveal 1980).

Throughout the Oligocene, Miocene and Pliocene, the climate of the region gradually, but with some fluctuations, became drier and cooler. These trends were particularly accentuated during the Pliocene, as the uplift of the Sierra-Cascade axis greatly reduced annual precipitation and mean temperatures in the Great Basin (Reveal 1980).

The overall effect of this climatic shift was to cause the fragmentation and impoverishment of the conifer-hardwood forests, the extinction or extirpation of many species with northern or coastal affinities, and northward migration and adaptive radiation in many genera from the warm and dry

southwest (Reveal 1980).

Axelrod (1958, 1968, 1977 and elsewhere) and Chaney (1940, 1947 and elsewhere) described these changes in terms of the migration of three Tertiary geofloras. The Arcto-Tertiary geoflora was a widespread holarctic entity dominated by deciduous trees. With the drying and cooling trends across much of North America and Asia in the Tertiary, its distribution became restricted to the southeastern portions of these two continents. The Neotropical-Tertiary geoflora occupied the southern half of North America and was characterized by broad-leaved evergreen trees. This was the geoflora that first occupied the Bodie Hills and most of the rest of the Great Basin. It retreated toward the south during the Tertiary, giving rise to descendants which are now found in Central America.

Both the Arcto-Tertiary and Neotropical-Tertiary geofloras were replaced across much of western North America by the Madro-Tertiary geoflora. This geoflora had its origins in the mountains and valleys of what is now the American southwest and northern Mexico. It was characterized by xeromorphic, sclerophyllous shrubs and trees. Many of these taxa were well adapted to the kind of climate that was becoming widespread by the end of the Tertiary. Eventually it was the Madro-Tertiary geoflora which came to dominate the Bodie

Hills and most of the Intermountain Region.

Cronquist (1978) acknowledges the usefulness of recognizing these floristic groups, but cautions against a too-literal interpretation of the geoflora concept. There was, he points out, enormous diversity within each group, continuous interchange between them, and there were, no doubt, taxa common to any two or all three of them.

Axelrod (1956) described a Mio-Pliocene flora from Aldrich Station, a short distance northeast of the Bodie Hills. It was dominated by a mixture of Madro-Tertiary and Arcto-Tertiary taxa closely related to such modern species as Alnus tenuifolia, Picea breweriana, Populus angustifolia, Quercus chrysolepis, Salix exigua and Sequoiadendron giganteum. A similar assemblage probably occupied portions of the Bodie Hills at this time.

As already mentioned, the Pleistocene was a time of alternating glacial and interglacial periods in and around the Great Basin. During glacial advances, mesic and alpine habitats expanded, while xeric habitats became less widespread. Alpine vegetation may at one time have reached as low as 6100 ft (Billings 1978). During the interglacials, as at present, this relationship was reversed. Viewed as a whole, then, the Pleistocene was a time of repeated shifts in plant

and habitat distributions. With respect to the Bodie Hills or any other local area, it was a time of alternating introductions and extirpations of taxa with various geographic affinities.

Some groups of species migrated along well defined paths into or near the Bodie Hills. It is probable that the Sierra Nevada served as the principal high elevation migration route. It provided a path along which many plants with predominantly northern distributions expanded southward during the glacial stages. Another route of migration at high elevations was westward into the Great Basin from the Rocky Mountains. This was a route of major importance across much of the Great Basin, but its influence was greatly attenuated in far western areas such as the Bodie Hills. The Lahontan Trough, a series of valleys and low passes in western Nevada, was an important low-elevation route along which many species from the Sonoran and Mojave Deserts expanded northward during the interglacials (Reveal 1980).

The vegetation of the Great Basin was probably dominated throughout much of the late Pleistocene by grasslands and coniferous forests of Abies, Picea and Pinus. This changed very rapidly in response to warmer and drier conditions at the beginning of the Holocene epoch. During this Hypsithermal interval, the well-developed pinyon-juniper associations



of the southwest migrated northward into the Great Basin. It was during the Hypsithermal also that sagebrush became established as the major vegetation type of the valleys, that saline and alkaline soils replaced the evaporating pluvial lakes, and many higher-elevation plants became restricted to small disjunct islands of suitable habitat in numerous ranges (Reveal 1980).

Following the Hypsithermal, lower temperatures and variable moisture conditions returned from about 3000 BP to the late 19th century AD. Temperatures were again particularly cold from the 12th or 13th century until the mid-19th century. It was during this time that the "Little Ice Age" produced many small glaciers on the highest peaks of the Sierra Nevada. Temperatures were then warmer during the first half of the 20th century, but have begun to decline once more during the last two decades (Busby et al. 1980).

## History of Land Use in the Bodie Hills

The flora and vegetation of the Bodie Hills are not today as they were in the 1850's when people of European descent first settled in the area. Mining, woodcutting and grazing have brought important changes during the last one and a quarter centuries. Since a history of land use in this area has never been written with specific reference to its botanical implications, it seems appropriate to make a few such comments here.

In the first half of the 19th century only a few trappers and explorers ever passed near enough to the Bodie Hills to view them. Perhaps the first group to actually traverse the range was John C. Fremont's expedition of 1843-44. On January 25, 1844, they crossed from Mud Spring Valley to Bridgeport Valley on an Indian trail. The Bodie Hills made little impression on them, though, as they were cold, hungry, expecting the worst in their imminent crossing of the ice-bound Sierra, and dragging with them the infamous howitzer which they were to abandon two days later (Lewis 1955).

With the rush for gold in the western foothills of the Sierra Nevada in 1849, there came a surge of activity which

would inevitably find its way east of the crest. In 1852 an army batallion under the command of lieutenant Tredwell Moore chased a group of Miwok Indians from Yosemite across the mountains seeking to avenge the deaths of some prospectors. They never caught up with the Indians, but being prospectors themselves, their interest turned when they noticed signs of mineral deposits on the crest at Mono Pass. Later that summer a group of miners led by Leroy Vining returned to the area and began to prospect in the mountains west of Mono Basin (Russel 1928).

No major discoveries occurred in the region until 1857, when placer gold was found on Virginia Creek near the mouth of Clearwater Creek at Dogtown. About the same time, placer gold was discovered at Mono Diggings (later Monoville), one mile east of Conway Summit. News of these two discoveries attracted the first rush of miners into the Bodie Hills. The rush was small, including no more than 1000 people. Most later departed for the "excitements" at Aurora and Bodie (Kersten 1964).

In August of 1860 three prospectors from Monoville, James M. Braley, J. M. Corey and E. R. Hicks, discovered silver on a hill in the eastern Bodie Hills and quickly organized the Esmeralda Mining District. The following spring additional deposits were found nearby and in the ensuing

rush the town of Aurora was settled. It grew quickly until the summer of 1863 when it had some 5000 inhabitants. For a very short time, Aurora ranked second only to Virginia City in importance among Nevada mining towns. The boom was short-lived, however. In the spring of 1864 miners began to realize that the Esmeralda Lode, although rich, was very shallow. In 1865 many of Aurora's mines and mills closed down and many of its residents moved away. By 1870 a majority of the town's buildings had been deserted. In 1874 only 65 people lived there (Farquhar 1928), and by 1918 it was completely deserted (Kersten 1964).

Mining and associated activities continued at a modest pace, but without any major strikes in the Bodie Hills, from the mid-1860s to the late 1870s (Kersten 1964). In 1859, before the Esmeralda excitement, gold had been discovered in the south-central Bodie Hills by another prospector from Monovalle, named Waterman S. "Bill" Body (Nadeau 1965). The site came to be known as Bodie and provided meager support for a few miners over the next 15 years. Prosperity came with the discovery of a rich pocket of ore in Bodie Bluff in 1874 and an even richer one early in 1879. This latter event touched off a stampede during which the population of Bodie swelled to 10,000 by summer. For more than a decade it enjoyed preeminence among the mining towns of Mono County and was the economic hub of the Bodie Hills. Bodie's decline

began in 1888, although a few mines continued to produce until about 1915 (Johnson & Johnson 1967), and most of the population had departed by 1906 (Kersten 1964).

About this time, when Bodie's economy was faltering and Aurora's was history, there was a renewal of activity in the northern Bodie Hills. Masonic had been established in 1862 by a group of Masons prospecting out of Aurora (Maule 1938). Their success had been limited, but in 1902 highgrade ore was discovered. Production began in 1907 and continued until 1920, when the main lode became exhausted. A couple of mines continued to work sporadically until 1930. In the late 1940s a cyanide plant was built at the Chemung Mine and for a few years processed ore from this and two other mines (Johnson 1948).

All of this activity has in various ways affected the plant life of the Bodie Hills. Some of the most noticeable disturbances were caused directly by the mining. Most of the tailing piles created 100 to 120 years ago remain substantially unvegetated, supporting only a few scattered shrubs and annual herbs. Fortunately, these are not very extensive. One wonders, however, if any taxa restricted to soils derived from ore-bearing rocks were extirpated or made rare by the disturbance of mining. It seems odd, for example, that Eriogonum beatleyae should be found at only one site, while

it is absent from many other sites, all adjacent to mines, with apparently similar soils. Wet-site plants were also extensively disturbed, as streams and springs were commonly diverted, dammed, dredged, or polluted with silt and acid.

As roads were built throughout the range, habitats for ruderal species were created where previously disturbance had been rare and localized. There are today numerous species in and near the Bodie Hills which occur only on roadsides or in similarly disturbed places.

Other disturbances were less direct. The mining activity created demands for resources which were only partly met by local supplies. The greatest need was for wood -- lumber for buildings, timbers for the mines, and cordwood for stoves and boilers. Only firewood was available in any quantity within the Bodie Hills. Both pinyon pine and Utah juniper were available for this purpose, but apparently the juniper was rarely or never used. During the 1860s, '70s and '80s, tens of thousands of cords of pinyon pine were cut in the Bodie Hills and elsewhere and hauled by mule train to Aurora and Bodie (Johnson & Johnson 1967, Maule 1938, Smith 1925).

This no doubt depleted the pinyon groves in many areas, and a comparison of early and recent photographs shows that

this indeed occurred at Aurora (cf. Kersten 1964, figs. 10 & 11). It may also account for the unusual situation commented upon by Vasek and Thorne (1977), that "the region south and west of Bodie is one of the very few areas where Utah junipers occur at the upper elevational margin of the pinyon woodland." This may not be natural -- it may simply be that higher, pure stands of pinyon were cut down and not allowed to regenerate. Occasionally no trees of any sort were available for fuel and the miners would dig up and burn the ubiquitous sagebrush (Kersten 1964). It is likely also, although no mention of it appears in the literature, that aspen groves were cut for firewood, particularly during the several "firewood famines" suffered by Bodie.

Lumber for buildings and timbers for mines had to be imported. From 1860 until about 1885, logging was a thriving industry among the lodgepole and Jeffrey pine forests of the eastern Sierra Nevada. At the peak of demand there were one or more sawmills in virtually every Sierran canyon within 25 miles of Bodie. The town of Bridgeport was settled in 1863 in the valley then known as Big Meadows and was for many years the center of the lumber industry (Maule 1938). Evidence of the former "wood ranches" can be seen today all over the east slope of the Sierra, where in some places the stumps of trees felled a century ago are almost as numerous as the trees that have since grown to maturity. There is

little evidence of woodcutting in the few small stands of lodgepole and Jeffrey pine in the Bodie Hills and there is no mention of such in the literature. It seems probable, though, that these most conveniently situated stands were logged and perhaps permanently depleted.

The largest supplier of wood to Bodie was Mono Mills, in the Jeffrey pine forests just south of Mono Lake. For a short time lumber was carried by barge across the lake and then by wagon to its destination. Then in November 1881 a railroad was completed between Mono Mills and Bodie. This enterprise lasted until 1917 (Johnson & Johnson 1967, Maule 1938).

Other resources in short supply locally were fresh foods and pasturage. The excessively short and dry growing season within the Bodie Hills made it impossible to grow sufficient quantities of vegetables there. Most such crops were grown at lower elevations in Big Meadows, Mono Basin and Mud Spring Valley (Brown 1865, Kersten 1964, Maule 1938). Non-perishable foods were imported from even greater distances. Meadows along Bodie Creek and the East Walker River supported dairy cattle and were mowed for hay (Kersten 1964). Today there remains no evidence of the domestic plants imported at that time other than the hops (Humulus) which grow against protected walls in Bodie.



With the passing of the mining era, raising livestock became the most important industry in northern Mono County. The cattle ranches which had begun as suppliers of Bodie and Aurora were enlarged or acquired by large ranching concerns and came to cover many thousands of acres in the valleys surrounding the Bodie Hills. At the same time, Basque, French, Spanish, Portuguese and Mexican immigrants began to herd large flocks of sheep in Mono Basin and the surrounding hills (Busby et al. 1980). Today cattle ranching and sheep herding continue to be mainstays of the local economy. Thousands of sheep are grazed in the southern Bodie Hills, while cattle graze the middle and northern parts of the range.

Both species have been and continue to be grazed in a way that maximizes production at considerable expense to the plant life. Portions of many meadows are now dominated by unpalatable species such as Iris missouriensis and Urtica dioica. Many meadows have also been periodically stripped of the plants protecting them from erosion, thus allowing them to become dissected by the streams meandering through them. Springs, too, are frequently trampled and fouled.

Some species have been completely eliminated from habitats in which they previously grew. The rare and threatened Phacelia monoensis has probably been eliminated from its

type locality in Mormon Meadow by overgrazing. The few enclosures in the range have been inadequately maintained and some are poorly situated. Livestock grazing and associated activities are probably responsible for the introduction of the majority of exotic weeds into the Bodie Hills.

Further disturbances are caused by tourism and prospecting for minerals or geothermal energy. Both have become major activities in recent years. Bodie itself now attracts several hundred visitors each day during the summer. Most of the resulting impact is confined to the townsite of Bodie and the two main access roads. But a moderate number of people, including the prospectors, venture down Bodie Canyon to Aurora, drive from Bridgeport to Masonic, or explore the many miles of lesser-used roads. Again, most of the disturbance is confined to the roads, but occasionally dirt bikes or four-wheel-drive trucks are driven off the roads into relatively undisturbed vegetation. Such activities perpetuate the existence of already widespread ruderal taxa.

In summary, human activities have caused a number of changes in the natural vegetation of the Bodie Hills. Numerous weedy species have been introduced. Many of these are restricted to ruderal habitats which were once rare, but are now widespread. The overall forage quality of most meadows and shrub areas has been lowered by long-term overgrazing.

Streams, ponds and springs have been trampled, diverted and polluted. Meadows have become dissected. Several native species are less widespread now than they were originally. The pinyon pine forests in particular were severely cut during the mining era. Most of the cut stands have recovered well, but others, possibly, have not. The rare plants have all been disturbed to some extent, although probably not severely in most cases.

Many of the influences detrimental to plants and their habitats continue at present. Fortunately, these have now been recognized by the Bureau of Land Management and efforts will be made to mitigate them in their forthcoming master plans for the Bodie Planning Unit.

## Origins of the Bodie Hills Floristic Assemblage

As Mitchell points out in his phytogeographical analysis of the White Mountains flora (Lloyd & Mitchell 1973), the present distribution of a species does not necessarily indicate anything about its past distributional history. Tabulating the centers of distribution of all taxa in a local flora can, however, lead to general conclusions about the geographic affinities of the flora as a whole, particularly when this flora lies in a boundary area between two or more floristic provinces.

In order to identify the geographic elements in the present flora of the Bodie Hills, and to assess their relative importance, I have summarized in Tables 3 and 4 the centers of distribution represented within each genus in the Bodie Hills. The distributional categories are defined as follows (the abbreviations are those used in Tables 3 and 4):

Mono-Inyo (MI): Taxa mostly limited to or centered in these two counties. Most also occur in western Mineral and Esmeralda Counties and some occur throughout the Reno floristic section of the Great Basin as defined by Cronquist et al. (1972).

Sierra Nevada (SN): Taxa centered in or nearly endemic to the Sierra Nevada.

Sonoran-Mojavean (SM): Taxa centered in the Sonoran and/or Mojave Deserts.

Great Basin (GB): Taxa centered in the basins or ranges of Nevada and/or Utah.

Rocky Mountains (R): Taxa centered in the Rockies which have dispersed westward or southwestward toward the Sierra Nevada.

Northwestern (NW): Taxa centered in a broad region from the Cascade Ranges and British Columbia eastward to the northern Rocky Mountains.

Widespread Western North America (W): Taxa so widely distributed that they cannot be unequivocally assigned to any of the above centers of distribution. Many occur in all of the western states and have relatively broad ecological tolerances.

Cosmopolitan (C): Taxa widespread across North America and also on other continents.

Introduced (I): Naturalized taxa, mostly from Eurasia and mostly weeds in disturbed places.

The information presented here was derived mainly from regional floras (Munz 1959; Cronquist et al. 1972, 1976; Lloyd & Mitchell 1973), but in a few cases also from monographs or other taxonomic papers.

Table 3. Numerical tabulation of Bodie Hills taxa in relation to overall distribution patterns. (Abbreviations explained in text above).

GROUP	MI	SN	SM	CB	R	NW	W	C	I	TOTAL
Non-Flowering Plants	0	3	1	4	1	0	2	1	0	12
Dicots	17	45	5	104	5	49	82	32	15	354
Monocots	1	5	0	13	0	5	47	18	5	94
Totals	18	53	6	121	6	54	131	51	20	460
% of Total	3.9	11.5	1.3	26.3	1.3	11.7	28.5	11.1	4.3	100

Table 4. Present centers of distribution of Bodie Hills taxa. Numerals represent the number of taxa per genus characteristic of each distributional category. Abbreviations are explained in the text above. Genera are listed in the order in which they are presented in the flora.

[illegible]

GENUS	MI	SN	SM	GB	R	NW	W	C	I
Erigeron	1	1	.	4	.	.	2	.	.
Eriophyllum	.	.	.	.	.	1	.	.	.
Eupatorium	.	.	.	.	.	1	.	.	.
Gnaphalium	.	.	.	.	.	.	1	.	.
Haplopappus	.	1	.	.	.	2	2	.	.
Hulsea	.	1	.	.	.	.	.	.	.
Iva	.	.	.	.	.	.	1	.	.
Lactuca	.	.	.	.	.	.	.	1	.
Layia	.	.	.	1	.	.	.	.	.
Machaeranthera	.	.	.	.	.	.	1	.	.
Madia	.	.	.	.	.	.	.	1	.
Malacothrix	.	.	.	.	.	1	.	.	.
Senecio	.	.	.	1	.	3	1	.	.
Solidago	.	.	.	1	.	.	.	.	.
Stephanomeria	.	.	.	1	.	.	1	.	.
Taraxacum	.	.	.	.	.	.	.	.	1
Tetradymia	.	.	.	1	.	.	.	.	.
Townsendia	.	.	.	1	.	.	.	.	.
Wyethia	.	1	.	.	.	.	.	.	.
Cryptantha	.	1	.	4	.	1	1	1	.
Hackelia	.	.	.	.	.	1	.	.	.
Lappula	.	.	.	.	.	.	.	1	.
Mertensia	.	.	.	1	.	.	.	.	.
Plagiobothrys	1	.	.	1	.	1	.	.	.
Arabis	.	.	1	5	1	2	1	.	.
Barbarea	.	.	.	.	.	.	.	1	.
Descurainia	.	.	.	2	.	.	1	.	1
Draba	1	2	.	.	.	1	.	.	.
Erysimum	.	1	.	1	.	.	.	.	.
Hymenolobus	.	.	.	.	.	.	.	1	.
Lepidium	.	.	.	.	.	1	.	.	1
Lesquerella	.	.	.	1	.	.	.	.	.
Nasturtium	.	.	.	.	.	.	.	.	1
Phoenicautus	.	.	.	.	.	.	1	.	.
Polycstenium	.	.	.	.	.	1	.	.	.
Rorippa	.	.	.	.	.	.	.	1	.
Sisymbrium	.	.	.	.	.	.	.	.	1
Stanleya	.	.	.	.	.	.	1	.	.
Streptanthus	1	.	.	.	.	.	.	.	.
Thelypodium	.	.	.	2	.	.	.	.	.
Opuntia	.	.	.	1	.	.	.	.	.
Callitriche	.	.	.	.	.	.	.	1	.
Nemacladus	.	.	.	1	.	.	.	.	.
Cleomella	.	.	.	1	.	.	.	.	.



[illegible]

GENUS	MI	SN	SM	GB	R	NW	W	C	I
Hesperochiron	.	.	.	.	.	.	1	.	.
Nama	.	.	.	3	.	.	.	.	.
Nemophila	.	1	.	.	.	.	.	.	.
Phacelia	1	1	.	2	.	2	.	.	.
Marrubium	.	.	.	.	.	.	.	.	1
Mentha	.	.	.	.	.	.	.	1	.
Monardella	.	.	.	.	.	.	1	.	.
Trichostemma	.	1	.	.	.	.	.	.	.
Linum	.	.	.	.	.	.	.	1	.
Mentzelia	.	1	.	1	.	.	2	.	.
Phoradendron	.	.	.	1	.	.	.	.	.
Sidalcea	.	1	.	.	.	.	.	.	.
Sphaeralcea	.	.	.	1	.	.	.	.	.
Humulus	.	.	.	.	.	.	.	.	1
Mirabilis	.	.	1	.	.	.	.	.	.
Camissonia	.	.	.	1	.	1	1	.	.
Epilobium	.	.	.	.	.	1	2	1	.
Gayophytum	.	.	.	.	.	.	1	.	.
Orobanche	.	.	.	1	.	.	1	.	.
Argemone	.	.	.	1	.	.	.	.	.
Allophyllum	.	.	1	.	.	.	.	.	.
Collomia	.	.	.	.	.	.	.	1	.
Eriastrum	.	.	.	.	.	.	1	.	.
Gilia	.	.	.	2	.	.	.	.	.
Gymnosteris	.	.	.	.	.	1	.	.	.
Ipomopsis	.	1	.	.	.	1	.	.	.
Leptodactylon	.	.	.	.	.	.	1	.	.
Linanthus	.	1	.	1	.	.	.	.	.
Microsteris	.	.	.	.	.	.	1	.	.
Navarretia	.	.	.	.	.	.	1	.	.
Phlox	.	2	.	1	.	1	.	.	.
Polygala	.	.	1	.	.	.	.	.	.
Chorizanthe	.	.	.	1	.	.	.	.	.
Eriogonum	1	2	.	9	.	2	2	.	.
Oxyria	.	.	.	.	.	.	.	1	.
Oxytheca	.	.	.	1	.	.	.	.	.
Polygonum	.	.	.	.	.	2	.	1	1
Rumex	.	.	.	.	.	1	1	1	.

GENUS	MI	SN	SM	GB	R	NW	W	C	I
Calyptridium	.	1	.	.	.	.	1	.	.
Claytonia	.	.	.	.	.	.	.	1	.
Lewisia	.	1	.	1	.	.	.	.	.
Aconitum	.	.	.	.	.	1	.	.	.
Aquilegia	.	.	.	.	.	1	.	.	.
Delphinium	.	.	.	1	.	.	.	.	.
Myosurus	.	.	.	.	.	1	.	.	.
Ranunculus	.	1	.	.	.	.	1	1	.
Ceanothus	.	.	.	.	.	1	.	.	.
Rhamnus	.	.	.	.	.	.	.	1	.
Amelanchier	.	.	.	.	1	.	.	.	.
Cercocarpus	.	.	.	1	.	.	.	.	.
Chamaebatiaria	.	.	.	1	.	.	.	.	.
Geum	.	.	.	.	.	.	.	1	.
Holodiscus	.	.	.	1	.	.	.	.	.
Horkelia	.	.	.	.	.	1	.	.	.
Potentilla	.	.	.	1	.	.	2	3	.
Prunus	.	.	.	1	1	.	.	.	.
Purshia	.	.	.	1	.	.	.	.	.
Rosa	.	.	.	.	.	1	.	.	.
Sibbaldia	.	.	.	.	.	.	.	1	.
Galium	.	1	.	.	.	.	2	.	.
Populus	.	.	.	.	.	.	2	.	.
Salix	.	1	.	.	1	.	3	1	.
Heuchera	1	1	.	.	.	.	.	.	.
Lithophragma	.	.	.	.	.	.	1	.	.
Castilleja	1	1	.	.	.	1	2	.	.
Collinsia	.	.	.	.	.	.	1	.	.
Cordylanthus	2	.	.	.	.	.	.	.	.
Limosella	.	.	.	.	.	.	.	1	.
Mimulus	.	1	.	1	.	.	3	.	.
Orthocarpus	.	.	.	1	.	1	.	.	.
Penstemon	.	.	.	3	.	1	.	.	.
Scrophularia	1	.	.	.	.	.	.	.	.
Verbascum	.	.	.	.	.	.	.	.	1
Veronica	.	.	.	.	.	.	.	3	.
Nicotiana	.	.	.	.	.	.	1	.	.
Solanum	.	.	.	.	.	.	1	.	.
Urtica	.	.	.	.	.	.	1	.	.
Valeriana	.	1	.	.	.	.	.	.	.

[illegible]

A total of 450 different species in 238 genera and 73 families were identified in the vascular flora of the Bodie Hills. The two largest families were, predictably, Asteraceae (with 67 species in 37 genera) and Poaceae (with 49 species in 23 genera). The two largest genera in the flora were Eriogonum (16 taxa in 14 species) and Carex (also 14 species). Relatively few species were found to be represented by more than one subspecies or variety. Counting these additional entities brings the total number of taxa to 460. This is partly a reflection of the depauperate nature of the flora -- 460 taxa is not a large number for an area of 390 square miles -- and partly a reflection of my conservative approach to the taxonomy of certain groups.

The results of the phytogeographical analysis (summarized in Table 3) indicate that a variety of geographical elements are represented in the flora of the Bodie Hills. The largest portion of the flora (28.5%) was assigned to the widespread western distributional category. Another 11.1% has an even wider distribution. This cosmopolitan element includes taxa occurring also in Europe, Asia or South America. While most of these taxa do not betray their migration route into the Bodie Hills, their abundance (together about 40% of the flora) indicates that the range has not been isolated from the rest of the west. Most of the xerophytes and halophytes in these groups probably entered from the Great

Basin and are of varied ancestry. Most of the mesophytes probably entered from the Sierra Nevada and trace their origins to widespread Arcto-Tertiary and boreal elements, or to the Mediterranean climatic zone of cismontane California. An additional 4.3% of the taxa are exotic, having been introduced by human activity.

The second largest group, comprising 26.3% of the flora, is that with distributions centered in the Great Basin. This is as one would expect, since the Bodie Hills are physically and climatically more akin to the Great Basin than the Sierra Nevada or any other region. Species centered in the Rocky Mountains comprise 1.3% of the flora, although it is likely that more taxa are present which actually dispersed westward across the Great Basin from the Rockies. These species were placed in other categories here because their present distributions are not centered in the Rockies. Thus a minimum of 27.6% of Bodie Hills taxa have their centers of distribution east of the range. The great majority of these no doubt entered the Bodie Hills from the Great Basin and are derived from elements of the Madre-Tertiary geoflora.

Approximately equal numbers of taxa are centered in the Sierra Nevada and northwestern North America. Members of both groups no doubt entered the range from the Sierra Neva-

da directly, or indirectly via the Sweetwaters. Together they comprise about 23% of the flora. It is probable that most of the Sierran taxa evolved in or near that range. Most of the northwestern taxa probably originated farther to the north and migrated down the Sierra-Cascade axis during the Pleistocene.

A small but very interesting group of species is more typical of the southern deserts than the western Great Basin. This Sonoran-Mojavean element comprises about 1.3% of the flora and includes Brickellia oblongifolia, Ephedra nevadensis, Mirabilis bigelovii and Polygala acanthoclada. Several more taxa with southern desert affinities grow just outside the study area in Mud Spring Valley. The presence of these species here is probably attributable to the nearness of the Lahontan Trough.

The last group of taxa, about 4% of the flora, includes those which have relatively limited distributions centered in the Mono-Inyo Counties area. Most are occasional to common or locally abundant in the Bodie Hills. None, however, is strictly endemic to the range. The one coming closest to this, based on present knowledge, is Draba quadricostata. Others falling into this category are:

<u>Angelica lineariloba</u>	<u>Muilla transmontana</u>
<u>Astragalus johannis-howellii</u>	<u>Plagiobothrys kingii harknessii</u>
<u>A. lentiginosus ineptus</u>	<u>Phacelia monoensis</u>
<u>Castilleja pilosus</u>	<u>Scrophularia desertorum</u>
<u>Cordylanthus helleri</u>	<u>Silene bernardina</u>
<u>C. ramosus setosus</u>	<u>Streptanthus oliganthus</u>
<u>Erigeron aphanactis</u>	<u>Trifolium andersonii monoense</u>
<u>Eriogonum esmeraldense</u>	<u>Viola purpurea aurea</u>
<u>Heuchera duranii</u>	

Thus, the flora of the Bodie Hills is a relatively depauperate mixture of Sierran and Great Basin species. Several taxa are of more distant origin, and several developed locally. None in the latter group is strictly endemic to the range, however.



# VASCULAR PLANTS OF THE BODIE HILLS

(Division Tracheophyta)

## Notes to the User of this Flora

This flora presents the subdivisions and classes of division Tracheophyta (the vascular plants) in their traditional phylogenetic order. The families, genera, species and subspecific taxa within each class are alphabetized.

The nomenclature used here generally agrees with that used by Kartesz and Kartesz (1980) in their Synonymized Checklist of the Vascular Flora of the United States, Canada and Greenland. It reflects the current state of taxonomic opinion for most genera and I have deferred to it for the appropriate nomenclature in most cases. I have made a few exceptions where more recent taxonomic work is available or where a different treatment appears more practical. Synonymous names which are now obsolete, but still familiar to many people are either placed in brackets at the end of the species annotation or are discussed more fully within the annotation.

Common names are given for all families, many genera

and some species. Only those names are used whose continued use seems justified because they are already widely known to amateur and professional botanists in western North America. No effort is made herein to perpetuate the use of arbitrarily invented or rarely used "common" names.

Most of the keys in this flora were adapted from earlier sources; some are original. Credit has been given at the head of each key in which I have been aided substantially by previously published keys. The user of this flora should be aware that its keys to families and genera were written with only those species occurring in the Bodie Hills in mind. They do not, in most cases, reflect the full range of variability within a family or genus. Thus, specimens of species not occurring in the Bodie Hills may not be identifiable, even to the generic or familial level, using the keys in this flora.

Full descriptions of genera and species have been omitted because these are available elsewhere and contribute little to the aims of a local flora. The best descriptions of species from the Bodie Hills will be found in the Intermountain Flora (Cronquist et al. 1972 and 1977, with additional volumes in progress) and A California Flora (Munz 1959, supplemented by Munz 1968). Occasionally descriptions will be found only under the older synonymous names. A very

few recently described species do not appear in either of these floras and one must refer to the original descriptions which I have cited in their annotations.

The species annotation which follows the scientific name of each plant in this flora contains, in addition to the items already mentioned, (1) some indication of how common or uncommon the plant is in the Bodie Hills, (2) a brief description of its habitat or vegetational association, (3) the plant's approximate elevational range in the Bodie Hills, (4) a list of thesis voucher specimens, giving the location, elevation and my collection number for each, (5) an occasional mention of collections made by other people or additional observations made by myself, and (6) an occasional comment on the taxonomy, ecology or distribution of the plant.

#### Key to the Subdivisions of Tracheophyta

(partly after Munz 1974)

1. Plants reproducing by one-celled spores borne in sporangia on leaf surfaces; plants without seeds, cones or flowers.
2. Leaves scale-like or vestigial, with a single nerve, not fern-like; sporophylls (fertile leaves) with a single sporangium borne on the adaxial (upper) surface.

- 3. Stems hollow, jointed and erect; leaves whorled and united, forming sheaths at the nodes.....  
.....Subdivision 2. Sphenopsida
- 3. Stems not as above, usually prostrate; leaves not as above, densely clothing the stem.....  
.....Subdivision 1. Lycopsidea
- 2. Leaves broad, dissected, many-nerved, fern-like; sporophylls (fertile fronds) with many sporangia borne on the abaxial (lower) surface.....  
.....Subdivision 3. Filicopsida
- 1. Plants reproducing by many-celled seeds, these borne in a woody strobilus (cone), a small non-woody or berry-like strobilus, or in the ovary of a flower.
- 4. Plants without flowers; seeds naked on the megasporophylls of a strobilus.
- 5. Plants well-developed trees; leaves needle-like in fascicles or scale-like and clothing the branchlets  
.....Subdivision 4. Coniferopsida
- 5. Plants shrubby, with jointed stems; leaves scale-like and inconspicuous, occurring only at the remote nodes.....Subdivision 5. Gnetopsida
- 4. Plants producing flowers, these usually conspicuous; seeds enclosed within an ovary.....  
.....Subdivision 6. Magnoliopsida

#### Subdivision 1. Lycopsidea

#### Class Lycopodiae

#### Order Selaginellales

#### Selaginellaceae, SPIKE-MOSS FAMILY

#### Selaginella Beauv., SPIKE-MOSS

S. watsonii Underw. Rare in the Bodie Hills, known only from

crevices in granite outcrops on west summit of Masonic Mtn.:  
9150 ft, 1727.

Subdivision 2. Sphenopsida

Class Equisetae

Order Equisetales

Equisetaceae, HORSETAIL FAMILY

Equisetum L., HORSETAIL, SCOURING-RUSH

E. laevigatum A. Braun. SCOURING-RUSH. Occasional along  
creeks and meadow margins, below 8000 ft: Clearwater Ck.,  
7200 ft, 419; Mormon Mdw., 7300 ft, 633; observed along  
Bodie Ck., 6450 ft.

Subdivision 3. Filicopsida

Class Filicae

Order Filicales

1. Leaves 2-pinnate or nearly so, thin; sporangia borne in  
discrete sori along leaf veins; margins not reflexed.  
.....Aspidiaceae
1. Leaves composed of 6-12 pairs of separate pinnae which  
are deeply 2-lobed; pinnae thickish, sporangia borne  
along the margins of the pinnae; margins often reflexed  
and concealing the sporangia.....Pteridaceae

## Aspidiaceae

Cystopteris Bernh.

C. fragilis (L.) Bernh. var. fragilis. FRAGILE FERN. Occasional in moist rocky crevices and ephemeral stream beds, 6500-10,000 ft: hillside above Clearwater Ck. near Cinnabar Cn., 7250 ft, 658; north side of Bodie Mtn., 9100 ft, 825; Rough Ck., 9250 ft, 1424.

## Pteridaceae

Pellaea Link, CLIFF-BRAKE

P. breweri D. C. Eat. Occasional on rocky outcrops and talus slopes, 6500-10,000 ft: hillside above lower Clearwater Ck., 7350 ft, 646, 651; north side of Bodie Mtn., 9100 ft, 1121; Rough Ck., 9200 ft, 1425.

## Subdivision 4. Coniferopsida

## Class Coniferae

## Order Coniferales

1. Leaves scale-like or awl-shaped; ovulate cones fleshy, berry-like.....Cupressaceae
1. Leaves linear, needle-like, in fascicles; ovulate cones woody, composed of brown scales.....Pinaceae

## Cupressaceae, CYPRESS FAMILY

Juniperus L., JUNIPER

(after Cronquist et al. 1972)

1. Scale-like leaves with a resin gland on the back; mature ovulate cones juicy.....J. occidentalis
1. Scale-like leaves without a resin gland on the back; mature ovulate cones mealy or fibrous.....J. osteosperma

J. occidentalis Hook. var. australis (Vasek) A. Holmgr. & N. Holmgr., SIERRA JUNIPER. Occasional on granite southeast of Conway Summit, 7400-7800 ft, 1455. This is not a tree of the Bodie Hills proper, but enters a corner of the area from the Copper Mtn. area of the Sierra Nevada.

J. osteosperma (Torr.) Little, UTAH JUNIPER. Widespread around the periphery of the range, mostly 6200-8000 ft: south of Mormon Mdw., 7450 ft., 411; observed north of Mono Basin, in East Walker River Cn., around Masonic and Aurora, etc.

## Pinaceae, PINE FAMILY

Pinus L., PINE

1. Leaves mostly 5 per fascicle, 2.5-7 cm long; cones sub-cylindric, 7-10 cm long; scales unarmed.....P. flexilis
1. Leaves fewer than 5 per fascicle; cones otherwise.
  2. Leaves mostly 3 per fascicle, 12-25 cm long; cones long-oval, 15-25 cm long; scales armed with mostly incurved or deflexed prickles.....P. jeffreyi
  2. Leaves 2 or 1 per fascicle, shorter; cones smaller.
    3. Leaves mostly 2 per fascicle, 3-6 cm long; cones ovoid, 2-5 cm long; scales armed with slightly deflexed prickles.....P. contorta
    3. Leaves mostly 1 per fascicle, 2.5-3.5 cm long; cones subglobose to broadly ovate, 3.5-5.5 cm long; scales thick, unarmed.....P. monophylla

P. contorta Dougl. ex Loud. var. murrayana (Grev. & Balf.) Engelm., LODGEPOLE PINE. Occasional as isolated individuals on peaks or small groves in canyons, 7000-9850 ft: cn. on north slope of Brawley Pks., 7100-8200 ft, 1196; north slope of Bodie Mtn., 9850 ft, 1296. [P. murrayana Grev. & Balf.]

P. flexilis James, LIMBER PINE. Occasional as isolated individuals or small groves on higher peaks, 8800-10,000 ft: near summit of east Brawley Pk., 9000 ft, 1640; north side of Bodie Mtn., 9900 ft, 1267.



P. jeffreyi Grev. & Balf., JEFFREY PINE. Occasional in very small stands on hydrothermally altered soils or in canyons, 6200-9000 ft: Hot Springs Canyon, 6850 ft, 563; Bodie Cn., 7100 ft, 1197; observed in lower Masonic Gulch, 6300 ft, East Walker River Cn., 6400 ft, on south slope between east and middle Brawley Pks., 8600 ft.

P. monophylla Torr. & Frem., SINGLE-LEAF PINYON. Widespread at low to middle elevations throughout the range, below 8400 ft: near The Hot Springs, 6600 ft, 562; observed north of Mono Basin, east of Bridgeport Valley, around Aurora, Masonic, etc.

#### Subdivision 5. Gnetopsida

##### Class Gnetae

##### Order Ephedrales

##### Ephedraceae, EPHEDRA FAMILY

#### Ephedra L., EPHEDRA, MORMON-TEA, JOINT-FIR

1. Branchlets green, not glaucous, numerous, erect and mostly parallel; leaf bases brown; seeds with faint longitudinal furrows.....E. viridis
1. Branchlets gray-green, glaucous, fewer and divergent; leaf bases gray; seeds smooth.....E. nevadensis

E. nevadensis S. Wats. Occasional on dry, gravelly slopes on

the eastern side of the range, below 6500 ft: lower Bodie Cn., 6350 ft, 1176.

E. viridis Coville. Occasional on dry slopes and rocky outcrops throughout the range, mostly below 8000 ft: lower Clearwater Cn., 6900 ft, 491; observed at Masonic, in East Walker River Cn. and in Bodie Cn.

#### Subdivision 6. Magnoliopsida, FLOWERING PLANTS

1. Leaves mostly net-veined, usually broad, but if linear, not grass-like; flowers usually 4 or 5-merous; cotyledons 2.....Class 1. Dicotyledoneae, p. 84.
1. Leaves mostly parallel-veined, often linear and grass-like; flowers usually 3-merous; cotyledon 1 (none of these characters are readily visible in the minute, free-floating aquatics of Lemnaceae).....  
.....Class 2. Monocotyledoneae, p. 243.

## Class 1. Dicotyledoneae, DICOTS

## Key to Dicot Families

(after Munz 1959 and Jepson 1925)

1. Flowers without a perianth, or the perianth so reduced as to escape notice.....GROUP I
1. Flowers with a perianth composed of a calyx and/or corolla, these sometimes reduced and not obviously perianth-like.
  2. Corolla absent, the perianth composed of sepals only, but these sometimes resembling petals, or inconspicuous or early-deciduous.....GROUP II
  2. Corolla present, the perianth composed of both sepals and petals (the sepals reduced to pappus in Asteraceae).
    3. Corolla of separate petals.
      4. Stamens many, more than twice as many as the petals.....GROUP III
      4. Stamens fewer, no more than twice as many as the petals.....GROUP IV
    3. Corolla of partly to almost completely united petals.
      5. Ovary superior.....GROUP V
      5. Ovary inferior.....GROUP VI

## GROUP I

1. Plants woody trees or shrubs; inflorescence a catkin.....Salicaceae
1. Plants herbaceous; inflorescence not a catkin.
  2. Plants terrestrial vines.....Moraceae
  2. Plants rooted aquatics, not vines.
    3. Leaves opposite, obovate.....Callitrichaceae

3. Leaves whorled, 7-10 per whorl, lanceolate.  
 .....Hippuridaceae

## GROUP II

## 1. Plants woody trees, shrubs or subshrubs.

2. Calyx salverform, the 5 sepals united; stamens many; style becoming long and plumose in fruit.  
 .....Rosaceae (Cercocarpus)
2. Calyx of 3-6 separate sepals; stamens 12 or fewer; style not becoming long and plumose in fruit.
3. Leaves opposite; fruit a fleshy drupe; leaves and branchlets silvery with minute scales..Elaeagnaceae
3. Leaves alternate; fruit a dry achene or utricle; leaves and branchlets without silvery scales.
4. Flowers subtended by involucre of united bracts.....Polygonaceae
4. Flowers not subtended by involucre.  
 .....Chenopodiaceae

## 1. Plants herbaceous.

## 5. Leaves opposite.

6. Plants vines.....Moraceae
6. Plants not vines.

7. Herbage covered with stinging hairs; calyx of 4 free sepals; flowers in racemes.....Urticaceae

7. Herbage without stinging hairs; sepals united into a tubular, corolla-like calyx; flowers 1-5 in a calyx-like involucre of united bracts.....Nyctaginaceae

## 5. Leaves alternate.

8. Stamens many, more than twice the number of sepals.....Ranunculaceae

8. Stamens fewer, usually less than 9.

9. Flowers subtended by involucre of united bracts, OR a scarious stipular sheath (ocrea)

- present above each node.....Polygonaceae
9. Plants with neither involucre nor ocreae.
10. Flowers subtended by scarious bracts.....  
.....Amaranthaceae
10. Flowers subtended by non-scarious bracts.  
.....Chenopodiaceae

## GROUP III

1. Plants cactus-like: fleshy, jointed, with needle-like thorns and glochids.....Cactaceae
1. Plants not cactus-like.
2. Plants trees, woody shrubs or vines.....Rosaceae
2. Plants herbaceous.
3. Herbage spiny; flowers 5-13 cm across, with large, white petals.....Papaveraceae
3. Herbage not spiny; flowers and petals smaller.
4. Ovary inferior; fruit an elongate, prismatic capsule.....Loasaceae
4. Ovary superior; fruit not prismatic.
5. Filaments united in a tube surrounding the style; herbage stellate-pubescent...Malvaceae
5. Filaments not united in a tube (except the innermost series forming a sheath in Aquilegia); herbage not stellate-pubescent.
6. Ovary recessed in a cup-like hypanthium; leaves pinnately compound.....Rosaceae
6. Flowers without a hypanthium; leaves simple.
7. Sepals 2.....Portulacaceae
7. Sepals more than 2.

8. Fruit a circumscissile capsule; sepals pink and petaloid.....  
 ....Portulacaceae (Lewisia rediviva)

8. Fruit an achene or follicle; sepals not pink and petaloid..Ranunculaceae

#### GROUP IV

1. Ovary inferior or partly so.

2. Inflorescence a compound umbel; fruit a 2-seeded schizocarp; herbs.....Apiaceae

2. Inflorescence not a compound umbel; fruit not a schizocarp.

3. Inflorescence a dense head; leaves opposite; shrubs.....Cornaceae

3. Inflorescence not a head; leaves alternate.

4. Perianth 4-merous; style 1.....Onagraceae

4. Perianth 5-merous; styles 2 or 3, partly united toward the base.

5. Plants herbaceous.....Saxifragaceae

5. Plants shrubby.

6. Styles 3; leaves finely serrate.....  
 .....Rhamnaceae (Ceanothus)

6. Styles 2; leaves mostly with deep lobes.  
 .....Grossulariaceae

1. Ovary superior.

7. Flowers irregular.

8. Leaves compound; fruit a legume.....Fabaceae

8. Leaves simple; fruit a capsule.

9. Petals 5, the lowest one spurred; perennial herbs.....Violaceae

9. Petals 3 or 4, none spurred; perennial subshrubs or annual herbs.

10. Petals 4; aquatic or semiaquatic annual herbs.....Elatinaceae

10. Petals 3; terrestrial perennial subshrubs.  
.....Polygalaceae

7. Flowers regular.

11. Sepals and petals 4; stamens 6.

12. Ovary and fruit sessile.....Brassicaceae

12. Ovary and fruit borne on a stipe.

13. Plants herbaceous, annual.....Capparidaceae

13. Plants shrubby, perennial.....  
.....Brassicaceae (Stanleya)

11. Sepals and petals mostly 5 or 10; stamens mostly 5 or 10.

14. Flowers perigynous (stamens borne on the rim of a fleshy disc or cup-like hypanthium).

15. Leaves simple, finely serrulate.....  
.....Rhamnaceae (Rhamnus)

15. Leaves pinnately compound.....Rosaceae

14. Flowers hypogynous (stamens borne on the receptacle).

16. Plants woody shrubs; anthers opening by terminal pores.....Ericaceae (Ledum)

16. Plants herbaceous; anthers opening by longitudinal slits.

17. Gynoecium apocarpous (pistils many and separate); fruit an achene...Ranunculaceae

17. Gynoecium syncarpous (pistil solitary, of united carpels); fruit a capsule.

18. Sepals 2; style simple and stigmas 2; petals entire and not blue.....  
.....Portulacaceae

18. Sepals 5; styles and stigmas 2-5; petals notched or entire, white or blue.

19. Petals blue, entire; placentation axile, the ovary divided by septae; styles 5; leaves mostly alternate.  
.....Linaceae

19. Petals whitish, usually slightly bifid to deeply 2-cleft; placentation free-central, the ovary not divided by septae; styles 2-5; leaves opposite.....Caryophyllaceae

#### GROUP V

1. Plants completely parasitic, without visible chlorophyll.

2. Plants stem-parasitic; flowers minute, regular.....  
.....Cuscutaceae

2. Plants root-parasitic; flowers larger, irregular....  
.....Orobanchaceae

1. Plants partly or completely autotrophic, with visible chlorophyll.

3. Flowers irregular.

4. Ovary 4-lobed, developing into four 1-seeded nutlets; plants usually aromatic.....Lamiaceae

4. Ovary not lobed, not developing into nutlets; plants usually not aromatic.

3. Flowers regular.

5. Anthers opening by terminal pores or slits; stamens more than 5.....Ericaceae

5. Anthers opening by longitudinal slits; stamens not more than 5.

6. Pistils 2, the ovaries distinct, but the styles or stigmas united; fresh plants exuding milky latex when broken.

7. Stamens and stigmas united into a column, this bearing hood-like appendages.  
.....Asclepiadaceae

7. Stamens and stigmas not united; hoods absent.  
.....Apocynaceae



- 6. Pistil 1; fresh plants not exuding milky latex when broken.
  - 8. Ovary 4-lobed, developing into 1-4 one-seeded nutlets; inflorescence usually a tightly coiled cyme.....Boraginaceae
  - 8. Ovary not lobed, developing into a capsule; inflorescence usually not a tightly coiled cyme.
    - 9. Style 3-cleft; ovary 3-loculed; capsule 3-valved.....Polemoniaceae
    - 9. Style not 3-cleft; ovary 1 or 2-loculed; capsule not 3-valved.
- 10. Sepals partly united.
  - 11. Leaves opposite; ovary 1-loculed. ....Gentianaceae
  - 11. Leaves alternate; ovary 2-loculed. ....Solanaceae
- 10. Sepals separate to the base.
  - 12. Plants trailing or twining; leaf bases mostly sagittate.....Convolvulaceae
  - 12. Plants erect or diffuse; leaf bases never sagittate.....Hydrophyllaceae

## GROUP VI

- 1. Inflorescence a head.....Asteraceae
- 1. Inflorescence not a head.
  - 2. Leaves alternate.....Campanulaceae
  - 2. Leaves opposite or whorled.
    - 3. Corolla gibbous at the base; stamens 3.....Valerianaceae
    - 3. Corolla not gibbous at the base; stamens 4 or 5, rarely 2.

4. Plants shrubby or arborescent.....Caprifoliaceae

4. Plants herbaceous.....Rubiaceae

### Amaranthaceae, AMARANTH FAMILY

#### Amaranthus L., AMARANTH

A. graecizans L. Occasional in dry or moist, disturbed places, mostly below 7500 ft: beside road in Mormon Mdw., 7350 ft., 921; observed in Bodie Ck. in Bodie Cn., 6480 ft.

### Apiaceae (=Umbelliferae), CARROT FAMILY

#### Vegetative and Flowering Key

1. Ultimate divisions of the leaves linear to linear-lanceolate, mostly 8-20 times as long as broad.
  2. Slender herbs, 2-8 dm tall, from 1 or more small tubers; rays of the umbels 1-4 cm long; leaf blades simple, ternate or biternate, 5-15 cm long.  
.....Perideridia
  2. Stout herbs, 5-15 dm tall, from stout taproots; rays of the umbels 3-7 cm long; leaf blades ternate-pinnately decompound, 10-35 cm long.....Angelica
1. Ultimate divisions of the leaves linear-lanceolate or broader, less than 8 times as long as broad.
  3. Flowers sessile in dense, capitate umbellets; rays wooly-white tomentose; leaflets pinnatifid or pillately compound into deeply lobed segments 1-12 cm long, their margins not revolute.....Sphenosciadium
  3. Flowers pedicellate in looser umbellets; rays of the umbels glabrous or nearly so; leaflets pinnatifid and

somewhat revolute, or pinnately compound into dentate, lanceolate to lance-ovate subleaflets with flat margins.

4. Plants acaulescent or short-caulescent, 1-12 dm tall; leaflets or subleaflets pinnatifid into rounded or linear-lanceolate lobes, their margins somewhat revolute.....Lomatium
4. Plants strongly caulescent, 3-20 dm tall; leaflets dentate and lanceolate to ovate, their margins flat.
  5. Leaflets linear-lanceolate to lanceolate, 3-10 cm long, serrate to incised; petioles 1-8 cm long; fruit ovoid to subglobose.....Cicuta
  5. Leaflets lance-oblong to ovate, 2-10 cm long, serrate to incised or lobed; petioles 5-30 cm long; fruit linear-fusiform.....Osmorhiza

#### Fruiting Key

(after Munz 1959)

1. Fruits with at least the lateral ribs winged; fruits dorsally compressed.
  2. Dorsal ribs filiform; plants short-caulescent or acaulescent.....Lomatium
  2. Dorsal ribs prominent or with narrow wings; plants strongly caulescent.
    3. Fruits pedicellate, the umbellets not capitate. ....Angelica
    3. Fruits sessile, the umbellets capitate. ....Sphenosciadium
1. Fruits not winged on any of the ribs; fruits terete, globose or slightly laterally compressed.
  4. Fruits elongate, several times longer than wide; stout herbs, 3-12 dm tall.....Osmorhiza
  4. Fruits globose or ovoid, not more than twice as long as wide.
    5. Ribs of the fruit corky, broader than the intervals; stout herbs, 5-20 dm high.....Cicuta

5. Ribs of the fruit filiform, not corky; slender herbs 2-8 dm high.....Perideridia

Angelica L.

A. lineariloba Gray. Occasional on moist, rocky slopes, among sagebrush, mostly above 8000 ft: Geiger grade 1 mi north of Bodie, 8900 ft, 897; observed at 10,050 ft on south side of Potato Pk.

Cicuta L., WATER-HEMLOCK

C. douglasii (DC.) Coult. & Rose. Occasional in wet meadows in the pinyon-juniper zone, 6000-8000 ft: East Walker River Cn. below Murphy Pond, 6500 ft, 1402.

Lomatium Raf.

1. Plants caulescent, 8-12 dm tall; fruit oblong-oval, 12-16 mm long, glabrous.....L. dissectum
1. Plants acaulescent or short-caulescent, 1-4 dm tall; fruit ovate to oblong-ovate, 6-8 mm long, puberulent.....L. nevadense

L. dissectum (Nutt. ex Torr. & Gray) Mathias & Constance  
var. multifidum (Nutt. ex Torr. & Gray) Mathias & Constance.  
Common on moist, rocky slopes among sagebrush, 7000-9500 ft:

1 mi south of Mormon Mdw., 7600 ft, 576; east slope of east summit of Masonic Mtn., 9000 ft, 1167.

L. nevadense (S. Wats.) Coult. & Rose var nevadense. Common on gravelly hillsides and ridges, below 8500 ft: hillside 3.7 mi east-northeast of Bodie, 8100 ft, 982, 983; south of Mormon Mdw., 7450-7550 ft, 1014, 1147.

Osmorhiza Raf., SWEET CICELY

O. occidentalis (Nutt. ex Torr. & Gray) Torr. Common in riparian aspen groves, below 8300 ft: beneath aspens at Lakeview Spring, 1073, 1238; beneath aspens in canyon on north slope of Brawley Pks., 7800 ft, 1581.

Perideridia Reichenb., YAMPAH

1. Basal leaves ternate, biternate or simply pinnate with only 2 pairs of pinnae; umbels flat or concave, the umbellets slightly convex; involucre absent or of 1-2 setaceous bracts 2-10 mm long; involucre of 7-10 linear-lanceolate bracts 1-2 mm long; vallecular oil tubes solitary.....P. lemmonii
1. Basal leaves bipinnately or tri pinnately dissected; umbels conspicuously convex; involucre of about 10 ovate-lanceolate, early-desiduous bracts, 3-10 mm long and wholly scarious; involucre of 8-10 obovate-lanceolate, wholly scarious bractlets 3-9 mm long; vallecular oil tubes usually 3.....P. bolanderi

P. bolanderi (Gray) A. Nels. & Macbr. ssp. bolanderi. Occa-

sional on moist hillsides or dry to moist meadows, below 8500 ft: south of Mormon Mdw., 7450 ft, 373; near The Hot Springs, 6600 ft, 559; also collected northeast of Bridgeport, Alexander & Kellogg 3832; on Masonic Mtn., Q. Jones 48-21 (Chuang & Constance 1969).

P. lemmonii (Coult. & Rose) Chuang & Constance. Common in moist to wet meadows, below 8500 ft: Mormon Mdw., 7300 ft, 636; south of Mormon Mdw., 7500 ft, 834; beside lower Clearwater Ck., 6950 ft, 1468; spring on west side of Bridgeport Cn., 7750 ft, 1603; also collected 2 mi southwest of Masonic, Wiggins & Rollins 569 (Chuang & Constance 1969). [P. parishii (Coult. & Rose) A. Nels. & Macbr.]

#### Sphenosciadium Gray

S. capitellatum Gray, SWAMP WHITE-HEADS, RANGER'S BUTTONS. Occasional in perennially wet meadows or along shaded streams, 7500-9500 ft: streambank in canyon on north slope of Brawley Pks., 7700 ft, 1307; subalpine mdw. on upper Rough Ck., 9600 ft, 1429; streambank in Masonic Gulch below Masonic Lower Town, 7750 ft, 1688.

## Apocynaceae, DOGBANE FAMILY

Apocynum L., DOGBANE

A. medium Greene var. floribundum (Greene) Woodson. Occasional on dry, partly shaded slopes near streams on the eastern side of the range, below 8500 ft: Bodie Cn. 2 mi northeast of state line, 6960 ft, 1191; observed in Bodie Cn. near state line, 7500 ft; on north slope of Brawley Pks., 8100 ft. According to Kartesz & Kartesz (1980) this plant should be A. X medium Greene, a hybrid between A. androsaemifolium L. var. incanum DC. and A. cannabinum L. var. hypericifolium Gray. Neither parent occurs near this area, however, so its status as a hybrid here appears questionable.

## Asclepiadaceae, MILKWEED FAMILY

Asclepias L., MILKWEED

A. cryptoceras S. Wats. ssp. cryptoceras. Occasional on steep slopes of deep clay soil on east side of the range, below 8000 ft: Bodie Cn., 7750 ft, 1199; observed beside road from Sonoma to Masonic, 6100 ft.

## Asteraceae (=Compositae), SUNFLOWER FAMILY

(partly after Munz 1959 and Abrams &amp; Ferris 1960)

1. Tubular disc-flowers absent; ligulate flowers perfect, 5-toothed at the apex; fresh plants exuding milky latex when broken. (Subfamily Liguliflorae, Tribe Cichorieae)
  2. Achenes strongly flattened and topped by a short beak; ligules purple.....Lactuca
  2. Achenes not flattened, but angled or terete, without a beak, or long-beaked (Taraxacum); ligules yellow or pink to purplish.
    3. Plants extensively divaricate-branched; ligules pink to purplish, sometimes drying straw-colored .....Stephanomeria
    3. Plants unbranched, or with fewer, mostly ascending branches; ligules yellow, sometimes drying purplish to purplish-white.
      4. Leaves all basal; heads solitary on scapose peduncles.
        5. Achenes spinulose above and topped by a long, slender beak.....Taraxacum
        5. Achenes not spinulose above and tapered from about the middle, but not topped by a long, slender beak.....Agoseris
      4. Leaves cauline as well as basal; heads not on scapose peduncles.
        6. Pappus early-deciduous, with 2-5 bristles persisting.....Malacothrix
        6. Pappus persisting in full, or late-deciduous. ....Crepis
1. Tubular disc-flowers present; ray-flowers perfect or imperfect, 3-toothed at the apex, or absent; fresh plants not containing milky latex. (Subfamily Tubuliflorae)
  7. Plants thistle-like; bearing sharp, spinose teeth on leaf margins and phyllaries; involucre 2.5-4 cm high; anthers sagittate-tailed at their base; tubular flowers with 5 long lobes. (Tribe Cynareae) .....Cirsium



7. Plants not thistle-like; involucre not as high; anthers tailed only in Antennaria and Gnaphalium; tubular flowers with shorter lobes.
8. Pappus none or vestigial.
  9. Ray flowers none or vestigial.
    10. Heads solitary in the axils; phyllaries in a single series and united into a deeply lobed to subentire cup; perennial herbs.....Iva
    10. Heads in spikes, racemes or panicles; phyllaries in 2 or more imbricated series and not forming a cup; perennial herbs or shrubs.....Artemisia
  9. Ray flowers evident.
    11. Receptacles naked, without chaffy bracts subtending the achenes; rays yellow; leaves spatulate, entire to apically 3-lobed; perennial herbs.....Eriophyllum
    11. Receptacles with chaffy bracts subtending at least some of the achenes.
      12. Phyllaries in a single series; lateral margins of the phyllaries infolded to enclose the ray achenes; heavily glandular annual herbs.....Madia
      12. Phyllaries imbricated in 2-several series, their lateral margins not enclosing the rays; perennial herbs.
        13. Rays white; heads many and very small in dense, flat-topped corymbs; leaves bi- or tripinnatifid into many fine, linear segments.....Achillea
        13. Rays yellow; heads usually solitary and relatively large; leaves entire to bipinnatifid into several nonlinear segments.....Balsamorhiza
8. Pappus evident on some or all of the achenes.

14. Ray-flowers none or vestigial.

15. Pappus of broad, hyaline scales; whitish or purplish-flowered biennials with a basal rosette of pinnatifid leaves.....Chaenactis

15. Pappus all or nearly all of capillary bristles.

16. Phyllaries completely scarious or hyaline.

17. Annuals from slender taproots; outer flowers pistillate and the inner perfect or functionally staminate.....Gnaphalium

17. Perennials from rhizomes or fibrous roots; all flowers either staminate or pistillate, the plants dioecious.....Antennaria

16. Phyllaries herbaceous or partly scarious or hyaline.

18. Plants well developed shrubs.

19. Phyllaries 4-5, ca. 8 mm long.....Tetradymia

19. Phyllaries more numerous and shorter.

20. Phyllaries arranged in vertical ranks; flowers yellow; leaves narrowly linear to linear-oblong or -lanceolate.Chrysothamnus

20. Phyllaries staggered, not in vertical ranks.

21. Flowers yellow; leaves linear-oblong to oblong.....Haplopappus

21. Flowers whitish to pink-purple; leaves linear-oblong to round-ovate.Brickellia

18. Plants herbaceous throughout or woody only near the base.

22. Flowers yellow; style branches strongly flattened, neither subterete nor clavate.

23. Phyllaries all equal and in one series, often black-tipped....Senecio hydrophilus

23. Phyllaries unequal or in 2 or more series, not black-tipped.

- 24. Plants usually woody near the base; herbage stipitate-glandular.....Haplopappus
- 24. Plants caespitose, not woody near the base; herbage obscurely glandular.....Erigeron
- 22. Flowers pink-purple to whitish; style branches subterete and clavate, scarcely flattened.
  - 25. Achenes 5-angled or -ribbed; phyllaries in 2 subequal series, obscurely or not at all nerved .....Eupatorium
  - 25. Achenes 10-nerved; phyllaries in several very unequal, imbricate series, striate....Brickellia
- 14. Ray-flowers present and evident.
  - 26. Pappus of broad, hyaline scales, sometimes awn-tipped.
  - 27. Ray-flowers yellow to orange.
    - 28. Receptacle bearing chaffy bracts beside the achenes; basal leaves 2-4 dm long, lanceolate to oblong-ovate, entire, densely tomentose, not clasping at the base.....Wyethia
    - 28. Receptacle without chaffy bracts; basal leaves not as above.
      - 29. Phyllaries in one series; leaves persistently tomentose, entire to apically 3-lobed .....Eriophyllum
      - 29. Phyllaries mostly in 2-3 series.
        - 30. Phyllaries reflexed; pappus scales 5-10, awn-tipped; leaves entire, wooly-tomentose when young, but soon glabrate.....Dugaldia
        - 30. Phyllaries not reflexed; pappus-scales 4, not awned; leaves pinnately lobed, viscid-pubescent, aromatic.....Hulsea
  - 27. Ray-flowers white or pink-purple.
    - 31. Plants annual, fibrous-rooted; ray-flowers white; lateral margins of the phyllaries infolded to enclose the ray-achenes.....Layia
    - 31. Plants perennial, taprooted; ray-flowers pink to lavender or whitish; phyllaries not enclosing

the ray-achenes.....Townsendia

26. Pappus all or nearly all of capillary bristles.

32. Ray-flowers yellow.

33. Phyllaries many, usually imbricate.

34. Heads many in a dense, oblong panicle; plants rhizomatous or from a short caudex, in either case erect.....Solidago

34. Heads fewer in loose racemes, or solitary; plants taprooted and erect, or from a much-branched caudex and prostrate...Haplopappus

33. Phyllaries fewer, usually subequal and in 1 series.

35. Leaves opposite, cauline.....Arnica

35. Leaves alternate or basal.....Senecio

32. Ray-flowers white, pink, blue or purple.

36. Plants annual; ray-flowers scarcely exceeding the disc-flowers, white.....Conyza

36. Plants perennial or biennial; ray-flowers much surpassing the disc.

37. Phyllaries mostly spreading or recurved, chartaceous toward the base and green toward the tip; taprooted biennials.....Machaeranthera

37. Phyllaries not spreading or recurved, herbaceous in part or in whole, but not as above.

38. Phyllaries slightly or not at all graduated (except markedly graduated in Erigeron breweri); style appendages lanceolate or broader, 0.5 mm long or less.....Erigeron

38. Phyllaries imbricate; style appendages usually longer than 0.5 mm.....Aster

Taxonomic Synopsis of Bodie Hills Asteraceae  
(following Munz 1959)

Subfamily Tubuliflorae

Heliantheae (SUNFLOWER TRIBE)

Subtribe Verbesineae: Balsaborhiza, Wyethia

Subtribe Ambrosineae: Iva

Subtribe Madiinae: Layia, Madia

Helelieae (SNEEZWEED TRIBE)

Subtribe Heleniinae: Chaenactis, Dugaldia,  
Eriophyllum, Hulsea

Astereae (ASTER TRIBE)

Subtribe Solidagininae: Chrysothamnus, Haplopappus,  
Solidago

Subtribe Asterinae: Aster, Conyza, Erigeron,  
Macheranthera, Townsendia

Anthemidae (MAYWEED TRIBE)

Subtribe Anthemidinae: Achillea

Subtribe Chrysantheminae: Artemisia

Senecionieae (GROUNDSEL TRIBE)

Arnica, Senecio, Tetradymia

Inuleae (EVERLASTING TRIBE)

Antennaria, Gnaphalium

Eupatorieae (EUPATORY TRIBE)

Brickellia, Eupatorium

## Cynareae (THISTLE TRIBE)

Cirsium

## Subfamily Liguliflorae

## Cichorieae (CHICKORY TRIBE)

Subtribe Microseridinae: AgoserisSubtribe Stephanomeriinae: Malacothrix, StephanomeriaSubtribe Crepidinae: Crepis, Lactuca, TaraxacumAchillea L., YARROW

A. millefolium L. var. lanulosa (Nutt.) Piper. Infrequent in dry meadows, mostly below 8300 ft: 1 mi south of Mormon Mdw., 7500 ft, 587. [A. l. Nutt.]

Agoseris Raf.

A. glauca (Pursh) Raf.

1. Petioles and lower parts of leaves cobwebby-pubescent; phyllaries mostly in 2 ranks; pappus bristles mostly more than 10 mm long.....var. laciniata
1. Petioles and lower parts of leaves glabrous or short-pubescent, but not cobwebby; phyllaries mostly in 3 ranks; pappus bristles often less than 10 mm long. ....var. monticola

A. g. var. laciniata (D. C. Eat.) Smiley. Occasional on dry

to moist hillsides, often among sagebrush, mostly below 9500 ft: south of Mormon Mdw., 7450 ft, 377; hillside west of Sugarloaf, 8600 ft, 1000.

A. g. var. monticola (Greene) Q. Jones ex Cronq. Occasional in moist to wet meadows and along streambanks, mostly below 9500 ft: south of Mormon Mdw., 7400 ft, 397; mdw. on side of East Walker River Cn. below Murphy Pond, 6500 ft, 1397, 1521.

Antennaria Geartn., PUSSYTOES

1. Stems 1-4 cm tall; heads mostly solitary; phyllaries mostly brownish.....A. dimorpha
1. Stems 5-25 cm tall; heads several; phyllaries white or pinkish.....A. microphylla

A. dimorpha (Nutt.) T. & G. Occasional on dry, gravelly ridges or moist scree slopes, 7000-10,000 ft: hillside northeast of Mormon Mdw., 7700 ft, 458; on scree beneath late-lying snowbank on north slope of Bodie Mtn., 9850 ft, 1273; ridge northeast of Masonic Lower Town, 7850 ft, 1553.

A. microphylla Rydb. Occasional in dry meadows or on forested slopes, mostly below 9500 ft: south of Mormon Mdw., 7500 ft, 579; side of cn. on north slope of Brawley Pks., 7800 ft, 1314, 1317. [A. rosea Greene]

Arnica L.

(after Ediger &amp; Barkley 1978)

1. Cauline leaves 5-12 pairs, only gradually reduced upwards; disc corollas not stipitate-glandular.  
.....A. chamissonis
1. Cauline leaves usually 4 pairs, abruptly reduced upwards; disc corollas stipitate-glandular toward the base, occasionally also with non-glandular hairs.....A. sororia

A. chamissonis Less. ssp. foliosa (Nutt.) Maguire. Ediger and Barkley's treatment (1978) recognizes 6 varieties of A. chamissonis distributed between two subspecies. Two varieties of A. c. ssp. foliosa are found here.

1. Herbage densely tomentose; leaves seldom wider than 2 cm.; plants of very wet or seasonally inundated places, the lower portions of the stem sometimes submerged and leafless at the nodes.....var. incana
1. Herbage thinly pubescent to almost glabrous; some leaves usually 2-4 cm wide; plants of moist or wet, but never inundated places, the stems not becoming submerged  
.....var. andina

A. c. var. andina (Nutt.) Ediger & Barkley. Occasional in moist soil or among talus along perennial streams, 7000-9800 ft: Rough Ck. near Geiger Grade, 9100-9200 ft, 1419, 1674; Masonic Ck. in Masonic Gulch below Masonic Lower Town, 7500 ft, 1689, 7300 ft, 1699. This plant is scattered in rocky areas all along the upper portions of Rough Ck. In the talus



field around 9800 ft, just below the headwaters, there is a vast population which is spectacular when it flowers in late summer.

A. c. var. incana (Gray) Hulten. Occasional in wet meadows and around margins of ponds, 7000-8400 ft: Clearwater Ck. at mouth of Cinnabar Cn., 7200 ft, 707; margin of small lake at northwest base of Masonic Mtn., 8100 ft, 1356.

A. sororia Greene. Occasional in dry meadows, below 8500 ft: meadow at mouth of Cinnabar Cn., 7200 ft, 706.

Artemisia L., SAGEBRUSH, WORMWOOD

(partly after McArthur et al. 1979)

1. Woody shrubs, branching throughout; rhizomes absent.
  2. Leaves all or nearly all entire; plants of meadow margins.....A. cana
  2. Leaves mostly with 3 or more lobes; plants of drier habitats.
    3. Plants mostly over 4 dm tall.....A. tridentata
    3. Plants under 4 dm tall.
      4. Plants spinescent; leaves many-lobed; involucres globose.....A. spinescens
      4. Plants without spines; leaves mostly 3-lobed; involucres campanulate.
        5. Flowers 3-5 per head; corollas 1.8-3 mm long; phyllaries glabrous or nearly so.....A. nova
        5. Flowers 5-11 per head; corollas 3-4 mm long; phyllaries canescent.....A. arbuscula

1. Stout herbs, branching mostly at or near the base; strongly rhizomatous.

6. Principle leaves ca. 1 cm wide or less, exclusive of the lobes (if present); plants usually less than 1 m tall.....A. ludoviciana

6. Principle leaves usually 1-5 cm wide, exclusive of the lobes (if present); plants usually more than 1 m tall. ....A. douglasiana

A. arbuscula Nutt., LOW SAGEBRUSH. To be expected on clayey soils in the Bodie Hills, but apparently much less common than A. nova. No specimens clearly assignable to A. arbuscula were collected.

A. cana Pursh ssp. bolanderi (Gray) G. H. Ward. Common around margins of saline to subsaline meadows, mostly below 9200 ft: mouth of Cinnabar Cn., 7200 ft, 933; near upper Clearwater Ck., 7600 ft, 1713; mdw. 1 mi south of Aurora Pk., 8100 ft, 1321; Paramount Mine, 8720 ft, 1681.

A. douglasiana Bess. Occasional in sandy soils near streams, below 9000 ft: hillside below Mono Lake Vista, 7600 ft, 1456; near MacMillan Spring, 8100 ft, 1416; small cn. tributary to East Walker River Cn. below Murphy Pond, 6600 ft, 1528. This is a complex group in which material with pronounced divergent lobes may be transitional to A. ludoviciana Nutt. var. latiloba Nutt. (Cronquist 1955:64). Typical material is represented by 1456, transitional mater-

ial by 1416 and 1528.

A. ludoviciana Nutt. var. incompta (Nutt.) Keck. Occasional in sandy soil near streams, below 9000 ft: Bodie Cn. at mouth of cn. on north side of Brawley Pks., 7100 ft, 1624.

A. nova A. Nels., BLACK SAGEBRUSH. Widespread throughout the Bodie Hills as a dominant species on ridges and slopes with dry, shallow, clayey soils, mostly below 9500 ft: hilltop opposite mouth of Cinnabar Cn., 7250 ft, 730; top of ridge 1.5 mi south-southeast of Bodie, 8600 ft, 774; observed at northwest base of Masonic Mtn., on west slope of Beauty Pk.

A. spinescens D. C. Eat. Rare in the Bodie Hills and probably mostly in the southeastern portion below 9000 ft: summit of hill 3.0 mi east of Bodie, 8600 ft, 1517.

A. tridentata Nutt., BIG SAGEBRUSH, BASIN SAGEBRUSH. Abundant throughout the range to ca. 10,000 ft, forming the dominant vegetation over a larger area than any other species: Conway Grade, 7800 ft, 1379; Little Bodie Mine, 7530 ft, 686; mouth of Cinnabar Cn., 7200 ft, 655, 686, 726, 729; Mormon Mdw., 7350 ft., 628, 919; near The Hot Springs, 6700 ft, 565; Geiger Grade near Rough Ck., 9100 ft, 826; Aurora Cn., 6900 ft, 928; north base of Masonic Mtn., 8100 ft, 1360. The chromatographic analyses necessary for certain determi-

nations of subspecies were not carried out, but it is likely that all of the Bodie Hills material belongs to ssp. tridentata.

Aster L.

1. Plants with a branching, woody caudex; heads solitary on their stems; pappus distinctly double, the outer series of bristles very short.....A. scopulorum
1. Plants rhizomatous; heads 2-several on at least some of the stems; pappus a single series of long bristles.
  2. Leaves mostly linear-oblong, 1-4 cm long; involucre and peduncles glandular.....A. campestris
  2. Leaves mostly lance-linear to linear-oblong, 5-15 cm long; involucre and peduncles not glandular.
    3. Heads numerous in a long, leafy panicle; plants 4-10 dm high from stout, creeping rhizomes; ray-flowers usually pink-lavender.....A. eatonii
    3. Heads few-several in a nearly leafless cyme or cymose panicle; plants 2-7 dm high from short, slender rhizomes; ray-flowers violet-purple.....A. ascendens

A. ascendens Lindl. Common in wet meadows and along creeks, mostly below 8000 ft: mdw. at mouth of Cinnabar Cn., 7200 ft, 691; Mormon Mdw, 7420 ft, 1651; ck. south of Mormon Mdw., 7500 ft, 854; Bodie Cn. at outlet of stream from east side of Beauty Pk., 6480 ft, 1625. [A. adscendens is a much-perpetuated misspelling]

A. campestris Nutt. var. bloomeri (Gray) Gray. Common in or

bordering dry, subsaline meadows, mostly below 8000 ft: mdw. at mouth of Cinnabar Cn., 7200 ft, 708; margin of upper Mormon Mdw., 7420 ft, 1653; mdw. 1 mi south of Aurora Pk., 7900 ft, 1329.

A. eatonii (Gray) J. T. Howell. Infrequent in wet soil beside streams or springs, possibly not occurring within the Bodie Hills proper: seen only at spring below Mono Lake Vista, 7600 ft, 1453.

A. scopulorum Gray. Common on dry, gravelly slopes throughout the range, frequently among Artemisia nova, mostly below 9000 ft: hillside northeast of Mormon Mdw., 7700 ft, 459; hillside 2.7 mi east-northeast of Bodie, 8100 ft, 978; observed on west side of upper Bridgeport Cn., 7350 ft, at northwest base of Masonic Mtn., 8100 ft.

Balsamorhiza Nutt., BALSAM ROOT

1. Leaf blades sagittate.....B. sagittata  
 1. Leaf blades lanceolate, pinnatifid.....B. hookeri

B. hookeri (Hook.) Nutt. Occasional on rocky or clayey slopes throughout the range, mostly below 8000 ft: north slope of Bodie Cn. near road to lakes near Beauty Pk., 7850 ft, 1510; ridge northeast of Masonic Lower Town, 7850 ft,

1551; granitic talus in East Walker River Cn. below Murphy Pond, 6500 ft, 1525.

B. sagittata (Pursh) Nutt. Occasional on rocky slopes, mostly below 8000 ft: south of Mormon Mdw., 7350 ft, 614; hill near The Hot Springs, 6600 ft, 537.

Brickellia Ell.

- 1. Leaves round-ovate, subentire to dentate, 0.7-2 cm long.  
.....B. microphylla
- 1. Leaves linear-oblong, entire or 1 or 2-toothed, 1-2.2 cm long.....B. oblongifolia

B. microphylla (Nutt.) Gray. Infrequent in dry, rocky places among sagebrush or on travertine, mostly below 8000 ft: on decomposing travertine at Travertine Hot Springs, 6750 ft, 1761.

B. oblongifolia Nutt. var. linifolia (D. C. Eat.) B. L. Robins. Infrequent in dry, rocky places, mostly among sagebrush, mostly below 8000 ft: Bodie Cn. at outlet of stream from east side of Beauty Pk., 6450 ft, 1188.

Chaenactis DC.

C. douglasii (Hook.) Hook. & Arn. var. rubricaulis (Rydb.)

Ferris. Common throughout the range on dry soils, especially in disturbed areas, mostly below 8500 ft: mouth of Cinnabar Cn., 7200 ft, 416; hillside south of Mormon Mdw., 7350 ft, 615; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 753, 764; Bodie Cn. at outlet of stream from east side of Beauty Pk., 6450 ft, 1187; Masonic between Upper and Lower Towns, 7800 ft, 1111; along Sonoma-Masonic road, 6900 ft, 1567. Along the eastern margins of the Bodie Hills one occasionally encounters C. stevioides Hook. & Arn., but this is a species of the valleys and never really enters the range. It differs from C. douglasii in having only 4 pappus paleae instead of 10.

Chrysothamnus Nutt., RABBIT BUSH

(after Munz 1959 and McArthur et al. 1979)

- 1. Twigs felty-tomentose.
  - 2. Inflorescences mostly racemose or spicate; phyllaries very attenuate and recurving at the tips.....P. parryi
  - 2. Inflorescences cymose; phyllaries obtuse to slightly attenuate, never recurving at the tips....C. nauseosus
- 1. Twigs not felty-tomentose.....C. viscidiflorus

C. nauseosus (Pallas) Britton.

- 1. Leaves mostly linear-filiform, almost glabrous; corolla tube glabrous; phyllaries sometimes viscid, but not hairy, even on the outermost ones; involucre 6.5-9 mm high.....ssp. consimilis

1. Leaves broader, usually 1.0 mm or more, pubescent or white-tomentose; corolla tubes pubescent; phyllaries ciliate to tomentose, this sometimes restricted to the outermost ones, however, and obscure; involucre 6-13 mm high.
2. Involucre 6-7 mm high; corolla lobes ovate, 0.5-1.0 mm long.....ssp. hololeucus
2. Involucre 7-10(-13) mm high; corolla lobes lanceolate, 1.3-2.5 mm long.....ssp. albicaulus

C. n. ssp. albicaulus (Nutt.) Hall & Clements. Common on dry slopes, often among sagebrush, mostly below 9000 ft: hill-sides around mouth of Cinnabar Cn., 7250 ft, 870, 879; hill-side north of Bodie, 8450 ft, 599, 927.

C. n. ssp. consimilis (Greene) Hall & Clements. Common on dry slopes and at meadow margins, mostly below 9000 ft: lower Clearwater Cn., 7000 ft, 689; mouth of Cinnabar Cn., 7200 ft, 869, 1753; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 772; northwest base of Masonic Mtn., 8100 ft, 1361.

C. n. ssp. hololeucus (Gray) Hall & Clements. Occasional in dry soils, below 9000 ft: hillside near mouth of Cinnabar Cn., 7250 ft, 868.

C. parryi (Gray) Greene ssp. nevadansis (Gray) Hall & Clements. Occasional on dry, stoney slopes, mostly below 9000 ft: northwest base of Masonic Mtn., 8100 ft, 1364.



C. viscidiflorus (Hook.) Nutt.

1. Leaves glabrous, or sometimes with scabrid margins.  
.....ssp. viscidiflorus
1. Leaves densely puberulent on surfaces as well as on margins.....ssp. puberulus

C. v. ssp. puberulus (D. C. Eat.) Hall & Clemments. Widespread throughout the range, below 10,000 ft; commonly associated with sagebrush and possibly the most abundant Chrysothamnus in the Bodie Hills: Clearwater Cn. west of Cinnabar Cn., 7200 ft, 431; near mouth of Cinnabar Cn., 7200 ft, 723, 877; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 770; Bodie Cn. at base of road to lakes near Beauty Pk., 7820 ft, 1588; observed on south slope of Ht. Hicks, 8900 ft.

C. v. ssp. viscidiflorus. Common in dry, open sites, below 9500 ft: lower Clearwater Cn., 7000 ft, 690; beside Geiger Grade 1.5 mi west-northwest of Bodie, 9050 ft, 869; New York Hill, 8400 ft, 1365.

Cirsium P. Mill. THISTLE

1. Plants acaulescent, or very rarely to 3 dm tall; flowers pink to reddish-purple, rarely white.....C. drummondii
1. Plants with stout stems 8-20 dm tall; flowers whitish.  
.....C. utahense

C. drummondii Torr. & Gray. Common in moist meadows and along streambanks, mostly below 9000 ft: edge of meadow near The Hot Springs, 6600 ft, 542; beside Clearwater Ck. at mouth of Cinnabar Cn., 7200 ft, 731; observed in Mormon Mdw., 7300 ft, along Bodie Ck., 7500-8400 ft.

C. utahense Petrack. Occasional in dry, rocky places in canyons on east side of the range, below 8000 ft: Bodie Cn. at mouth of cn. on north side of Brawley Pks., 7100 ft, 1195.

Conyza Less.

C. canadensis (L.) Cronq. Occasional on disturbed ground, mostly below 7000 ft: hillside in East Walker River Cn. below Murphy Pond, 6300 ft, 1392.

Crepis L. HAWKSBEARD

1. Plants mostly more than 3 dm tall; the larger heads with 5-10 flowers; inflorescence with 30-100 heads.....C. acuminata
1. Plants mostly less than 3 dm tall; the larger heads with 10-60 flowers.
  2. Phyllaries bearing dark, curved setae; inflorescence with 1-5 heads.....C. modocensis
  2. Phyllaries not bearing dark setae; inflorescence with 10-30 heads.....C. occidentalis

C. acuminata Nutt. Common throughout the range in dry, often rocky places, below 9500 ft: south of Mormon Mdw., 7450 ft, 374; cn. on north side of Brawley Pks., 7600 ft, 1580; Masonic between Upper and Lower Towns, 8700 ft, 1112.

C. modocensis Greene ssp. subacaulis (Kell.) Babco. & Stebb. Infrequent on dry ridges, mostly in the northern part of the range, below 9000 ft: ridge northeast of Masonic Lower Town, 7850 ft, 1554.

C. occidentalis Nutt. ssp. occidentalis. Common in dry places throughout the range, below 9500 ft: south of Mormon Mdw., 7450 ft, 408; hillside 2.7 mi east-northeast of Bodie, 8100 ft, 890.

Dugaldia Cass.

D. hoopesii (Gray) Rydb. Occasional in wet places by streams or snow-accumulation sites, above 9000 ft: Geiger Grade near Rough Ck., 9100 ft, 814; talus on north side of Potato Peak, near the summit, 10,150 ft, 1740. [Helenium h. Gray]

Erigeron L., DAISY, FLEABANE

(partly after Munz 1959)

1. Pistillate corollas with very narrow, short (2-3 mm), erect, white to pale lavender rays; slender-stemmed biennials or perennials of moist to drying subsaline meadows.  
.....E. lonchophyllus
1. Pistillate corollas with rays usually wider, longer (over 3 mm), spreading, white to purple (not yellow), or occasionally the rays absent and the disc flowers yellow; perennials of dry, rocky or clayey soils.
2. Ray-flowers absent.
  3. Pubescence of the stem and leaves appressed; flowers all perfect; leaves all or nearly all in a basal tuft.....E. bloomeri
  3. Pubescence of the stem and leaves widely spreading; outermost series of flowers pistillate; cauline leaves present, but smaller than the basal leaves.  
.....E. aphanactis
2. Ray-flowers present.
  4. Leaves of nearly uniform size from the base to the top of the plant, cauline leaves well developed, linear or oblong, with short, stiff, spreading pubescence; phyllaries markedly graduate...E. breweri
  4. Leaves abruptly reduced up the stem, or if the cauline leaves well developed, then glabrous and at least some narrowly lanceolate; phyllaries mostly subequal.
    5. Leaves 3-lobed to 2-4 times ternate, the lobes slender; low, compact plants of high elevations.  
.....E. compositus
  5. Leaves entire or nearly so.
    6. Cauline leaves well developed; achenes 4-7-nerved; rays mostly 2-4 mm broad.  
.....E. peregrinus
    6. Cauline leaves fewer and reduced; achenes 2-nerved; rays mostly narrower.
    7. Pubescence of the stem and leaves widely

spreading; ray-flowers lavender. E. clokeyi

7. Pubescence of the stem and leaves appressed; ray-flowers white to lavender.

8. Stems decumbent, 5-25 cm long; basal leaves linear-oblongate, 3-12 cm long; ray-flowers usually white; plants of clayey or rocky slopes or flats.  
.....E. eatonii

8. Stems ascending or erect, 3-15 cm long; basal leaves spatulate or lanceolate, to 7 mm long; ray-flowers purple to pinkish; plants of crevices in rocky cliffs.....E. tener

E. aphanactis (Gray) Greene. Common throughout the range on dry slopes and ridges, below 9000 ft: ridge south of Mormon Mdw., 7450 ft, 372; hillside near white cliffs in Cinnabar Cn., 7300 ft, 505; hillside north of Murphy Spring, 8200 ft, 1508; observed west of Rancheria Gulch, 7600 ft, near Travertine Hot Springs, 6700 ft, northwest base of Masonic Mtn., 8100 ft.

E. bloomeri Gray var. bloomeri. Infrequent on stoney clay soils on ridges and hillsides in the northern part of the range, 6400-8400 ft: ridge east of Masonic Lower Town, 8000 ft, 1556; near road from Sonoma to Masonic, 6900 ft, 1566.

E. breweri Gray var. porphyreticus (M. E. Jones) Cronq. Common on dry talus slopes or rocky ridges, 6500-9000 ft: Bodie Cn. at state line, 7700 ft, 1201; talus in cn. on north side

of Brawley Pks., 7500 ft, 1306; ridge 0.7 mi east of Sugarloaf, 8850 ft, 1549.

E. clokeyi Cronq. Common on dry, stoney ridges and summits, mostly above 8500 ft: near summit of Mt. Beideman, 8970 ft, 519; ridge 0.7 mi east of Sugarloaf, 8850 ft, 1548; scree on northwest slope of Mt. Hicks, 9200 ft, 1336; Paramount Mine, 8650 ft, 779; east summit of Masonic Mtn., 9210 ft, 1164; saddle between summits of Masonic Mtn., 8920 ft, 1729.

E. compositus Pursh var. glabratus Macoun. Among rocks on summits of the highest peaks in the range, above 9300 ft: summit of Potato Pk., 10,230 ft, 1134; summit of east Brawley Pk., 9420 ft, 1647.

E. eatonii Gray ssp. plantagineus (Greene) Cronq. Common on clayey or gravelly slopes, often in slightly moist sites among sagebrush, below 9000 ft: Bridgeport Cn., 7600 ft, 568; hillside northeast of Mormon Mdw., 7600 ft, 465; scree above meadows 2.8 mi east of Bodie, 8120 ft, 1513; Bodie Cn. along road to lakes near Beauty Pk., 7900 ft, 1599; near The Hot Springs, 6600 ft, 538.

E. lonchophyllus Hook. Common in slightly saline meadows throughout the range, below 8500 ft: mouth of Cinnabar Cn., 7200 ft, 705; Bodie Cn., 6960 ft.

E. peregrinus (Pursh) Greene ssp. callianthemus (Greene) Cronq. var. angustifolius (Gray) Cronq. Rare in the Bodie Hills, seen only in the wet, subalpine meadow on upper Rough Ck., 9600 ft, 1432.

E. tener (Gray) Gray. In crevices in canyon walls on the eastern side of the range, below 8500 ft: cn. on north side of Brawley Pks., 7800 ft, 1313.

Eriophyllum Lag.

E. lanatum (Pursh) Forbes var. integrifolium (Hook.) Smiley. Common on open, gravelly or sandy slopes, above 8500 ft: scree on northwest slope of Mt. Hicks, 9200 ft, 1337; north slope of east Brawley Pk., 9100 ft, 1641; Geiger Grade near Rough Ck., 9100 ft, 817; Rough Ck. near Geiger Grade, 9150 ft, 1422; east slope of Bodie Mtn., near summit, 10,000 ft, 1263; observed on south side of Potato Pk., 9900 ft. Eriophyllum l. var. monoense also occurs in the Bodie Hills, but is so poorly distinguishable from var. integrifolium that I follow Kartesz and Kartesz (1980) in lumping the two taxa.

Eupatorium L.

E. occidentale Hook. Occasional on partly shaded, rocky can-

yon sides and cliffs, above 7500 ft: top of talus slopes in  
cn. on north side of Brawley Pks., 7800 ft, 1311; above  
snowbank on north slope of Potato Pk., 10,100 ft, 1737.

Gnaphalium L., CUDWEED

G. palustre Nutt. Common in sandy, disturbed places along  
streams and in meadows, mostly below 8000 ft: Clearwater Ck.  
at mouth of Cinnabar Cn., 7200 ft, 713, 932; mdw. on side of  
East Walker River Cn. below Murphy Pond, 6300 ft, 1386.

Haplopappus Cass.

(after Hall 1928)

1. Densely matted perennials or small shrubs.
  2. Plant a low mat; heads solitary on nearly naked peduncles; ray-flowers numerous and conspicuous..H. acaulis
  2. Plant a small shrub; heads solitary to several on leafy peduncles; ray-flowers few or absent.
    3. Twigs with dense, whitish, felty tomentum; ray-flowers absent.....H. macronema
    3. Twigs not tomentose or only thinly so, never felty; ray-flowers several, but often inconspicuous.  
.....H. suffruticosus
1. Perennial herbs with basal rosettes and fusiform tap-roots.
  4. Heads several to many, rarely one; stems 2-7 dm high.  
.....H. racemosus
  4. Heads solitary, terminal; stems rarely more than 3 dm high.....H. aparagioides



H. acaulis (Nutt.) Gray var. acaulis. Occasional on dry, gravelly ridges and slopes, sometimes among Artemisia nova, 6500-9500 ft: ridge south of Mormon Mdw., 7450 ft, 730; west slope of Mt. Biedeman, 8800 ft, 527; observed at Little Bodie Mine, 7600 ft, northwest base of Masonic Mtn., 8100 ft.

H. aparagioides Gray. Occasional in moist, meadowy places, 6300-9800 ft: mouth of Cinnabar Cn., 7200 ft, 712; margin of lake 1.3 mi south of Beauty Pk., 8300 ft, 1593; mdw. below Paramount Mine, 8600 ft, 792; mdw. on side of East Walker River Cn. below Murphy Pond, 6300 ft, 1396.

H. macronema Gray. Infrequent in sandy nivation cirques, seen only on hillside 0.8 mi southeast of Mt. Hicks, 8900 ft, 1343.

H. racemosus (Nutt.) Torr. ssp. glomeratus (Nutt.) Hall. Common in moderately to heavily mineralized soils, mostly around hot springs, 6300-7300 ft: around pools at The Hot Springs, 6600 ft, 549, 552; observed around springs and along streams at Travertine Hot Springs, 6500-6750 ft.

H. suffruticosus (Nutt.) Gray. Common throughout the range wherever snowbanks persist late into the spring or early summer, usually the dominant species in these places, above

8000 ft: ridge 1.5 mi south-southwest of Bodie, 8600 ft, 777; north slope of Brawley Pk., 9000 ft, 1638; gully beside Geiger Grade near Rough Ck., 9100 ft, 812; gully on north side of Masonic Mtn., 8800 ft, 1719. Extensive stands occur on the north and northwest slopes of Bodie Mtn.

Hulsea Torr. & Gray

H. algida Gray. Rare in the Bodie Hills, occurring only where the snowbank lingers latest on the north slope of Bodie Mtn., 9900-10,000 ft, 1441.

Iva L.

I. axilaris Pursh. Common in disturbed, clayey soils, below 8500 ft: Bodie Cn. along road to lakes near Beauty Pk., 7800 ft, 1598; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1357.

Lactuca L. LETTUCE

L. tartarica (L.) C. A. Mey. ssp. pulchella (Pursh) Stebb. Infrequent in dry, rocky, sometimes disturbed soils, as along road shoulders, below 8000 ft: beside road in Clearwater Cn. near mouth of Cinnabar Cn., 7200 ft, 916.

Layia Hook. & Arn.

L. glandulosa (Hook.) Hook. & Arn. Common on dry, gravelly slopes below 8000 ft: side of Clearwater Cn. west of Cinabar Cn., 7300 ft, 435; observed west of Rancheria Gulch, 7250 ft.

Machaeranthera Nees

M. shastensis Gray var. glossophylla (Piper) Cronq. & Keck. Common throughout the range on dry, gravelly or sandy slopes, 7000-10,000 ft: hillside east of Mono Lake Vista, 7800 ft, 1381; hillside south of Mormon Mdw., 7450 ft, 1154; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 748; beside Geiger Grade near Rough Ck., 9100 ft, 803; east slope of Potato Pk., 9600 ft, 1732; Masonic Mtn. near New York Hill, 8560ft, 1717. All specimens of Machaeranthera in the Bodie Hills appear to be intermediate between this species and M. canescens (Pursh) Gray ssp. c.

Madia Molina

M. gracilis (Sm.) Keck. Occasional in moist meadows or along intermittent streams, below 8000 ft: mdw. at mouth of Cinabar Cn., 7200 ft, 717; ck. south of Mormon Mdw., 7400 ft, 1155.

Malacothrix DC.

M. sonchoides (Nutt.) Torr. & Gray var. torreyi (Gray) E. Williams. Very infrequent in dry, sandy or gravelly places, below 8000 ft: hillside south of Mormon Mdw., 7500 ft, 484. This may be a slight southward range extension for this variety, as Munz (1959) does not record it for California. It was also collected just north of the Bodie Hills near Sonoma, 5800 ft, 1078. [M. t. Gray]

Senecio L., GROUNDSEL

(after Munz 1959)

1. Leaves well distributed along the stem; phyllaries black at the tip.....S. serra
1. Leaves mostly basal, the cauline leaves rapidly reduced up the stem.
  2. Stems usually solitary and more than 3 dm tall; phyllaries black at the tip.
    3. Plants of dry slopes; young leaves with multicellular hairs.....S. intergerrimus
    3. Plants of wet meadows and streambanks; young leaves glabrous.....S. hydrophilus
  2. Stems usually several and less than 3 dm tall; phyllaries green at the tip.
    4. Basal leaves entire or rarely toothed; herbage white-tomentose; stems not turning red in age. ....S. canus
    4. Basal leaves pinnatifid; herbage thinly tomentulose; stems turning red in age.....S. multilobatus

S. canus Hook. Occasional in dry, rocky places, usually on mountain summits, above 7000 ft: Bodie Cn. at mouth of cn. on north side of Brawley Pks., 7150 ft, 1571; near east summit of Masonic Mtn., 9150 ft, 1725; observed on summit of Beauty Pk., 9000 ft.

S. hydrophilus Nutt. Occasional in wet meadows, mostly below 7500 ft: beside Clearwater Ck. in Mormon Mdw., 7420 ft, 1650.

S. intergerrimus Nutt. var. exaltatus (Nutt.) Cronq. Occasional in slightly moist sites, usually on slopes, above 7000 ft: edge of mdw. at mouth of Cinnabar Cn., 7200 ft, 716; hillside northeast of Mormon Mdw., 7600 ft, 463; Bodie Cn. 1 mi southwest of state line, 7800 ft, 965; north slope of east Brawley Pk., at edge of Pinus flexilis grove, 9100 ft, 1642.

S. multilobatus Torr. & Gray ex Gray. Abundant and widespread throughout the range in dry to slightly moist places on slopes or meadow margins, usually among sagebrush, 6500-10,000 ft: gully south of Mormon Mdw., 7450 ft, 378; Clearwater Cn. west of Cinnabar Cn., 7250 ft, 656; near summit of Mt. Biedeman, 8970 ft, 512; hillside north of Bodie, 8600 ft, 607; salt-encrusted soil at Travertine Hot Springs, 6750 ft, 1662; Bodie Cn. 1 mi southwest of state line, 7800

ft, 964; near mouth of cn. on north side of Brawley Pks., 7200 ft, 1574; near stream west of Paramount Mine, 8720 ft, 1683. This is by far the most common Senecio in the range.

S. serra Hook. Rare in the Bodie Hills, seen only in Bodie Cn. at outlet of stream from east side of Beauty Pk., 6450 ft, 1185, 1623.

Solidago L., GOLDENROD

S. spectabilis (D. C. Eat.) Gray. Occasional on wet, meadowy hillsides, below 7000 ft: Bodie Cn. at outlet of stream from east side of Beauty Pk., 6450 ft, 1633; mdw. on side of East Walker River Cn. below Murphy Pond, 6500 ft, 1399.

Stephanomeria Nutt.

1. Pappus of capillary bristles; plants wooly-pubescent around the base.....S. spinosa
1. Pappus distinctly plumose; stems glabrous around the base.....S. exigua

S. exigua Nutt. ssp. coronaria (Greene) Gottlieb. Occasional in dry, loose soils, below 8500 ft: near Little Bodie Mine, 7600 ft, 743; disturbed soil in lower Clearwater Cn., 7000 ft, 1461; East Walker River Cn. below Murphy Pond, 6300 ft, 1410. Subspecies are described in a monograph by Gottlieb

(1972).

S. spinosa (Nutt.) S. Tomb. Occasional in dry soils, mostly below 9000 ft: near Little Bodie Mine, 7250 ft, 878; New York Hill, 8400 ft, 1364. [Lygodesmia s. Nutt.]

Taraxacum Wiggers, DANDELION

T. officinale Weber. A common weed in damp meadows along streams, mostly below 9000 ft: Bodie Cn. 3 mi northeast of Bodie, 7950 ft, 975; mdw. at Lakeview Spring, 8000 ft, 1075.

Tetradymia DC.

T. canescens DC. Common on dry slopes among Artemisia tridentata, mostly below 9000 ft: ridge 1.5 mi south-southwest of Bodie, 8600 ft, 749, 771; hillside north of Bodie, 8500 ft, 603; near mouth of cn. on north side of Brawley Pks., 7200 ft, 1585; Bodie Cn. at outlet of stream from east side of Beauty Pk., 6450 ft, 1186; Masonic Gulch below Masonic Lower Town, 7500 ft, 1692.

Townsendia Hook.

T. scapigera D. C. Eat. Occasional in slightly moist situations on gravelly or clayey soils, usually among sagebrush,

mostly above 7000 ft: hillside north of Mormon Mdw., 7400 ft, 987; north slope of Mt. Biedeman, 8850 ft, 526; edge of mdw. 2.9 mi east of Bodie, 8075 ft, 1520.

Wyethia Nutt.

W. mollis Gray. Infrequent in rocky or sandy places, above 7000 ft: Clearwater Cn. west of Cinnabar Cn., 7350 ft, 650; northwest base of Masonic Mtn., 8200 ft, 1053; observed on summit of east Brawley Pk., 9450 ft, east slope of Masonic Mtn., 8900 ft.

Boraginaceae, BORAGE FAMILY

(after Munz 1959)

1. Nutlets attached to a convex receptacle; corolla tubular, blue, the tube 5-10 mm long.....Mertensia
1. Nutlets attached to an elongate or conical receptacle (gynobase); corolla rotate to salverform, white, yellowish, blue or pink, the tube usually shorter than 5 mm, or if longer, then not blue.
  2. Nutlets conspicuously armed with barbed prickles; corollas blue or pink to whitish.
    3. Plants annual; pedicels erect in fruit; gynobase subulate.....Lappula
    3. Plants perennial; pedicels recurved in fruit; gynobase broadly pyramidal.....Hackelia
  2. Nutlets smooth, rough or papillose, sometimes minutely ornamented, but not armed with prickles; corolla white or yellowish.
    4. Nutlets attached to the gynobase laterally along a groove or slit in the pericarp, this usually partly



opened and forked at the base.....Cryptantha

4. Nutlets attached to the gynobase laterally or almost basally by an elevated keel and conspicuous attachment scar, the pericarp not slitted.  
.....Plagiobothrys

Cryptantha Lehm. ex G. Don

(after Munz 1959)

1. Plants annual, herbaceous throughout, low and hemispheric or erect and slender.
  2. Calyx circumscissile at maturity; plants low, hemispheric, diffusely branched, 2-10 cm high.....C. circumscissa
  2. Calyx not circumscissile; plants erect, the slender branches usually ascending, usually over 10 cm high.
    3. Nutlets tuberculate or papillate on the back, not smooth.
      4. Nutlets with low, rounded tubercles or bumps on the back, these 0.5-1.5 times as high as wide, but nearly smooth toward the base.....C. ambigua
      4. Nutlets with elongate papillae on the back, these 1.5-3 times as high as wide...C. echinella
    3. Nutlets smooth and shining on the back.
      5. Lateral angles of the nutlets rounded, even toward the apex; fruiting calyx 3-7 mm long.  
.....C. torreyana
      - Lateral angles of the nutlets rounded toward the base, but becoming sharp toward the apex; fruiting calyx 2-3.5 mm long.....C. watsonii
1. Plants perennial, woody at the base, caespitose or spreading-prostrate to weakly ascending.
  6. Nutlets rough or wrinkled on the back, not smooth; plants caespitose.
  7. Corolla tube 5-10 mm long, distinctly longer than

the calyx; corolla limb 5-10 mm broad, pale yellowish.....C. flavoculata

7. Corolla tube 3-4 mm long, shorter than the calyx; corolla limb 3-4 mm broad, whitish.....C. humilis

6. Nutlets smooth and shining on the back, not roughened; plants spreading-prostrate to weakly ascending.  
.....C. jamesii

C. ambigua (Gray) Greene. Common in moist to dry sites throughout the range, below 9500 ft: mouth of Cinnabar Cn., 7200 ft, 772; aspen grove on ridge 1.5 mi south-southwest of Bodie, 8600 ft, 761; ck. south of Mormon Mdw., 7500 ft, 848; hillside below Mono Lake Vista, 7600 ft, 1451; Geiger Grade near Rough Ck., 9080 ft, 1672.

C. circumscissa (Hook. & Arn.) I. M. Johnston. Abundant in dry, often disturbed sites throughout the range, below 9500 ft: beside road south of Mormon Mdw., 7450 ft, 368, 399; mouth of Cinnabar Cn., 7200 ft, 721; hill above Rancheria Gulch, 7350 ft, 1537. [Greeneocharis c. Rydb.]

C. echinella Greene. Occasional or infrequent in dry places, often with C. ambigua or C. torreyana, below 9000 ft: hillsides south of Mormon Mdw., 7450 ft, 401A.

C. flavoculata (A. Nels.) Payson. Common in dry soils throughout the range, below 9600 ft: near summit of Mt. Biedeman, 8960 ft, 509, 521; Paramount Mine, 8600 ft, 788;

on travertine near The Hot Springs, 6600 ft, 1021; lower Clearwater Cn., 7000 ft, 1462; summit of east Brawley Pk., 9440 ft, 1645. [Oreocharya f. A. Nels.]

C. humilis (Gray) Payson var. ovina (Payson) Higgins. On decomposing travertine at hot springs, 6600-6750 ft, and, more commonly, among Artemisia nova on peaks on the eastern side of the range, above 8000 ft: Travertine Hot Springs, 6750 ft, 1505; north slope of east Brawley Pk., 9200 ft, 1643. [C. nana (Eastwood) Payson var. o. Payson]

C. jamesii (Torr.) Payson var. abortiva (Greene) Payson. Occasional in dry soils among sagebrush, below 9500 ft: hillside southwest of Bodie, 8400 ft, 363; hillside 3.0 mi east of Bodie, 8500 ft, 1518; [Oreocarya a. Greene]

C. torreyana (Gray) Greene var. torreyana. Common on dry hillsides or meadows throughout the range, below 9500 ft: edge of Mormon Mdw., 7350 ft, 620; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 889; Bodie Cn. beside Bodie Ck., 7440 ft, 1203; observed south of Mormon Mdw., 7450 ft. Perhaps also in the Bodie Hills, but not among my collections, is C. gracilis Osterhaut. This desert-intermountain species has a fruiting calyx 2-2.8 mm long and leaves 1-3 cm long (vs. 3-6 mm and 2-6 cm respectively in C. torreyana).

C. watsonii (Gray) Greene. Common on dry to moist hillsides or meadows throughout the range, below 9500 ft: south of Mormon Mdw., 7450 ft, 401; cn. on north side of Brawley Pks., 7300 ft, 1577. Another specimen was collected with fruits resembling those of C. watsonii, but with a fruiting calyx longer (7 mm instead of 2-3.5 mm) and a corolla limb broader (2 mm instead of 1 mm) than is typical for this species (Munz 1959): Lakeview Spring, 8000 ft, 1234.

Hackelia Opiz., STICKSEED

H. micrantha (Eastwood) J. L. Gentry. Occasional in wet, shaded sites toward the northern end of the range, below 8100 ft: aspen grove at Lakeview Spring, 8000 ft, 1070; cn. tributary to East Walker River Cn. below Murphy Pond, 6600 ft, 1534. [H. jessicae (McGreg.) Brand; (Gentry 1974)]

Lappula Fabr., STICKSEED

L. redowskii (Hornem.) Greene var. redowskii. Very common in moist or wet soils in meadows, along streams, or around springs, below 8200 ft: mdw. at mouth of Cinnabar Cn., 7200 ft, 704, 728; Mormon Mdw., 7300-7400 ft, 923, 1032; Lakeview Spring, 8000 ft, 1241; lower Clearwater Cn., 7950 ft, 1464.

Mertensia Roth, LUNGWORT

M. oblongifolia (Nutt.) G. Don. var. nevadensis (A. Nels.)  
 L. O. Williams. Occasional in moist places among sagebrush,  
 below 9500 ft: hillsides south of Mormon Mdw., 7350-7500 ft,  
 618, 1015; Masonic Mtn. near New York Hill, 8750 ft, 1068.

Plagiobothrys Fisch. & Mey.

1. Backs of nutlets with transverse ridges or wrinkles, and minutely papillate to tuberculate between the ridges.
  2. Nutlets 2.5-3 mm long, their dorsal ridges smooth, not ornamented; nutlet scar elongate; corolla limb 4-7 mm across.....P. kingii
  2. Nutlets 1-2 mm long, their dorsal ridges with minute dendritic ornamentations; nutlet scar short; corolla limb 1-2 mm across.....P. scouleri
1. Backs of nutlets without transverse ridges or wrinkles, and minutely papillate to tuberculate on either side of the longitudinal midrib; nutlet scar short; corolla limb 1-1.5 mm across.....P. hispidus

P. hispidus Gray. Occasional in dry, loose, clayey to sandy soils, below 9300 ft: hillside northeast of Mormon Mdw., 7600 ft, 451; beside Geiger Grade near Rough Ck., 9100 ft, 909, 1670; Bodie Cn. at base of road to lakes near Beauty Pk., 7820 ft, 1589. [Sonnea h. Greene]

P. kingii (S. Wats.) Gray var. harknessii (Greene) Jepson.  
 Infrequent or occasional on dry slopes, below 7500 ft: side

of Clearwater Cn. west of Cinnabar Cn., 7300 ft, 432. The determination on the cited specimen is not certain, but the species is to be expected here. [P. h. Greene]

P. scouleri (Hook. & Arn.) I. M. Johnston var. scouleri. Common in moist soils along lake margins or in meadows, 6200-9600 ft: spring on west side of Bridgeport Cn., 7750 ft, 1602; ck. south of Mormon Mdw., 7500 ft, 843; Mormon Mdw., 7300 ft, 634; wet mdw. near The Hot Springs, 6600 ft, 560; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1044, 1046. [P. hispidulus (Greene) I. M. Johnston; Allocarya hispidula I. M. Johnston]

Brassicaceae (=Cruciferae), MUSTARD FAMILY

(partly after Munz 1959)

1. Fruit a silicle (not more than 3 times longer than wide or thick).
  2. Silicles laterally flattened (a suture dividing both faces of the fruit); plants annual.
    3. Seeds 1 in each locule; plants stiff, mostly erect, usually over 1.5 dm tall, branching throughout. .... Lepidium
    3. Seeds 2-many in each locule; plants delicate, often decumbent, 0.3-1.5 dm tall, branching at the base. .... Hymenolobus
  2. Silicles inflated, not flattened.
    4. Plants annual, of wet places. .... Rorippa
    4. Plants perennial, of dry places.
      5. Pubescence stellate; leaves spatulate-obovate;

- plants taprooted, branching at the base.  
.....Lesquerella
5. Pubescence simple to dendritic; leaves otherwise; plants rhizomatous, or caespitose with a branching caudex.
6. Lower leaves pinnatifid into linear segments; plants caespitose.....Polyctenium
6. Lower leaves entire or nearly so.
7. Plants caespitose, forming loose mats or dense tufts; leaves oblong, 2-4 mm long, densely clothing the lower stems.....Draba quadricostata
7. Plants rhizomatous; leaves lanceolate to oblanceolate, auriculate, 10-35 mm long, scattered along the stem.....Cardaria
1. Fruit a silique (3-many times longer than wide or thick).
8. Silique borne on a stipe 1-2.5 mm long; anthers coiled; sepals reflexed at anthesis.....Stanleya
8. Silique sessile on the receptacle or nearly so; anthers not coiled; sepals erect or spreading at anthesis.
9. Mature siliques dorsiventrally flattened (the sutures along the edges of the fruits).
10. Calyx urn-shaped at anthesis; stigma-lobes situated over the valves.....Streptanthus
10. Calyx not urn-shaped; stigma-lobes situated over the sutures.
11. Siliques twisted like corkscrews; plants of alpine rock crevices.....Draba breweri
11. Siliques plane, not twisted; plants of dry or moist sites below alpine.
12. Flowers yellow; plants of wet meadows or streambanks.

- 13. Leaves mostly basal, lance-ovate to oblanceolate; delicate annuals 0.5-3 dm tall.....Draba albertina
- 13. Leaves cauline as well as basal, the upper cauline leaves lyrate-pinnatifid; stout biennials or perennials 2-4 dm tall.....Barbarea
- 12. Flowers white to pinkish or purplish, not yellow; plants of dry sites.
  - 14. Pedicels 10-25 mm long in fruit, stout, straight, spreading at right angles to the stem..Phoenicaulis
  - 14. Pedicels less than 10 mm long in fruit, slender, straight or curved, spreading or deflexed....Arabis
- 9. Mature siliques inflated, terete or 4-angled.
  - 15. Leaves all or mostly entire.
    - 16. Mature siliques inflated, 4-6 mm long; plants less than 1 dm tall.....Draba douglasii
    - 16. Mature siliques terete or 4-angled, 50-80 mm long; plants 1-3 dm tall.....Erysimum
  - 15. Leaves pinnately compound or pinnatifid.
    - 17. Leaves pinnately compound, the leaflets ovate or rounded; plants of wet sites, often rooted in submerged mud; flowers white.....Nasturtium
    - 17. Leaves pinnatifid, the segments linear or linear-oblong; plants of dry or occasionally moist sites.
      - 18. Plants erect annuals; flowers yellow.
        - 19. Plants pubescent with forked or stellate hairs; siliques 0.3-3 cm long.....Descurainia
        - 19. Plants glabrous or with a few simple hairs; siliques 5-10 cm long.....Sisymbrium
      - 18. Plants caespitose perennials; flowers white. ....Polyctenium



Arabis L., ROCK CRESS

(partly after Munz 1959)

- 1. Siliques usually more than 3 mm wide.....A. platysperma
- 1. Siliques usually less than 3 mm wide.
  - 2. Seeds biseriate (2 rows in each locule).
    - 3. Fruiting pedicels erect to ascending...A. drummondii
    - 3. Fruiting pedicels reflexed.....A. pulchra
  - 2. Seeds uniseriate (1 row in each locule).
    - 4. Fruiting pedicels erect to ascending.
      - 5. Lower leaves densely pubescent with dendritic hairs; stems usually many, from a well-branched caudex.
        - 6. Siliques arcuate, 6-12 cm long; basal leaves 3-10 cm long; plants 2-9 dm tall; petals 7-14 mm long.....A. sparsiflora
        - 6. Siliques straight, 2-6 cm long; basal leaves 0.5-2 cm long; plants 1-3 dm tall; petals 4-6 mm long.
          - 7. Cauline leaves narrow-ovate to oblong, crowded at the base.....A. fernaldiana
          - 7. Cauline leaves narrow-lanceolate, remote. ....A. microphylla
      - 5. Lower leaves glabrate to pubescent, but the pubescence not dense and dendritic; stems 1-several.
        - 8. Siliques 1-1.5 mm wide; stems mostly simple. ....A. microphylla
        - 8. Siliques 2-3 mm wide; stems several.....A. lyallii
  - 4. Fruiting pedicels reflexed.
    - 9. Basal leaves linear.....A. cobrensis
    - 9. Basal leaves spatulate to oblanceolate.

- 10. Cauline leaves few, remote; plants mostly less than 2 dm tall.....A. microphylla
- 10. Cauline leaves usually many and crowded, especially below; plants mostly more than 2 dm tall.
  - 11. Siliques arcuate, 6-12 cm long.....A. sparsiflora
  - 11. Siliques straight, 3-6 cm long.....A. puberula

A. cobrensis M. E. Jones. Occasional or infrequent on dry slopes, above 7000 ft: hillside near white cliffs in Cinabar Cn., 7300 ft, 504; northeast slope of Potato Pk., 9650 ft, 1335; east slope of Potato Pk., 9600 ft, 1733; west slope of Mt. Hicks, 9100 ft, 1335.

A. drummondii Gray var. drummondii. Infrequent or rare on moist slopes among sagebrush, collected only near upper Rough Ck., 9500 ft, 1249.

A. fernaldiana Rollins var. stylosa (S. Wats.) Rollins. Not among my collections, but found by Wiggins and Rollins in rock crevices and under Cercocarpus ledifolius on Masonic Mtn. (Rollins 1946).

A. lyallii S. Wats. var. lyallii. Infrequent or rare on moist, rocky slopes, mostly above 9500 ft: near snowbank on north slope of Bodie Mtn., 9850 ft, 1271.

A. microphylla Nutt. var. microphylla. Not among my collections, but Wiggins and Rolling collected it in rock crevices on the northeast slope of Masonic Mtn. (Rollins 1946).

A. platysperma Gray var. platysperma. Infrequent on dry slopes among sagebrush, above 7000 ft: hillside east of Mono Lake Vista, 7800 ft, 1385; near snowbank on north slope of Potato Pk., 10,050 ft, 1739.

A. puberula Nutt. Infrequent or occasional on dry slopes, collected only on west slope of Mt. Biedeman, 8800 ft, 528.

A. pulchra M. E. Jones ex S. Wats. Infrequent or occasional on moist or dry slopes, collected only on hillside 2.7 mi east-northeast of Bodie, 8100 ft, 973.

A. sparsiflora Nutt.

1. Stems usually branched above; basal leaves entire, linear-oblongate.....var. sparsiflora
1. Stems usually simple; basal leaves dentate, oblongate to wider.....var. subvillosa

A. s. var. sparsiflora. A single specimen possibly of this variety was collected in Masonic Gulch between Masonic Upper and Lower Towns, 7750 ft, 1114. The following variety appears to be the predominant entity in this area.

A. s. var. subvillosa (S. Wats.) Rollins. Occasional on dry or moist slopes, also on Travertine, 6500-9000 ft: at The Hot Springs, 6600 ft, 1023; Masonic Gulch below Masonic Upper and Lower Towns, 7750 ft, 1115; Masonic Gulch below Masonic Lower Town, 7500 ft, 1694. Rollins (1946) reported a possible hybrid between this taxon and A. fernaldiana on Masonic Mtn.

Barbarea R. Br., WINTER CRESS

B. orthoceras Ledeb. Occasional along seasonal or perennial streams, 6000-9800 ft: ck. south of Mormon Mdw., 7450 ft, 381; banks of Rough Ck. near Geiger Grade, 9150 ft, 1137.

Cardaria Desv.

C. pubescens (C. A. Mey.) Jarmolenko. Rare in the Bodie Hills as a weed in sandy places, seen only in Bodie Cn. at Del Monte, 6520 ft, 1190.

Descurainia Webb. ex Berth., TANSY-MUSTARD

(after Munz 1959)

1. Upper leaves 2-3 times pinnate; silique septum with 2-3 longitudinal nerves; siliques 10-30 mm long.....D. sophia
1. Upper leaves once pinnate, the leaflets often pinnatifid; silique septum with 1 longitudinal nerve; siliques 3-15 mm long.

2. Seeds uniseriate (in one row in each locule of the silique, with placentae visible along only one margin of each locule); style conspicuous.
3. Stems glandular-pubescent, especially near the top; siliques 9-15 mm long.....D. richardsonii
3. Stems without gland-tipped hairs; siliques 3-7 mm long.....D. californica
2. Seeds biseriate (in 2 rows in each locule of the silique, with placentae visible along both margins of each locule); style minute or obsolete; siliques 5-12 mm long.....D. pinnata

D. californica (Gray) O. E. Schulz. Occasional in dry, loose, often somewhat disturbed soils, mostly above 7000 ft: shoulder of road in Clearwater Cn. west of Cinnabar Cn., 7100 ft, 446; Bodie Cn. 1 mi southwest of state line, 7800 ft, 968; Bodie Cn. 0.4 mi northeast of state line, 7440 ft, 1206.

D. pinnata (Walt.) Britton ssp. filipes (Gray) Detl. Occasional or infrequent in rocky places, collected only on hilltop 1.5 mi south-southeast of Bodie, 8850 ft, 1547.

D. richardsonii (Sweet) O. E. Schulz ssp. incisa (Engelm.) Detl. Occasional or infrequent on dry slopes, collected only on west slope of Mt. Biedeman, 8800 ft, 530.

D. sophia (L.) Webb. ex Prantl. Occasional in dry places among sagebrush, collected only near The Hot Springs, 6600

ft, 1029.

Draba L.

(after Munz 1959)

1. Plants annual; style obscure; plants of moist meadows.  
.....D. albertina
1. Plants perennial; style well developed; plants of dry sites.
  2. Fruits (silicles) inflated, leathery, not twisted.
    3. Silicles 4-6 mm long, the valves not costate; leaves 5-12 mm long.....D. douglasii
    3. Silicles 2-3 mm long, the valves with a medial costa (ridge) only slightly less pronounced than the sutures; leaves 2-4 mm long....D. quadricostata
  2. Fruits (siliques) compressed, membranous, twisted.  
.....D. breweri

D. albertina Greene. Locally common in moist or wet meadows, above 9500 ft: subalpine mdw. beside upper Rough Ck., 9600 ft, 1131. [D. stenoloba Ledeb. var. nana O. E. Schulz) C. L. Hitchc.]

D. breweri S. Wats. Rare in the Bodie Hills, seen only in rock crevices above snowbank on north slope of Bodie Mtn., 10,050 ft, 1433.

D. douglasii Gray var. crockeri (Lemmon) C. L. Hitchc. Occasional on dry, gravelly hillsides and ridges, often among

Artemisia nova, below 8500 ft: hillsides south of Mormon Mdw., 7550 ft, 567, 1011; observed in upper Bridgeport Cn, 7600 ft, on ridge east of Masonic Lower Town, 8000 ft.

D. quadricostata Rollins. Common on gravelly or clayey ridges or slopes, less often on flats, mostly on the western side of the range, but also around Beauty Pk., 6500-9000 ft: near Little Bodie Mine, 7580 ft, 733; rim of Clearwater Cn. west of Cinnabar Cn., 7300 ft, 653; hillsides south of Mormon Mdw., 7500 ft, 477; hilltop 0.6 mi southwest of The Hot Springs, 6600 ft, 315; on table-lands southwest of Beauty Pk., 8350 ft, 1596; observed at northwest base of Masonic Mtn., 8100 ft, east base of Masonic Mtn., 8600 ft, south side of New York Hill, 8600 ft, on ridges west of Rancheria Gulch, 7500 ft, and at many other localities.

Erysimum L., WALLFLOWER

(after Munz 1959)

1. Lower leaves spatulate to bluntly oblanceolate, green, usually thin; widespread, mostly above 8500 ft.  
.....E. perenne
1. Leaves linear to oblanceolate, grayish-green, usually thicker; usually on travertine about hot springs, mostly below 7000 ft.....E. argillosum

E. argillosum (Greene) Rydb. Restricted to decomposing travertine at Travertine Hot Springs, 6700 ft, 1503.

E. perenne (S. Wats. ex Coville) Abrams. SIERRA WALLFLOWER. Occasional on relatively moist slopes among sagebrush, above 8500 ft: gully beside Geiger Grade near Rough Ck., 9100 ft, 813; north side of Masonic Mtn. near New York Hill, 8550 ft, 1061.

Hymenolobus Nutt.

H. procumbens (L.) Nutt. ex Torr. & Gray. Collected only under sagebrush at margin of mdw. 1 mi south of Aurora Pk., 7900 ft, 1325. This plant is probably fairly common in moist, alkaline places below about 9000 ft throughout much of the range, but it is abundant only after a wet winter and spring. [Hutchinsia p. (L.) Desv.]



Lepidium L., PEPPERGRASS

1. Cauline leaves strongly clasping, appearing to completely surround the stem; silicles not or only minutely notched at the apex.....L. perfoliatum
1. Cauline leaves not clasping; silicles distinctly notched at the apex.....L. bourgeauanum

L. bourgeauanum Thellung. Common in disturbed soils near moist places, below 8500 ft: beside road in Clearwater Cn. west of Cinnabar Cn., 7200 ft, 417, 912; beside road in Bodie Cn. 0.4 mi northeast of state line, 7440 ft, 1202; Lakeview Spring, 8000 ft, 1244; mdw. on side of East Walker River Cn. below Murphy Pond, 6300 ft, 1389. This species is scarcely distinguishable from L. virginicum L. var. pubescens (Greene) Thellung, which may also occur here. Petals in all Bodie Hills specimens are absent or almost equalling the sepals, while those of L. virginicum supposedly equal or exceed the sepals. Herbarium specimens (at HSC) do not appear to support this distinction with any regularity, however. [L. densiflorum Schrad. var. b. (Thellung) C. L. Hitchc.]

L. perfoliatum L. Common in disturbed places near moisture, mostly below 8000 ft: shoulder of road Clearwater Cn. west of Cinnabar Cn., 7200 ft, 418; on saline soil at The Hot Springs, 6600 ft, 550; hillside north of The Hot Springs,

6600 ft, 1023.

Lesquerella S. Wats., BLADDERPOD

L. kingii S. Wats. Occasional on dry, gravelly or clayey slopes throughout the range, below 9000 ft: on decomposing travertine at The Hot Springs, 6600 ft, 1020; hillside 2.7 mi east-northeast of Bodie, 8100 ft, 981; Bodie Cn. at base of road to lakes near Beauty Pk., 7820 ft, 1587; observed at northwest base of Masonic Mtn., 8100 ft.

Nasturtium R. Br., WATERCRESS

N. officinale R. Br. Occasional along perennial water-courses, in wet meadows or in ponds, mostly below 9000 ft: puddle at Paramount Mine, 8600 ft, 798; Bodie Cn. at outlet of stream from east side of Beauty Pk., 6450 ft, 1183; bank of Masonic Ck. at Masonic Upper Town, 8050 ft, 1098.

Phoenicaulis Nutt.

P. cheiranthoides Nutt., DAGGERPOD. Common in dry, gravelly or rocky places throughout the range, 6500-10,000 ft: near mouth of Cinnabar Cn., 7200 ft, 412; near summit of Mt. Biedeman, 8970 ft, 516; observed on west summit of Masonic Mtn., 9150 ft, near summit of east Brawley Pk., 9450 ft,

hillside 1 mi south of Bodie, 8450 ft.

Polycstenium Greene

P. fremontii (S. Wats.) Greene. Rare in the Bodie Hills, seen only in an ephemeral creekbed 1 mi south of Aurora Pk., 7900 ft, 1327. This is more typically a plant of basins and low-elevation sites where moisture accumulates in the spring. D. W. Taylor reports that it is abundant just south of here around Larkin Lake.

Rorippa Scop., YELLOW CRESS

R. curvipes Greene var. integra (Rydb.) R. Stuckey. Occasional along banks of perennial streams, below 8000 ft: banks of Clearwater Ck. near mouth of Cinnabar Cn., 7200 ft, 918; Bodie Cn. at outlet of stream from east side of Beauty Pk., 6480 ft, 1626. [R. obtusa (Nutt.) Britton]

Sisymbrium L.

S. altissimum L. Common and weedy in disturbed soils, below 8000 ft: lower Clearwater Cn., 6950 ft, 1467; Mormon Mdw., 7350 ft, 924; near The Hot Springs, 6600 ft, 451.

Stanleya Nutt., PRINCE'S PLUME

S. pinnata (Pursh) Britton. Occasional in loose clayey soil-  
sin the northern and eastern foothills of the range, below  
6800 ft: near road from Sonoma to Masonic, 6100 ft, 1569.

Streptanthus Nutt.

S. oliganthus Rollins. Common in the shade of pinyon pines  
in the northern third of the range, infrequent to rare else-  
where, 6000-8500 ft: side of East Walker River Cn. below  
Murphy Pond, 6500 ft, 1113, 1523; at state line on road from  
Sonoma to Masonic, 7000 ft, 1117; on ridge east of Masonic  
Lower Town, 7850 ft, 1555; side of Bodie Cn. 3 mi northeast  
of Bodie, 8100 ft, 977.

Thelypodium Endl.

1. Cauline leaves sessile, sagittate; siliques 1.5-2 cm  
long.....T. crispum
1. Cauline leaves petiolate, not sagittate; siliques 3-8 cm  
long.....T. laciniatum

T. crispum Greene ex Payson. Common in saline meadows or in  
moist areas among sagebrush, below 8500 ft: on decomposing  
travertine at The Hot Springs, 6600 ft, 1018; Bodie Cn. 1 mi  
southwest of state line, 7800 ft, 966; side of East Walker

River Cn. below Murphy Pond, 6300 ft, 1393; observed around lake south-southwest of Beauty Pk., 8300 ft, in mdws. below Travertine Hot Springs, 6600 ft.

T. laciniatum (Hook.) Endl. Occasional in rocky crevices and on talus slopes, below 8500 ft: northwest base of Masonic Mtn., 8300 ft, 1223; top of talus in cn. on north side of Brawley Pks, 7800 ft, 1320.

#### Cactaceae, CACTUS FAMILY

##### Opuntia P. Mill., PRICKLY-PEAR, BEAVER-TAIL

O. polyacantha Haw. var. rufispina (Engelm. & Bigelow) L. Benson. Common on rocky outcrops and dry talus slopes, below 9500 ft: talus slope in cn. on north side of Brawley Pks, 7600 ft, 1584; observed near summit of Mt. Biedeman, 8850 ft, in lower Clearwater Cn., 7100 ft, ridge 1.5 mi south-southwest of Bodie, 8600 ft, in cn. tributary to East Walker River Cn. below Murphy Pond, 6500 ft. This species was split out of O. erinacea Engelm. & Bigelow var. e. (Benson 1969). Along the northern and eastern edges of the range, but not quite entering the thesis area is O. pulchella Engelm., a species with short, cylindrical joints, rather than flattened pads.

## Callitrichaceae, WATER STARWORT FAMILY

Callitriche L., WATER STARWORT

C. heterophylla Pursh emend. Darby var. bolanderi (Hegelm.) Fassett. Infrequent along perennial streams and in ponds, rooted in mud, below 8400 ft: Warm Spring, 7650 ft, 1709.

## Campanulaceae, BELLFLOWER FAMILY

Nemacladus Nutt.

N. rigidus Curran. Infrequent or locally common on very clayey soils, generally appearing only in moist years, 6200-9000 ft: seen only on a hillside south of Mormon Mdw., with Allium atrorubens, 7450 ft, 1013.

## Capparaceae, CAPER FAMILY

Cleomella DC.

C. parviflora Gray. Locally abundant in moist areas on decomposing travertine at Travertine Hot Springs, often with Distichlis spicata, 6750 ft, 1656.

## Caprifoliaceae, HONEYSUCKLE FAMILY

1. Leaves pinnately compound, the 5-9 leaflets oblong-lanceolate to lanceolate, 6-15 cm long; flowers in flat-topped compound cymes; berries blue-black, densely glaucous.....Sambucus
1. Leaves simple, 1-2 cm long; flowers in small axillary or terminal clusters; berries white.....Symphoricarpus

Sambucus L., ELDERBERRY

S. caerulea Raf. Occasional in moist, rocky sites in or near pinyon-juniper forests, 6200-9000 ft: Bodie Cn. at outlet of stream from east side of Beauty Pk., 6450 ft, 1181; side of East Walker River Cn. below Murphy Pond, 6500 ft, 1412; observed around north side of Masonic Mtn, 8000-8100 ft, in Masonic Gulch below Lower Town Masonic, 7700 ft.

Symphoricarpus Durham., SNOWBERRY

1. Plans erect; leaves green, scarcely glaucous; corolla 7-9 mm long.....S. oreophilus
1. Plants spreading, sometimes rooting at tips of branches; leaves bluish, glaucous; corolla 6-7 mm long..S. parishii

S. oreophilus Gray var. oreophilus. Widespread and abundant, usually subdominant among Artemisia tridentata, 7000-10,000 ft: south of Mormon Mdw., 7500 ft, 486; hillside north of

Bodie, 8400 ft, 610; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 776; Geiger Grade near Rough Ck., 9100 ft, 820, 827; Upper Town Masonic, 8050 ft, 1108. [S. vaccinioides Rydb.]

S. parishii Rydb. Occasional in canyons on east side of the range, below 8000 ft: cn. on north side of Brawley Pks, 7400-8000 ft, 1305, 1315.

#### Caryophyllaceae, PINK FAMILY

- 1. Sepals united into a tubular calyx; petals clawed..Silene
- 1. Sepals distinct, petals not clawed.
  - 2. Styles 4-5, alternating with the sepals.....Sagina
  - 2. Styles 3, opposite the sepals.
    - 3. Petals deeply notched at the apex.....Stellaria
    - 3. Petals entire, without an apical notch.
      - 4. Valves of the capsule 2-toothed; leaves 1-nerved; stems diffuse, spreading.....Arenaria
      - 4. Valves of the capsule entire; leaves 3-nerved, but the lateral nerves sometimes indistinct, stems usually densely compacted into a low mound.....Minuartia

#### Arenaria L., SANDWORT

A. aculeata S. Wats. Common on open, wind-swept, pebbly slopes, 6500-9800 ft: low hilltops south of Mormon Mdw.,



7450 ft, 369, 7320 ft, 630; north of Masonic Mtn. near New York Hill, 8650 ft, 1065; near summit of east Beauty Pk., 9420 ft, 1664. [A kingii (S. Wats.) Jones var. glabrescens (S. Wats.) Maguire]

Minuartia L.

M. nuttallii (Pax) Briq. ssp. fragilis (Maguire & Holmgren) McNeill. Locally common on decomposing travertine at hot springs near Bridgeport, 6600-7650 ft: The Hot Springs, 6600 ft, 1031; Travertine Hot Springs, 6750 ft, 1504. [Arenaria n. Pax ssp. f. Maguire & Holmgren; (McNeill 1980)]

Sagina L.

S. saginoides (L.) Karst. Common on stream banks and in wet meadows throughout the range, 6200-9800 ft: Bodie Cn. at outlet of stream from east side of Beauty Pk., 6480 ft, 1629; stream below Paramount Mine, 8600 ft, 794; mdw. at Masonic Upper Town, 8050 ft, 1107; observed along upper Rough Ck., 9600 ft. [S. s. var. hesperia Fern.]

Silene L., CATCHFLY

1. Corollas mostly less than 10 mm long; stems 0.5-2 dm long, decumbent from slender rootstocks.....S. menziesii
1. Corollas mostly exceeding 10 mm long; stems 1.5-4.5 dm tall, erect from at woody taproot.....S. bernardina

S. bernardina S. Wats. Common on dry slopes among Artemisia tridentata, 6500-9600 ft: hills south of Mormon Mdw., 7550 ft, 482; along Geiger Grade near Rough Ck., 9100 ft, 808. [S. montana S. Wats. ssp. bernardina (S. Wats.) C. L. Hitchc. & Maguire]

S. menziesii Hook. ssp. dorii (Kellogg) C. L. Hitchc. & Maguire. Occasional on moist, shaded banks, mostly below 8000 ft: near Clearwater Ck. at mouth of Cinnabar Cn., 7200 ft, 1295; Bodie Cn. 0.4 mi northeast of state line, 7450 ft, 1204.

Stellaria L., CHICKWEED, STARWORT

S. longipes Goldie. Occasional in wet meadows or on stream banks, 7000-9800 ft: ck. south of Mormon Mdw., 7400 ft, 395; beside upper Rough Ck., 9600 ft, 1431.

Chenopodiaceae, GOOSEFOOT FAMILY

(partly after Munz 1959)

1. Leaves fleshy and linear-terete, without a flattened blade.
2. Leaves and bracts tipped with sharp spines.....Salsola
2. Leaves and bracts not spiny-tipped.
  3. Plants annual; fruiting calyx zygomorphic, the sepals unequal with swollen protuberances.....Suaeda
  3. Plants perennial; fruiting calyx actinomorphic, the

sepals transversely winged, but all similar.

4. Plants erect or spreading shrubs, 10-25 dm tall; branches bearing short, thorny twigs; staminate flowers in spikes, pistillate flowers solitary and axillary.....Sarcobatus
4. Plants branching at the base with many erect stems 1-3 dm tall; branches not thorny; flowers perfect or staminate, solitary or in 2s or 3s. ....Kochia
1. Leaves with a flattened blade, not terete, not particularly fleshy, linear to ovate or broader.
  5. Plants densely stellate-tomentose (with some longer unbranched hairs); leaves linear to narrowly lanceolate, the margins strongly revolute; low shrubs 1-6 dm tall.....Ceratoides
  5. Plants glabrate to farinose (scaley- or mealy- pubescent), or pilose with unbranched, not stellate hairs; leaves linear or broader, the margins plane, not revolute; shrubs or herbs.
    6. Flowers imperfect, the pistillate ones enclosed between 2 accrescent bractlets and with no calyx.
      7. Plants spinose shrubs; leaves oblanceolate to oblong; bractlets united along their margins into a flattened sac around the ovary or seed. ....Grayia
      7. Plants annual herbs, not spinose; leaves triangular- to oval-hastate; bractlets not united....Atriplex
    6. Flowers all or mostly perfect, none enclosed between bractlets and all with an evident calyx.
      8. Calyx of 1 segment; stamen 1.....Monolepis
      8. Calyx of 5 segments; stamens 5.
        9. Calyx lobes with hooked spines; plants pilose with long, unbranched hairs.....Bassia
        9. Calyx lobes without hooked spines; plants glabrate to farinose.....Chenopodium

Atriplex L., SALT BUSH

A. patula L. ssp. hastata (L.) Hall & Clements. Occasional on clayey soils bordering wet meadows at Travertine Hot Springs, 6560 ft, 1764.

Bassia All.

B. hyssopifolia (Pall) Kuntze. Common on travertine or saline soils at hot springs, 6600-6750 ft: The Hot Springs, 6600 ft, 548; Travertine Hot Springs, 6750 ft, 1760.

Ceratoides (Tourn.) Bagnébin

C. lanata (Pursh) J. T. Howell var. subspinosa (Rydb.) J.T. Howell, WINTER FAT. Occasional on rocky hilltops or slopes, mostly in the southern half of the range, usually above 7500 ft: ridge 1.5 mi south-southwest of Bodie, 8600 ft, 1516; west slope of Mt. Hicks, 9100 ft, 1334; observed on hill 0.6 mi east-southeast of Sugarloaf, 8850 ft. [Eurotia l. (Pursh) Moq.; (Howell 1971)]

Chenopodium L., GOOSEFOOT, PIGWEED

(partly after Munz 1969)

1. Seed vertical, standing on edge within the calyx; plants widely branching at the base, the stems spreading and decumbent to ascending.....C. botryodes
1. Seeds horizontal, lying flat within the calyx; plants branching at and above the base; the syems mostly erect.
  2. Leaves linear, entire, 1-4 cm long and 2-3 mm wide....  
.....C. leptophyllum
  2. Leaves lance-ovate to triangular-hastate, entire to sinuate-dentate.
    3. Pericarp closely adherent to the seed and difficult to remove; leaves broadly lanceolate to rhombic-ovate, conspicuously sinuous-dentate, 1-5 cm long.....C. album
    3. Pricarp free from the seed and easily removed; leaves obovate to triangular-hastate, mostly entire, 1-3 cm long.
      4. Main leaf blades ovate to (less commonly) triangular-oblong, 1.5-3 cm long and 1/3 to 2/3 as broad; young stems sparsely farinose.....  
.....C. atrovirens
      4. Main leaf blades broadly triangular-hastate, 1-3 cm long and at least 2/3 as broad; young stems densely farinose.....C. fremontii

C. album L., PIGWEED, LAMB'S QUARTERS. Occasional as a roadside weed, below 8000 ft: near lower Clearwater Ck., 7000 ft, 1458.

C. atrovirens Rydb. Common as a weed in dry, disturbed or overgrazed places, below 9500 ft: aspen grove on ridge 1.5

mi south-southwest of Bodie, 8600 ft, 762; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 887.

C. botryodes Sm. Infrequent in moist, sometimes alkaline places, collected only in mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 893. [C. humile Hook.; C. rubrum L. var. humile S. Wats.]

C. fremontii S. Wats. Occasional in dry places and on travertine, below 8500 ft: Travertine Hot Springs, 6750 ft, 1658.

C. leptophyllum (Moq.) ex S. Wats. Common in dry or slightly disturbed places, often abundant where ground is overgrazed, below 9500 ft: north slope of Mt. Biedeman, 8900 ft, 524; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 768; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 888.

Grayia Hook. & Arn.

G. spinosa (Hook.) Moq., SPINY HOPSAGE. Common throughout the range, mostly among Artemisia tridentata, below 9000 ft: Clearwater Cn. west of Cinnabar Cn., 7200 ft, 430; hillside northeast of Mormon Mdw., 7500 ft, 464; observed near Travertine Hot Springs, 6700 ft, south of Sonoma, 6300 ft.

[Atriplex s. (Hook.) Collotzi]

Kochia Roth

K. americana S. Wats. Occasional on saline soils bordering meadows below Travertine Hot Springs, 6550-6750 ft, 1762.

Monolepis Schrad.

(after Munz 1959)

- 1. Leaves 5-15 mm long, entire; pericarp papillose.....M. spathulata
- 1. Leaves 10-50 mm long, often hastate; pericarp pitted.....M. nuttalliana

M. nuttalliana (Roemer & Schultes) Greene. Very common in clayey soils, especially where disturbed, below 9500 ft: Clearwater Cn. west of Cinnabar Cn., 7100 ft, 445; north slope of Mt. Biedeman, 8900 ft, 523; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 891; Bodie Cn. at base of road to lakes near Beauty Pk., 7820 ft, 1591; observed along road at top of Aurora Cn., 8500 ft, at Masonic Lower Town, 7650 ft.

M. spathulata Gray. Infrequent in moist, subalkaline places, often near or beneath Artemisia cana, collected only at mdw. 1 mi south of Aurora Pk., 7900 ft, 1322.

Salsola L.

S. pestifera A. Nels., RUSSIAN THISTLE. Frequent as a weed in disturbed places, usually beside roads, below 8000 ft: Clearwater Cn., 6900-7200 ft, 495, 683, 913; south of Mormon Mdw., 7500 ft, 837; observed along road from Bridgeport Reservoir to Masonic Mtn, 7200 ft. [S. kali L. var. tenuifolia Tausch.]

Sarcobatus Nees., GREASEWOOD

S. vermiculatus (Hook.) Torr. Localized on alkaline soils, mostly around hot springs, below 7000 ft: The Hot Springs, 6600 ft, 1022; observed at Travertine Hot Springs, 6550-6750 ft, in East Walker River Cn. below Murphy Pond, 6300 ft.

Suaeda Forsk. ex Scop.

S. occidentalis S. Wats. Very localized on clayey, alkaline soils, seen only around meadows below Travertine Hot Springs, 6560 ft, 1763.



## Convolvulaceae, MORNING GLORY FAMILY

Convolvulus L., MORNING GLORY, BINDWEED

C. arvensis L. Rare in the Bodie Hills as a roadside weed, seen only at northwest base of Masonic Mtn., 8100 ft, 1371.

## Cornaceae, DOGWOOD FAMILY

Cornus L., DOGWOOD

C. sericea L. ssp. sericea, AMERICAN DOGWOOD. Rare in the Bodie Hills, known only from one location on lower Clearwater Ck., 6900 ft, 591. [C. stolonifera Michx.]

## Cuscutaceae, DODDER FAMILY

Cuscuta L., DODDER

C. suksdorfii Yunker var. subpedicellata Yunker. Occasional as a parasite on low, woody or suffrutescent perennials, mostly below 8100 ft: west side of upper Bridgeport Cn., on Aster scopulorum and Draba douglasii, 7700 ft, 1601; dry hillside at southwest base of Masonic Mtn., on Monardella odoratissima, 8000 ft, 1416.

## Elaeagnaceae, OLEASTER FAMILY

(after Munz 1959)

1. Leaves alternate, lanceolate; plants without spines.  
 .....Elaeagnus
1. Leaves opposite, oblong to lanceolate; plants densely  
 beset with spines.....Shepherdia

Elaeagnus L.

E. angustifolia L., RUSSIAN OLIVE. Rare in the Bodie Hills,  
 seen only in Bodie Cn. at outlet of stream from east side of  
 Beauty Pk., 6450 ft, 1184.

Shepherdia Nutt.

S. argentea (Pursh) Nutt., BUFFALO BERRY. Occasional near  
 moist places in canyons, below 7000 ft: mdw. on side of East  
 Walker River Cn. below Murphy Pond, 6500 ft, 1401; observed  
 in Bodie Cn. near Del Monte, 6700 ft.

## Elatinaceae, WATERWORT FAMILY

Elatine L., WATERWORT

E. rubella Rydb. Occasional in shallow water or on emerging  
 mud around lakes, below 8300 ft: margin of lake at northwest

base of Masonic Mtn., 8100 ft, 1040, 1226.

Ericaceae, HEATH FAMILY

1. Leaves alternate, 1.5-3 cm long, not revolute; corolla white, the petals distinct; capsule opening from the base upward.....Ledum
1. Leaves opposite, 1-2 cm long, somewhat revolute; corolla red-purple, the petals united toward the base; capsule opening from the base upward.....Kalmia

Kalmia L., AMERICAN-LAUREL

K. microphylla (Hook.) Heller var. microphylla. Rare in the Bodie Hills, known only from a single population of very depauperate plants in Sphagnum fimbriatum peat in lower Cinabar Cn., 7280 ft, 1540. [K. polifolia Wang. var. m. (Hook.) Rehd.]

Ledum L., LABRADOR TEA

L. glandulosum Nutt. var. californicum (Kellogg) C. L. Hitchc. Rare in the Bodie Hills, known only along ck. in cn. on north side of Brawley Pks., 7100-8100 ft: near confluence with Bodie Ck., 7200 ft, 1303, 1573.

## Fabaceae (=Leguminosae), BEAN FAMILY

1. Leaves palmately divided or pinnate with 3 leaflets.
  2. Leaves pinnate with 3 leaflets; fruits tightly coiled; corolla 1.5-2 mm long, yellow.....Medicago
  2. Leaves palmate with 3 or more leaflets; fruits elongate; corolla longer than 2 mm, not yellow.
    3. Anthers strongly differentiated: some small and attached at the middle, others larger and basally attached; stamens monadelphous (united by their filaments into a single tubular group); leaflets 4-many.....Lupinus
    3. Anthers not much differentiated; stamens diadelphous (united by their filaments into two groups); leaflets 3-6.....Trifolium
1. Leaves pinnately compound with more than 3 leaflets.
  4. Rachis of the leaf prolonged into a tendril; plants trailing or climbing.....Vicia
  4. Leaves without tendrils; plants not trailing or climbing.
    5. Leaflets gland-dotted (with translucent spots); corolla pink-rose.....Dalea
    5. Leaflets not gland-dotted; corolla yellowish, whitish or purplish.
      6. Fruits 3.5-6.5 cm long, 4-5 mm wide; perennial herbs with stout, erect stems 4-12 dm high; flowers mostly yellow.....Lotus
      6. Fruits rarely longer than 3.5 cm; perennial herbs with stems prostrate to ascending, not stout, usually less than 4 dm high; flowers mostly whitish to purplish.....Astragalus

Astragalus L., MILKVETCH, LOCOWEED

(after Munz 1959)

1. Stipules of the lowest 1-3 nodes sheathing the stem (connate on the side of the stem opposite the petiole).
2. Flowers very small, the banner 5-5.5 mm long; fruits 7-10.5 mm long, triquetrous (3-edged with the faces concave).....A. johannis-howellii
2. Flowers larger, the banner 8.5-17.5 mm long; fruits 13-40 mm long, inflated.
3. Calyx (tube and teeth together) 7-12 mm long; petals whitish to pale lavender, the banner 13-17.5 mm long; fruit leathery.....A. bolanderi
3. Calyx 4-6 mm long; petals purple with white wing-tips, the banner 8.5-14 mm long; fruit membranous.....A. whitneyi
1. Stipules of the lowest 1-3 nodes separate, not connate and sheathing.
4. Pubescence of the leaves and stems tomentose to shaggy, or of incurved hairs, but in neither case strictly appressed.
5. Stems none or very short; fruits inflated, ovoid, densely cottony-pubescent; leaves and stems finely tomentose to shaggy.....A. purshii
5. Stems well developed; fruits strongly laterally compressed, coiled into a partial or complete ring, puberulent to glabrate; leaves and stems with short, incurved hairs.....A. curvicaupus
4. Pubescence of the leaves and stems strictly appressed, the hairs usually straight, OR the plants nearly glabrous.
6. Stems none or very short, with internodes shorter than the imbricated stipules; pubescence dolabriiform (seemingly attached at the middle); wing-petals deeply cleft at the apex.....A. calycosus
6. Stems well developed, most or all of the internodes longer than the stipules; pubescence simple and attached at one end; wing-petals not deeply cleft.

- 7. Plants nearly glabrous throughout; fruit stipitate, pendulous, bladderly-inflated and 1-locular.....A. oophorus
- 7. Plants pubescent at least in part; fruit sessile.
- 8. Fruit dorsiventrally compressed and arched into a partial or complete ring; petals yellowish-white, with the keel-tip purple.  
.....A. iodanthus
- 8. Fruit bladderly-inflated and 2-locular; petals usually purple.....A. lentigenosus

A. bolanderi Gray. Not among my collections, but to be expected here and reported from the west slope of Mt. Hicks, ca. 9100 ft, by D. W. Taylor (pers. comm.).

A. calycosus Torr. ex S. Wats. Occasional on granitic soils on Masonic Mtn., above 8200 ft: east summit of Masonic Mtn., 9210 ft, 1165; north slope of Masonic Mtn. at New York Hill, 8650 ft, 1064.

A. curvicarpus (Heller) J. F. Macbr. Common throughout the range in sandy to gravelly soils, below 9400 ft: hillside south of Mormon Mdw., 7320 ft, 638; hillside northeast of Mormon Mdw., 7500 ft, 462; hillside north of Bodie, 8600 ft, 604; hillside 2.7 mi east-northeast of Bodie, 8100 ft, 985; hillside 3.0 mi east of Bodie, 8600 ft, 1514; southwest slope of Beauty Pk., 8600 ft, 1614; south slope of Mt. Hicks, 9200 ft, 1341.

A. iodanthus S. Wats. Common throughout the range, mostly below 9000 ft: hillside south of Mormon Mdw., 7500 ft, 487; hillside 2.7 mi east-northeast of Bodie, 8100 ft, 984; southwest slope of Beauty Pk., 8450 ft, 1612; southeast slope of Masonic Mtn., 8700 ft, 1156.

A. johannis-howellii Barneby. Locally abundant among sagebrush in the region surrounding Beauty Pk., 8250-8600 ft: around lake southwest of Beauty Pk., 8300 ft, 1592; southwest slope of Beauty Pk., 8600 ft, 1613; southeast slope of Beauty Pk., 8350 ft, 1615.

A. lentiginosus Dougl. ex Hook. var. ineptus (Gray) M. E. Jones. Occasional in loose, dry soils in the central part of the range, mostly above 8500 ft: Geiger Grade near Rough Ck., 9080 ft, 1671; southwest slope of Potato Pk., 9800 ft, 1741.

A. oophorus S. Wats. Occasional on clayey or sandy slopes, below 8000 ft: Bodie Cn. at base of road to lakes near Beauty Pk., 7850 ft, 1597; side of East Walker River Cn. below Murphy Pond, 6500 ft, 1524; beside road from Sonoma to Masonic, 6100 ft, 1568.

A. purshii Dougl. ex Hook. Occasional on dry, gravelly slopes and ridges, 6500-9500 ft. Material from the Bodie

Hills is assignable to two poorly distinguished varieties. They are separated on the basis of flower and fruit dimensions, but the plants in this area seem to intergrade, with measurements commonly falling within the range of overlap between the varieties.

1. Calyx (5.6)6.1-8.8 mm long; banner 10.3-15 mm long; keel 9.4-11.7 mm long; fruit 7.7-15 mm long.....var. lectulus

1. Calyx (8)10-14.2(15.8) mm long; banner (14.6)15.4-25 mm long; keel (11.5)12.4-20.8 mm long; fruit 13-23(27) mm long.....var. tinctus

A. p. var. lectulus (S. Wats.) M. E. Jones: hillside 0.6 mi east-southeast of Sugarloaf, 8800 ft, 1550; north slope of Masonic Mtn. near New York Hill, 8650 ft, 1066.

A. p. var. tinctus M. E. Jones: hillside south of Mormon Mdw., 7550 ft, 483; hillside northwest of Sugarloaf, 8550 ft, 998.

A. whitneyi Gray var. whitneyi. Common on dry, gravelly slopes and ridges, above 8000 ft: hillside 0.6 mi northeast of Sugarloaf, 8750 ft, 1546; north slope of east Brawley Pk., 9000 ft, 1664; ridge extending northeastward from Potato Pk., 9650 ft, 1136; northwest base of Masonic Mtn., 8200 ft, 1056.



Dalea L. ex Juss.

D. searlsiae (Gray) Barneby. Rare in the Bodie Hills, primarily a plant of basins between ranges, seen only on edge of wash in lower Bodie Cn., 6500 ft, 1172. [Petalostemon s. Gray]

Lotus L.

L. crassifolius (Benth.) Greene. Rare in the Bodie Hills, seen only on hillside east of Mono Lake Vista, 7800 ft, 1378. [Hosackia c. Benth.]

Lupinus L., LUPINE

(after Munz 1959)

1. Banner glabrous on the back; calyx not spurred.
  2. Plants forming prostrate mats or dense cushions.....L. breweri
  2. Plants with erect or ascending stems.
    3. Leaves mostly in dense basal clusters, few along the stems.....L. sellulus
    3. Leaves well distributed along the stems.
      4. Keel ciliate along the upper edge, at least toward the tip; flowers mostly blue or violet.
        5. Bracts of the inflorescence conspicuously exerted before anthesis and persisting until after anthesis.....L. culbertsonii
        5. Bracts of the inflorescence not conspicuously exerted before anthesis and deciduous at the

onset of anthesis.

- 6. Flowers very small, only 5-6 mm long.....  
.....L. meionanthus
- 6. Flowers larger, 10-12 mm long.....  
.....L. nevadensis
- 4. Keel glabrous along the upper edge; flowers  
mostly yellowish-white.....L. andersonii
- 1. Banner pubescent on the back; calyx spurred at the base  
just above the pedicel.
- 7. Wing-petals with a dense patch of short pubescence on  
the outer surface in the upper distal corner; calyx  
spur 2-2.5 mm long.....L. laxiflorus
- 7. Wing-petals glabrous throughout; calyx spur ca. 1 mm  
long.....L. caudatus

L. andersonii S. Wats. Locally abundant on slopes and around talus, among Artemisia tridentata, above 8600 ft: near Geiger Grade at east base of Bodie Mtn., 9050 ft, 778; near Geiger Grade near Rough Ck., 9100 ft, 822; observed on south slope of Potato Pk., near summit, 10,000 ft.

L. breweri Gray var. bryoides C. P. Sm. Locally common in dry meadows (usually with Carex douglasii) or on dry, gravelly slopes or ridges (usually with Phlox covillii), mostly above 8000 ft: low ridge 1 mi south of Bodie, 8450 ft, 593; hillside 2.7 mi east-northeast of Bodie, 8100 ft, 1511; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 1667; saddle between Bodie Mtn. and Potato Pk., 9850 ft; observed on north side of Masonic Mtn. east summit, 8850 ft.

L. caudatus Kellogg. Common and widespread, usually associated with Artemisia tridentata, 6000-10,000 ft: Clearwater Cn. west of Cinnabar Cn., 7350 ft, 649; hillside south of Mormon Mdw., 7600 ft, 457; beside Geiger Grade near Rough Ck., 9100 ft, 829. There is a single report, as yet unconfirmed, of L. inyoensis Heller in the Bodie Hills. It was collected by Alexander and Kellogg in 1945 on the ridge 1.5 mi south-southwest of Bodie, at 8600 ft. This species resembles L. inyoensis very closely, particularly in pressed specimens. Munz (1959) distinguishes them on the basis of pubescence, which is either appressed (L. caudatus) or spreading (L. inyoensis). A more reliable distinction for field use is based on growth habit. L. inyoensis tends to be much more rounded in outline than L. caudatus. Where the two occur close to each other, L. inyoensis occupies the moister habitats of sandy swales and nivation cirques (D. W. Taylor pers. comm.).

L. culbertsonii Greene ssp. hypolasius (Greene) Cox. Occasional around margins of moist meadows and aspen groves, mostly below 9000 ft: Mormon Mdw., 7350 ft, 922; upper Mormon Mdw., 7500 ft, 1218; edge of aspen grove on ridge 1.5 mi south-southwest of Bodie, 8600 ft, 767. [L. h. Greene]

L. laxiflorus Dougl. var. calcaratus Kellogg. Occasional on somewhat moist slopes or among aspens, above 8500 ft: edge

of aspen grove on ridge 1.5 mi south-southwest of Bodie, 8600 ft, 756; north slope of east Brawley Pk., 1637; east slope of Masonic Mtn. near east summit, 1166; L. laxiflorus here includes L. arbustus, following the taxonomically conservative treatment of Hitchcock and Cronquist (1973). I refer the Bodie Hills material to var. calcaratus because the spurs regularly exceed 1 mm and the flowers are 10-14 mm long, even though the dominant color is light blue, rather than the cream color supposedly more typical of this variety. It is possible, however, that both var. calcaratus and var. laxiflorus occur in the range.

L. meionanthus Gray. Abundant, but localized in sandy soils below late-lying snowbanks, mostly above 8500 ft: ridge 1.5 mi south-southwest of Bodie, 8600 ft, 754; east slope of Bodie Mtn., 10,000 ft, 1264; observed on north slope of Potato Pk., 10,100 ft, north slope of Masonic Mtn., 8900 ft.

L. nevadensis Heller. Rare or infrequent in the Bodie Hills, among sagebrush, seen only at north base of Masonic Mtn., 8200 ft, 1055.

L. sellulus Kellogg ssp. sellulus var. sellulus. Common in and around dry meadows, or less often among sagebrush, 7000-9500 ft: ck. near Little Bodie Mine, 7450 ft, 745; mdw. at mouth of Cinnabar Cn., 7200 ft, 498; Rough Ck. near

Geiger Grade, 9200 ft, 1676; dry mdw. between east and west summits of Masonic Mtn., 8900 ft, 1723.

Medicago L., MEDIC

M. lupinula L. Rare in the Bodie Hills as a naturalized weed, seen only in mdw. beside aspen grove in Masonic Gulch below Masonic Lower Town, 7580 ft, 1701.

Trifolium L., CLOVER

1. Heads with a involucre subtending the flowers (small and easily overlooked in T. monanthum).
2. Flowers usually 1 or 2 (or occasionally to 8) per head; corolla whitish to cream-colored, with a purple keel; calyx teeth entire; stems slender, decumbent, less than 1 dm long.....T. monanthum
2. Flowers more numerous, frequently more than 20 per head; corolla purplish to pale pink; calyx teeth tricotomously forked; stems erect or decumbent, 1-3 dm long.....T. cyathiferum
1. Heads without an involucre subtending the flowers.
3. Plants strongly caespitose, the prostrate stems forming mats; leaflets 4-6, 0.5-1 cm long.....T. andersonii
3. Plants not caespitose-matted, the stems decumbent to erect; leaflets 3, 0.5-3(-6) cm long.....T. longipes

T. andersonii Gray var. monoense (Greene) J. Gillett. Common on vernal moist, gravelly slopes and in gullies, mostly below 9200 ft: south side of Bridgeport Cn., 7600 ft, 1005;

south of Mormon Mdw., 7500 ft, 404, 488; near The Hot Springs, 6600 ft, 558; observed at northwest base of Masonic Mtn., 8100 ft. [T. m. Greene; (Isely 1980)]

T. cyathiferum Lindl. Occasional in wet meadows or on stream banks, mostly below 8000 ft: south of Mormon Mdw., 7600 ft, 569; Bodie Cn. at outlet of stream from east side of Beauty Pk., 6480 ft, 1628.

T. longipes Nutt. Occasional in moist meadows or on stream-banks, below 9000 ft: south of Mormon Mdw., 7400 ft, 403.

T. monanthum Gray. Occasional in wet meadows or on stream-banks, above 8000 ft: stream below Paramount Mine, 8600 ft, 793; observed at Masonic Upper Town, 8100 ft.

Vicia L., VETCH

V. americana Muhl. ex Willd. ssp. americana. Occasional in moist places along streams or in aspen groves, below 8500 ft: Bodie Cn. at outlet of stream from east side of Beauty Pk., 6480 ft, 1627; near Lakeview Spring, 8000 ft, 1232, 1275. [V. a. ssp. oregana (Nutt.) Abrams]

## Gentianaceae, GENTIAN FAMILY

Gentianopsis Ma, GENTIAN

G. holopetala (Gray) Iltis. Occasional in wet meadows on the west side of the range, below 8000 ft: seeps from cliffs near Clearwater Ck. below Warm Spring, 7650 ft, 1707; mdw. on side of East Walker River Cn. below Murphy Pond, 6500 ft, 1403. [Gentiana h. (Gray) Holm]

## Grossulariaceae, GOOSEBERRY FAMILY

Ribes L., GOOSEBERRY, CURRANT

1. Plants bearing spines at the nodes and prickles along the young internodes (GOOSEBERRIES).
  2. Ovary and berry glabrous; leaves 2-5 cm broad.....R. inerme
  2. Ovary and berry pubescent, usually glandular; leaves 1-2 cm broad.....R. velutinum
1. Plants without spines or prickles (CURRANTS).
  3. Flowers whitish or pinkish; leaf margins with many very small lobes 0.5-1.5 mm wide.....R. cereum
  3. Flowers yellow; leaf margins with 3 large, mostly entire lobes 4-12 mm wide.....R. aureum

R. aureum Pursh. Locally common beside wet meadows or stream banks, below 8000 ft: near mouth of Cinnabar Cn., 7200 ft,

423; side of East Walker River Cn. below Murphy Pond, 6400 ft, 1409; observed in Cottonwood Cn., 7350 ft, near The Hot Springs, 6600 ft.

R. cereum Dougl. Common throughout the range, around meadows or along streams, occasionally in talus, mostly below 9500 ft: northeast end of Mormon Mdw., 7450 ft, 471; near Geiger Grade at Rough Ck., 9100 ft, 823, 1138; north slope of east Brawley Pk., 9000 ft, 1639; observed at Bodie, 8400 ft, near summit of Potato Pk., 10,150 ft, in Masonic Gulch, 7600 ft.

R. inerme Rydb. Occasional in wet places around springs or along streams, mostly toward the north end of the range, below 8600 ft: Lakeview Spring, 8000 ft, 1072, 1240; ck. below Masonic Spring, 8300 ft, 1366. [R. divaricatum Dougl. var. i. (Rydb.) McMin]

R. velutinum Greene. Infrequent in wet places along streams, below 9000 ft: Lakeview Spring, 8000 ft, 1071; west slope of Mt. Biedeman (very depauperate), 8600 ft, 531.

#### Hippuridaceae, MARE'S-TAIL FAMILY

#### Hippuris L., MARE'S-TAIL

H. vulgaris L. Rare in the Bodie Hills, seen only in shallow



spring on south side of Big Alkali Valley, 7400 ft, 1222.

# Hydrophyllaceae, WATERLEAF FAMILY

1. Plants perennial herbs from a woody rootcrown, a short taproot, or slender rootstocks.
  2. Plants acaulescent; corollas bright white to bluish, 10-25 mm long; flowers solitary in the leaf axils.  
.....Hesperochiron
  2. Plants acaulescent; inflorescence composed of short coiled cymes.
    3. Corollas dirty white to yellowish or bluish, 4-8 mm long; plants arising from woody rootcrowns.  
.....Phacelia (in part)
    3. Corollas purple (often becoming white in dried specimens), 10-15 mm long; plants arising from slender rootstocks.....Nama rothrockii
1. Plants annual herbs from fibrous roots.
  4. Calyx with reflexed auricles between the sepals; flowers solitary in the leaf axils, and the leaves pinnately dentate.....Nemophila
  4. Calyx without auricles; flowers few to many in weakly to strongly coiled cymes, or if solitary, then the leaves entire.
    5. Stamens unequally inserted and unequal in length.  
.....Nama (in part)
    5. Stamens equally inserted and equal in length, or if unequal in length, then the seeds transversely corrugate.....Phacelia (in part)

## Hesperochiron S. Wats.

H. californicus (Benth.) S. Wats. Common in moist meadows

throughout the range, 6500-9850 ft: mouth of Cinnabar Cn., 7200 ft, 502; 0.6 mi northeast of Bodie, 8400 ft, 986; 2.1 mi east-northeast of Bodie, 8070 ft, 1519; mdw. 1 mi south of Aurora Pk., 7900 ft, 1324; observed at headwaters of Rough Ck., 9800 ft. [H. c. var. watsonianus (Greene) Brand.]

Nama L.

1. Plants perennial from slender rootstocks; inflorescence a many-flowered, subcapitate terminal cyme; leaves coarsely dentate.....N. rothrockii
1. Plants annual; flowers few in reduced cymes or solitary; leaves entire.
  2. Corolla tubular, 3-5 mm long, 1-3 mm broad...N. densum
  2. Corolla broadly funnelform, 10-17 mm long, 7-12 mm broad.....N. aretioides

N. aretioides (Hook. & Arn.) Brand. Rare in the Bodie Hills, in the eastern foothills adjacent to Mud Spring Valley, below 6500 ft: beside road from Sonoma to Masonic, 6150 ft, 1118.

N. densum Lemmon. Infrequent in dry, periodically disturbed places, often along roads, mostly below 8000 ft: road southwest of Rancheria Gulch, 7150 ft, 1536.

N. rothrockii Gray. Infrequent in dry, sandy soils, mostly below 8000 ft: Bodie Cn. 0.2 mi northeast of state line,

7250 ft, 1198.

Nemophila Nutt. ex W. Bart.

N. spathulata Coville. Occasional in moist places under sagebrush, below 9800 ft: beside Rough Ck. near Geiger Grade, 9500 ft, 1130; near mdw. at Masonic Upper Town, 8050 ft, 1047.

Phacelia Juss.

1. Plants perennial or biennial with woody rootcrowns; corollas dirty-white to yellowish or bluish.
2. Leaves once-pinnate, the pinnae being lobed to pinnatifid; calyx lobes narrowly spatulate, broadest near the apex; stems mostly glabrous, 3-10 dm long.....P. ramosissima
2. Leaves entire and lanceolate, or once-pinnate with entire pinnae; calyx lobes linear to linear-oblong, broadest near the middle; stems clothed with sharp, stiff, spreading hairs.
3. Plants 2-12 dm tall; inflorescence elongate, consisting of many coiled cymes; plants of low to middle elevations.....P. heterophylla
3. Plants 0.5-2.5 dm tall; inflorescence a short, dense cluster of fewer coiled cymes; plants of high elevations.....P. frigida
1. Plants annual; corollas blue and/or yellow.
4. Leaves entire, corollas deep blue (becoming whitish toward the base), bowl-shaped; seeds finely pitted. ....P. humilis
4. Leaves pinnately lobed to pinnatifid; corollas entirely or partly yellow; seeds with transverse corrugations.

5. Plants erect; leaves pinnatifid or once-pinnate with pinnatifid pinnae; corolla funnelform, 9-16 mm long, with a purple limb and yellow tube.....P. bicolor
5. Plants prostrate; leaves pinnately lobed or rarely entire; corolla tubular to campanulate, 2-4 mm long, entirely yellow.....P. monoensis

P. bicolor Torr. ex S. Wats. Occasional in shaded or moist, often sandy places, below 9500 ft: beneath junipers south of Mormon Mdw., 7500 ft, 479; hillside northeast of Mormon Mdw., 7450 ft, 472; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 886.

P. frigida Greene. Infrequent in rocky or sandy places near peaks, above 8500 ft: hillside 0.8 mi south-southwest of Mt. Hicks, 8900 ft, 1344; east side of Potato Pk., 10,100 ft, 1738.

P. heterophylla Pursh ssp. virgata (Greene) Heckard. Infrequent in dry places, below 8000 ft: cn. tributary to East Walker River Cn. below Murphy Pond, 6600 ft, 1351; Masonic Gulch 0.4 mi below Masonic Lower Town, 7500 ft, 1691.

P. humilis Torr. & Gray. Abundant in aspen groves and on slightly moist hillsides, mostly below 9000 ft: hillside north of Mormon Mdw., 7400 ft, 988; hillside northeast of Mormon Mdw., 7600 ft, 468; aspen grove on ridge 1.5 mi

south-southwest of Bodie, 8600 ft, 759; observed near Lake-view Spring, 8000 ft.

P. monoensis Halse. Occasional on very clayey soils with natural or human disturbance, below 8600 ft: Bodie Cn. at base of road to lakes near Beauty Pk., 7820 ft, 1586; observed near crossroads at summit of Aurora Cn., 8500 ft. This species was recently described (Halse 1981) from material which had previously been determined as Miltitzia lutea (Hook. & Arn.) DC. In Munz (1959), P. monoensis will key to P. inyoensis (Macbr.) J. T. Howell.

P. ramosissima Dougl. ex Lehm. var. ramosissima. Occasional in shaded or damp places, below 9000 ft: aspen grove at Lake-view Spring, 8000 ft, 1074; among Ceanothus velutinus on north slope of Masonic Mtn. near New York Hill, 8560 ft, 1716. [P. r. var. eremophila (Greene) Macbr.]

## Lamiaceae (=Labiatae), MINT FAMILY

1. Stamens long-exserted and arched; ovary of 4 nutlets united 1/3 their length; style not basal; nutlets laterally attached.....Trichostemma
1. Stamens included, or exserted and not arched; ovary of 4 distinct nutlets; style basal; nutlets basally attached.
  2. Corolla strongly 2-lipped; calyx with 10 hooked teeth. ....Marrubium
  2. Corolla actinomorphic or nearly so, the lobes subequal; calyx without hooked teeth.
    3. Inflorescence a dense terminal head; plants of dry places.....Monardella
    3. Inflorescence of axillary whorls; plants of wet meadows.....Mentha

Marrubium L., HOREHOUND

M. vulgare L. Occasional as a weed in overgrazed areas, below 8000 ft: lower Clearwater Cn., 6950 ft, 1466; observed near Warm Spring, 7650 ft.

Mentha L. MINT

M. arvensis L. ssp. haplocalyx Briq. Occasional in wet meadows or on streambanks, below 8000 ft: lower Clearwater Cn., 6950 ft, 1465; Clearwater Ck. at mouth of Cinnabar Cn., 7200 ft, 643, 917, 1294. [M. a. var. vilosa (Benth.) S. R. Stewart]

Monardella Benth.

M. odoratissima Benth. ssp. glauca (Greene) Epling., MOUNTAIN PENNYROYAL. Common on rocky slopes in slightly moist places, above 7000 ft: hillside east of Mono Lake Vista, 7800 ft, 1384; hillside northeast of Mormon Mdw., 7600 ft, 456; below Paramount Mine, 8650 ft, 780; southeast slope of Masonic Mtn., 8700 ft, 1157.

Trichostema L.

T. austromontanum F. H. Lewis. Infrequent in moist or drying meadows, below 8000 ft: south of Mormon Mdw., 7500 ft, 842.

## Linaceae, FLAX FAMILY

Linum L., FLAX

L. lewisii Pursh. Infrequent or rare in the Bodie Hills, seen only at southwest edge of Mormon Mdw., 7280 ft, 1754.  
[L. perenne L. ssp. l. (Pursh) Hulten.]

## Loasaceae, LOASA FAMILY

Mentzelia L., BLAZING STAR, SANDPAPER PLANT

(after Munz 1959)

1. Petals 5-8 cm long; plants stout biennials or perennials, 4-16 dm tall; seeds flat, winged all around.  
.....M. laevicaulis
1. Petals much shorter, 2-10 mm long; plants loosely branched perennials or annuals, not stout, 0.5-4 dm tall; seeds angled or faceted, without wings.
  2. Cespitose perennials, 0.5-1.5 dm tall; leaves 3-5 cleft into lance-acuminate divisions, the margins strongly revolute; petals 8-10 mm long; capsules urseolate.....M. torreyi
  2. Erect annuals, 1-4 dm tall; leaves pinnatifid to entire, the margins not at all revolute; petals 2-6 mm long; capsules linear-cylindric.
    3. Floral bracts round-ovate to lance-ovate, white-membranous.....M. congesta
    3. Floral bracts lance-linear or wider, green.  
.....M. albicaulis

M. albicaulis (Dougl. ex Hook.) Torr. & Gray. Common in loose, dry soils, usually among sagebrush, below 9000 ft: side of Clearwater Cn., 7300 ft, 426; roadsides south of Mormon Mdw., 7450 ft, 380, 590, 836; hillside north of Bodie, 8500 ft, 601. See comment under M. congesta.

M. congesta (Nutt.) Torr. & Gray. Common in loose, dry soils, usually among sagebrush, below 9000 ft: roadside



south of Mormon Mdw., 7600 ft, 573; hillside northeast of Mormon Mdw., 7600 ft, 566; hillside north of Bodie, 8500 ft, 600, 608. Several specimens were collected which appear to be intermediate between M. congesta and M. albicaulis and cannot with certainty be assigned to either species. This intermediacy is most noticeable in the shape and coloration of the floral bracts, but in some cases extends also to the shape and color of the petals and the length of the capsules. These uncertain specimens are as follows: near Little Bodie Mine, 7530 ft, 735; lower Clearwater Cn., 6900 ft, 592; 2 mi east of Sonoma, 5800 ft, 1093. Whether they represent hybrids or indicate that the two species are actually a single more variable entity, remains to be seen.

M. laevicaulis (Dougl.) Torr. & Gray, BLAZING STAR. Occasional in warm, dry, rocky places, below 9400 ft: hillside below Mono Lake Vista, 7600 ft, 1452; lower Bodie Cn. 0.3 mi below stream from east slope of Beauty Pk., 6400 ft, 1177; observed near summit of Mt. Hicks, 9350 ft.

M. torreyi Gray. Locally common on clayey soils and decomposing travertine at Travertine Hot Springs, 6600-6750 ft, 1501.

## Loranthaceae, MISTLETOE FAMILY

Phoradendron Nutt., MISTLETOE

P. juniperinum Engelm. ex Gray. Occasional as a parasite on Juniperus osteosperma, among the branches, below 8000 ft: south of Mormon Mdw., 7550 ft, 480.

## Malvaceae, MALLOW FAMILY

1. Style-branches filiform, stigmatic on the inner surface; upper leaves deeply lobed to deeply palmatifid, glabrate to sparsely stellate-pubescent; flowers purplish, in congested spike-like racemes.....Sidalcea
1. Style-branches capitate; upper leaves shallowly lobed, densely stellate-tomentose; flowers pinkish-orange. ....Sphaeralcea

Sidalcea Gray, CHECKER

S. oregana (Nutt. ex Torr. & Gray) Gray ssp. spicata (Regel)  
C. L. Hitchc. Occasional in wet sites along streams, above 8500 ft: in Rough Ck. 0.4 mi above Geiger Grade, 9400 ft, 1428; stream 0.7 mi west-southwest of Paramount Mine, 8720 ft, 1682.

Sphaeralcea St. Hil., GLOBEMALLOW

S. ambigua Gray ssp. monticola Kearney. Common in dry, rocky or clayey soils, mostly above 6500 ft: hilltop 3 mi east of Bodie, 8600 ft, 1515; summit of Mt. Hicks, 9400 ft, 1340; 0.5 mi northeast of Paramount Mine, 8450 ft, 790.

## Moraceae, MULBERRY FAMILY

Humulus L., HOPS

H. lupulus L. var. lupuloides E. Small. Naturalized around buildings in Bodie, 8390 ft, 1751. The terminal leaflets of this variety are usually about twice as long as broad. This supposedly differentiates it from the typical var. lupulus, which is more common in California (Bailey 1949). Variety lupuloides has previously been reported from the state (as H. americanus Nutt.) only from the Tahoe Basin by Gladys Smith (1973).

## Nyctaginaceae, FOUR O'CLOCK FAMILY

Mirabilis L., FOUR O'CLOCK

M. bigelovii Gray var. retorsa (Heller) Munz. Infrequent in dry places in canyons, below 7000 ft: Bodie Cn. 0.6 mi north

of Del Monte, 6780 ft, 1189; East Walker River Cn. below Murphy Pond, 6250 ft, 1411.

Onagraceae, EVENING-PRIMROSE FAMILY

- 1. Seeds comose (with a tuft of hairs at one end); sepals not reflexed at anthesis; petals white to pinkish or purplish, usually notched or deeply cleft.....Epilobium
- 1. Seeds naked; sepals reflexed at anthesis; petals yellow or white, mostly entire.
  - 2. Petals yellow; plants delicate annuals or taprooted perennials.....Camissonia
  - 2. Petals white; plants delicate annuals.....Cayophytum

Camissonia Link, EVENING-PRIMROSE

- 1. Plants slender-stemmed annuals.....C. contorta
- 1. Plants acauleacent perennials.
  - 2. Leaves entire or few-toothed; capsule glabrous. ....C. subacaulis
  - 2. Leaves deeply pinnatifid; capsule densely pubescent. ....C. tanacetifolia

C. contorta (Dougl.) Kearney. Occasional in dry, sandy soil, below 9000 ft: side of lower Cottonwood Cn., 7200 ft, 991; north slope of Mt. Biedeman, 8900 ft, 522. [Oenothera c. Dougl. ex Hook.]

C. subacaulis (Pursh) Raven. Occasional in moist meadows, below 9000 ft: beside Clearwater Ck. at mouth of Cinnabar Cn., 7200 ft, 1016. [Oenothera heterantha Nutt.]

C. tanacetifolia (Torr. & Gray) Raven. Locally common around moist margins of lakes and ephemeral ponds, below 8500 ft: edge of ephemeral pond south of Big Alkali Valley, 7580 ft, 1221; margin of lake south-southwest of Beauty Pk., 8300 ft, 1594; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1037. [Oenothera t. Torr. & Gray]

Epilobium L., WILLOW-HERB

(after Munz 1959)

1. Petals 1-2 cm long, entire, spreading; flower tube not prolonged above the ovary; flowers slightly zygomorphic.  
.....E. angustifolium
1. Petals slightly less than 1 cm long, notched to deeply 2-parted, erect to spreading; flower tube at least slightly prolonged above the ovary; flowers actinomorphic.
  2. Stems with exfoliating epidermis; plants of dry sites; leaves alternate, with fascicles in the axils.  
.....E. paniculatum
  2. Stems with epidermis remaining intact; plants of wet sites.
    3. Leaves all opposite; plants usually under 3 dm tall and unbranched.....E. oregonense
    3. Uppermost leaves alternate and the lower ones opposite; plants usually over 3 dm tall and branching above.....E. ciliatum

E. angustifolium L., FIREWEED. Rare in the Bodie Hills, probably only at the north end, seen only in Masonic Gulch 0.8 mi below Masonic Lower Town, 7300 ft, 1700.

E. ciliatum Raf. var. ciliatum. Common throughout the range in moist meadows, along streams and in aspen groves, below 9500 ft: spring on south side of Bridgeport Cn., 7750 ft, 1604; ck. south of Mormon Mdw., 7500 ft, 582, 833; Clearwater Ck. at mouth of Cinnabar Cn., 7200 ft, 696; Bodie Cn. 0.4 mi northeast of state line, 7450 ft, 1205; mdw. on side of East Walker River Cn. below Murphy Pond, 6500 ft, 1405; aspen grove at Lakeview Spring, 8000 ft, 1236; Masonic Gulch 0.5 mi below Masonic Lower Town, 7500 ft, 1695. [includes E. adenocaulon Hausskn.]

E. oregonense Hausskn. Occasional in wet meadows or on streambanks, below 9500 ft: mdw. at Masonic Upper Town, 8050 ft, 1103.

E. paniculatum Nutt. ex Torr. & Gray. Common in moist meadows or beside streams, below 8000 ft: ck. south of Mormon Mdw., 7400-7500 ft, 835, 1220; mdw. on side of East Walker River Cn. below Murphy Pond, 6300 ft, 1391.

Gayophytum A. Juss.

G. diffusum Torr. & Gray ssp. parviflorum Lewis & Szweykowski. Abundant throughout the range in dry, loamy or sandy soils, frequently among sagebrush, 6000-10,000 ft: south of Mormon Mdw., 7450 ft, 390; hillside northeast of Mormon Mdw., 7600 ft, 450; hillside 0.6 mi southwest of Bodie, 8400 ft, 364; hillside 1 mi south of Bodie, 8450 ft, 594; hillside north of Bodie, 8600 ft, 605; Geiger Grade near Rough Ck., 9100 ft, 804. This plant keys to G. nuttallii Torr. & Gray in Munz (1959).

## Orobanchaceae, BROOMRAPE FAMILY

Orobanche, BROOMRAPE

1. Corollas and peduncles purplish; corollas mostly 2.4-2.8 cm long; peduncles 0.5-2 cm long; anthers wooly.  
.....O. corymbosa
1. Corollas and peduncles yellowish; corollas mostly 1.5-2 cm long; peduncles 3-10 cm long; anthers glabrous to pubescent.....O. fasciculata

O. corymbosa (Rydb.) Ferris. Occasional as a parasite on Artemisia, mostly below 9000 ft: south of Mormon Mdw., 7550 ft, 1146; southeast slope of Masonic Mtn., 8700 ft, 1158.  
[O. californica Cham. & Schlecht. var. c. (Rydb.) Munz]

O. fasciculata Nutt. var. lutea (Parry) Achey. Occasional as a parasite on Artemisia, mostly below 9000 ft: Clearwater Cn. west of Cinnabar Cn., 7300 ft, 437; among sagebrush on southwest slope of Mt. Hicks, 8850 ft, 1333.

Papaveraceae, POPPY FAMILY

Argemone L., PRICKLY POPPY

A. munita Dur. & Hilg. ssp. rotundata (Rydb.) G. B. Ownby. Occasional or infrequent in dry, somewhat disturbed or rocky places, below 8500 ft: lower Clearwater Cn., 6900 ft, 492; observed 1 mi northeast of Murphy Spring, 8200 ft.

Polemoniaceae, PHLOX FAMILY

1. Calyx herbaceous, of uniform texture, becoming chartaceous in age, not ruptured by the maturing capsule; sinuses distended, carinate.....Collomia
1. Calyx differentiated into hyaline sinuses between green ribs; sinuses not carinate.
  2. Leaves all bracteate-involucral, none basal (but cotyledons sometimes persisting) or cauline; small annuals.....Gymnosteris
  2. Leaves cauline or basal or both, sometimes also bracteate.
  3. Leaves opposite throughout or in part.
  4. Leaves entire; stamen insertion unequal.
  5. Plants usually perennial; flowers showy; leaves consistently opposite.....Phlox



- 5. Plants annual; flowers diminutive; leaves alternate above.....Microsteris
- 4. Leaves deeply palmately cleft; stamen insertion equal.
  - 6. Leaves spinose; plants perennial subshrubs. ....Leptodectylon
  - 6. Leaves not spinose; plants annual or perennial, herbaceous.....Linanthus
- 3. Leaves alternate.
  - 7. Calyx lobes equal; leaves all along the stem or mostly basal.
    - 8. Corolla large, scarlet; leaves pinnatifid with more or less linear segments; leaf segments conspicuously mucronate.....Ipomopsis
    - 8. Corolla small, predominantly violet or purple; leaves entire to pinnate, but the segments not linear; mucros absent or inconspicuous.
      - 9. Upper leaves reduced; corollas usually with some yellow and/or white.....Cilia
      - 9. Upper leaves well developed; corolla entirely deep violet.....Allophyllum
  - 7. Calyx lobes unequal; leaves mostly bracteate.
    - 10. Inflorescence densely wooly; leaves and calyx wth or without mucros.....Eriastrum
    - 10. Inflorescence glabrous to villous; leaves and calyx mucronate.....Navarretia

Allophyllum (Nutt.) A. & V. Grant

A. violaceum (Heller) A. & V. Grant. Occasional on sandy or gravelly hillsides, usually among sagebrush, below 9000 ft:

hillside south of Mormon Mdw., 7600 ft, 571; observed on hillside north of Bodie, 8500 ft. [Gilia v. Heller]

Collomia Nutt.

C. linearis Nutt. Occasional in moist aspen groves, below 9000 ft: ridge 1.5 mi south-southwest of Bodie, 8600 ft, 760; aspen grove at Lakeview Spring, 8000 ft, 1230.

Eriastrum Woot. & Standl.

E. wilcoxii (A. Nels.) Mason. Abundant in dry, loose soils, often in somewhat disturbed places, below 9000 ft: lower Clearwater Cn., 7000 ft, 688; hilltop west of mouth of Cinnabar Cn., 7450 ft, 874; roadside south of Mormon Mdw., 7450 ft, 400; hillside northeast of Mormon Mdw., 7700 ft, 460; observed in Bodie Cn. near state line, 7530 ft, at northwest base of Masonic Mtn., 8100 ft.

Gilia Ruiz & Pavon

1. Plants glandular-pubescent (not wooly) on lower stems and leaves; corolla 2.5-7.5 mm long.....C. micromeria
1. Plants arachnoid-wooly on the lower stems and leaves; corolla 7-12 mm long.....C. sinuata

G. micromeria Gray. Occasional in dry, sandy places among

sagebrush, below 9000 ft: gully in north side of Bodie Cn. 1.7 mi south of Beauty Pk., 8150 ft, 1616.

G. sinuata Dougl. ex Benth. Occasional in dry, sandy or loamy soils among sagebrush, below 9000 ft: hillside north of Bodie, 8600 ft, 609; Bodie Cn. 1 mi southwest of state line, 7800 ft, 974; observed on lower Bodie Cn., 6400 ft.

Gymnosteris Greene

G. parvula (Rydb.) Heller. Occasional in loose or disturbed soils, early in the season, mostly above 8000 ft: ridge 1.5 mi south-southwest of Bodie, 8600 ft, 966.

Ipomopsis Michx.

1. Corollas tubular-funnelform, 20-35 mm long, bright red or pink; stems mostly 3-8 dm tall.....I. aggregata
1. Corollas salverform, 4-6 mm long, white with some yellow; stems mostly 0.5-1.5 dm tall.....I. congesta

I. aggregata (Pursh) V. Grant ssp. attenuata (Gray) V. & A. Grant. Occasional in semimoist areas among sagebrush, mostly above 8500 ft: Ceiger Grade near Rough Ck., 9100 ft, 807; north slope of Masonic Mtn. near New York Hill, 8560 ft, 1715.

I. congesta (Hook.) V. Grant ssp. montana (A. Nels. & Kennedy) V. Grant. Common on decomposing travertine and around meadows at hot springs, infrequent on high scree slopes elsewhere, 6600-9500 ft: The Hot Springs, 6600 ft, 1019; Travertine Hot Springs, 6750 ft, 1661; near summit of Mt. Hicks, 9380 ft, 1339.

Leptodactylon Hook. & Arn., PRICKLY-PHLOX

L. pungens (Torr.) Nutt. ex Rydb. ssp. pulchriflorum (Brand.) Mason. Common throughout the range, frequently subdominant with sagebrush, 6500-10,100 ft: near summit of Mt. Biedeman, 8970 ft, 513; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 769; observed on southeast slope of Masonic Mtn., 8900 ft, in upper Cottonwood Cn. 1.7 mi south of Bodie, and many other places.

Linanthus Benth.

- 1. Plants delicate annuals.....L. septentrionalis
- 1. Plants perennial.....L. pachyphyllus

L. pachyphyllus R. Patterson. Locally abundant on moist or rocky slopes above 9000 ft: near Rough Ck. 0.4 mi above Geiger Grade, 9500 ft, 1129. Recently described from material previously keying to L. nuttallii (Gray) Greene ex Mlkn.

(Patterson 1977).

L. septentrionalis Mason. Common in dry soils throughout the range, mostly below 9000 ft: Clearwater Cn. west of Cinnabar Cn., 7300 ft, 439; near The Hot Springs, 6600 ft, 555; observed near summit of Mt. Biedeman, 8900 ft, and among Artemisia nova at northwest base of Masonic Mtn., 8100 ft.

Microsteris Greene

M. gracilis (Hook.) Greene ssp. humilis (Greene) V. Grant. Occasional in moist places, mostly below 9000 ft: ck. south of Mormon Mdw., 7500 ft, 1006; north side of Mormon Mdw., 7500 ft, 1034; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 997; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1036.

Navarretia Ruiz & Pavon

N. breweri (Gray) Greene. Very abundant throughout the range, mostly in clayey soils, 6000-10,000 ft: hillside northeast of Mormon Mdw., 7600 ft, 449; observed 1 mi south of Bodie, 8450 ft, in Bodie Cn. near state line, 7500 ft, at northwest base of Masonic Mtn., 8100 ft, and elsewhere.

Phlox L.

1. Style 10-25 mm long, almost as long as the corolla tube; plants erect, 1-2 dm tall.....P. stansburyi
1. Style 2-6 mm long, less than half as long as the corolla tube; plants prostrate to cushion-shaped, 0.2-1 dm tall.
  2. Leaves 3-5 mm long; pubescence glandular; plants forming tight, cushion-like mounds.....P. covillei
  2. Leaves 5-15 mm long; pubescence not glandular; plants forming loose, spreading mats.
    3. Leaves gray-green, 5-10 mm long.....P. hoodii
    3. Leaves yellow-green, 10-15 mm long.....P. diffusa

P. covillei E. Nels. Common in gry, exposed, rocky or gravelly places, above 7000 ft: in saddle between Bodie Mtn. and Potato Pk., 9850 ft, 1132; observed near road at head of Bridgport Cn., 7650 ft, near Warm Spring, 7650 ft, at Travertine Hot Springs, 6700 ft, along Geiger Grade 2.3 mi north of Potato Pk., 8800 ft.

P. diffusa Benth. Occasional on dry, gravelly slopes, mostly on or near Masonic Mtn., above 8000 ft: west summit of Masonic Mtn., 9150 ft, 1728; north slope of Masonic Mtn. near New York Hill, 8650 ft, 1063.

P. hoodii Richards. ssp. canescens (Tor. & Gray) Wherry. Occasional on dry, gravelly slopes, below 9000 ft: ridge 1 mi south of Bodie, 8450 ft, 594; hillside 0.6 mi southwest of

Bodie, 8400 ft, 365.

P. stansburyi (Torr.) Heller. Common on dry, gravelly slopes or among sagebrush, below 9000 ft: Clearwater Cn. west of Cinnabar Cn., 7300 ft, 434; south of Mormon Mdw., 7400 ft, 375, 396; hillside 0.6 mi southwest of Bodie, 8400 ft, 366; observed on ridge east of Masonic Lower Town, 8000 ft, south of Sonoma, 6100 ft. [including P. s. var. brevifolia (Gray) E. Nels.]

#### Polygalaceae, MILKWORT FAMILY

##### Polygala L., MILKWORT

P. acanthoclada Gray. Rare or infrequent, collected only among Artemisia nova and Leptodactylon pungens on north slope of east Brawley Pk., 8800 ft, 1634.

## Polygonaceae, BUCKWHEAT FAMILY

(after Munz 1959)

1. Leaves not subtended by stipular sheaths; flowers arising from a tubular to campanulate involucre.
  2. Involucre with spine- or bristle-tipped teeth.
    3. Teeth of involucre with curved spines; involucre usually 1-flowered.....Chorizanthe
    3. Teeth of involucre with straight spines; involucre 2-3-flowered.....Oxytheca
  2. Involucre lobed, the lobes not spine- or bristle-tipped; flowers 1-many per involucre.....Eriogonum
1. Leaves subtended by membranous stipular sheaths (ocreae); flowers not arising from an involucre.
  4. Calyx 4-parted.....Polygonum
  4. Calyx 4- or 6-parted.
    5. Calyx 4-parted; stigmas 2; leaves reniform...Oxyria
    5. Calyx 6-parted; stigmas 3; leaves not reniform.  
.....Rumex

Chorizanthe R. Br. ex Benth.

C. brevicornu Torr. var. spathulata (Small ex Rydb.) C. L. Hitchc. Common in dry, sandy or gravelly soils, mostly below 9000 ft: side of lower Cottonwood Cn., 7400 ft, 995; hillside northeast of Mormon Mdw., 7500 ft, 1219; hillside southwest of The Hot Springs, 6520 ft, 532; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 751.



Eriogonum Michx., WILD BUCKWHEAT

(after Reveal 1966, 1968 and 1972)

## 1. Plants annual.

## 2. Leaves strictly basal, round to oblong-ovate.

## 3. Involucres borne on peduncles.

4. Involucres ca. 1 mm long and wide, not glandular; petioles and leaves pubescent, but not densely tomentose underneath; peduncles 5-15 mm long; achenes glabrous.....E. esmeraldense

4. Involucres 2-3 mm long, 2-3.5 mm wide, glandular; petioles and leaves densely tomentose underneath; peduncles 3-10 mm long; achenes pubescent.....E. nutans

## 3. Involucres sessile on the nodes of branches.

5. Outer perianth segments fan-shaped, yellowish to reddish; flowers fewer than 10 per involucre; tips of the branches turning inward with age. ....E. nidularium

5. Outer perianth segments oblong or oblong-ovate, whitish to pinkish; flowers more than 10 per involucre; tips of the branches remaining divaricate in age.....E. baileyi

2. Leaves basal and also on the lower nodes, linear. ....E. spergulinum

## 1. Plants perennial.

## 6. Perianth long-attenuate and stipe-like at the base.

7. Plants forming compact mats or rounded mounds; perianth pubescent externally.....E. caespitosum

7. Plants erect, branching shrubs; perianth glabrous externally.....E. umbellatum

## 6. Perianth campanulate to cuneate at the base, not long-attenuate.

8. Involucres solitary at the nodes, the lateral ones appressed to the branches.

- 9. Plants loosely cespitose, forming rounded mats from a branching caudex; involucre borne racemously along stems arising from margins of the mat; flowering late summer to fall...E. wrightii
- 9. Plants small, erect shrubs; involucre in compact, terminal cymes throughout the plant; flowering early to late summer....E. microthecum
- 8. Involucres in heads or clusters.
  - 10. Inner perianth segments half as wide as the outer segments; leaves round to ovate, whitish tomentose, often with rusty margins.
    - 11. Inflorescence capitate.....E. ovalifolium
    - 11. Inflorescence cymose-umbellate....E. strictum
  - 10. Inner perianth segments similar to the outer segments; leaves oblanceolate to lanceolate or elliptical, glabrate or greenish to whitish-tomentose, the margins not rusty.
    - 12. Leaf blade 4-15 cm long, glabrate above; flowering stems 4-8 dm tall; plants not forming low mats.....E. elatum
    - 12. Leaf blades 0.8-2 cm long, tomentose; flowering stems 0.1-0.8 dm tall; plants forming low, spreading mats.
      - 13. Leaves lanceolate, somewhat glandular; above 9000 ft.....E. rosense
      - 13. Leaves broadly elliptic, not glandular; below 8000 ft.....E. beatleyae

E. baileyi S. Wats. var. baileyi. Abundant throughout the range in dry soils, often in somewhat disturbed places, mostly below 8800 ft: near Little Bodie Mine, 7600 ft, 744; lower Clearwater Cn., 7000 ft, 684, 1460; sandy flat in Cinabar Cn., 7250 ft, 506; south of Mormon Mdw., 7500 ft, 398,

612, 832; dry mdw. below Warm Spring, 7600 ft, 1706; disturbed soil at Masonic Lower Town, 7600 ft, 1703. Material from the Bodie Hills keys to E. vimineum Dougl. ex Benth. when using Reveal's (1968) key. This is because the involucre are 2-3 mm long, instead of the 1-1.5 mm which supposedly typifies this species.

E. beatleyae Reveal. Rare in the Bodie Hills, known only from gravelly and clayey soils at the mine 0.5 mi south of Mormon Mdw., 7500 ft, 475. Described by Reveal (1972); see also the note under E. rosense.

E. caespitosum Nutt. Common on dry, gravelly soil on slopes and in passes, below 9500 ft: north slope of Mt. Biedeman, 8850 ft, 525; observed on hilltop west of Rancheria Gulch, 7620; near road at pass at top of Bridgrport Cn., 7650 ft, hillside 1 mi south of Bodie, 8450 ft, hillside north of Bodie, 8400 ft, 1.5 mi south of Beauty Pk., 8300 ft.

E. elatum Dougl. ex Benth. Occasional on rocky slopes in relatively moist positions, below 9500 ft: Clearwater Cn. west of Cinnabar Cn., 7300 ft, 654; hillsides south of Mormon Mdw., 7350-7600 ft, 613, 577; observed on hilltop west of Rancheria Gulch, 7620 ft, east slope of Masonic Mtn., 9000 ft.

E. esmeraldense S. Wats. Occasional in dry, sandy soil, below 9000 ft: side of lower Cottonwood Cn., 7400 ft, 994.

E. microthecum Nutt. Abundant throughout the range on dry slopes, often among sagebrush, 6000-10,000 ft. This species complex is discussed in detail by Reveal (1971). Two of the varieties he recognizes are found here: var. laxiflorum, which occurs throughout the Intermountain Region, and var. ambiguum, which is restricted to the extreme west-central edge of the Great Basin. They are equally abundant in the Bodie Hills and typically occur in mixed populations.

1. Flowers whitish.....var. laxiflorum

1. Flowers yellowish.....var. ambiguum

E. m. var. ambiguum (M. E. Jones) Reveal in Munz: near summit of Mt. Biedeman, 8970 ft, 514; south of Mormon Mdw., 7500 ft, 474; hillside near The Hot Springs, 6600 ft, 533; hillside below Paramount Mine, 8720 ft, 784; northwest base of Masonic Mtn., 8100 ft, 1363.

E. m. var. laxiflorum Hook.: Clearwater Cn. west of Cinnabar Cn., 7300 ft, 652, 876; hill opposite mouth of Cinnabar Cn., 7250 ft, 724; south of Mormon Mdw., 7350-7600 ft, 611, 586; hillside below Paramount Mine, 8720 ft, 785.

E. nidularium Coville. Occasional in dry, gravelly or disturbed soils along the eastern slopes of the range, primarily a plant of the adjoining basins, below 7000 ft: roadside 1.3 mi south-southwest of Sonoma, 6100 ft, 1570.

E. nutans Torr. & Gray var. nutans. Rare in the Bodie Hills, collected by C. Hardham (#15110, CAS) along "Rough Ck. between Bodie & Potato Mtns." (Reveal & Ertter 1980). No elevation was recorded, but it was probably near Geiger Grade at 9100 ft. E. nutans was not known to occur in California at the time of Reveal's (1968) treatment of the genus, and will therefore key to E. collinum S. Stokes ex M. E. Jones in that reference. The characters distinguishing E. nutans from E. collinum are discussed by Reveal (1966).

E. ovalifolium Nutt.

1. Flowers whitish with some red; flowering stems less than 1 dm tall; mostly above 7000 ft.....var. nivale
1. Flowers mostly yellow; flowering stems usually 1-2 dm tall; mostly below 7000 ft.....var. ovalifolium

E. o. var. nivale (Canby) M. E. Jones. Common on dry, gravelly slopes, above 7000 ft: west slope of Bt. Biedeman, 8800 ft, 508; south of Mormon Mdw., 7500 ft, 473; Clearwater Cn. west of Cinnabar Cn., 7300 ft, 433.

E. o. var. ovalifolium. Occasional on dry, rocky or gravelly slopes, below 7000 ft: hillside southwest of The Hot Springs, 6600 ft, 1027;

E. rosense A. Nels. & Kennedy. Infrequent in gravelly soil atop peaks, above 9000 ft: summit of east Brawley Pk., 9420 ft, 1646; east summit of Masonic Mtn., 9210 ft, 1163. This species is closely related to E. beatleyae, both of which key to E. anemophilum in Reveal (1968). Reveal (1972) explains that the common Sierran representative of this complex is actually E. rosense, while E. anemophilum is confined to Purshing Co., Nevada. E. beatleyae is mostly in central and western Nevada.

E. spergulinum Gray var. reddingianum (M. E. Jones) J. T. Howell. Common in sand or loose gravel, 6000-10,100 ft: hillside south of Mormon Mdw., 7600 ft, 572; aspen grove on ridge 1.5 mi south-southwest of Bodie, 8600 ft, 763; 1 mi south of Bodie, 8450 ft, 596; Geiger Grade near Rough Ck., 9100 ft, 830; Rough Ck. above Geiger Grade, 9300 ft, 1127.

E. strictum Benth. ssp. proloferum (Torr. & Gray) S. Stokes var. proloferum. Rare in the Bodie Hills, seen only in dry soil among sagebrush on hillside north of Bodie, 8400 ft, 297.

E. umbellatum Torr. var. umbellatum. Common on dry slopes, often among sagebrush, below 9500 ft: hilltop west of Rancheria Gulch, 7620 ft, 1538; near summit of Mt. Biedeman, 8970 ft, 518; hillsides south of Mormon Mdw., 7500 ft, 476, 578; hill beside Travertine Hot Springs, 7600 ft, 1502; Geiger Grade near Rough Ck., 9100 ft, 881; near stream 0.7 mi west of Paramount Mine, 8720 ft, 1686; gully on north slope of Masonic Mtn., 8800 ft, 1720.

E. wrightii Torr. ex Benth. var. subscaposum S. Wats. Occasional to locally abundant on dry slopes or ridges, especially in scree, below 9500 ft: hillside below Mono Lake Vista, 7700 ft, 1457; hill 1 mi south of Mormon Mdw., 7600 ft, 575; near Little Bodie Mine, 7550 ft, 734; hillside west of mouth of Cinnabar Cn, 7250 ft, 871.

Oxyria Hill, MOUNTAIN SORREL

O. digyna (L.) Hill. Occasional in moist places in talus along upper Rough Ck., 9600-9900 ft, 1259.

Oxytheca Nutt.

O. dendroidea Nutt. ssp. dendroidea. Rare or infrequent in the Bodie Hills, in dry, sandy, or occasionally disturbed places, below 8000 ft: shoulder of road at northeast end of

Mormon Mdw., 7440 ft, 1649. Ertter (1980) provides a detailed account of this and closely related species.

Polygonum L., KNOTWEED

1. Plants aquatic perennials; flowers pink, in terminal spike-like racemes; leaves oblong to lanceolate (broadest when floating), 5-10 cm long.....P. amphibium
1. Plants terrestrial annuals; flowers white to pinkish, in axillary fascicles or leafy-bracteate spikes; leaves linear to oblong, 0.5-4 cm long.
  2. Stems terete or nearly so, prostrate or occasionally somewhat ascending.....P. aviculare
  2. Stems strongly angled, mostly erect.
    3. Flowers in small axillary clusters; stamens 8; leaves lance-oblong to linear, 1-4 cm long; plants usually 1-4 dm tall.....P. douglasii
    3. Flowers in terminal leafy-bracteate spikes; stamens 3; leaves linear to lance-linear, 0.5-1 cm long; plants mostly 0.3-0.8 dm tall.....P. kelloggii

P. amphibium L. var. stipulaceum (Coleman) Fern., WATER SMARTWEED. Rare within the Bodie Hills, seen only in the pool at Warm Spring, 7650 ft, 1213. This plant grows in great abundance at the southwest end of Bridgeport Reservoir, just outside the study area. Care should be taken not to confuse it with Potamogeton, which it can resemble very closely in habit and leaf shape.

P. aviculare L. Common as a weed in unpaved roads and other



disturbed places, mostly below 9000 ft: in road south of Mormon Mdw., 7500 ft, 839; Bodie Cn. at base of road to lakes near Beauty Pk., 7820 ft, 1590; in road at Masonic Lower Town, 7600 ft, 1702.

P. douglasii Greene var. johnstonii Munz. Occasional in moist places among sagebrush or in meadows, 6300-9800 ft: ck. south of Mormon Mdw., 7500 ft, 844; Bodie Cn. 1 mi southwest of state line, 7800 ft, 967; near margin of lake at northwest base of Masonic Mtn., 8100 ft, 1050.

P. kelloggii Greene. Occasional in wet, gravelly places near streams or ponds, below 9800 ft: beside upper Rough Ck., 9650 ft, 1744; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1094.

Rumex L., DOCK, SORREL

1. Plants dioecious, mostly 1-5 dm tall; leaves mostly basal, acid to the taste; valves without callosities.  
.....R. pauciflorus
1. Plant monoecious, mostly 3-10 dm tall; leaves cauline as well as basal, not acid to the taste.
  2. Valves without callosities.....R. californicus
  2. Valves with callosities.....R. triangulivalvis

R. californicus Rech. f. Occasional in moist places along

streams, mostly below 9500 ft: ck. south of Mormon Mdw., 7450 ft, 379; beside Rough Ck. near Geiger Grade, 9200 ft, 1675.

R. pauciflorus Nutt. ex S. Wats. Occasional in sandy soil below snowbanks or in damp sites among sagebrush, 6000-10,000 ft: ridge 1.5 mi south-southwest of Bodie, 8600 ft, 999; near snowbank on north slope of Bodie Mtn., 10,000 ft, 1435; cn. on north side of Brawley Pks., 8000 ft, 1583.

R. triangularis (Danser) Rech. f. Common in wet places near streams, springs and lakes, below 9000 ft: Mormon Mdw., 7350 ft, 925; Bodie Cn. at outlet of stream from east side of Beauty Pk., 6480 ft, 1632; mdw. below Masonic Spring, 8300 ft, 1370; beside Lakeview Spring, 8000 ft, 1245; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1227.

#### Portulacaceae, PURSELANE FAMILY

(after Munz 1959)

1. Style solitary with 2 stigmas; inflorescence a 1-sided raceme or congested cyme.....Calyptroidium
1. Style branches 3-8; flowers solitary or in loose, not one-sided racemes.
  2. Plants nearly acaulescent, from fleshy taproots; flowers usually 1 per stem; capsules circumscissile.  
.....Lewisia
  2. Plants caulescent, with lax, creeping stems from fibrous roots or slender, bulblet-bearing rhizomes; flowers 3-8 in axillary or subterminal racemes; cap-

sule opening by three valves.....Claytonia

Calyptridium Nutt ex Torr. & Gray,

1. Plants annual; flowers few in 1-sided racemes; sepals ovate, ca. 2 mm long; style short.....C. pygmaeum
1. Plants usually perennial; flowers numerous in congested or head-like cymes; sepals reniform, 5-8 mm long; style long-filiform.....C. umbellatum

C. pygmaeum Parish ex Rydb. Common in dry to moist soils, among or near sagebrush, above 7000 ft: hillside south of Mormon Mdw., 7350 ft, 621; ridge 1 mi south of Bodie, 8450 ft, 598; Geiger Grade near Rough Ck., 9100 ft, 828.

C. umbellatum (Torr.) Greene, PUSSYPAWS. Occasional in dry to damp, gravelly soil, above 8000 ft: ridge 1 mi southwest of Bodie, 8450 ft, 597; Geiger Grade near Rough Ck., 9100 ft, 800; Rough Ck. above Geiger Grade, 9150 ft, 1124; near snowbank on north slope of Bodie Mtn., 10,000 ft, 1434.

Claytonia L.

C. chamissoi Ledeb. ex Spreng. Occasional on streambanks, below 9500 ft: ck. south of Mormon Mdw., 7400 ft, 409; stream below Paramount Mine, 8600 ft, 795. [Montia c. (Ledeb.) Dur. & Jacks.; Crunocallis c. Rydb.]

Lewisia Pursh

1. Sepals 2, herbaceous, 2.5-3.5 mm long; petals 5, 4-5 mm long.....L. sierrae

1. Sepals 6-8, petaloid, ca. 10 mm long; petals 13-15, ca. 15 mm long.....L. rediviva

L. rediviva Pursh ssp. minor (Rydb.) N. Holmgren, BITTER-ROOT. Occasional in open, gravelly or clayey flats, often among Artemisia nova, below 9000 ft: hills south of Mormon Mdw., 7500 ft, 485; observed in pass at top of Bridgeport Cn., 7650 ft, hilltop opposite mouth of Cinnabar Cn., 7250 ft.

L. sierrae Ferris. Locally common along banks of upper Rough Ck., mostly above 9000 ft: Rough Ck. near Geiger Grade, 9150 ft, 1125.

## Ranunculaceae, BUTTERCUP or CROWFOOT FAMILY

(after Munz 1959)

1. Flowers zygomorphic; pistils 5, becoming follicles.

2. Upper sepal and upper pair of petals spurred; leaves all or mostly basal.....Delphinium

2. Upper sepals and petal hooded; leaves distributed along the stem.....Aconitum

1. Flowers actinomorphic; pistils becoming follicles or achenes.

3. Petals red, long-spurred; pistils 5, becoming folli-

cles.....Aquilegia

3. Petals yellow, white, greenish or absent, not spurred; pistils many, becoming achenes.

4. Receptacle becoming long and cylindric in fruit; plants tufted annuals, leaves all basal....Myosurus

4. Receptacle not elongate in fruit (but conical, to 7 mm long in R. cymbalaria); plants perennial; leaves cauline as well as basal.....Ranunculus

Aconitum L., MONK'S HOOD

A. columbianum Nutt. Infrequent in perennially wet, shaded places, below 8500 ft: Bodie Cn. at outlet of stream from east side of Beauty Pk., 6450 ft, 1182; aspen grove at Lakeview Spring, 8000 ft, 1704.

Aquilegia L., COLUMBINE

A. formosa Fisch. var. formosa. Occasional in wet, nonsaline places, 6300-9600 ft: margins of Mormon Mdw., 7450 ft, 470; aspen grove at Lakeview Spring, 8000 ft, 1233; observed along Rough Ck., 9200-9600 ft.

Delphinium L., LARKSPUR

D. andersonii Gray. Occasional on moist hillsides, near seeps or streams, below 8000 ft: ck. south of Mormon Mdw., 7400 ft, 407; Bodie Cn. 1 mi southwest of state line, 7800

ft, 963; cn. on north side of Brawley Pks, 7800 ft, 1582.

Myosurus L., MOUSE TAIL

M. minimus L. ssp. montanus Campbell. Occasional on moist hillsides or around ponds and lakes, below 8500 ft: Bodie Cn. 1 mi southwest of state line, 7800 ft, 969; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1041, 1051.

Ranunculus L., BUTTERCUP, CROWFOOT

(after Munz 1959)

1. Petals white; plants aquatic, partly or wholly submerged in streams; submerged leaves dissected into linear segments.....R. aquatilis
1. Petals yellow; plants of wet meadows or alpine snowfields; lower leaves not dissected.
  2. Lower leaves simple, shallowly lobed; petals 4-8 mm long; plants of wet meadows at middle to low elevations.....R. cymbalaria
  2. Lower leaves deeply 3-lobed, the lateral lobes shallowly parted and the middle one usually entire; petals 7-11 mm long; plants of rocky snow accumulation sites at high elevations.....R. eschscholtzii

R. aquatilis L. var. capillaceus (Thuill.) DC. Occasional in slow-moving, perennial streams, below 8000 ft: Clearwater Ck. at mouth of Cinnabar Cn., 7200 ft, 642; observed in Clearwater Ck. below Warm Spring, 7600 ft.

R. cymbalaria Pursh var. saximontanus Fern. Common in wet meadows and on streambanks, mostly below 9000 ft: mouth of Cinnabar Cn., 7200 ft, 497; observed in Bodie Cn. at outlet of stream from east side of Beauty Pk., 6450 ft, along stream below Paramount Mine, 8600 ft.

R. eschscholtzii Schlecht. var. oxynotus (Gray) Jepson. Common very locally in scree near snowbank on north slope of Bodie Mtn., 9900 ft, 1266.

#### Rhamnaceae, BUCKTHORN FAMILY

- 1. Fruit a fleshy drupe with 2-3 nutlets; leaves pinnately veined.....Rhamnus
- 1. Fruit a dry capsule; leaves 3-veined from the base. ....Ceanothus

#### Ceanothus L.

C. velutinus Dougl. ex Hook. var. velutinus, TOBACCO BUSH. Infrequent on rocky or gravelly slopes, mostly around Masonic Mtn., 7800-8500 ft: hillside east of Mono Lake Vista, 7800 ft, 1383; northwest base of Masonic Mtn., 8100 ft, 1058; observed on north slope of Masonic Mtn., near New York Hill, 8700 ft.

Rhamnus L., BUCKTHORN

R. rubra Greene. Barely entering the range on gravelly slopes near Conway Summit, 7000-8300 ft: hillside east of Mono Lake Vista, 7800 ft, 1376. One would expect this to be ssp. yosemitana C. B. Wolf, but the soft puberulence on both leaf surfaces which characterizes this subspecies is nearly lacking in the specimen seen here.

## Rosaceae, ROSE FAMILY

1. Ovary inferior, 5-carpellate, with 2-5 styles; fruit a purplish-black pome, 4-6 mm in diameter (subfamily Pomoidae); plant a woody shrub with leaves simple, entire to serrate; flowers white, ca. 2-2.5 cm across, in a corymbose raceme.....Amelanchier
1. Ovary superior, with 1 style; fruit not a pome.
  2. Fruit a fleshy, 1-seeded drupe (subfamily Prunoideae); woody shrubs with simple, finely serrate leaves; flowers rose or white, ca. 1.2-1.5 cm across, solitary or in long racemes.....Prunus
  2. Fruit a dry achene or follicle (achenes in a fleshy hip in Rosa); ovaries 1-many, unicarpellate.
    3. Ovaries 5, each becoming a dehiscent follicle (subfamily Spiraeoideae); woody shrubs with leaves twice-pinnate, the ultimate divisions less than 1 mm long; flowers white, ca. 1.2 cm across, in a panicle; pubescence stellate.....Chamaebatiaria
    3. Ovaries 1-many, each becoming an indehiscent achene (subfamily Rosoideae); other characters various, but leaves never twice-pinnate.
      4. Leaves simple, never pinnate or palmate.
        5. Leaves entire and the margins revolute; petals absent; achene with a long, plumose tail; small trees.....Cercocarpus



5. Leaves toothed or lobed, the margins flat or revolute; petals present; achene without a plumose tail; shrubs.
  6. Leaves cuneate, 3-lobed at the apex, the margins revolute; flowers solitary.  
.....Purshia
  6. Leaves obovate to ovate, toothed around the apex, the margins flat; flowers paniculate.....Holodiscus
4. Leaves pinnately or palmately compound.
  7. Plants shrubby, woody well above the base.
    8. Flowers yellow, stems not prickly; carpels not enclosed within a fleshy flower-tube.....Potentilla fruticosa
    8. Flowers pink-rose; stems heavily beset with prickles; carpels enclosed within a fleshy flower-tube (a red "hip" in fruit).....Rosa
  7. Plants herbaceous throughout, or woody only at the rootcrown.
    9. Stamens 5; leaves 3-foliolate, each leaflet 2-5 toothed at the apex; plants creeping-caespitose; subalpine to alpine.....Sibbaldia
    9. Stamens 10, 20 or many; leaves not as above; plants erect or prostrate; valley bottoms to alpine.
      10. Stamens many; styles persistent, elongate in fruit, geniculate above the middle, with the upper segment eventually falling off; basal leaves lyrate-pinnate, 1-4 dm long, including the petiole.....Geum
      10. Stamens usually 10 or 20; styles deciduous, neither elongate nor geniculate; basal leaves mostly shorter.
        11. Flower-tube deep; filaments 10, dilated; petals white, ca. 3 mm long.....Horkelia
        11. Flower-tube shallow; filaments 20 or 10, not dilated; petals yellow, or if white, then 6-8 mm long.....Potentilla

Amelanchier Medic., SERVICE BERRY

A. pallida Greene. Occasional throughout the range among Artemisia tridentata or on rocky slopes, below 9500 ft: hillside southwest of Mormon Mdw., 7350 ft, 616; northwest base of Masonic Mtn., 8100 ft, 1057; cn. tributary to East Walker River Cn. below Murphy Pond, 6400 ft, 1526.

Cercocarpus H. B. K., MOUNTAIN-MAHOGANY

C. ledifolius Nutt. ex Torr. & Gray. Occasional on rocky outcrops and canyon sides, above 7200 ft: 0.3 mi northwest of Paramount Mine, 8450 ft, 791; observed on north slope of east Brawley Pk., 8900 ft, on northwest slope of Masonic Mtn., 8400 ft.

Chamaebatiaria (Porter) Maxim., DESERT SWEET

C. millefolium (Torr.) Maxim. Infrequent in canyons on east side of the range, 6400-8000 ft: Bodie Cn. 1.5 mi northwest of state line, 7100 ft, 1299.

Geum L., AVENS

G. macrophyllum Willd. Occasional in wet, partly shaded places, below 8500 ft: Lakeview Spring, 8000 ft, 1239; cn.

tributary to East Walker River Cn. below Murphy Pond, 6600 ft, 1532.

Holodiscus (K. Koch) Maxim., CREAM BUSH

H. dumosus (Nutt.) Heller var. glabrescens (Greenem.) C. L. Hitchc. Common on rocky outcrops and among Artemisia tridentata, below 9500 ft: hillside east of Mono Lake Vista, 7800 ft, 1377; hillside southwest of Mormon Mdw., 7350 ft, 630; cliff in Clearwater Cn. west of Cinnabar Cn., 7200 ft, 415. [H. microphyllus Rydb. var m.]

Horkelia Cham. & Schlecht.

H. fusca Lindl. ssp. parviflora (Nutt.) Keck. Occasional around dry meadow margins, above 7500 ft: 0.5 mi below Warm Spring, 7640 ft, 1217; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 895.

Potentilla L., CINQUEFOIL

(after Munz 1959)

1. Plants shrubby, with woody branches.....P. fruticosa
1. Plants herbaceous perennials.
  2. Flowers solitary, axillary, long-pedicelled; stems slender, prostrate, rooting at the nodes; leaves whitish, silky-tomentose.....P. anserina
  2. Flowers cymose, short-pedicelled; stems erect, or if

prostrate, then not rooting at the nodes and not white silky-tomentose.

3. Styles lateral or nearly basal; petals mostly white; basal leaves pinnate with 5-9 coarsely serrate leaflets.....P. glandulosa
3. Styles terminal or nearly so; petals bright yellow; basal leaves otherwise.
4. Stems prostrate, but not stoloniferous; basal leaves pinnate with 13-15 leaflets; stamens ca. 20.....P. millefolia
4. Stems erect; basal leaves palmate with 3-7 leaflets.
5. Basal leaves with 3 obovate to roundish leaflets 2-4 cm long, coarsely crenate; stamens usually 10.....P. biennis
5. Basal leaves with 5-7 oblanceolate leaflets 3-6 cm long, divided ca. half-way by lanceolate teeth; stamens ca. 20.....P. gracilis

P. anserina L. ssp. anserina. Occasional in moist, somewhat alkaline meadows, mostly below 8000 ft: mdw. at mouth of Cinnabar Cn., 7200 ft, 709. [P. a. var. sericea Hayne]

P. biennis Greene. Common in moist to wet meadows and along streams, 6000-10,000 ft: ck. south of Mormon Mdw., 7500 ft, 580; mdw. at mouth of Cinnabar Cn., 7200 ft, 503; mdw. at Masonic Upper Town, 1109; observed in Bodie Cn., 6500 ft, along Rough Ck., 9200 ft.

P. fruticosa L. ssp. floribunda (Pursh) Elkington, BUSH CINQUEFOIL. Occasional in rocky areas around high meadows or

near snowbanks, above 9600 ft: upper Rough Ck., 9700 ft, 1258; in scree near snowbank on north slope of Bodie Mtn, 10,000 ft, 1436. [P. floribunda Pursh; Pentaphylloides floribunda (Pursh) A. Love]

P. glandulosa Lindl. ssp. nevadensis (S. Wats.) Keck. Occasional in wet meadows or near snowbanks, mostly above 8000 ft: in scree near snowbank on north slope of Potato Pk., 10,050 ft, 1735; mdw. at Masonic Upper Town, 8050 ft, 1100.

P. gracilis Dougl. ex Hook. ssp. glabrata (Lehm.) C. L. Hitchc. Very common in moist areas along creeks, in meadows and near springs, 6500-9800 ft: spring on west side of Bridgeport Cn., 7750 ft, 1608; ck. south of Mormon Mdw., 7500 ft, 392, 1009; mouth of Cinnabar Cn., 7200 ft, 703; near upper Rough Ck., 9600 ft, 1252, 1749; mdw. at Masonic Upper Town, 8050 ft, 1099. [P. g. ssp. nuttallii (Nutt.) Keck]

P. millefolia Rydb. var. millefolia. Very common in moist to dry meadows, mostly below 9100 ft: mouth of Cinnabar Cn., 7200 ft, 710, 501; northeast end of Mormon Mdw., 7420 ft, 1652; Bodie Ck. 2.4 mi east-northeast of Bodie, 7950 ft, 976; observed in mdw. at Masonic Upper Town, 8050 ft.

Prunus L., STONE FRUITS

(after Munz 1959)

1. Plants shrubby, with thorny branchlets; leaves oblanceolate, 1-2 cm long; flowers pink, usually solitary.  
.....P. andersonii
1. Plants shrubby to arborescent, without thorny branchlets; leaves oblong-ovate to obovate, 3-8 cm long; flowers white, numerous in long racemes.....P. virginiana

P. andersonii Gray, DESERT PEACH. Locally common on dry hillsides, usually with Artemisia tridentata, below 8300 ft: lower Clearwater Cn., 6900 ft, 493; observed at southwest base of Masonic Mtn., 8050 ft.

P. virginiana L. var. melanocarpa (A. Nels.) Sarg., WESTERN CHOKE-CHERRY. Infrequent near perennial moisture in Bodie Cn., 6450-7500 ft: Bodie Cn. near Del Monte, 6950 ft, 1620; Bodie Cn. at outlet of stream from east side of Beauty Pk., 6480 ft, 1622. The leaves and twigs are quite glabrous, suggesting var. melanocarpa, rather than the more typically Sierran var. demissa (Nutt.) Torr.

Purshia DC. ex Poir., ANTELOPE BUSH

P. tridentata (Pursh) DC. Common on dry slopes throughout the range, usually among Artemisia tridentata, mostly below 9500 ft: lower Clearwater Cn., 6900 ft, 494; observed in

upper Cottonwood Cn., east of Sugarloaf, 8400 ft, in Aurora Cn., 7200 ft, Masonic Gulch, 7500 ft.

Rosa L., ROSE

R. woodsii Lindl. var. ultramontana (S. Wats.) Jepson. Locally abundant in moist to wet places along streams, below 9000 ft: lower Clearwater Cn., 6800-7200 ft, 442, 496; observed in Bodie Cn., 7000 ft, at Masonic Lower Town, 7600 ft, in Aurora Cn., 7200 ft.

Sibbaldia L.

S. procumbens L. Occasional in moist meadows beside upper Rough Ck., above 9600 ft: upper Rough Ck., 9750 ft, 1260.

Rubiaceae, Madder Family

Galium L., BEDSTRAW

1. Plants annual; corollas 3-lobed; fruits with curved hairs; leaves 2 or 4 at each node.....G. bifolium
1. Plants perennial; other characters various.
  2. Corollas mostly 3-lobed; fruits glabrous; leaves 4-6 at each node; arising from slender rhizomes.  
.....G. trifidum
  2. Corollas 4-lobed; fruits with straight hairs; leaves 4 at each node; arising from a woody rootcrown.  
.....G. hypotrichium

G. bifolium S. Wats. Locally abundant in shaded litter of aspen groves, mostly below 9000 ft: beneath aspens at Lake-view Spring, 8000 ft, 1069.

G. hypotrichium Gray ssp. hypotrichium. Occasional on dry, rocky slopes, usually growing from beneath rocks, 6200-10,000 ft: near mouth of Cottonwood Cn., 7200 ft, 993; talus in cn. on north side of Brawley Pks, 7800 ft, 1312; near summit of Mt. Biedeman, 8960 ft, 511; Clearwater Cn. near mouth of Cinnabar Cn., 7300 ft, 428; hillside south of The Hot Springs, 6600 ft, 536.

G. trifidum L. var. pacificum Wieg. Rare or infrequent in the Bodie Hills, seen only on banks of Clearwater Ck. in upper Mormon Mdw., 7420 ft, 1655. This is G. t. ssp. columbianum (Rydb.) Hulten in Kartesz & Kartesz (1980); I prefer Dempster's (1979) treatment of the genus. One might also expect G. t. var. pusillum Gray in this region.

#### Salicaceae, WILLOW FAMILY

1. Buds with many scales; leaves round-ovate to deltoid; catkin scales lacerate; stamens numerous; flower surrounded by a broad disc.....Populus
1. Buds with a single scale; leaves lanceolate; catkin scales denticulate to entire; flower without a broad disc.....Salix



Populus L., COTTONWOODS, ASPENS, POPLARS

1. Leaves deltoid-orbicular, crenate except toward the apex; bark tough, thick, whitish; stamens 40-80....P. fremontii
1. Leaves round-ovate, finely toothed to entire; bark smooth, thin, greenish white, becoming rough only toward bases of the oldest trees; stamens 6-12.....P. tremuloides

P. fremontii S. Wats., FREMONT COTTONWOOD. Rare in the Bodie Hills, seen only in lower Bodie Cn., 6350 ft, 1173.

P. tremuloides Michx., QUAKING ASPEN. Abundant throughout the range in riparian thickets at lower elevations, and about springs and late-lying snowbanks at higher elevations, 6500-9500 ft: Clearwater Cn., 7100 ft, 441; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 755; observed in extensive stands at Lakeview Spring, 8000 ft, in Masonic Gulch, 7000-8000 ft, cn. on north side of Brawley Pks., 7000-8000 ft.

Salix, WILLOW

(after Munz 1959)

1. Leaf blades distinctly serrulate.
2. Mature leaf blades glabrous beneath, 1-2 cm wide.  
.....S. myrtillofolia
2. Mature leaf blades appressed-pubescent beneath, rarely more than 1 cm wide.....S. exigua

1. Leaf blades entire or nearly so.

3. Mature leaf blades quite glabrous beneath; bark of branchlets white, not glaucous; filaments glabrous and united at the base; leaves lanceolate.....S. lutea

3. Mature leaf blades sparsely to strongly pubescent beneath; bark of branchlets yellow to dark brown, or glaucous, but brown when the bloom is rubbed off; if the filaments glabrous and united at the base (S. lasiolepis), then the leaves oblanceolate.

4. Leaves linear to lance-linear, many times longer than wide, usually less than 8 mm wide; stigmas sessile; catkin scales yellowish.....S. exigua

4. Leaves lanceolate or oblanceolate, 3-6(-8) times as long as wide, usually more than 8 mm wide at maturity; stigmas on a style 0.1-1 mm long, or if sessile, the leaves not at all linear; catkin scales dark, at least at the tip.

5. Capsules glabrous, 4-5 mm long; filaments glabrous, united at the base; leaves sparsely pubescent and glaucous beneath.....S. lasiolepis

5. Capsules pubescent, 5-8.5 mm long; filaments hairy near the base, distinct; leaves usually equally pubescent on both surfaces.

6. catkin scales dark brown; styles ca. 1 mm long; capsules 7-8.5 mm long, shaggy-pubescent.....S. orestera

6. Catkin scales yellowish with reddish tips (best seen when fresh); styles 0-0.3 mm long; capsules appressed-pubescent.....S. geyeriana

S. exigua Nutt., NARROW-LEAVED WILLOW. Common along streams throughout the range, mostly below 8000 ft: lower Clearwater Cn., 7100 ft, 444, 914, 1003; ck. south of Mormon Mdw., 7550 ft, 1600; lower Bodie Cn., 6350 ft, 1174; Masonic Gulch below Masonic Lower Town, 7500 ft, 1697.

S. gayeriana Anders. var. argentea (Bebb.) Schneid. Infrequent along streams, mostly above 7000 ft: beside stream west of Paramount Mine, 8720 ft, 1680.

S. lasiolepis Benth., ARROYO WILLOW. Common beside streams and on wet hillsides, below 9000 ft: lower Bodie Cn., 6350 ft; gully on north side of Masonic Mtn., 8820 ft, 1721; west base of Masonic Mtn., 7850 ft, 1059; side of East Walker River Cn. below Murphy Pond, 6600 ft, 1535.

S. lutea Nutt., YELLOW WILLOW. Occasional or infrequent by streams, below 8000 ft: Bodie Cn. near Del Monte, 6800 ft, 1621; reported near Bridgeport by Munz (1959). [S. l. var. watsonii (Bebb.) Jepson]

S. myrtillofolia Anderss. var. myrtillofolia. Occasional along streams, mostly in the southwestern part of the range, below 8000 ft: Clearwater Cn. west of Cinnabar Cn., 7100-7200 ft, 420, 443, 915, 1002. [S. pseudocordata (Anderss.) Rydb.]

S. orestera Schneid. Infrequent in subalpine meadows and near high snowbanks, above 9500 ft: below snowbank on north slope of Bodie Mtn., 9850 ft, 1272; upper Rough Ck., 9600 ft, 1748.

## Saxifragaceae, SAXIFRAGE FAMILY

1. Stamens 10; styles 3; leaf axils bearing bulblets.  
 .....Lithophragma
1. Stamens 5; styles 2; leaves without bulblets.....Heuchera

Heuchera L., ALUM ROOT

1. Mature styles long, slender, exceeding 2 mm; flowers  
 4-5.5 mm long, reddish with white petals.....H. rubescens
1. Mature styles short, less than 1 mm; flowers 2-2.5 mm  
 long, yellowish with some pink.....H. duranii

H. duranii Bacig. Occasional on moist, rocky slopes among sagebrush, above 9000 ft: upper Rough Ck., 9500 ft, 1250; Masonic Mtn. near New York Hill, 8750 ft, 1076; observed on Mt. Hicks, 9400 ft, on Potato Pk., 10,000 ft.

H. rubescens Torr. var. alpicola Jepson. Rare or infrequent, seen only in cn. tributary to East Walker River Cn. below Murphy Pond, 6500 ft, 1529.

Lithophragma (Nutt.) Torr. & Gray, WOODLAND STAR

L. glabrum Nutt. Occasional in moist places along streams, 7000-9500 ft: ck. south of Mormon Mdw., 7500 ft, 1007; Rough Ck. near Geiger Grade, 9150 ft, 1126. [L. bulbifera Rydb.]

## Scrophulariaceae, FIGWORT FAMILY

1. Fertile stamens 5; corolla rotate, nearly regular, mostly yellow; inflorescence a tall spike; introduced biennial weeds of disturbed places.....Verbascum
1. Fertile stamens 4 or 2; corolla usually zygomorphic and bilabiate (but not strongly so in Veronica and Limosella); inflorescence and habitats various.
  2. Fertile stamens 2; corolla subrotate, blue or whitish; upper corolla lip appearing single-lobed due to the fusion of 2 lobes; in streams or wet meadows..Veronica
  2. Fertile stamens 4 (sometimes a sterile stamen also present); corolla strongly bilabiate, or subrotate and whitish; lobes of upper corolla lip not entirely fused.
    3. Plants acaulescent; flowers solitary on long pedicels; leaves tufted, entire, oblong to spatulate, the distal portion sometimes floating; plants of muddy or submerged lakeshore habitats.....Limosella
    3. Plants caulescent; flowers several to many in an inflorescence, rarely solitary; corolla strongly bilabiate; leaves not as above; plants of dry to wet habitats, but never submerged.
    4. Corolla with upper lip flattened or widely arched, not forming a galea; seeds not with a loose, reticulate coat; plants not root-parasitic.
    5. Stigmas 2, flattened and plate-like (these sometimes becoming closely appressed and appearing capitate); corolla yellow or purple.  
.....Mimulus
    5. Stigmas united, capitate or dot-like; corolla not yellow.
      6. Plants annual; lower corolla lip appearing 2-lobed, but with a keel-shaped middle lobe concealed between these; capsule valves 2-cleft.....Collinsia
      6. Plants perennial; lower corolla lip and capsule not as above.
      7. Corolla brownish, 5-15 mm long; sterile

stamen much reduced, clavate to obovate; stems 4-angled....Scrophularia

7. Corolla blue, purple or red, 10-35 mm long; sterile stamen represented by a long filament (staminode); stems terete.....Penstemon

4. Corolla with upper lip narrowly arched, forming a galea which encloses the stamens; seeds with a loose, reticulate coat; plants root-parasitic.

8. Galea strongly exceeding the lower corolla lip; calyx not cleft to the base; perennials, except for C. exilis.....Castilleja

8. Galea scarcely if at all exceeding the lower corolla lip; annuals.

9. Calyx not cleft to the base; inflorescences many-flowered.....Orthocarpus

9. Calyx cleft to the base; inflorescences few-flowered.....Cordylanthus

Castilleja Mutis ex L. f., PAINTBRUSH

(after Munz 1959)

1. Plants annual; leaves and bracts entire; plants of wet meadows.....C. exilis

1. Plants perennial; leaves and bracts, especially the upper ones, lobed or divided; plants of perennially or seasonally dry places.

2. Calyx lobes united much farther abaxially (side away from the stem) than adaxially (side facing the stem); calyx usually long-exserted through the calyx sinus. ....C. linariaefolia

2. Calyx lobes united abaxially only a little more than adaxially; corolla mostly or completely included.

3. Tips of bracts and calyces bright red (usually) to orange or yellow; galea 12-15 mm long; lower corolla lip 2-3 mm long, dark green, incurved.....C. chromosa

3. Tips of bracts and calyces whitish, sometimes also with pink or purple about the margins; galea 6-8 mm long; lower corolla lip 5-7 mm long.
4. Corolla 17-22 mm long; galea 7-8 mm long; bracts tending to be rounded distally.....C. pilosa
4. Corolla 13-16 mm long; galea ca. 6 mm long; bracts tending to be acute distally.....C. nana

C. chromosa A. Nels. Abundant throughout the range on dry, rocky slopes and among sagebrush, below 9500 ft: near summit of Mt. Biedeman, 8970 ft, 510; rocky slopes in Clearwater Cn., 7200 ft, 429, 627; hillside north of Bodie, 8500 ft, 602; north slope of Mt. Hicks, 9200 ft, 1342; observed at northwest base of Masonic Mtn., 8100 ft.

C. exilis A. Nels. Infrequent in wet meadows, seen only in East Walker River Cn. below Murphy Pond, 6500 ft, 1398.

C. linariifolia Benth. ex DC. Common in moist places around sagebrush and around meadow margins, below 9300 ft: hillside south of Mormon Mdw., 7350 ft, 626; cliff in Clearwater Cn., 7350 ft, 648; Bodie Cn. near Del Monte, 6960 ft, 1193; Geiger Grade near Rough Ck., 9100 ft, 821; hillside below Paramount Mine, 8720 ft, 786; Masonic Gulch 0.5 mi below Masonic Lower Town, 7500 ft, 1696; cn. tributary to East Walker River Cn. below Murphy Pond, 6600 ft, 1530.

C. nana Eastw. Infrequent among sagebrush above 9100 ft:

seen only near Rough Ck., 9300 ft, 1128.

C. pilosa (S. Wats.) Rydb.

(after Smith 1973:185-6)

1. Hairs of foliage long, shaggy, scarcely or not at all glandular; herbage not shiny-purple; plant stout, heavy, to 30 cm or more tall.....ssp. pilosa
1. Some hairs of foliage shiny-glandular; herbage shiny-purple; plants delicate, 6-16 cm tall; flowers and bracts appearing arachnoid, but not so under magnification.....ssp. jusselii

C. p. ssp. jusselii (Eastwood) Munz. No specimens definitely attributable to this taxon have been collected in the Bodie Hills. It is included because it may yet be found and because the characters given by Munz (1959:667-8) to distinguish the two are not reliable.

C. p. ssp. pilosa. Occasional in dry areas among sagebrush, mostly below 9300 ft: ridge 1.5 mi south-southwest of Bodie, 8600 ft, 757; hillside 2.7 mi east-northeast of Bodie, 8100 ft, 1510; Geiger Grade near Rough Ck., 9100 ft, 801.

Collinsia Nutt.

C. parviflora Dougl. ex Lindl. Abundant in moist meadows, along streams and in aspen groves, especially in shade,



mostly below 9000 ft: ck. south of Mormon Mdw., 7500 ft, 584; hillside northeast of Mormon Mdw., 7600 ft, 452; Masonic Gulch 0.4 mi below Masonic Lower Town, 7500 ft, 1693.

Cordylanthus Nutt. ex Benth. in DC., BIRD'S BEAK

1. Leaves filiform, involute, mostly less than 1 mm broad; pubescence of stems without glands; calyx teeth 0.5 mm long.....C. ramosus
1. Leaves linear, mostly flat, 1-1.5 mm broad; pubescence of stems including some glandular hairs; calyx teeth ca. 1.5 mm long.....C. helleri

C. helleri (Ferris) J. F. Macbr. Occasional in clayey soil among sagebrush, mostly below 8000 ft: hillside south of Mormon Mdw., 7550 ft, 1145; hilltop west of Cinnabar Cn., 7450 ft, 873; Bodie Cn. at base of road to lakes near Beauty Pk., 7820 ft, 1609.

C. ramosus Nutt. ex Benth. ssp. setosus Pennell. Occasional or infrequent on dry slopes, mostly below 9000 ft: northwest base of Masonic Mtn., 8250 ft, 1225.

Limosella L., MUDWORT

L. aquatica L. Occasional in muddy soil of pond margins or receding lakeshores, below 8400 ft: margin of lake at northwest base of Masonic Mtn., 8100 ft, 1038, 1043; edge of

pool at Warm Spring, 7650 ft, 1709A. Specimens key best in Mason (1957) based upon leaf shape, but appear to have both acute and rounded corolla lobes, and therefore also resemble L. acaulis Ses. & Moc.

Mimulus L., MONKEY FLOWER

(after Munz 1959)

1. Plants perennial; weakly stoloniferous or rhizomatous herbs.
  2. Stems mostly 1-6 dm tall; leaves glabrous; pedicels shorter than the corollas; mature calyx strongly inflated.....M. guttatus
  2. Stems mostly 0.1-0.5 dm tall; leaves with long, white, soft, multicellular hairs above; pedicels usually longer than the corollas; mature calyx only slightly inflated.....M. primuloides
1. Plants annual herbs, without stolons or rhizomes.
  3. Pedicels longer than the calyces; corollas dropping off before shriveling; corollas yellow with purple spots.
    4. Mature calyx strongly inflated; plants glandular-pubescent around the inflorescence, glabrous elsewhere.....M. guttatus
    4. Mature calyx not or only slightly inflated; plants glandular-pubescent or white-villous throughout.
      5. Plants white-villous, 0.5-3.5 dm tall; calyx not ribbed along the sepal midveins; calyx lobes lance-ovate.....M. pilosus
      5. Plants glandular-puberulent, 0.1-0.6 dm tall; calyx ribbed along the sepal midveins; calyx lobes rounded and mucronate.....M. suksdorfii
  3. Pedicels shorter than the calyces; corollas persistent after shriveling; corollas yellow with purple streaks or entirely purple-magenta.....M. densus

M. densus A. L. Grant. Common on loose soil on open slopes or among sagebrush, below 9500 ft: scree slope west of mouth of Cinnabar Cn., 7200 ft, 424; hillside northeast of Mormon Mdw., 7600 ft, 447, 448; near The Hot Springs, 6600 ft, 561; Bodie Cn. 1 mi southwest of state line, 7800 ft, 962; Geiger Grade near Rough Ck., 9100 ft, 799; beside road 1.5 mi north of Masonic Lower Town, 7050 ft, 1096.

M. guttatus Fisch ex DC. Occasional in wet soil beside streams or springs, below 8500 ft: spring on south side of Bridgeport Cn., 7750 ft, 1605; wet hillside in Masonic Gulch near Masonic Upper Town, 8000 ft, 1110; Lakeview Spring, 8000 ft, 1237.

M. pilosus (Benth.) S. Wats. Occasional in wet soil along streams, mostly below 8000 ft: ck. south of Mormon Mdw., 7500 ft, 840; lower Clearwater Cn., 6950 ft, 1463; side of East Walker River Cn. below Murphy Pond, 6300 ft, 1387. [This is Mimetanthe p. Greene in Kartesz & Kartesz (1980).]

M. primuloides Benth. var. primuloides. Common in wet meadows along upper Rough Ck., mostly above 9000 ft: Rough Ck. near Geiger Grade, 9150 ft, 1123; upper Rough Ck., 9600 ft, 1253.

M. suksdorfii Gray. Occasional on wet or moist slopes, most-

ly above 7000 ft: Bodie Cn. 1 mi southwest of state line,  
7800 ft, 970.

Orthocarpus Nutt., OWL'S-CLOVER

1. Corolla and bract tips pink to rose; lower corolla lip  
simple-saccate.....O. copelandii
1. Corolla yellow to white; lower corolla lip 3-saccate.  
.....O. hispidus

O. copelandii Eastwood. var. cryptanthus (Piper) Keck. In-  
frequent among sagebrush or in aspen groves, below 8500 ft:  
hillside south of Mormon Mdw., 7400 ft, 1144; Lakeview  
Spring, 8050 ft, 1276; observed in Bodie Cn. at base of road  
to lakes near Beauty Pk., 7820 ft.

O. hispidus Benth. Occasional in wet meadows and along stre-  
ambanks, below 8200 ft: ck. south of Mormon Mdw., 7500 ft,  
583, 846; in Mormon Mdw., 7350 ft, 1151; Lakeview Spring,  
8000 ft, 1243.

Penstemon Mitchell, BEARD TONGUE

(after Hitchcock & Cronquist 1973, Munz 1959)

1. Corolla scarlet; anthersacs opening across their conflu-  
ent apices, not becoming divaricate after dehiscence, but  
remaining horseshoe-shaped.....P. bridgesii
1. Corolla scarlet; anther sacs opening throughout their  
length, becoming divaricate to opposite after dehiscence.

- 2. Inflorescence glandular-puberulent; corolla dark blue-purple.....P. humilis
- 2. Inflorescence not glandular-puberulent.
  - 3. Corolla 25-35 mm long, bright blue-purple; inflorescence secund.....P. speciosus
  - 3. Corolla 10-15 mm long, dark blue-purple; inflorescence of whorls.....P. rydbergii

P. bridgesii Gray. Infrequent on dry, rocky slopes or on talus, mostly below 8000 ft: Clearwater Cn. near mouth of Cinnabar Cn., 7300 ft, 644; Bodie Cn. at mouth of cn. on north side of Brawley Pks., 7150 ft, 1572; Masonic Gulch 0.4 mi below Masonic Lower Town, 7500 ft, 1690; observed in cn. tributary to East Walker River Cn. below Murphy Pond, 6300 ft.

P. humilis Nutt. ex Gray. Common on dry, gravelly or rocky slopes or ridges, mostly below 9500 ft: northwest slope of Mt. Hicks, 9200 ft, 1338; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 750; east base of Bodie Mtn., 9100 ft, 1120; near east summit of Masonic Mtn., 9000 ft, 1159; northwest base of Masonic Mtn., 8200 ft, 1054.

P. rydbergii A. Nels. var. varians (A. Nels.) Cronq. Occasional in moist meadows, below 8000 ft: ck. south of Mormon Mdw., 7400 ft, 406; mdw. south of Mormon Mdw., 7600 ft, 574.

[P. oreocharis Greene]

P. speciosus Dougl. ex Lindl. Occasional on dry, rocky slopes and ridges, 7000-9200 ft: hillsides south of Mormon Mdw., 7500 ft, 481, 631; talus in Clearwater Cn., 7200 ft, 413; hillside south of Masonic Lower Town, 7750 ft, 1116.

[P. s. ssp. kennedyi (A. Nels.) Keck]

Scrophularia L.

S. desertorum (Munz) J. R. Shaw. Infrequent on dry slopes or in talus, 6200-9000 ft: Clearwater Cn., near mouth of Cinabar Cn., 7200 ft, 414; Paramount Mine, 8680 ft, 782. [S. californica Cham. & Schlecht. var. d. Munz]

Verbascum L., MULLEIN

V. thapsus L. Infrequent as a weed in disturbed creekbeds, below 8000 ft: ck. south of Mormon Mdw., 7400 ft, 581.

Veronica L., SPEEDWELL

(after Munz 1959)

1. Main stem with lateral racemes below the tip; corolla 7-10 mm wide; perennials, usually rooting beneath water.  
.....V. americana
1. Main stem ending in a single racemose inflorescence; corolla 2-8 mm wide; plants of wet sites, but usually not rooted under water.
2. Plants annual; stems erect; leaves mostly linear-oblong; flowers in most leaf axils; corolla white, 2-3 mm wide; style very short, about as long as

the notch.....V. peregrina

2. Plants perennial; stems decumbent; leaves round-ovate below, becoming narrower and bracteate above; flowers only in upper leaf axils; corolla usually blue, 5-8 mm wide; style almost as long as the capsule, much longer than the notch.....V. serpyllifolia

V. americana (Raf.) Schwein. ex Benth. Occasional along streams, rooting in submersed mud, less often in meadows, 6500-8100 ft: ck. east of The Hot Springs, 6700 ft, 564; observed in ck. near Little Bodie Mine, 7450 ft, mdw. at Masonic Upper Town, 8050 ft.

V. peregrina L. ssp. xalapensis (H. B. K.) Pennell. Occasional on banks of creeks and ponds, 7000-9000 ft: ck. south of Mormon Mdw., 7500 ft, 841; Lakeview Spring, 8000 ft, 1242.

V. serpyllifolia L. ssp. humifusa (Dickson) Syme. Occasional in wet meadows: mdw. at Masonic Upper Town, 8050 ft, 1104.

#### Solanaceae, NIGHTSHADE FAMILY

1. Corolla rotate; fruit a berry.....Solanum  
1. Corolla funnelform; fruit a capsule.....Nicotiana

Nicotiana L., TOBACCO

N. attenuata Torr. ex S. Wats. Occasional in dry, disturbed places, below 8000 ft: roadside in lower Clearwater Cn., 7000 ft, 682, 1459; roadside in lower Bodie Cn., 6400 ft, 1180.

Solanum L., NIGHTSHADE

S. triflorum Nutt. Rare in the Bodie Hills, collected only on a dry, sandy bank along upper Clearwater Ck., 1.2 mi below Warm Spring, 7580 ft, 1714.

## Urticaceae, NETTLE FAMILY

Urtica L., NETTLE

U. dioica L. var. holosericea (Nutt.) C. L. Hitchc. Occasional and locally abundant in moist soil near streams or springs, below 9000 ft: Clearwater Ck. at mouth of Cinnabar Cn., 7200 ft, 700; observed at Murphy Spring, 8100 ft, McMillan Spring, 8150 ft. [U. h. Nutt.]



## Valerianaceae, VALERIAN FAMILY

Valeriana L., VALERIAN

V. californica Heller. Occasional on rocky outcrops above 9000 ft: north slope of Bodie Mtn., 9100 ft, 1119, 9500 ft, 1446, 10,000 ft, 1265. [V. capitata Pall. ex Link. ssp. C. (Heller) F. G. Mey.]

## Violaceae, VIOLET FAMILY

Viola L., VIOLET

1. Petals yellow on the front and purplish on the back; leaves long-pubescent; leaf bases mostly attenuate.  
.....V. purpurea
1. Petals deep blue-violet on both front and back; leaves glabrous; leaf bases mostly cordate.....V. nephrophylla

V. nephrophylla Greene. Rare or infrequent, collected only in the wet mdw. at Masonic Upper Town, 8050 ft, 1106.

V. purpurea Kellogg ssp. aurea (Kellogg) J. Clausen. Occasional on dry slopes, usually among sagebrush, mostly below 8000 ft: Bodie Ch. 1 mi southwest of state line, 7800 ft, 972; observed on hillsides south of Mormon Mdw., 7400 ft.  
[V. a. Kellogg]

## Class 2. Monocotyledoneae, MONOCOTS

## Key to Monocot Families

(partly after Cronquist et al. 1977)

1. Plants strictly aquatic, free-floating, or rooted and with elliptical floating leaves, never emergent.
  2. Plants very small, thalloid, free-floating, but with a few rootlets hanging down in the water; flowers microscopic, rarely seen.....Lemnaceae
  2. Plants larger, not thalloid, with floating and submerged leaves; plant firmly rooted in the bottom; inflorescence a terminal spike of white, 4-merous flowers.....Potamogetonaceae
1. Plants terrestrial, or emergent aquatics; if with floating leaves, these hastate.
  3. Perianth absent or vestigial, the flower closely surrounded instead by bracts.
    4. Flowers inserted spirally or distichously (Cyperus only) on the axis of a spike or spikelet, each flower subtended by one bract; stem usually solid, often triangular; flowers usually with a vestigial perianth of inconspicuous, slender bristles; carpels 3 or 2; seeds free from the pericarp.....Cyperaceae
    4. Flowers inserted distichously on the axis of a spikelet (or sometimes the flowers solitary in the spikelet); each flower subtended by 2 bracts (lemma and palea); these usually hollow and terete; vestigial perianth represented by minute lodicules; carpels 2; seeds adnate to the pericarp.....Poaceae
  3. Perianth present, but sometimes inconspicuous because of size or coloration.
    5. Perianth not showy, of small brown tepals, or minute greenish scales.
      6. Perianth of small, brown, lanceolate tepals; inflorescence paniculate (or flowers solitary in the smallest annuals); fruit a capsule.....Juncaceae
      6. Perianth of minute, greenish or yellowish,

lance-ovate scales; inflorescence a tall, slender, spike-like raceme; fruit a follicle; plants of heavily alkaline soils...Juncaginaceae

5. Perianth showy, not as above.

7. Carpels separate; fruit an achene; plants semi-aquatic.....Alismataceae

7. Carpels connate; fruit a capsule; plants of dry to moist habitats.

8. Ovary superior; stamens 6.....Liliaceae

8. Ovary inferior; stamens 3.....Iridaceae

#### Alismataceae, WATER-PLANTAIN FAMILY

#### Sagittaria L., ARROWHEAD

S. cuneata Sheldon. Rare in the Bodie Hills, seen only in the shallow pond immediately below Warm Spring, 7650 ft, 1215.

#### Cyperaceae, SEDGE FAMILY

1. Achene enclosed in a perigynium and subtended by a scale.  
.....Carex

1. Achene not enclosed in a perigynium, but subtended by a scale and sometimes also by bristles.

2. Spikelet solitary; thickened base of the style persistent on the achene as a tubercle.....Eleocharis

2. Spikelets 2-many; achene sometimes apiculate, but not with the style base persisting as a tubercle...Scirpus

Carex L., SEDGE

(partly after Cronquist et al. 1977)

1. Stigmas 3 and the achenes trigonous, or stigmas 2 and the achenes lenticular in long, cylindric spikes (subg. Carex).

2. Stigmas 3 and the achenes trigonous.

3. Perigynia pubescent at maturity.

4. Plants 3-10 dm tall; pistillate spikes 1-4 cm long, many-flowered, all borne high on the stems; achenes loose in the inflated, velvety-pubescent perigynium; stem bases clothed with brownish-purple old sheaths (sect. Hirtae).  
.....C. lanuginosa

4. Plants 0.5-3 dm tall; pistillate spikes 0.5-1 cm long, few-flowered, some borne near the bases of the stems; achene filling the finely pubescent perigynium; stem-bases clothed with reddish-purple old sheaths (sect. Montanae).

5. Perigynium-beak obsolete to 0.75 mm long and bidentulate.....C. brevipes

5. Perigynium-beak 0.75-1.5 mm long and strongly bidentate.....C. rossii

3. Perigynia glabrous at maturity.

6. Style continuous with the achene, not easily broken near the base; stems 3-12 dm tall from long, stout rhizomes; perigynia 4-7 mm long, inflated (sect. Vesicarieae).....C. rostrata

6. Style deciduous, readily detached near the base; rhizomes absent or very short and slender; perigynia 2.7-4.2 mm long; strongly flattened (sect. Atratae).

7. Spikes closely aggregated into a dense head; pistillate scales blackish with a greenish midrib; plants 1-3 dm tall; alpine.....  
.....C. helleri

7. Spikes close to one another, but not aggregated into a head; pistillate scales light to dark brownish with a brownish midrib; plants

- (1.5)3-8 dm tall; subalpine or lower.  
 .....C. atrata
2. Stigmas 2 and the achenes lenticular in long, cylindric spikes (sect. *Acutae*).....C. nebraskensis
1. Stigmas 2 and the achenes lenticular in relatively short, sometimes ovate spikes (subg. *Vigneae*).
8. Spikes androgynous (staminate flowers above the pistillate), or the plants mostly dioecious and the spikes unisexual (sect. *Davisae*).
9. Perigynium 1.7-2.4 mm long, the beak 0.2-0.4 mm long, the wall very firm and thickened basally.  
 .....C. simulata
9. Perigynium 2.6-4.3 mm long, the beak 0.5-1.5 mm long, the wall usually firm, but never so thick basally.
10. Spikes usually androgynous; perigynia 2.9-3.8 mm long; plants (1)3-7 dm tall, from coarse, blackish rhizomes.....C. praegracilis
10. Spikes usually unisexual; perigynia 3.5-4.6 mm long; plants (0.5)1-3 dm tall, from slender, brownish rhizomes.....C. douglasii
8. Spikes gynecandrous (pistillate flowers above the staminate), but sometimes with some of the lateral ones entirely pistillate (sect. *Ovales*).
11. Perigynium beak broadly winged, the wings usually undulate and serrulate.....C. straminiformis
11. Perigynium beak slender, narrowly margined, the margin serrulate, but not undulate.
12. Lowest bract of the inflorescence elongate, 1-8 cm long, equalling or more often surpassing the inflorescence.....C. athrostachya
12. All bracts of the inflorescence short and inconspicuous, often resembling the scales.
13. Perigynium plano-convex; achene 1.4-1.9 mm long; inflorescence elongate-ovate, most of the spikes individually distinguishable with out dissection.....C. pachystachya

13. Perigynium flat, except where distended by the achene; achene 1.1-1.5 mm long; inflorescence compact-ovate, most of the individual spikes not visually distinguishable.....  
 .....C. microptera

C. athrostachya Olney. Occasional along perennial streams at higher elevations, mostly above 9000 ft: Rough Ck. above Geiger Grade, 9150 ft, 1423, 9200 ft, 1679.

C. atrata L. var. erecta W. Boott in S. Wats. Occasional along perennial streams, 7000-9800 ft: cn. on north side of Brawley Pks., 7600 ft, 1579, 7700 ft, 1316; among talus among upper Rough Ck., 9650 ft, 1747. This treatment follows that of Cronquist et al. (1977) in lumping C. heteroneura W. Boott into C. atrata. This is C. h. var. brevisquama F. J. Hermann of Kartesz & Kartesz (1980).

C. brevipes W. Boott. Rare in the Bodie Hills, collected only in the wet mdw. at Masonic Upper Town, 8050 ft, 1102. Cronquist et al. (1977) regard this as merely a Sierran form of the more widespread C. rossii, which is common here.

C. douglasii F. Boott. Widespread in dry, subsaline meadows, often becoming the dominant species, 6000-10,000 ft: hillside south of Mormon Mdw., 7350 ft, 624; ck. south of Mormon Mdw., 1010; Bodie Cn. at mouth of cn. on north side of Brawley Pks., 7100 ft, 1301; mdw. beside Geiger Grade at east

base of Bodie Mtn., 9050 ft, 890. This is frequently the only species to survive in heavily overgrazed meadows, such as those along upper Clearwater Ck., around Murphy Spring and at Bodie.

C. helleri Mackenzie. Locally common in loose scree watered by late-melting snowbanks on north slope of Bodie Mtn., above 9800 ft: 9850 ft, 1268, 10,000 ft, 1434.

C. lanuginosa Michx. Common in moist meadows or along streams throughout the range, mostly below 8500 ft: lower Clearwater Cn., 6950 ft, 1471; mouth of Cinnabar Cn., 7200 ft, 1298; mdw. on side of East Walker River Cn. below Murphy Pond, 6500 ft, 1407; Masonic Gulch below Masonic Lower Town, 7300 ft, 1698.

C. microptera Mackenzie. Very common along streams and around springs throughout the range, 6000-10,000 ft: spring on south side of Bridgeport Cn., 7750 ft, 1607; ck. south of Mormon Mdw., 7500 ft, 1008; among talus on upper Rough Ck., 9650 ft, 1746; cn. on north side of Brawley Pks., 7700 ft, 1310; mdw. below Masonic Spring, 8300 ft, 1368; cn. tributary to East Walker River Cn. below Murphy Pond, 6600 ft, 1527. [Includes C. festivella Mackenzie]

C. nebraskensis Dewey. Very common along streams and in wet

meadows, throughout the range, 6000-10,000 ft: hillside below Mono Lake Vista, 7600 ft, 1454; ck. south of Mormon Mdw., 7500 ft, 855; in Mormon Mdw., 7300 ft, 632; mouth of Cinnabar Cn., 7200 ft, 697; hillside northeast of Mormon Mdw., 7600 ft, 467; Rough Ck. above Geiger Grade, 9200 ft, 1673; mdw. below Masonic Spring, 8300 ft, 1367.

C. pachystachya Cham. ex Steudel. Infrequent in dry to moist meadows, collected only at Lakeview Spring, 8000 ft, 1274.

C. praegracilis W. Boott. Occasional in moist to dry meadows or along streams, mostly below 8000 ft: ck. south of Mormon Mdw., 7500 ft, 852; lower Clearwater Cn., 6950 ft, 1472; mouth of Cinnabar Cn., 7200 ft, 693; near mdw. on side of East Walker River Cn. below Murphy Pond, 6500 ft, 1404.

C. rossii F. Boott ex Hook. Common on dry or moist hill-sides, among sagebrush or near meadows, mostly above 8000 ft: north slope of Bodie Mtn., 9900 ft, 1444; with Pinus contorta on north slope of Brawley Pks., 8200 ft, 1319.

C. rostrata Stokes ex With. Infrequent in wet meadows, mostly below 8000 ft: mouth of Cinnabar Cn., 7200 ft, 715; in Sphagnum in Cinnabar Cn., 7200 ft, 1541; mdw. below Warm Spring, 7650 ft, 1711.



C. simulata Mackenzie. Occasional in moist meadows, mostly below 8000 ft: lower Clearwater Cn., 6950 ft, 1470; mouth of Cinnabar Cn., 7200 ft, 702; near Sphagnum in Cinnabar Cn., 7280 ft, 1742; mdw. below Warm Spring, 7650 ft, 1712.

C. straminiformis Bailey. Common along streams or near snowbanks, usually in shade at lower elevations, above 7000 ft: north slope of Bodie Mtn., 9900 ft, 1443; Rough Ck. above Geiger Grade, 9150 ft, 1420, 1421; Geiger Grade near Rough Ck., 9100 ft, 824; cn. on north side of Brawley Pks., 7200 ft, 1302, 7300 ft, 1575; stream below Paramount Mine, 8600 ft, 797.

Eleocharis R. Br., SPIKERUSH

(after Cronquist et al. 1977)

1. Stigmas 3; achenes trigonous; tubercle confluent with the achene; stems slender, short, mostly 1-3 dm tall.  
.....E. pauciflora
1. Stigmas 2; achenes lenticular; tubercle well differentiated from the achene; stems usually stouter and taller than above.....E. palustris

E. palustris (L.) Roemer & Schultes. Common in meadows or in standing water of streams and ponds, 6300-8500 ft: ck. south of Mormon Mdw., 7500 ft, 853; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1039; observed at pool below Warm Spring, 7650 ft, mdw. on side of East Walker River Cn.

below Murphy Pond, 6500 ft, in lake southwest of Beauty Pk., 8100 ft.

E. pauciflora (Lightf.) Link. Common in moist to wet meadows, 6300-9800 ft: margin of lake at northwest base of Masonic Mtn., 8100 ft, 1042; upper Rough Ck., 9600 ft, 1255; mdw. 1 mi south of Aurora Pk., 7900 ft, 1323.

Scirpus L., BULRUSH

(partly after Cronquist et al. 1977)

1. Spikelets very numerous, sessile in small, pedunculate clusters in a compound, umbelliform, terminal cyme that is subtended by several long, leaf-like, sheathless involucre bracts; stems leafy throughout, mostly 6-15 dm tall, obscurely triangular in cross section.....S. microcarpus
1. Spikelets 2-15, sessile in compact heads; involucre bracts not leaf-like; stems leafy only at the base.
  2. Stems mostly 5-15 dm tall, strongly triangular in cross section, the sides slightly concave; involucre bract appearing as a continuation of the stem. ....S. americanus
  2. Stems 1-4 dm tall, subterete; involucre bracts short and scale-like, with one longer and divergent; achenes not apiculate.....S. nevadensis

S. americanus Pers. Occasional about hot springs and wet, saline meadows, 6600-7500 ft: Travertine Hot Springs, 6750 ft, 1506; observed in Mormon Mdw., 7280 ft.

S. microcarpus C. Presl. Occasional along creeks and in moist meadows, below 8000 ft: lower Clearwater Cn., 6950 ft, 1469; Bodie Cn. at outlet of stream from east side of Beauty Pk., 6480 ft, 1630.

S. nevadensis S. Wats. Locally abundant in saline meadows and moist, decomposing travertine, 6500-6800 ft: Travertine Hot Springs, 6560 ft, 1765, 6750 ft, 1659.

#### Iridaceae, IRIS FAMILY

1. Perianth segments 6-10 mm long, all similar; slender perennial herbs with fibrous roots.....Sisyrinchium
1. Perianth segments 40-60 mm long, the outer 3 recurved and the inner 3 erect; stout perennial herbs with thick, spreading rhizomes.....Iris

#### Iris L., IRIS

I. missouriensis Nutt. Common throughout the range in moist meadows, particularly where overgrazed, below 9000 ft: south of Mormon Mdw., 7400 ft, 405; observed in Mormon Mdw., 7350 ft, near Warm Spring, 7650 ft, mdws. east of Bodie, 8300 ft.

#### Sisyrinchium L., BLUE-EYED-GRASS

S. halophilum Greene. Common in moist, slightly saline

meadows, below 7800 ft: Mormon Mdw., 7300 ft, 588; observed in lower Clearwater Cn., 7000 ft.

# Juncaceae, RUSH FAMILY

## Juncus L., RUSH

### 1. Plants annual.

2. Stamens 6; plants (1)5-30 cm tall; flowers usually both lateral and terminal on the stems (but the lateral ones may be absent from depauperate specimens).  
.....J. bufonius
2. Stamens 3; plants 0.5-5 cm tall; flowers terminal only.....J. kelloggii

### 1. Plants perennial.

3. Inflorescence cymose-corymbose, the flowers scattered; flowers each subtended closely by a pair of hyaline-scarious bracts (prophylls).
4. Inflorescence 1-4 flowered; stems terete; seeds with a white-hyaline appendage at each end; plants of high elevations.....J. parryi
4. Inflorescence (5)10-50 flowered; stems terete or compressed; seeds without appendages; plants of low to middle elevations.....J. balticus
3. Inflorescence of 1-several cymose heads, the flowers tightly grouped; flowers not subtended by prophylls.
5. Leaf blade flat, grass-like, the flat upper surface facing the stem, and without internal partitions.  
.....J. orthophyllus
5. Leaf blade not as above.
6. Leaf blade terete, hollow, and distally septate (partitions are visible when light is shone through the leaf).....J. nevadensis
6. Leaf blade equitant (folded along the midrib and the opposite margins united from a little above

the base, with the edge thus formed facing the stem); leaf blade with scattered partial or complete septae.....J. ensifolius

J. balticus Willd.

1. Stems compressed and one or more of the basal leaves with a well developed blade.....var. mexicanus
1. Stems terete or compressed, and all of the basal leaves reduced to sheaths only.....var. montanus

J. b. var. mexicanus (Willd.) Kuntze. Infrequent in dry to moist meadows, below 7500 ft: lower Clearwater Cn., 6950 ft, 1473; mdw. at mouth of Cinnabar Cn., 7200 ft, 720, 1296. Kartesz & Kartesz (1980) and Cronquist et al. (1977) both lump this variety into var. montanus. The latter reference notes that the mexicanus phase is rare in the Great Basin, however, and so its occurrence here may be noteworthy. [J. m. Willd.]

J. b. var. montanus Engelm. Abundant and frequently dominant in dry to moist meadows, 6000-9800 ft: hillside northeast of Mormon Mdw., 7600 ft, 469; at The Hot Springs, 6600 ft, 1028; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 892; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1048; mdw. on side of East Walker River Cn. below Murphy Pond, 6500 ft, 1400.

J. bufonius L. Occasional in wet places, in meadows or on hillsides, below 9000 ft: Bodie Cn. 1 mi southwest of state line, 7800 ft, 971.

J. ensifolius Wikstr. var. montanus (Engelm.) C. L. Hitchc. Occasional on banks of perennial streams, 7000-9700 ft: Rough Ck. above Geiger Grade, 9400 ft, 1427; upper Rough Ck., 9600 ft, 1430; cn. on north side of Brawley Pks., 7700 ft, 1308; observed at spring below Mono Lake Vista, 7650 ft.

J. kelloggii Engelm. Occasional in wet places, in meadows or on hillsides, mostly below 9000 ft: hillside south of Mormon Mdw., 7350 ft, 1035; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1045.

J. nevadensis S. Wats. Occasional in wet places, in meadows, around lakes or along streams, above 7000 ft: ck. south of Mormon Mdw., 7500 ft, 838; northeast end of Mormon Mdw., 7420 ft, 1654; upper Rough Ck, 9700 ft, 1742; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1047.

J. orthophyllus Coville. Occasional in wet meadows, below 9000 ft: mdw. mouth of Cinnabar Cn., 7200 ft, 1297; hillside northeast of Mormon Mdw., 7600 ft, 455; mdw. at Masonic Upper Town,, 8050 ft, 1105.

J. parryi Engelm. Locally common near snowbanks on north slopes of Bodie Mtn. and Potato Pk., above 9500 ft: north slope of Bodie Mtn., 9900 ft, 1445; northeast slope of Potato Pk., 10,050 ft, 1736.

Juncaginaceae, ARROW WEED FAMILY

Triglochin L., ARROW-GRASS

(after Cronquist et al. 1977)

1. Ligules bilobed, divided to the base; plants well spaced along the rhizome, 1.5-3 dm tall.....T. concinnum
1. Ligules entire or slightly bifid; plants closely spaced along the rhizome, 3-10 dm tall.....T. maritimum

T. concinnum Burtt-Davy var. debile (M. E. Jones) J. T. Howell. Locally abundant in wet, saline meadows and about hot springs, 6500-7500 ft: at The Hot Springs, 6600 ft, 551; Travertine Hot Springs, 6550-6750 ft, 1498. [T. concinna var. debilis; T. debile A. Love & D. Love]

T. maritimum L. elatum (Nutt.) Gray. Occasional in wet, saline meadows and about hot springs, 6500-7500 ft: Travertine Hot Springs, 6750 ft, 1656; Mormon Mdw., 7280 ft, 1755. [T. maritima var. elata; T. elatum Nutt.]

## Lemnaceae, DUCKWEED FAMILY

Lemna L., DUCKWEED

L. minuta H. B. K. Occasional on the surface of quiet or slowly moving warm waters of small ponds and streams, below 9000 ft: along stream for 1 mi below Warm Spring, 7650 ft, 1708, 1710.

## Liliaceae, LILY FAMILY

(partly after Cronquist et al. 1977)

1. Flowers several to many in a terminal, simple, small-flowered umbel on a leafless scape; inflorescence subtended by scarious bracts. (Amaryllidaceae of some authors)
  2. Flowers pink or rose to purplish; plants with onion-like odor; pedicels not subtended by bractlets within the main spathe-like bracts.....Allium
  2. Flowers white; plants not smelling like onions; pedicels subtended by bractlets within the main spathe-like bracts.....Muilla
1. Flowers solitary, few and large in a loose umbel, or more numerous in a raceme or panicle, never as above.
  3. Flowers solitary or 2-5 in a loose raceme or large-flowered umbel.
    4. Sepals and petals very dissimilar: sepals short, narrow acuminate; petals longer, broad, acute at the apex, mostly white with a hairy gland near the base; leaves both basal and cauline; fruit a 3-sided capsule, lanceolate in profile, dehiscent septically.....Calochortus
    4. Sepals and petals very similar: tepals oblong-rhomboidal, brownish with yellow mottling; leaves strictly cauline; fruit a 6-sided capsule, squarish



- ... profile, dehiscing loculocidally....Fritillaria
3. Flowers more numerous, in tighter racemes or elongate panicles.
5. Leaves mostly basal, linear, 15-40 cm long, 0.5-1.5 cm wide; stems arising from bulbs; fruit a 3-lobed ovoid capsule.....Zigadenus
5. Leaves mostly or entirely cauline, broadly lanceolate; stems arising from rhizomes; fruit a berry or capsule.
6. Leaves strongly sheathing at the base, oblong-lanceolate to broadly elliptical, 25-40 cm long, 10-20 cm wide; flowers usually more than 100 in a stiffly erect panicle; fruit a 3-lobed ovoid capsule.....Veratrum
6. Leaves not at all or only slightly sheathing at the base, lanceolate to oblong, 6-15 cm long, 1.5-5 cm wide; flowers 5-10 in an open raceme; fruit a greenish or reddish to blackish berry. ....Smilacina

Allium L., ONION

1. Leaves flat, 4-6 mm wide, 2 per scape; scapes compressed; ovary crests undulate-entire.....A. anceps
1. Leaves terete or channeled, narrower; scapes terete.
2. Leaf solitary, terete; bulb coats not reticulate; ovary crests tall, erose-dentate.....A. atrorubens
2. Leaves 2 or 3 per scape, channeled; bulb coats reticulate.
3. Ovary crests papillose-denticulate; outer bulb coats thin, minutely very sinuous, striate above. ....A. bisceptrum
3. Ovary crests undulate-entire; outer bulb coats thick, with prominent, thick-walled, elongate cells in herringbone pattern.....A. amplexans

A. amplectens Torr. Occasional in clayey soils among Artemisia nova, 7000-9000 ft: near margin of lake at north-west base of Masonic Mtn., 8100 ft, 1052.

A. anceps Kellogg. Occasional in clayey soils, 7000-9000 ft: hillside 2.7 mi east-northeast of Bodie, 8100 ft, 979.

A. atrorubens S. Wats. var. atrorubens. Common in clayey soils on western side of the range, 6500-8500 ft: hillsides around Mormon Mdw., 7400 ft, 989, 1012; Clearwater Cn. near mouth of Cinnabar Cn., 7300 ft, 427.

A. bisceptrum S. Wats. var. bisceptrum. Widespread on clayey hillsides and in aspen groves, 6500-9300 ft: hillsides and drainages around Mormon Mdw., 7400 ft. 402, 990; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 766; cn. on north side of Brawley Pks., 7600 ft, 1578.

Calochortus Pursh, MARIPOSA-LILY

1. Gland strongly depressed and surrounded by a dark, fringed membrane; few hairs surrounding the gland; anthers and pollen purple.....C. nuttallii
1. Gland only slightly depressed and without a membrane; numerous hairs surrounding the gland; anthers and pollen yellowish.....C. leichtlinii

C. leichtlinii Hook. f. Common in dry habitats, mostly west

of the state line, 6500-9500 ft: hillsides south of Mormon Mdw., 7450 ft, 391.

C. nutallii Torr. & Gray. Occasional among sagebrush, mostly east of the state line, below 8600 ft: Bodie Cn. along road to lakes near Beauty Pk., 8200 ft, 1611.

Fritillaria L.

F. atropurpurea Nutt. Occasional on vernal moist slopes, 7500-8500 ft: cn. on north side of Brawley Pks., 7800 ft, 1318; observed near crest of ridge east of Masonic Lower Town, 7850 ft.

Muilla S. Wats.

M. transmontana Greene. Occasional or infrequent on dry, gravelly, sagebrush-covered ridges or slopes, all or mostly west of the state line, 6500-8800 ft: head of Cottonwood Cn. 0.5 mi west of Sugarloaf, 8600 ft, 1001; observed at east base of Masonic Mtn., 8600 ft. This is a common, but frequently overlooked species endemic to the eastern base of the Sierra Nevada and a few adjacent ranges in the Great Basin. The inflorescences last only a few weeks and may not appear at all in dry years.

Smilacina Desf., FALSE SOLOMON'S SEAL

S. stellata (L.) Desf. Occasional in moist, shaded places, 6500-8000 ft: mdw. on side of East Walker River Cn. below Murphy Pond, 6600 ft, 1533; cn. on north side of Brawley Pks., 7400 ft, 1304.

Veratrum L., FALSE HELLEBORE

V. californicum Dur. var. californicum. Rare in the Bodie Hills, known from a single location in a subalpine mdw. on upper Rough Ck., 9600 ft, 1251.

Zigadenus Michx., DEATH CAMAS

Z. paniculatus (Nutt.) S. Wats. Common on sagebrush-covered slopes, 7000-9000 ft: hillside south of Mormon Mdw., 7500 ft, 489; valley north of Mt. Biedeman, 8150 ft, 507; observed on west slope of Mt. Hicks, 8850 ft.

## Poaceae (=Gramineae), GRASS FAMILY

(mostly after Cronquist et al. 1977)

1. Spikelets sessile on the rachis, or if more than one spikelet per node, then at least one of them sessile; inflorescence a true spike.....GROUP I
1. Spikelets all borne on pedicels at least 1 mm long; inflorescence paniculate or racemose, occasionally a panicle outwardly spike-like.
  2. Florets solitary in each spikelet.....GROUP II
  2. Florets 2-many in each spikelet.
    3. Glumes, at least the second one, equalling or exceeding the first floret.....GROUP III
    3. Glumes both shorter than the first floret..GROUP IV

## GROUP I

1. First glume absent, except in the terminal spikelet; spikelets placed edgewise to the rachis.....Lolium
1. First glume present; spikelets placed flatwise to the rachis.
  2. Rachis disarticulating at maturity.
    3. Spikelets 3 at each node, the lateral pair pedicellate and reduced; florets 1 per spikelet....Hordeum
    3. Spikelets usually 2 at each node, all sessile; florets 1-6 per spikelet.....Sitanion
  2. Rachis continuous, intact at maturity.
    4. Spikelets 2-6 per node, sometimes solitary; lemmas rotated 90 from their normal position due to twisting of the rachilla.....Elymus
    4. Spikelets solitary at each node; lemmas not rotated from their normal position.....Agropyron

## GROUP II

1. Lemma hard, awned, tightly enclosing the palea and caryopsis.
2. Awn deciduous, 3-7 mm long.
  3. Glumes 4-7.5(8) mm long.....Oryzopsis
  3. Glumes (7)7.5-10 mm long.....Stipa webberi
2. Awn persistent; 11-160 mm long.....Stipa
1. Lemma softer, flexible, with or without an awn, not tightly enclosing the palea and caryopsis.
  4. Glumes both shorter than the floret.....Sphenopholis
  4. Glumes, at least the second one, equalling or exceeding the floret.
    5. Spikelets disarticulating below the glumes.
      6. Glumes awnless; lemmas dorsally awned.....Alopecurus
      6. Glumes with apical awns 0.6-10 mm long; lemmas awnless or apically awned.
        7. Glume awns 4-10 mm long; lemmas 0.7-1.2 mm long, awned.....Polypogon
        7. Glume awns 0.6-3.2 mm long; lemmas 1.2-2.5 mm long, essentially awnless.....Phleum
    5. Spikelets disarticulating above the glumes.
      8. Inflorescence a congested, spike-like panicle; glumes ciliate along prominent keels and bearing short, stout, apical awns.....Phleum
      8. Inflorescence an open or narrow panicle, not spike-like; glumes not ciliate or awned as above.
        9. Lemmas awnless.....Agrostis
        9. Lemmas awned apically or dorsally.
          10. Lemmas apically awned; callus naked.....Muhlenbergia

10. Lemmas dorsally awned; callus bearded with straight hairs.....Calamagrostis

## GROUP III

1. Lemmas awnless (or sometimes apically short-awned in Koeleria).
  2. Culms mostly 0.5-2 dm tall.....Poa suksdorfii
  2. Culms mostly 2.5-8.5 dm tall.
    3. Lemmas 3.2-5.2 mm long; glumes similar in shape; spikelets disarticulating above the glumes.  
.....Koeleria
    3. Lemmas 2-3.2 mm long; glumes dissimilar in shape; spikelets disarticulating below the glumes.  
.....Sphenopholis
1. Lemmas dorsally awned.
  4. Awn attached above the middle of the lemma....Trisetum
  4. Awn attached below the middle of the lemma.....Deschampsia

## GROUP IV

1. Florets all imperfect, the plants dioecious or monoecious.
  2. Plants densely tufted, short-rhizomatous; culms 6-10 dm tall.....Leucopoa
  2. Plants spreading, long-rhizomatous; culms 1-4 dm tall.  
.....Distichlis
1. Florets usually all perfect, the plants neither dioecious nor monoecious.
  3. Culms 2-3 m tall; rachilla with long, spreading hairs.  
.....Phragmites
  3. Culms less than 2 m tall, usually much less; rachilla without long, spreading hairs.

- 4. Lemmas 3-nerved.....Muhlenbergia
- 4. Lemmas 5-7 nerved.
  - 5. Lemmas with a tuft of cobwebby hairs at the base.....Poa
  - 5. Lemmas without cobwebby hairs.
    - 6. Lemmas keeled on the back.
      - 7. Lemmas awnless.....Poa
      - 7. Lemmas awned from a bifid apex.....Bromus
    - 6. Lemmas rounded on the back.
      - 8. Spikelets disarticulating below the glumes; spikelets secund, all curved around to one side of the rachis....Melica
      - 8. Spikelets disarticulating above the glumes; spikelets not secund.
      - 9. Lemmas awned from the apex.
        - 10. Awn of the lemma inserted between the teeth of a bifid lemma apex. ....Bromus
        - 10. Awn inserted on an entire lemma apex, the edge of the awn confluent with that of the lemma.....Festuca
    - 9. Lemmas awnless.
      - 11. Nerves of the lemma converging toward the apex; leaf tips curved like boat prows; plants not of strongly alkaline or saline soils.....Poa
      - 11. Nerves of the lemma parallel, not converging toward the apex; leaf tips flat or involute, not prow-like; plants of strongly alkaline or saline soils.....Puccinellia



## Taxonomic Synopsis of Bodie Hills Grasses

(following Cronquist et al. 1977)

## Subfamily Pooideae (=Festuciodeae)

Tribe Poeae: Bromus, Festuca, Leucopoa, Lolium,  
Poa, Puccinellia

Tribe Aveneae: Agrostis, Alopecurus, Calamagrostis,  
Deschampsia, Koeleria, Phleum, Polypogon,  
Sphenopholis, Trisetum

Tribe Triticeae: Agropyron, Elymus, Hordeum, Sitanion

Tribe Meliceae: Melica

Tribe Stipeae: Oryzopsis, Stipa

## Subfamily Eragrostideae

Tribe Eragrosteae: Muhlenbergia

Tribe Aleuopodeae: Distichlis

## Subfamily Arundinoideae

Tribe Arundineae: Phragmites

Agropyron Geartn., WHEATGRASS

(after Cronquist et al. 1977)

1. Spikelets spreading from the rachis, strongly compressed and crowded, the internodes 0.3-2.2 mm long in the middle of the spike.....A. cristatum
1. Spikelets apressed to the rachis, little compressed and

not crowded, the internodes 4-12 mm long in the middle of the spike.

2. Lemmas pubescent; plants with long, creeping rhizomes; anthers 4-5 mm long.....A. dasystachum
2. Lemmas glabrous; plants without creeping rhizomes; anthers 1-1.8 mm long.....A. trachycaulum

A. cristatum (L.) Gaertn., CRESTED WHEATGRASS. Infrequent in moist meadows, below 9500 ft: mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 881, 1668. This is a catch-all name for a species complex whose taxonomy remains unsettled due to intergradation between taxa and the introduction of Old World strains into North America (Cronquist et al. 1977). The specimens cited may be referred to A. sibiricum (Willd.) Beauv., according to the key in Bowden (1965), who recognizes three species in the complex.

A. dasystachum (Hook.) Scribn. & Sm. var. dasystachum, THICKSPIKE WHEATGRASS. Infrequent in moist meadows below 9500 ft: mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 880.

A. trachycaulum (Link) Malte ex F. H. Lewis var. trachycaulum, SLENDER WHEATGRASS. Occasional in moist meadows or along streams, mostly above 7000 ft: mdw. on west side of Bridgeport Cn., 7750 ft, 1606; south side of Mormon Mdw., 7350 ft, 1153; mdw. at mouth of Cinnabar Cn., 7200 ft,

718; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 884; in talus along upper Rough Ck., 9650 ft, 1745.

Agrostis L., BENTGRASS

(after Cronquist et al. 1977)

1. Panicles narrow, contracted, some branches spikelet-bearing from the base.....A. exarata
1. Panicles open, diffuse, branches all naked at the base. ....A. scabra

A. exarata Trin. var. exarata. Occasional or infrequent in moist meadows, collected only along ck. south of Mormon Mdw., 7500 ft, 849, 850.

A. scabra Willd. Occasional on sandy banks of perennial streams, mostly above 7000 ft: Rough Ck. above Geiger Grade, 9200 ft, 1678; Bodie Cn. near mouth of cn. on north side of Brawley Pks., 7100 ft, 1300.

Alopecurus L.

A. aequalis Sobol. var. aequalis. Occasional in mud or sand beside perennial streams, below 9000 ft: Clearwater Ck. at mouth of Cinnabar Cn., 7200 ft, 695; ck. below Paramount Mine, 8600 ft, 796; Bodie Cn. below outlet of stream from east side of Beauty Pk., 6400 ft, 1178.

Bromus L., BROME

(after Cronquist et al. 1977)

1. Plants annual, 1-5 dm tall; awns 10-17 mm long; lemmas 10-17 mm long, rounded to slightly carinate on the back; spikelets 12-20 mm long.....B. tectorum
1. Plants annual, mostly 5-9 dm tall; awns shorter; lemmas and spikelets longer to shorter.
  2. Spikelets strongly flattened, 20-30 mm long; lemmas carinate-keeled on the back, 11-15 mm long; awns 4-6 mm long.....B. carinatus
  2. Spikelets nearly terete, 7-14 mm long; lemmas rounded on the back, 9-12 mm long; awns 1.5-3 mm long. ....B. anomalus

B. anomalus Rupr. ex Fourn. Infrequent on dry hillsides, below 9500 ft: seen only beside Geiger Grade near Rough Ck., 9100 ft, 810.

B. carinatus Hook. & Arn. Common in slightly moist places, often in or near aspen groves, above 7000 ft: Geiger Grade near Rough Ck., 9100 ft, 805; Bodie Cn. 0.4 mi southeast of state line, 7440 ft, 1207; aspen grove in cn. on north side of Brawley Pks., 7300 ft, 1576; Lakeview Spring, 8000 ft, 1431; Masonic Gulch 0.3 mi below Masonic Lower Town, 7550 ft, 1687. I am following Cronquist et al. (1977) in lumping B. marginatus Nees. ex Steud. and B. polyanthus Scribn. into B. carinatus. All three of these taxa (in the strict sense) occur in the study area.

B. tectorum L., CHEATGRASS. Abundant throughout the range on dry slopes in nearly every type of vegetation, below 9500 ft: near Little Bodie Mine, 7530 ft, 737; south of Mormon Mdw., 7400-7600 ft, 585, 845; observed on hillside north of Bodie, 8400 ft, mtn. slope south of Aurora, 8300 ft, at northwest base of Masonic Mtn., 8100 ft, and in most other areas.

Calamagrostis Adans., REEDGRASS

C. canadensis (Michx.) Beauv. Infrequent in wet places along perennial streams, collected only in cn. on north side of Brawley Pks., 7700 ft, 1309.

Deschampsia Beauv., HAIRGRASS

(from Cronquist et al. 1977)

1. Panicle open; blades flat or folded, 1-3(5) mm wide; anthers 1.2-2.2 mm long.....D. cespitosa
1. Panicle narrow; blades usually filiform, the basal ones ca. 1 mm broad; anthers 0.3-0.7 mm long.....D. elongata

D. cespitosa (L.) Beauv. Locally common in wet meadows along Clearwater Ck. and its tributaries, below 8000 ft: Clearwater Ck. at mouth of Cinnabar Cn., 7200 ft, 698; rooted in Sphagnum peat in lower Cinnabar Cn., 7280 ft, 1543; observed below Warm Spring, 7650 ft.

D. elongata (Hook.) Munro ex Benth. Occasional or infrequent in muddy soil along creeks or about springs, collected only at McMillan Spring, 8150 ft, 1414.

Distichlis Raf., SALTGRASS

D. spicata (L.) Greene var. stricta (Torr.) Beetle. Locally abundant on decomposing travertine at hot springs near Bridgeport, and occasional at saline seeps elsewhere, mostly below 9000 ft: The Hot Springs, 6600 ft, 543; Travertine Hot Springs, 6750 ft, 1757; side of East Walker River Cn. below Murphy Pond, 6300 ft, 1394.

Elymus L., WILDRYE

1. Plants rhizomatous, not forming bunches; spikelets 2 or occasionally 1 at each node; culms 3-7(12) dm tall.  
.....E. triticoides

1. Plants scarcely if at all rhizomatous, forming bunches; spikelets usually 3-6 at each node; culms 7-20 dm tall.  
.....E. cinereus

E. cinereus Scribn. & Merr. var. cinereus. Common on dry hillsides and occasional in meadows throughout the range, below 9500 ft: edge of Mormon Mdw., 7300 ft, 637; Geiger Grade near Rough Ck., 9100 ft, 831; observed in mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, near Aurora, 7600 ft, in Masonic Gulch, 7700 ft, and many other

places.

E. triticoides Buckley var. triticoides. Common in dry or moist, sometimes saline soils in meadows or near streams, below 9500 ft: near The Hot Springs, 6600 ft, 557, 1030; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 885; Bodie Cn. 0.6 mi southwest of state line, 7750 ft, 1200; cn. on north side of Brawley Pks., 7300 ft, 1576; mdw. 1 mi south of Aurora Pk., 7900 ft, 1330; below McMillan Spring, 8000 ft, 1417; northwest base of Masonic Mtn., 8100 ft, 1358; Lakeview Spring, 8000 ft, 1235.

Festuca L., FESCUE

F. saximontana Rydb. Occasional near perennial streams, mostly above 8500 ft: Geiger Grade near Rough Ck., 9150 ft, 1730, 1746; stream 0.7 mi west-southwest of Paramount Mine, 8720 ft, 1685. [F. ovina L. var. rydbergii St.-Yves]

Hordeum L., BARLEY, FOXTAIL

(after Cronquist et al. 1977)

1. Glumes 25-150 mm long; lemma awns 10-60 mm long.  
.....H. jubatum
1. Glumes 7-20 mm long; lemma awns 5-10(20) mm long.  
.....H. brachyantherum

H. brachyantherum Nevski. Occasional in moist meadows or along perennial streams, 6500-9600 ft: Mormon Mdw., 7350 ft, 1152; mdw. at mouth of Cinnabar Cn., 7200 ft, 694; Geiger Grade near Rough Ck., 9150 ft, 1247; observed at margin of lake at northwest base of Masonic Mtn., 8100 ft.

H. jubatum L. Infrequent in dry or moist, disturbed places, collected only in mdw. on side of East Walker River Cn. below Murphy Pond, 6300 ft, 1388.

Koeleria Pers., JUNEGRASS

K. nitidia Nutt. Occasional in meadows, aspen groves or among sagebrush, mostly above 8000 ft: near summit of Mt. Biedeman, 8970 ft, 520; aspen grove on ridge 1.5 mi south-southwest of Bodie, 8600 ft, 758, 765; hillside north of Bodie, 8600 ft, 606; Geiger Grade near Rough Ck., 9100 ft, 819; below Paramount Mine, 8600 ft, 789. This is the K. cristata Pers. of most references. Cronquist et al. (1977:254) note that the latter is an illegitimate name, although it is the one most widely known.

Leucopoa Griseb.

L. kingii (S. Wats.) W. A. Webber. Infrequent on dry mountain slopes, among sagebrush or Pinus flexilis, mostly above



7600 ft: below Paramount Mine, 8720 ft, 783; north slope of east Brawley Pk., 9000 ft, 1636; north slope of Masonic Mtn. near New York Hill, 8550 ft, 1060; observed in Masonic Gulch, 7800 ft.

Melica L.

M. stricta Boland. Occasional on dry slopes among sagebrush, mostly below 9500 ft: hillsides south of Mormon Mdw., 7500 ft, 304, 383; observed at northwest base of Masonic Mtn., 8100 ft.

Muhlenbergia Schreb., MUHLY

(after Cronquist et al. 1977)

1. Panicles narrow, spike-like, the branches appressed; spikelets borne on short pedicels; ligules 1-2 mm long, acute; moist meadows to dry slopes.....M. richardsonis
1. Panicles open (when out of the sheath), diffuse, the branches spreading; spikelets borne on long pedicels; ligules 0.2-0.8 mm long, truncate; wet meadows.  
.....M. asperifolia

M. asperifolia (Nees & Meyen) Parodi. Locally common in sub-alkaline meadows, mostly below 8000 ft: hillside south of Mormon Mdw., 7350 ft, 627; mouth of Cinnabar Cn., 7200 ft, 692.

M. richardsonis (Trin.) Rydb. Abundant throughout the range in many habitats, from meadows to rocky summits, 6000-10,200 ft: hillsides south of Mormon Mdw., 7350-7450 ft, 384, 623; mouth of Cinnabar Cn., 7200 ft, 719; summit of Bodie Mtn., 10,190 ft, 1262; Rough Ck. above Geiger Grade, 9600 ft, 1257; mdw. 1 mi south of Aurora Pk., 7900 ft, 1326; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1228; mdw. on side of East Walker River Cn. below Murphy Pond, 6300 ft, 1390. [Includes M. squarrosa Rydb.]

Oryzopsis Michx., RICEGRASS

O. hymenoides (Roemer & Schultes) Ricker, INDIAN RICEGRASS. Common on dry slopes throughout the range, usually among sagebrush, below 9500 ft: near Little Bodie Mine, 7530 ft, 738; hillsides south of Mormon Mdw., 7450 ft, 425; observed in many other areas.

Phleum L., TIMOTHY

(after Cronquist et al. 1977)

1. Panicles 2-3 times longer than wide, up to 5 cm long; culms less than 5 dm tall, usually somewhat decumbent, not from a bulbous base.....P. alpinum
1. Panicles frequently more than 3 times longer than wide, 3-16 cm long; culms usually more than 5 dm tall, erect from a swollen, bulbous base.....P. pratense

P. alpinum L. Occasional in moist or wet meadows, above 8600 ft: near upper Rough Ck., 9600 ft, 1254; stream 0.7 mi west-southwest of Paramount Mine, 8720 ft, 1684. [P. commutatum Gaud.]

P. pratense L. Infrequent in moist meadows, below 8000 ft: ck. south of Mormon Mdw., 7500 ft, 847.

Phragmites Adans., REED

P. australis (Cav.) Trin. ex Steudel. Rare in the Bodie Hills, seen only on side of East Walker River Cn. below Murphy Pond, 6400 ft, 1408.

Poa L., BLUEGRASS

(after Cronquist et al. 1977)

1. Creeping rhizomes present.

2. Lemmas copiously webbed at the base.....P. pratensis

2. Lemmas not webbed at the base.....P. nervosa

1. Creeping rhizomes absent.

3. Lemmas webbed at the base.

4. Lower panicle branches usually more than 2 per node; lemmas mostly 2.5-3.5 mm long....P. palustris

4. Lower panicle branches 2 per node; lemmas mostly 3.5-4.5 mm long.....P. leptocoma

3. Lemmas not webbed at the base.

5. Spikelets strongly compressed; lemmas keeled to the

base.

- 6. Plants mostly more than 2.5 dm tall; plants of middle elevations.....P. cusickii
- 6. Plants mostly less than 2.5 dm tall; plants of alpine elevations.....P. suksdorfii
- 5. Spikelets little compressed; lemmas obscurely keeled or rounded.
- 7. Lemmas puberulent, especially toward the base; plants to 3 dm tall.....P. secunda
- 7. Lemmas glabrous to minutely scaberulous; plants 3-10 dm tall.....P. nevadensis

P. cusickii Vasey. Occasional to locally abundant in moist meadows, mostly above 8500 ft: mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 882, 1666.

P. leptocoma Trin. Infrequent or occasional in wet, non-saline soils, collected only at McMillan Spring, 8150 ft, 1413.

P. nervosa (Hook.) Vasey. Infrequent on dry mountain slopes, above 8800 ft: near Rough Ck. above Geiger Grade, 9500 ft, 1248; north slope of east Brawley Pk., 9000 ft, 1635.

P. nevadensis Vasey ex Scribn. Common throughout the range in meadows and along ephemeral stream courses, below 9500 ft: south of Mormon Mdw., 7350-7450 ft, 382, 619, 622; in Mormon Mdw., 7300 ft, 635; mouth of Cinnabar Cn., 7200 ft,

499, 699; wet mdw. in Cinnabar Cn., 7280 ft, 1544, 1545; lower Clearwater Cn., 7000 ft, 685; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 883, 1669; Rough Ck. above Geiger Grade, 9200 ft, 1677; hillside below Paramount Mine, 8600 ft, 787; mdw. 1 mi south of Aurora Pk., 7900 ft, 1328; margin of lake at northwest base of Masonic Mtn., 8100 ft, 1229, 1359.

P. palustris L. Occasional in moist or wet soils, mostly around Masonic Mtn., below 8500 ft: McMillan Spring, 8150 ft, 1415; mdw. below Masonic Spring, 8300 ft, 1369; Lakeview Spring, 8000 ft, 1705.

P. pratensis L. Occasional in wet or moist soil along perennial streams, 6200-9800 ft: mouth of Cinnabar Cn., 7200 ft, 721, 500; Rough Ck. above Geiger Grade, 9100 ft, 1731, 9600 ft, 1265; lower Bodie Cn., 6400 ft, 1179.

P. secunda Presl. Occasional on moist or dry hillsides, 6500-9800 ft: south of Mormon Mdw., 7450 ft, 387; hilltop opposite mouth of Cinnabar Cn., 7250 ft, 727; near The Hot Springs, 6600 ft, 556; hillside 2.1 mi east-northeast of Bodie, 8100 ft, 1509; upper Rough Ck., 9700 ft, 1743; near east summit of Masonic Mtn., 9000 ft, 1161. [P. sandbergii Vasey; (Arnow 1981)]

P. suksdorfii (Beal) Vasey ex Piper. Infrequent in subalpine meadows and on alpine scree slopes, above 9700 ft: near snowbank on north slope of Bodie Mtn., 10,000 ft, 1437, 1440; near pond at head of Rough Ck., 9800 ft, 1261.

Polypogon Desf.

P. monspeliensis (L.) Desf. Infrequent or rare on dry or moist, subsaline soils, collected only on side of East Walker River Cn. below Murphy Pond, 6300 ft, 1395.

Puccinellia Parl., ALKALI-GRASS

(after Cronquist et al. 1979)

1. Blades filiform, ca. 0.5 mm broad when involuted, mostly basal; culms 1.5-4 dm tall.....P. lemmonii
1. Leaves wider, ca. 1 mm broad when involuted, some cauline as well as basal.
  2. Lemmas mostly 2-3 mm long; panicles mostly 10-25 cm long, with the lower branches erect or spreading; culms erect, 3.5-7 dm tall.....P. nuttalliana
  2. Lemmas mostly 1.4-2.2 mm long; panicles mostly 5.5-12 cm long, with the lower branches usually reflexed; culms decumbent, 1.5-3.5 dm tall.....P. distans

P. distans (Jacq.) Parl. Infrequent or rare in moist, saline meadows, collected only in mdw. 1 mi south of Aurora Pk., 7900 ft, 1331.

P. lemmonii (Vasey) Scribn. Locally common in saline meadows at hot springs and mineralized seeps, below 8000 ft: The Hot Springs, 6600 ft, 1025; Travertine Hot Springs, 6550 ft, 1499; mdw. 1 mi south of Aurora Pk., 7900 ft, 1332.

P. nuttalliana (Schultes) A. S. Hitchc. Locally common in saline meadows at hot springs, below 8000 ft: The Hot Springs, 6600 ft, 1544; Travertine Hot Springs, 6550-6750 ft, 1500, 1758.

Sitanion Raf., SQUIRRELTAIL

S. hystrix (Nutt.) J. G. Smith var. hystrix. Very common in dry sites throughout the range, usually among sagebrush, 6000-10,000 ft: near Little Bodie Mine, 7530 ft, 736; hillsides south of Mormon Mdw., 7350-7450 ft, 376, 389, 617; opposite mouth of Cinnabar Cn., 7250 ft, 725; ridge 1.5 mi south-southwest of Bodie, 8600 ft, 773; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 1665; Geiger Grade near Rough Ck., 9100 ft, 815; east slope of west summit of Masonic Mtn., 9000 ft, 1724; ridge east of Masonic Lower Town, 7850 ft, 1552. [Includes S. h. var. californicum (J. G. Smith) F. D. Wilson]

Sphenopholis Scribn., WEDGEGRASS

S. obtusata (Michx.) Scribn. var. obtusata. Rare or infrequent, collected only in mdw. on side of East Walker River Cn. below Murphy Pond, 6500 ft, 1406.

Stipa L., NEEDLEGRASS

(after Cronquist et al. 1977)

1. Lemma densely villous with hairs 2-4 mm long.
  2. Awn persistent, twisted, twice geniculate, 11-22 mm long.....S. pinetorum
  2. Awn deciduous, not twisted, not geniculate, 7-7 mm long.....S. webberi
1. Lemma villous, but with hairs shorter than 2 mm, except sometimes near the apex.
  3. Awn glabrous to minutely coarse-pubescent, but never plumose.
    4. Lemma 3.5-5(6) mm long; awn 11-22 mm long; hairs at apex of lemma 1.5-4 mm long.....S. pinetorum
    4. Lemma 8-14 mm long; awn (60)70-160 mm long; hairs at apex of lemma less than 0.5 mm long....S. comata
  3. Awn plumose on the lower two segments with hairs 0.5-2 mm long.
    5. Ligules 2-7 mm long; glumes often purple.....S. thurberiana
    5. Ligules 0.2-0.7 mm long; glumes usually greenish.
      6. Pubescence of lemma tip and first awn segment subequal in length; palea usually half as long as the lemma.....S. occidentalis
      6. Pubescence of lemma tip longer than that of the first awn segment; palea usually more than half as long as the lemma.....S. nevadensis



S. comata Trin. & Rupr. var. comata. Occasional on dry hillsides among sagebrush, mostly below 8500 ft: near Travertine Hot Springs, 6550 ft, 1497; Bodie Cn. 1.5 mi northeast of state line, 7100 ft, 1194; observed south of Mormon Mdw., 7400 ft, in lower Clearwater Cn., 7000 ft.

S. nevadensis B. L. Johnson. Infrequent on dry hillsides among sagebrush, collected only on hillside east of Mono Lake Vista, 7800 ft, 1382.

S. occidentalis Thurber ex S. Wats. var. o. Common on dry slopes and in dry meadows throughout the range, mostly above 7000 ft: near Little Bodie Mine, 7530 ft, 739; hillside north of Murphy Spring, 8200 ft, 1507; mdw. beside Geiger Grade at east base of Bodie Mtn., 9050 ft, 1664; Geiger Grade near Rough Ck., 9100 ft, 816; north slope of Potato Pk., 10,050 ft, 1734; north slope of Masonic Mtn., 8720 ft, 1718, 8900 ft, 1722. This is by far the most abundant Stipa in the area.

S. pinetorum M. E. Jones. Infrequent or rare on dry slopes, collected only on east summit of Masonic Mtn., 9000 ft, 1160A.

S. thurberiana Piper. Infrequent or rare on dry slopes, collected only on east summit of Masonic Mtn., 9000 ft, 1160.

S. webberi (Thurber) B. L. Johnson. Infrequent on dry hill-sides, below 8000 ft: side of lower Clearwater Cn., 7300 ft, 436; hillside northeast of Mormon Mdw., 7700 ft, 461. [Oryzopsis w. Benth ex Vasey]

Trisetum Pers.

T. spicatum (L.) Richter. Occasional on moist slopes in the upper Rough Ck. drainage, mostly above 9000 ft: Geiger Grade near Rough Ck., 9100 ft, 818; upper Rough Ck., 9600 ft, 1750; north slope of Bodie Mtn., 9850-10,000 ft, 1270; 1438; 1442.

Potamogetonaceae, PONDWEED FAMILY

Potamogeton L., PONDWEED

P. gramineus L. Occurring only in perennial bodies of standing or slow-moving water, below 8300 ft: pool and stream below Warm Spring, 7650 ft, 1216; small lake at northwest base of Masonic Mtn., 8100 ft, 1335. There remains some uncertainty as to the identity of this plant. The material seen was not clearly distinguishable from P. diversifolius Raf.

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