A FLORA OF THE VACA MOUNTAINS, CALIFORNIA

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THESIS

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A FLORA OF THE VACA MOUNTAINS, CALIFORNIA

A Thesis

by

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Abstract

of

A FLORA OF THE VACA MOUNTAINS, CALIFORNIA

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Statement of Problem: This study was undertaken to provide as complete an account as possible of all the vascular plants growing without cultivation in the Vaca Mountains, California. This written flora will be of use to those interested in the plants of the area for practical or aesthetic reasons and to those concerned with broader phytogeographical questions. It provides more detailed information than that available in more general floras on the habitats of the plant taxa present in the Vaca Mountains and offers more recent taxonomic treatments of those taxa found in the range. Introductory information on the geology, soils, climate, vegetation, and land use of the area is given, along with a history of botanical collecting and analyses of the composition of the flora and its relationships to the floras of other areas in the Coast Ranges of California. The major body of the work is an annotated catalogue of vascular plants.

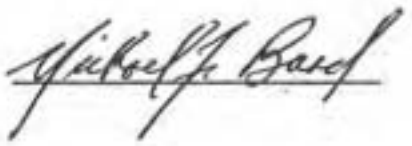
Sources of Data: Data were collected by means of extensive plant collecting in the Vaca Mountains and by surveys of major herbaria to locate plants collected in the range by other workers. Serious collecting was initiated in 1975 and continued through 1980. A total of 2,135 specimens, not including duplicates, representing 535 taxa, was collected during this time period.

Conclusions Reached:

1. The flora of the Vaca Mountains consists of 586 taxa below the rank of genus, occurring in 89 families and 317 genera. One hundred fifty-seven (26.8 percent) of the taxa below the rank of genus are introduced.
2. Almost 64 percent of the introduced flora is contributed by five families, of which the grass family, Poaceae, is the most important.
3. There are no plants known to be endemic to the Vaca Mountains. Possible reasons for this are the relatively homogeneous substrate and the rather harsh climate.
4. The Sacramento-San Joaquin Delta apparently acts as a barrier to north-south plant dispersal. Twenty-five plant taxa reach their southern limits of distribution in the Coast Ranges in the Vaca Mountains, while only

9 reach their northern distributional limits in the Coast Ranges there. On the other side of the Delta Mount Diablo exhibits the opposite ratio of plants reaching southern limits to those reaching northern limits, strongly suggesting the presence of a barrier. Other reasons for the barrier hypothesis are discussed.

5. This study has resulted in 13 range extensions of significance.
6. The proportion of introduced plants in the Vaca Mountains compares favorably to the nonnative components of other Coast Range floras.
7. There are 110 more native plant taxa below the rank of genus at Mount Diablo than in the Vaca Mountains, although both mountain ranges are part of the inner Coast Ranges. Reasons for this appear to relate to the more heterogeneous substrate at Mount Diablo and to the greater coastal influence experienced in at least limited areas there.

Committee Chair's Signature of Approval 

DEDICATED TO MY MOTHER AND FATHER

For their unfailing support and love

PREFACE

There were several reasons behind the choice of the Vaca Mountains as a subject for a floristic study. The relatively short distance from my home in Sacramento was one. The fact that the range is readily accessible by vehicle was another. Also weighing heavily in my decision were my ties to Solano County--I was raised in the city of Vallejo. The heavy use of the range for instructional purposes by classes at California State University, Sacramento, and the University of California, Davis, was yet another inducement to preparing a flora of the range.

But the most important reason for undertaking this study was the realization that it would fill an important void in our knowledge of the flora of California. Stebbins and Major (1965:2) have pointed out the importance of local floras in providing answers to phytogeographical questions. The South Coast Ranges are covered rather thoroughly by local floras (Bowerman, 1944; Griffin, 1975; Hoover, 1970; Howell et al., 1958; Howitt and Howell, 1964 and 1973; McClintock et al., 1968; Sharsmith, 1945; Smith, 1976; Thomas, 1961; Twisselmann, 1956 and 1967). Few such local floras exist for the North Coast Ranges. Only one published flora, John Thomas Howell's excellent Marin Flora (Howell, 1970), treats plant communities and elevations similar to those present in the Vaca Mountains. A few mimeographed checklists for North Coast Range counties are

available (e.g., Baker, 1954; Major, 1963), but these either merely list plants by counties or cite a few localities in a very large area at which a particular taxon has been collected. Other floras (e.g., Ferlatte, 1974) cover higher elevations and quite different plant communities from those found in the Vaca Mountains.

Thus the present flora represents an attempt to partially fill this void. It is the only flora to deal with the inner North Coast Ranges at elevations below 1,000 m.

I am deeply indebted to the many people who have assisted me in this endeavor. My major professor and friend, Michael F. Baad, has been very supportive since the inception of this study. To him I am most grateful. The two other members of my graduate committee, Marda L. West and Harold W. Wiedman, have also given their support to this study, and I thank them sincerely.

The following botanists have given expert assistance with the determination of certain groups: Rimo Bacigalupi (Mimulus), Susan C. Barber (Verbena), Steven Broich (Lathyrus), Lincoln Constance (Eucrypta, Lomatium, Nemophila, and Phacelia), Beecher Crampton (Stipa), Lauramay T. Dempster (Galium and Plectritis), Thomas C. Fuller (various species of weeds), Lawrence R. Heckard (Castilleja, Cordylanthus, and the Phacelia magellanica complex), and John M. Tucker (Quercus). Thomas C. Fuller and G. Douglas Barbe supplied collection records for

various Solano County weeds. To all of these people I offer my warmest thanks.

I wish to further express my gratitude to Lawrence Heckard for making the facilities of the Jepson Herbarium and Library available to me after hours. James C. Hickman also helped in this regard. Alice Howard similarly granted me access at odd hours to the Herbarium of the University of California, Berkeley, and also helped me to obtain expert assistance in several groups of plants. For this, and for her friendship, I am thankful.

G. Ledyard Stebbins and Grady Webster kindly provided me with a preliminary list of the plants of the Stebbins Cold Canyon Reserve. This list added several plants to the flora and is cited under the appropriate entries in the Annotated Catalogue of Vascular Plants. Discussions and field trips to the Reserve with Dr. Stebbins have provided me with additional information on the plants of the northern part of the Vaca Mountains.

Several landowners in the Vaca Mountains granted me permission to trespass on their properties. Without their cooperation this work would not have been possible. Thanks are extended to the Brazelton family, to H.W. Chadbourne, to Manuel Castro, to Reuben R. Peterson, to R.J. Taylor, and to Melvin L. Toponce.

Sharon Olendorff spent many long hours typing the manuscript. It is a pleasure to acknowledge her excellent work.

Finally, I wish to express my deepest love and appreciation to my wife, Karen, for her unflagging support throughout this study. She has accompanied me on many field trips, helped with herbarium surveys, stayed at home with me on weekends while I worked identifying specimens and writing, and endured countless other inconveniences (including plant specimens in her refrigerator!), all without complaint. In the process she has become a tolerable botanist and has forever endeared herself to me.

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INTRODUCTION

Location and Topography

The Vaca Mountains are part of the inner North Coast Ranges of California. They extend north from a latitude of 38° 16' N, just north of the city of Fairfield, to latitude 38° 31' N, where Putah Canyon separates the range from the remainder of the approximately 325 km long mountain block bordering the west side of the Sacramento Valley (Figure 1). Approximately 28 km long and 9 km wide, the range covers a total area of about 250 km^2.

The backbone of the Vaca Mountains is Blue Ridge, which runs the length of the range and for most of its length is above 600 m in elevation. The highest point, Mount Vaca, at an elevation of 859 m, is only slightly higher than several unnamed points along Blue Ridge to the north. Blue Ridge becomes progressively lower toward the south and disappears at the head of Suisun Valley, near Fairfield. Signal Hill, about 3 km south of Mount Vaca along Blue Ridge, rises to an elevation of 730 m; Pine Peak, another 3 km south along the ridge, is 619 m in elevation.

The Vaca Mountains are bordered on the north by Putah Canyon (elevation ca. 60 m), on the east by Vaca and Pleasants valleys (elevation ca. 90 m), on the west by Gordon Valley and Wragg Canyon (elevation 135-180 m), and

Figure 1. Location of the Vaca Mountains in California.

on the south by Suisun and Sacramento valleys (elevation 30-100 m). This flora treats only the vascular plants occurring in the Vaca Mountains proper; it does not include plants found only on the surrounding valley floors or in the low hills bordering Pleasants and Vaca valleys on the east. The only exception to this is Putah Canyon: plants occurring in the riparian woodland and floodplain of Putah Creek are included. Place names and their locations in and around the Vaca Mountains can be found in Figure 2.

For most of its length in the Vaca Mountains, Blue Ridge forms the boundary between Napa and Solano counties. Lands on the western slopes of the range lie within the former county; those to the east of Blue Ridge are part of Solano County. The extreme southern part of the range, in the vicinity of Tolenas Springs, is wholly within Solano County. At the north end of the range Putah Creek forms the boundary between Yolo County on the north and Solano County on the south. Thus, except for plants collected from along the northern shores of Putah Creek, in Yolo County, all of the collections reported in this work are from either Solano or Napa counties.

The western slopes of the Vaca Mountains are steep, dissected by several short, steep canyons, many of which are unnamed. The eastern slopes are more gradual and are cut by several intermittent streams which have formed (from south to north) Laguna, Walker, Gates, Mix, and Miller canyons. The divides between these canyons are

Figure 2. Place names and significant collecting localities in and around the Vaca Mountains. (Superimposed on United States Geological Survey 15 minute topographic maps, Mount Vaca and Lake Berryessa).

LEGEND FOR FIGURE 2

1. Collecting locality along State Highway 128 on the east side of Markley Canyon southwest of Monticello Dam
2. Monticello Dam
3. Cold Canyon
4. Upper Cold Canyon near site of old homestead
5. Wild Horse Canyon
6. Devil's Gate (also called Putah Pass)
7. Collecting locality along Putah Creek
8. Collecting locality along Putah Creek
9. Junction of State Highway 128 and Pleasants Valley Road (the latter is also known as County Road 86 at this point)
10. Collecting locality north of Pleasants Valley School site
11. English Hills
12. Miller Canyon
13. Pleasants Valley
14. Vaca Valley
15. Davis Hills
16. Soda Springs Canyon
17. Tolenas Springs
18. Pine Peak
19. Walker Canyon (also called Dutton Canyon)
20. Pansy Flat
21. Signal Hill
22. Collecting locality along Blue Ridge north of Signal Hill
23. Gates Canyon
24. Collins Camp (location approximate; a Jepson collecting locality in upper Gates Canyon)
25. Collecting locality near head of Seventy Acre Canyon
26. Mount Vaca
27. Junction of Mix Canyon Road and Ridge Road
28. Upper Mix Canyon
29. Collecting locality in Mix Canyon
30. Collecting locality in Mix Canyon
31. Grove of Quercus kelloggii near head of Miller Canyon
32. Collecting locality along Ridge Road north of Mix Canyon, in and near shallow drainage along road
33. Head of Wild Horse Canyon
34. Collecting locality along Blue Ridge in northern part of range
35. Collecting locality on the east side of Markley Canyon southwest of Monticello Dam
36. Wragg Canyon
37. Upper Gordon Valley
38. Lower Gordon Valley
39. Laguna Canyon


Lagoon
Valley
Canyon
Gordon
Valley
Wooden
Valley
Fairfield

marked by a series of transverse spurs and gullies resulting from differences in the hardness of the sandstones and shales present. The topography of the western slopes, in contrast, is less irregular because of the steeper incline and uniform nature of the shale (Weaver, 1949:8). Running parallel to Blue Ridge on the east are lower ridges, each dissected by the several canyons on the eastern slopes of the range. Like Blue Ridge these ridges decrease in height southward. The most conspicuous of these, called Pleasants Ridge in its northern part, averages about 600 m in elevation in the north to 300 m in the south. A few streams draining from the Vaca Mountains north into Putah Creek have formed steep canyons. The most important of these canyons are Cold Canyon and Wild Horse Canyon.

Geology and Soils

The geologic features of the Vaca Mountains have been mapped and described by Weaver (1949) and Thomasson et al. (1960). The range is composed entirely of marine sedimentary rocks of Cretaceous age. These rocks are primarily sandstones and shales. According to Thomasson et al. (1960:36), thick-bedded hard sandstones form the ridges, whereas the ravines are underlain by more easily eroded rocks consisting of shale, soft sandstone, and siltstone. Weaver (1949) recognizes two major formations: 1) the Chico Formation, of Upper Cretaceous age, located on the eastern slopes of the Vaca Mountains; and 2) the

Knoxville Formation (undifferentiated from the Horsetown Formation), of Lower Cretaceous age, on the western slopes of the range.

No rocks of igneous origin are found in the Vaca Mountains. Consequently, no unusual substrates such as serpentine are present. This at least partially explains the absence of endemic vascular plant species in the range. In contrast, the next major mountain range to the west, the Howell Mountains, is largely of volcanic origin and outcroppings of serpentines and basalts are rather common there, especially northward.

The valleys to the east and south of the Vaca Mountains are composed of much younger alluvial strata of Quaternary age. The English Hills, east of Pleasants and Vaca valleys, are quite different in geologic structure from the Vaca Mountains. Younger sedimentary rocks, of Eocene age, comprise the major part of the English Hills, but relatively large areas in the vicinity of Putnam Peak are capped by basalt, probably extruded as a result of local faulting and folding (Thomasson et al., 1960:37). As previously indicated, both the English Hills and the valleys surrounding the Vaca Mountains are excluded from the scope of the present flora.

The soils of the Vaca Mountains have been mapped by the United States Department of Agriculture, Soil Conservation Service (Bates, 1977; Lambert and Kashiwagi, 1978). Most of the soils in the Vaca Mountains fall into

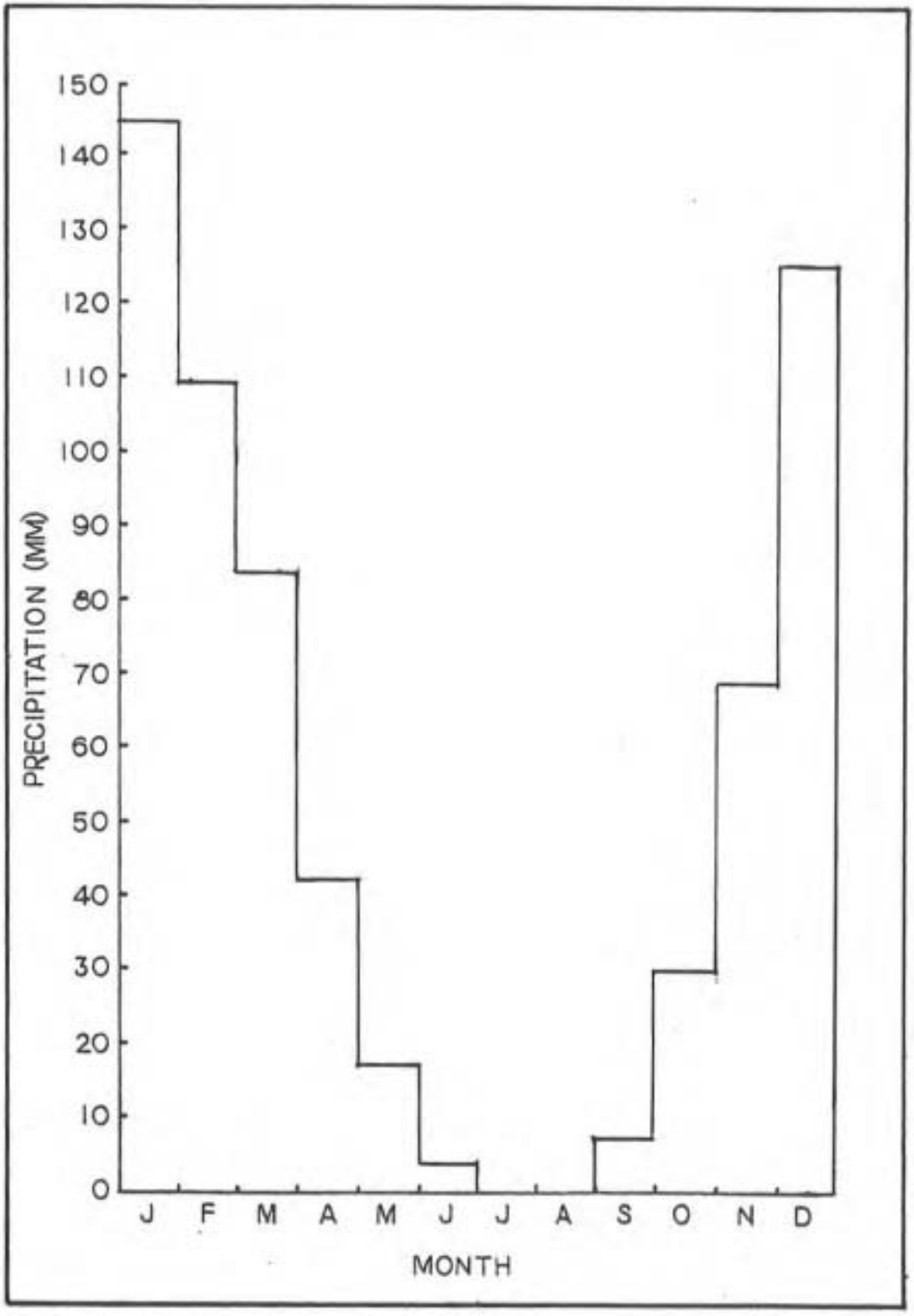
five soil series. These are the Millsholm, Maymen, Los Gatos, Bressa, and Dibble series. The plant cover on the Millsholm, Bressa, and Dibble series is composed mostly of annual grasses, forbs, and scattered blue oaks. The latter two series are found only on the western side of the Vaca Mountains; the former is confined to the eastern slopes. The vegetation found on soils of the Maymen series is chaparral, while that of the deeper Los Gatos series is foothill woodland. Other soil series of lesser importance in the Vaca Mountains include the Brentwood, Corning, and Rincon series.

Climate

The climate of the Vaca Mountains, like that of most of the California Coast Ranges, is of the Mediterranean type, with cool, wet winters and warm, dry summers. The mean annual rainfall for the nearby city of Vacaville, in the Sacramento Valley east of the range, is 634 mm, as measured by the National Weather Service station there. January, with a mean of 144 mm, is the wettest month, while July and August, with essentially no precipitation, are the driest months. Figure 3 shows the mean monthly distribution of rainfall at Vacaville.

Vacaville, at an elevation of 32 m, is located in the Sacramento Valley. The higher elevations in the Vaca Mountains would be expected to experience greater rainfall than the valley lowlands. The precipitation map of

Figure 3. Mean monthly precipitation values at Vacaville, California, for the period 1881-1979. (Data from Goodridge, 1980).

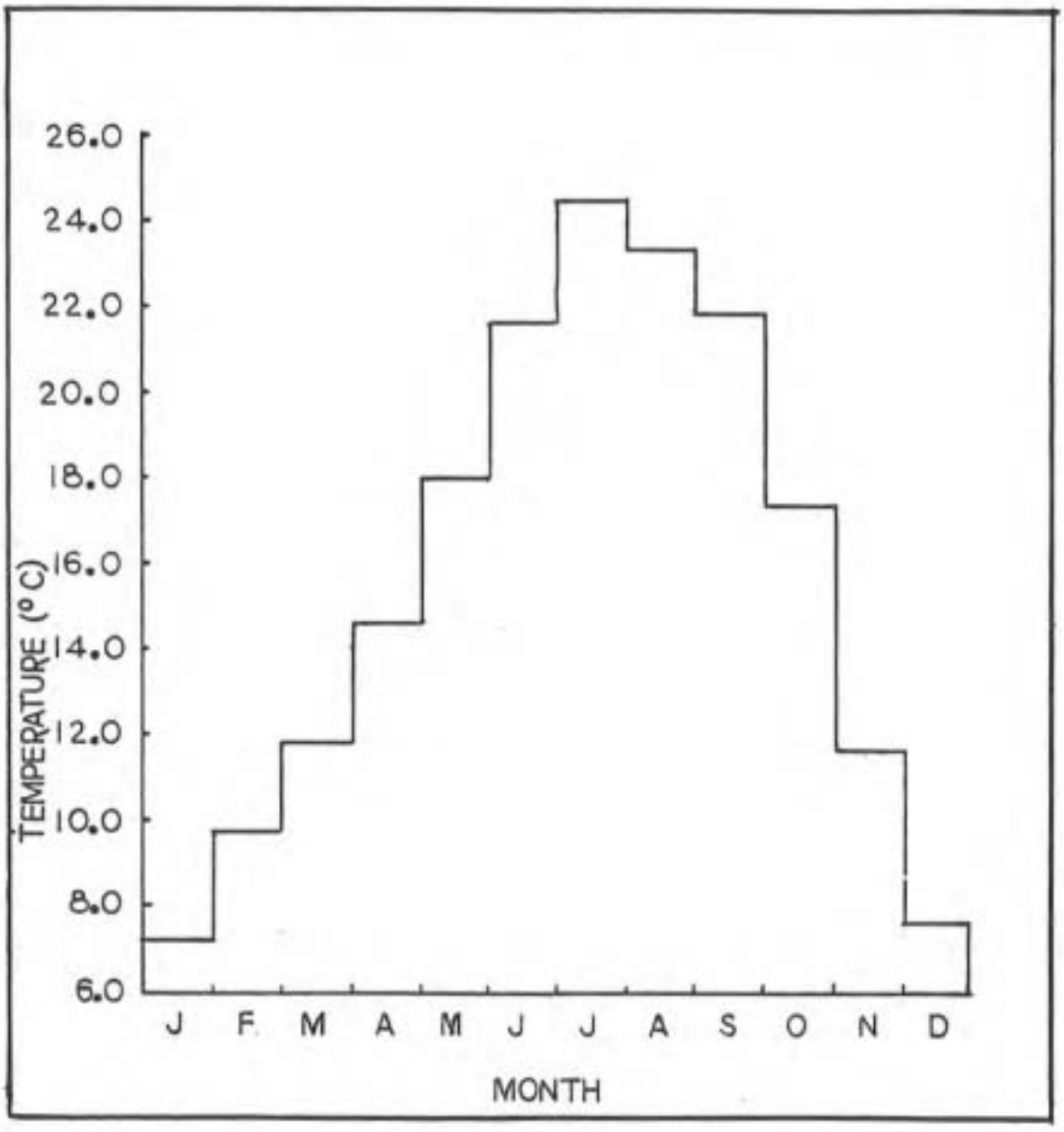

150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
PRECIPITATION (MM)
J
F
M
A
M
J
J
A
S
O
N
D
MONTH

California (Rantz, 1969) shows that most of the range probably receives 762 mm to 889 mm of precipitation (25-30 inches), and the higher elevations receive greater than 889 mm (30 inches). Most of the precipitation in the Vaca Mountains comes in the form of rain, but infrequent snowfalls are known to occur.

The temperature at Vacaville ranges from a monthly mean low of 7.2°C in January to a monthly mean high of 24.3°C in July. Figure 4 shows the monthly mean temperature distribution for Vacaville.

The influence of summer fog is not nearly so great in the Vaca Mountains as in the mountains of the middle and outer North Coast Ranges. The several south to north trending mountain chains to the west of the Vaca Mountains act as a barrier to the movement of fog from the ocean to the interior. This pattern of moisture depletion inland probably explains the absence from the Vaca Mountains of several species of woody plants present in the middle and outer Coast Ranges (see the section, Relationships of the Flora). Nevertheless, summer moisture in the form of summer fog and moisture laden winds exhibits some influence on the vegetation of the range, as evidenced by differences between the plant composition of the western and eastern slopes, and between the southeastern and northern parts of the range. One of the characteristic oak species of the middle and outer Coast Ranges, coast live oak (Quercus agrifolia), is an important component of the foothill

Figure 4. Mean monthly temperatures at Vacaville, California, for the period 1941-1970. (Data from United States Department of Commerce, 1973).


26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
TEMPERATURE (°C)
J F M A M J J A S O N D
MONTH

woodland plant community in the Vaca Mountains only on the western side of the range and in the southern portion along ridges. On the eastern slopes of the range only rare individuals can be found. This difference probably results from less summer moisture reaching the eastern slopes of the range, producing conditions unfavorable to the growth of Quercus agrifolia. On the eastern side the coast live oak gives way to interior live oak, Quercus wislizenii var. wislizenii, a species better adapted to hot, dry summers.

Similar differences in vegetation, probably related to summer moisture, can be seen with respect to the vegetation of the northern and southeastern portions of the Vaca Mountains. On the eastern side of the range, from Miller Canyon south, chaparral rarely covers substantial surface areas below an elevation of about 300 m, even on south-facing slopes. In the northern and northwestern parts of the range, this plant community assumes importance in many areas with elevations as low as 70 m. Although aspect is important (much of the chaparral in this area occupies west-facing slopes), it is clearly not the overriding factor. Even in canyons and on north-facing slopes (as, for example, in Cold Canyon), foothill woodland is not as well developed in the north as it is on the eastern slopes of the range. Indeed, much of the foothill woodland vegetation in the canyons of the north end of the range forms a kind of ecotone with chaparral, in that many species characteristic of the latter community are interspersed

with typical woodland species. These differences are doubtless due to disparate quantities of summer moisture, the canyons on the eastern side of the range receiving some moisture through the Carquinez Strait and those on the north enjoying little, if any, of this relief.

Vegetation

The vegetation of the Vaca Mountains is here divided into five plant communities: grassland, foothill woodland, chaparral, streamside woodland, and riparian woodland. Although these can be further subdivided using various vegetation classification systems (e.g., Cheatham and Haller, 1975; Thorne, 1976), recognition of the above five plant communities is considered adequate for the purposes of the present floristic work. With the exception of the two azonal communities, streamside woodland and riparian woodland, the plant communities acknowledged here conform to the community classification of Munz and Keck (1949 and 1950). The major characteristics of these five plant communities will be discussed in turn.

Grassland. This community, called valley grassland by Munz and Keck (1949), is usually associated with foothill woodland, with which it intergrades. Introduced annual grasses have displaced the once dominant bunch grasses, so that today the community is composed of these introduced annual grasses and of forbs that are native or introduced. The species composition of this community

varies both seasonally and annually in response to weather, grazing pressure, and amount of residual mulch remaining at the end of the growing season (Heady, 1977).

Characteristic plants of the grassland community in the Vaca Mountains include Aira caryophyllea, Avena spp., Bromus spp., Hordeum leporinum, Lolium perenne subsp. multiflorum, and Vulpia spp., among the grasses, and numerous forbs including Achyrachaena mollis, Amsinckia intermedia, Chlorogalum pomeridianum, Dichelostemma spp., Erodium spp., Filago spp., Gilia spp., Lomatium utriculatum, Lotus spp., Lupinus spp., Micropus californicus, Plagiobothrys spp., Plantago erecta, Ranunculus canus, Thysanocarpus curvipes, Trifolium spp., Triteleia laxa, and Wyethia helenioides.

The grassland community is not extensive in the Vaca Mountains. It is found primarily at lower elevations, where it is best developed on south-facing slopes. In the southern part of the range small expanses of grassland occur at higher elevations near Blue Ridge, as at Pansy Flat. Grassland is usually found adjacent to foothill woodland and intergrades with that community, forming a savanna in which the dominant tree is Quercus douglasii. Except for the areas immediately beneath individual trees, where species more characteristic of foothill woodland may occur, the herbaceous plants of this oak savanna are the same as those found in the grassland community.

Foothill woodland. This community is one of the two most extensive plant communities in the Vaca Mountains (the other is chaparral). Found on favorable sites at all elevations, foothill woodland is best developed in canyons and at elevations below about 300 m. The canopy cover varies from completely closed, as on the north-facing slopes of canyons, to relatively open with an understory of grassland species or shrubs. Transitions to either grassland or chaparral occur. The dominant tree of the oak savanna phase of the foothill woodland is usually Quercus douglasii; scattered individuals of Pinus sabiniana, Aesculus californica, and Quercus wislizenii var. wislizenii also occur. The understory consists of the annual grasses and forbs characteristic of the grassland community. Below Tolenas Springs, in the canyon formed by Soda Springs Creek, Quercus lobata is a dominant in the oak savanna found there.

In the closed phase of the foothill community the following woody species are typical: Aesculus californica, Fraxinus dipetala, Heteromeles arbutifolia, Pinus sabiniana, Quercus douglasii, Q. wislizenii var. wislizenii, Rhamnus californica subsp. californica, R. crocea subsp. ilicifolia, Toxicodendron diversilobum, and Umbellularia californica. On the west side of the range and along Blue Ridge in the southern part of the range Quercus agrifolia often replaces Q. wislizenii var. wislizenii. Quercus kelloggii is the dominant species in

a few patches of foothill woodland along Blue Ridge north of Mix Canyon. These black oak groves probably are relicts from more mesic times.

Many herbaceous species are characteristic of foothill woodland. Several of these are also found in the grassland community and need not be repeated here. Others include the ferns, Adiantum jordanii, Pityrogramma triangularis, and Polypodium californicum; the grasses, Bromus carinatus, B. laevipes, Elymus glaucus, Festuca californica, Melica californica, M. torreyana, and Poa scabrella; and the forbs, Angelica tomentosa, Calochortus amabilis, Cardamine integrifolia subsp. cardiophylla, Caucalis microcarpa, Collinsia heterophylla, Delphinium spp., Dodecatheon hendersonii, Galium spp., Lithophragma spp., Lomatium californicum, Nemophila heterophylla, Ranunculus hebecarpus, Sanicula spp., and Saxifraga californica.

Foothill woodland grades into chaparral in many areas where the two communities adjoin. In these ecotonal situations the canopy cover of the trees is usually rather open with an understory of shrubs characteristic of the chaparral. This is especially apparent in the canyons at the north end of the Vaca Mountains, but is also conspicuous at the upper limits of the foothill woodland community on the east and west sides of the range.

Chaparral. This community of sclerophyllus shrubs covers much of the Vaca Mountains, especially the steep

slopes and ridges above 300 m. In the north it occurs at elevations as low as 60 m on the west-facing slopes of canyons. Most of the chaparral in the range would fall into the mixed chaparral category of Thorne (1976) and Cheatham and Haller (1975). Pure or nearly pure stands of Adenostoma fasciculatum (the chamise chaparral of Cheatham and Haller and the chamisal of Thorne) are relatively rare in the range, although small representatives of this phase of chaparral do occur. Characteristic shrubs of the chaparral community include Adenostoma fasciculatum, Arctostaphylos glandulosa subsp. glandulosa, A. manzanita, Ceanothus cuneatus, C. sorediatus, Cercocarpus betuloides, Clematis lasiantha, Diplacus aurantiacus subsp. aurantiacus, Eriodictyon californicum, Garrya flavescens subsp. pallida, Heteromeles arbutifolia, Holodiscus discolor, Lepechinia calycina, Pickeringia montana, Quercus dumosa, Q. wislizenii var frutescens, Rhamnus californica subsp. californica, R. crocea subsp. ilicifolia, Ribes malvaceum, and Toxicodendron diversilobum.

In some areas tree species, normally considered to belong to woodland communities, are conspicuous components of the chaparral. For example, just below and east of Blue Ridge in the vicinity of Mount Vaca an association of Quercus chrysolepis, Q. wislizenii var. frutescens, Umbellularia californica, and various shrubs typical of chaparral is found. Although the soils are undoubtedly deeper than those found in more representative chaparral

situations--and because of the presence of trees it can be argued that the association does not properly belong to the chaparral community--the association has much closer affinities to chaparral than to foothill woodland. The trees behave more as large shrubs and are sclerophyllus. Furthermore, they share the fire-adapted features of chaparral species. Umbellularia californica, for example, is a vigorous sprouter following fire and has been observed to be successful following wildfires at several locations along Blue Ridge. Similar low woodlands in the midst of chaparral are found on Mount Diablo; Bowerman (1944:46) has also chosen to refer these to chaparral.

In a mature chaparral community few herbaceous plants occur. Following removal of shrubs by fire or other disturbance many herbaceous species become prevalent. These include the grasses, Aira caryophyllea, Avena spp., Bromus spp., Stipa lepida, and Vulpia spp., and the forbs, Apiastrum angustifolium, Calandrinia spp., Daucus pusillus, Emmenanthe penduliflora, Erodium cicutarium, Eucrypta chrysanthemifolia var. chrysanthemifolia, Filago spp., Helianthella californica, Helianthemum scoparium, Helianthus gracilentus, Lotus spp., Microseris lindleyi, Navarretia mellita, Phacelia spp., Psilocarpus tenellus, Pterostegia drymarioides, Rigiopappus leptocladus, Salvia columbariae, Solanum xantii var. intermedium, Stylocline filaginea, Triteleia lugens, and Zigadenus fremontii var. fremontii.

Streamside woodland. This woodland community occurs in canyon bottoms along the several intermittent and semipermanent streams on the eastern and northern slopes of the Vaca Mountains. Very similar to foothill woodland, this community shares many of the same woody species. The addition of several woody, predominantly winter deciduous species, most notably Acer macrophyllum, Baccharis viminea, Calycanthus occidentalis, Populus fremontii subsp. fremontii, Rosa californica, Rubus discolor, R. ursinus, Salix bonplandiana, S. hindsiana, S. lasiolepis, S. melanopsis, Sambucus mexicana, and Vitis californica, convey distinction upon this community.

Herbaceous species present in streamside woodland include (in addition to those characteristic of foothill woodland) Aristolochia californica, Artemisia douglasiana, Carex nudata, Cyperus eragrostis, Datisca glomerata, Eleocharis macrostachya, Equisetum spp., Juncus spp., Marah spp., Melilotus spp., Mimulus guttatus, Perideridia kelloggii, Polypogon spp., Psoralea macrostachya, and Rumex spp.

Riparian woodland. This community is developed only along Putah Creek at the north end of the range. Water is not a limiting factor to the plants of this truly azonal community, owing to the permanent flow of Putah Creek. Sharing with streamside woodland many of the same winter deciduous woody species, the riparian woodland community has a much better developed canopy of tall trees.

Populus fremontii subsp. fremontii is much more frequent in this community than in streamside woodland. Several large arboreal willows are present in riparian woodland. These include Salix bonplandiana, also present in streamside woodland, and S. gooddingii and S. lasiandra, both of which are unique to the riparian woodland community. Other conspicuous tree species include Acer negundo subsp. californicum, Alnus rhombifolia, Fraxinus latifolia, Juglans hindsii, Quercus lobata, and Q. wislizenii var. wislizenii. Shrubs present in riparian woodland include those found in streamside woodland, plus Cephalanthus occidentalis var. californicus and Clematis ligusticifolia, among others.

The herbs present in riparian woodland are in large part the same ones found in streamside and foothill woodlands. They need not be repeated here. Aquatic plants occur in the more quiet waters of Putah Creek. These include Azolla filiculoides, Elodea canadensis, Lemna minor, and Myriophyllum exalbescens. Elymus triticoides is locally frequent in this community and the stream orchis, Epipactis gigantea, is known in the Vaca Mountains only from here. Much of the herbaceous understory away from the immediate influence of water is weedy in nature, with many of the same annual grasses common to the grassland community. Where the ground remains moist Cynodon dactylon is rather common.

Land Use

Native Americans inhabiting the Vaca Mountains and vicinity belonged to the Patwin, a word meaning "people" used by several tribelets of related cultural and linguistic qualities to refer to themselves (Johnson, 1978). One of the most famous of the Patwin was Chief Solano, a friend of General Mariano Guadalupe Vallejo, Mexican comandante of Sonoma and environs. The present Solano County, one of the original 27 California counties, was named in honor of Chief Solano, who had in turn received his name upon baptism in honor of the seventeenth century Franciscan missionary, St. Francis Solano, for whom the mission established at Sonoma in 1823 had been named (Hoover et al., 1966:511).

The Vaca Mountains were a part of four Mexican Land Grants, Suisun, Tolenas, Chimiles, and Los Putos (Donley et al., 1979:13). Rancho Los Putos was given to Juan Manuel Vaca and Juan Felipe Peña in 1843 (Hoover et al., 1966). Both the Vaca Mountains and the town of Vacaville owe their names to the former grantee. Most of Rancho Los Putos lies east of the Vaca Mountains proper, encompassing Vaca Valley, the English Hills, and part of the Sacramento Valley, The Peña adobe still stands beside the Interstate 80 freeway in Lagoon Valley, about 2 miles southwest of Vacaville.

The lower elevations of the Vaca Mountains have long been used for agricultural purposes. The lands in

surrounding valleys and favorable sites on the lower slopes of the Vaca Mountains have been cleared for the planting of orchards and vineyards. Oaks in the Vaca Mountains and nearby hills have been cut for fuel since at least the 1850s. Writing in 1912, Jepson (1912:137) estimated that over a sixty year period 150,000 cords of oak wood were removed from the hill country of Solano County. He also made reference to the fine groves of valley oak (Quercus lobata) once present in Vaca and Suisun valleys before their removal to provide heat and to make way for orchards and vineyards. Livestock grazing is another prevalent consumptive use at lower elevations in the Vaca Mountains. Grasslands and woodlands are grazed, in some places heavily, a practice which has undoubtedly been pursued since the mid-nineteenth century.

Several residences have been built in the Vaca Mountains. These occur mostly on the lower slopes of the eastern side near Vacaville and in Mix and Gates canyons. A few are found along Blue Ridge north of Mix Canyon. All of the lands in the Vaca Mountains are privately owned, except for a few square kilometers of public lands on the northern slopes of the range. Several microwave stations are present on the summit of Mount Vaca and at other high points along Blue Ridge.

Tolenas Springs, in the southern part of the Vaca Mountains, was an early Indian spa; its mineral waters were later bottled and remained popular until about 1905 (Hoover

et al., 1966:521). The onyx present on the site was polished and used for ornamental clocks. More recently the onyx has been quarried to produce crushed white rock for roofs and patios (ibid.). At present, the quarry is not active.

At the northern end of the range Putah Creek has carved a deep canyon through the long mountain block of which the Vaca Mountains form the southern part. This is referred to as Putah Canyon. The western part of Putah Canyon, known as Devil's Gate, is narrow and precipitous. Monticello Dam was constructed at Devil's Gate in the 1950s, forming Lake Berryesa. The lake is used for recreational purposes and provides a large water supply for agriculture and municipal use. Lake Curry at the western base of the range in Gordon Valley is a source of water for the city of Vallejo.

The upper chaparral covered slopes of the Vaca Mountains are used for deer hunting in many areas of the range. Hunting clubs, whereby local landowners pool their lands and charge fees for hunting, are rather common.

About 110 hectares in Cold Canyon, on the north slope of the range, have been purchased by the University of California and made a part of the University's Natural Land and Water Reserves System. The Stebbins Cold Canyon Reserve was dedicated in 1981 and named in honor of G. Ledyard Stebbins, Emeritus Professor of Genetics at the University of California, Davis, and long-time student of

the California flora. Adjacent lands are managed by the California Department of Fish and Game and the Bureau of Land Management, United States Department of the Interior. The University hopes to consolidate most of the lands in the Cold Canyon drainage, an area of about 525 hectares, and manage these for research and instructional purposes.

History of Botanical Collecting

Owing to its proximity to the research centers of the San Francisco Bay Area, Davis, and Sacramento, many botanists have collected plants in the Vaca Mountains. Before the onset of the present study, the most important single collector by far was Willis Linn Jepson, eminent California botanist and professor at the University of California, Berkeley. Born in Vacaville in 1867, Jepson maintained a ranch near there (called "Little Oak") until his death in 1946. Beginning in 1884 and continuing until his death Jepson collected diligently in the Vaca Mountains and the surrounding valleys and foothills. Some 323 specimens representing 189 plant taxa were collected by Jepson in the Vaca Mountains proper. When his collections from Vacaville and the nearby valleys and foothills are added to this, the number of specimens and taxa collected is several times this figure. It is apparent from his notes on file at the Jepson Herbarium of the University of California, Berkeley, that Jepson planned to compile a

flora of the Vaca Mountains, a project that he never completed.

Other early collectors (near the turn of the century) included R.H. Platt, W.A. Sitchell, and C.F. Baker. Both E.L. Greene and Mary Katharine Brandegee collected in nearby Vacaville; whether they ever reached the Vaca Mountains proper is uncertain. Greene, however, described several species from early collections made by Jepson in the range. A partial list of other, more recent collectors in the range proper would include: M.F. Baad, G.D. Barbe, W.D. Clark, G.L. Clifton, L. Constance, B. Crampton, Alva Day, L.T. Dempster, E. Ferguson, V. Grant, A.A. Heller, D.V. Hemphill, R.F. Hoover, A.R. Kruckeberg, A. Lewis, H. Lewis, G.J. Muth, L.F. Robbins, H.K. Sharsmith, G.L. Stebbins, J.H. Thomas, J.M. Tucker, and G. Webster. Numerous others have collected plants from the nearby valleys.

Composition of the Flora

The flora of the Vaca Mountains consists of 586 taxa below the rank of genus, occurring in 89 families and 317 genera. One hundred fifty-seven (26.8 percent) of the taxa below the rank of genus are introduced. The following tables offer an analysis of the flora of the Vaca Mountains. Table 1 is a tabulation of the vascular plants. Nomenclature for divisions and classes follows the system of Cronquist (see Cronquist et al., 1972 and 1977).

Table 1. Tabulation of the vascular plants of the Vaca Mountains.

Division			Taxa Below the Rank of Genus		
Class	Families	Genera	Total	Native	Introduced
Equisetophyta	1	1	4	4	0
Polypodiophyta	6	8	9	9	0
Pinophyta	2	2	2	2	0
Magnoliophyta					
Magnoliopsida	70	252	466	352	114
Liliopsida	10	54	105	62	43
Total	89	317	586	429	157

Table 2 shows the eleven largest families of vascular plants and the percent of the total flora contributed by each. Table 3 displays the eighteen largest genera and the number of taxa within each.

Almost 64 percent of the introduced flora of the Vaca Mountains is contributed by five families (Table 4). Of these the grass family, Poaceae, is the most important, constituting 26 percent of the total number of introduced plants. This fact illustrates the displacement of the native bunch grasses by annual grasses native to the Mediterranean region.

Eight families are represented in the Vaca Mountains solely by introduced species (Table 5). Seventy-three genera are represented in the flora solely by introduced species. These, and the number of taxa within each, are given in Table 6.

No plant species are known to be endemic to the Vaca Mountains. Possible reasons for this are related to the relatively homogeneous substrate and the rather harsh climate of the inner Coast Ranges. Conditions are thus neither favorable to the formation of new species nor conducive to the maintenance of relictual species. Three species of limited distribution are known to occur in the range. These are Arabis modesta, Hesperolinon breweri, and Lomatium repostum. The first two are considered to be rare and endangered by the California Native Plant Society (Smith et al., 1980) and are candidates for listing as

Table 2. The eleven largest families of vascular plants found in the Vaca Mountains and the percent of the total flora contributed by each.

Family	Number of Genera	Number of Taxa Below the Rank of Genus	Percent of Total Number of Taxa
Asteraceae	52	86	14.7
Poaceae	33	68	11.6
Fabaceae	15	46	7.8
Brassicaceae	18	29	4.9
Scrophulariaceae	15	27	4.6
Apiaceae	13	21	3.6
Polemoniaceae	5	17	2.9
Rosaceae	10	15	2.6
Lamiaceae	9	13	2.2
Boraginaceae	6	13	2.2
Ranunculaceae	4	13	2.2
Total	180	349	59.2

Table 3. The eighteen largest genera of vascular plants found in the Vaca Mountains.

Genus	Number of Taxa Below the Rank of Genus
Trifolium	13
Quercus	10
Lotus, *Lupinus*, *Vulpia*	8
Bromus, *Galium*	7
Clarkia, *Eriogonum*, *Juncus*, *Salix*	6
Delphinium, *Gilia*, *Lomatium*, *Mimulus*, *Navarretia*, *Phacelia*, *Ranunculus*	5

Table 4. The five families with the largest numbers of introduced species in the Vaca Mountains.

Family	Number of Introduced Species[1]
Poaceae	41
Asteraceae	25
Brassicaceae	14
Fabaceae	13
Apiaceae	7

[1]Includes infraspecific taxa.

Table 5. Families represented in the Vaca Mountains solely by introduced species.

Family	Number of Species
Apocynaceae	1
Cannabaceae	1
Geraniaceae	6
Moraceae	1
Oxalidaceae	1
Simarubaceae	1
Tamaricaceae	1
Zygophyllaceae	1

Table 6. Genera represented in the Vaca Mountains solely by introduced species and the number of taxa within each.

Aira (2)	Cytisus (1)	Raphanus (2)
Anagallis (1)	Datura (1)	Robinia (1)
Anthemis (1)	Descurainia (1)	Rumex (3)
Anthriscus (1)	Echinochloa (1)	Salsola (1)
Arundo (1)	Erodium (4)	Scandix (1)
Asparagus (1)	Erophila (1)	Setaria (1)
Avena (2)	Ficus (1)	Silene (1)
Brachypodium (1)	Foeniculum (1)	Silybum (1)
Brassica (4)	Gastridium (1)	Sisymbrium (2)
Briza (1)	Geranium (2)	Soliva (1)
Cannabis (1)	Hypochoeris (2)	Sonchus (2)
Capsella (1)	Kickxia (1)	Sorghum (2)
Cardaria (1)	Lamium (1)	Spartium (1)
Carduus (1)	Lolium (2)	Spergula (1)
Centaurea (3)	Malva (2)	Spergularia (1)
Cerastium (1)	Marrubium (1)	Tamarix (1)
Cichorium (1)	Medicago (2)	Torilis (2)
Conium (1)	Melilotus (2)	Tragopogon (1)
Convolvulus (1)	Oryzopsis (1)	Tribulus (1)
Conyza (2)	Oxalis (1)	Verbascum (2)
Coriandrum (1)	Panicum (1)	Veronica (1)
Cotula (1)	Paspalum (1)	Vicia (2)
Crypsis (1)	Phalaris (2)	Vinca (1)
Cynodon (1)	Phyla (1)	
Cynosurus (1)	Picris (1)	

endangered or threatened pursuant to the Endangered Species Act of 1973, as amended (United States Department of the Interior, Fish and Wildlife Service, 1980). Lomatium repostum is considered to be rare, but not endangered, by the California Native Plant Society. Hesperolinon breweri has not been collected in the Vaca Mountains since the last century and may therefore no longer be extant in the range. It is also found on Mount Diablo and in Capell Valley, Napa County, where its occurrence is documented by more recent collections.

Relationships of the Flora

Howell (1970:25-27) discounts the importance of the Golden Gate as a barrier to plant distribution in the outer Coast Ranges. Although 97 plant entities reach their southern limits in Marin County and only 34 reach their northern limits in that county (these numbers are changed somewhat by information presented in the supplement to Howell's Marin Flora, but the ratio remains similar), Howell attributes this disparity not to the supposed barrier of the Golden Gate but rather to the fact that the flora of Marin County has much stronger affinities with northern elements. Most of this northern influence is coastal.

The situation with respect to the flora of the Vaca Mountains strongly suggests a role for the barrier hypothesis. A similar disparity exists with regard to the

number of plant taxa reaching southern distributional limits in the range as opposed to those which range no farther north than the Vaca Mountains. Twenty-five plant taxa reach their southern limits of distribution in the Coast Ranges in the Vaca Mountains (Table 7). Only 9 plant taxa reach their northern distributional limits in the Coast Ranges in the Vaca Mountains (Table 8). Although an explanation similar to that employed by Howell with respect to Marin County--that the plants reaching southern distributional limits have northern ties--could also be used to explain the situation in the Vaca Mountains, evidence indicates otherwise. Of the 25 plants which range no farther south in the Coast Ranges than the Vaca Mountains, 15 extend farther south in the Sierra Nevada. Four taxa, Asclepias cordifolia, Dichelostemma volubile, Helianthella californica var. nevadensis, and Mimulus kelloggii, occur as far south in the Sierra Nevada as Kern County. Two other taxa, Galium bolanderi and Ranunculus occidentalis, range south through the Sierra Nevada to the Tehachapi Mountains. Solanum parishii is also known from Riverside and San Diego counties, and Cercis occidentalis occurs on desert mountain ranges in California and Arizona. Others range south to Amador, Calaveras, Mariposa, and Fresno counties.

Thus many of those plant taxa reaching southern distributional limits in the Coast Ranges in the Vaca

Table 7. Taxa that reach their southern limits of distribution in the Coast Ranges in the Vaca Mountains.

Antirrhinum breweri	*Helianthella californica* var. *nevadensis*
Arabis modesta	*Hypericum concinnum*[1]
Asclepias cordifolia	*Keckiella lemmonii*
Calochortus amabilis[1]	*Lomatium repostum*
Calycadenia pauciflora	*Marah watsonii*
Calycanthus occidentalis	*Mimulus kelloggii*
Calystegia occidentalis	*Mimulus pulsiferae*
Cardamine integrifolia subsp. *cardiophylla*	*Ranunculus occidentalis*
Cercis occidentalis	*Senecio eurycephalus* var. *eurycephalus*
Clarkia gracilis subsp. *albicaulis*	*Solanum parishii*
Dichelostemma volubile	*Stachys stricta*
Eriogonum dasyanthemum	*Trichostema laxum*
Galium bolanderi	

[1]These taxa occur in Marin County (Howell, 1970), which probably represents their southernmost limit in the Coast Ranges. The southernmost stations for these taxa in the inner Coast Ranges are presumed to be in the Vaca Mountains.

Table 8. Taxa that reach their northern limits of distribution in the Coast Ranges in the Vaca Mountains.

Caulanthus lasiophyllus var. *inalienus*	*Gilia capitata* subsp. *staminea*
Eriogonum gracile	*Helianthus gracilentus*
Eucrypta chrysanthemifolia var. *chrysanthemifolia*	*Hesperolinon breweri*
	Isopyrum occidentale
Gilia achilleaefolia subsp. *multicaulis*	*Salvia spathacea*

Mountains either have southern affinities or possess ecological amplitudes sufficient to enable them to exist in more southerly locations. Most of these plants show a pattern of distribution that circles the northern end of the Sacramento Valley, extending south in both the Coast Ranges and Sierra Nevada. The fact that these plant taxa reach no farther south in the Coast Ranges than the Vaca Mountains seems best explained by invoking a barrier hypothesis.

The Vaca Mountains are separated from the next inner Coast Range segment to the south, Mount Diablo, by Suisun Bay and the Sacramento-San Joaquin Delta. This represents a distance of some 40 km. Although other mountains and hills north of the Delta, most notably the southern Howell Mountains and the Benecia Hills, more closely approach Mount Diablo, the flora of these areas is much more coastal in its affinities. Thus, at least for some of the plants better adapted to the drier inner Coast Ranges, it is unlikely that these mountains and hills could act as stepping stones to the inner South Coast Ranges. That growing conditions at Mount Diablo are more severe than those present in the Vaca Mountains seems unlikely. Many of the same plant taxa occur at both locations and the climates are similar, except that mean annual precipitation at Mount Diablo is less. The presence at Mount Diablo of such characteristic outer Coast Range taxa as Aralia californica, Corylus cornuta var. californica, Disporum

hookeri, Garrya elliptica, Heracleum lanatum, Heuchera micrantha, Osmorhiza chilensis, Quercus garryana, and Rubus parviflorus (Bowerman, 1944; names changed to reflect current usage), all of which are absent from the Vaca Mountains, suggests that conditions are more mesic at Mount Diablo, at least in some locations. The habitat at Mount Diablo would, therefore, appear to be suitable to those plant taxa reaching their southern distributional limits in the Coast Ranges in the Vaca Mountains. The fact that they do not occur on Mount Diablo seems to indicate the presence of a barrier to dispersal.

The last piece of evidence to be presented in support of the barrier hypothesis is the distributional information given by Bowerman (1944) for the plants of Mount Diablo. Thirty species reach their northern limits of distribution at Mount Diablo, whereas only 8 species reach their southern limits there. Thus the situation at Mount Diablo is exactly the reverse of that of the Vaca Mountains, a fact that further suggests the presence of a barrier to north-south dispersal. Bowerman (1944:68) herself suggested this but cautioned that the disparate numbers of taxa reaching southern and northern distributional limits at Mount Diablo may instead be related to the past history of the area.

As Jepson (unpublished notes on file at the Jepson Herbarium) recognized, the Vaca Mountains are distinctive more for the species that are absent than for those that

are present. The more severe climate of the Vaca Mountains, as compared to that of the outer Coast Ranges, results in the complete absence from the Vaca Mountains of several taxa present in the outer Coast Ranges. Other plants, though present in the Vaca Mountains, are far more rare there than in the outer Coast Ranges. Table 9 is a list of taxa common or widespread in the outer Coast Ranges but rare in the Vaca Mountains. Table 10 lists some woody taxa similarly common or widespread in the outer Coast Ranges but completely absent from the Vaca Mountains.

A few plant taxa found to occur in the Vaca Mountains as a result of this study represent significant range extensions, at least from previously reported range descriptions. Table 11 lists 10 taxa collected during the course of this study that were not previously known to occur in the Vaca Mountains and for which the resulting range extensions are of significance. The ranges of three additional taxa have been expanded to include the Vaca Mountains based on Jepson collections. These taxa are Clarkia gracilis subsp. albicaulis, Gilia achilleaefolia subsp. multicaulis, and Gilia capitata subsp. staminea.

One hundred fifty-seven taxa below the rank of genus are introduced. This represents 26.8 percent of the flora of the Vaca Mountains. Table 12 compares the relative importance of introduced taxa to the floras of the Vaca Mountains, California as a whole, and several areas in the Coast Ranges of central and northern California for

Table 9. Taxa common or widespread in the outer Coast Ranges but rare in the Vaca Mountains.

Arbutus menziesii	*Osmaronia cerasiformis*
Artemisia californica	*Potentilla glandulosa* subsp. *glandulosa*
Clematis ligusticifolia	*Pteridium aquilinum* var. *pubescens*
Dendromecon rigida subsp. *rigida* [1]	*Rosa gymnocarpa*
Deschampsia elongata	*Scutellaria tuberosa* subsp. *tuberosa*
Dryopteris arguta	*Torreya californica*
Epipactis gigantea	*Trifolium barbigerum*
Festuca idahoensis	*Urtica holosericea*
Marah oreganus	*Verbena robusta*
Mimulus cardinalis	*Woodwardia fimbriata*
Mimulus douglasii	

[1]There is some question as to whether this taxon is in fact native to the Vaca Mountains. See the discussion given in the Annotated Catalogue of Vascular Plants under the entry for this taxon.

Table 10. Some woody taxa common or widespread in the outer Coast Ranges but absent from the Vaca Mountains.

Amelanchier pallida	*Lithocarpus densiflora*
Amorpha californica var. *napensis*	*Physocarpus capitatus*
Arctostaphylos canescens	*Pseudotsuga menziesii*
Arctostaphylos stanfordiana	*Rhamnus crocea* subsp. *crocea*
Ceanothus foliosus	*Ribes californicum*
Ceanothus parryi	*Ribes menziesii* var. *menziesii*
Ceanothus thyrsiflorus	*Rubus parviflorus* var. *velutinus*
Castanopsis chrysophylla	*Sequoia sempervirens*
Corylus cornuta var. *californica*	*Sambucus cerulea*
Ericameria arborescens	*Taxus brevifolia*
Garrya elliptica	*Vaccinium ovatum*
Keckiella corymbosa	

Table 11. Plants collected in the Vaca Mountains during the course of this study that represent significant range extensions.

Artemisia californica	*Helianthella californica* var. *nevadensis*
Crassula muscosa[1]	*Helianthus gracilentus*
Eriogonum dasyanthemum[2]	*Hesperolinon clevelandii*
Eucrypta chrysanthemifolia var. *chrysanthemifolia*	*Mimulus pulsiferae*
Filago vulgaris[1]	*Stachys stricta*

[1]These species are introductions from Europe.

[2]There are several Jepson collections of this species from the Vaca Mountains. The range given by Reveal (in Munz, 1968:60), however, does not include the Vaca Mountains.

Table 12. Comparison of the relative importance of introduced taxa to the floras of the Vaca Mountains, California, and several areas in the Coast Ranges of central and northern California.

Name of Area	Percent of Flora Consisting[1] of Introduced Species
Vaca Mountains	26.8
California (Smith and Noldenke, 1960; Howell, 1972)	15.3
Mount Diablo (Bowerman, 1944)	14.4
Mount Hamilton Range (Sharsmith, 1945)	9.0
Marin County (Howell, 1970)	23.5
Santa Cruz Mountains (Thomas, 1961)	30.7

[1]Includes infraspecific taxa except for Marin County and the Mount Hamilton Range.

which published floras are available. Although the proportion of introduced taxa in the Vaca Mountains (26.8 percent) is significantly higher than that of California as a whole (15.3 percent), it compares favorably with the figures for Marin County (23.5 percent) and the Santa Cruz Mountains (30.7 percent). Both of the latter areas, like the Vaca Mountains, have Mediterranean type climates and, consequently, about the same complement of introduced Mediterranean grasses and forbs. The lower proportions of introduced species reported for Mount Diablo (14.4 percent) and the Mount Hamilton Range (9.0 percent), both of which also have predominantly Mediterranean climates, at least partly results from the age of the published floras of these two areas. Both of these floras (Bowerman, 1944; Sharsmith, 1945) are over 35 years old; the percentages of introduced taxa present in both areas are almost certainly higher today.

Because of the position of Mount Diablo in the inner Coast Ranges on the opposite side of the Sacramento-San Joaquin Delta from the Vaca Mountains, it is of interest to compare the composition of the flora of Mount Diablo to that of the Vaca Mountains. Table 13 is a tabulation of the vascular plants of Mount Diablo based on data taken from Bowerman (1944). This can be compared to the tabulation of the flora of the Vaca Mountains given in Table 1. A total of 630 taxa below the rank of genus in 88 families is reported for Mount Diablo (the figures for the Vaca

Table 13. Tabulation of the vascular plants of Mount Diablo (based on data taken from Bowerman, 1944).

Division		Taxa Below the Rank of Genus		
Class	Families[1]	Total	Native	Introduced
Lycopodiophyta	1	1	1	0
Equisetophyta	1	3	3	0
Polypodiophyta	5	11	11	0
Pinophyta	2	4	4	0
Magnoliophyta				
Magnoliopsida	69	508	460	67
Liliopsida	10	103	79	24
Total	88	630	539	91

[1]The number of families recognized by Bowerman has been altered to conform to the present treatment of the vascular flora of the Vaca Mountains. No attempt has been made to similarly change her treatment of species.

Mountains are 586 and 89, respectively). Of greater interest than the fact that the Mount Diablo flora boasts 44 additional total taxa is the disparity between the total numbers of native taxa present in each area, 539 for Mount Diablo and only 429 for the Vaca Mountains. There are at least two major reasons for this difference. The first relates to the greater coastal influence experienced in parts of Mount Diablo, enabling many plants more typical of the outer Coast Ranges to occur in at least limited areas there. The presence at Mount Diablo of several species more characteristic of the outer Coast Ranges, all of which are absent from the Vaca Mountains, has been noted previously in this section.

The second reason for the higher number of native taxa at Mount Diablo is the greater heterogeneity of substrate there. The Vaca Mountains are composed entirely of sedimentary rocks. Mount Diablo, in contrast, is made up of both sedimentary and igneous rocks; serpentine, though not extensive, is also present (Bowerman, 1944). Thus there is a greater array of habitats at Mount Diablo, a fact almost certainly reflected in the larger number of native plant taxa present there as compared to the number present in the Vaca Mountains.

Notes on the Annotated Catalogue

The following Annotated Catalogue of Vascular Plants includes all vascular plants growing without cultivation in the Vaca Mountains. It was compiled from information derived from two major sources, the most important of which has been the extensive collecting of the author during the course of this study. Serious collecting was initiated in 1975 and continued through 1980. A total of 2,135 specimens, not including duplicates, representing 535 taxa, has been collected during this time period. The identity of each of these specimens has been carefully determined using available floras (e.g., Abrams, 1923, 1944, and 1951; Abrams and Ferris, 1960; Hitchcock et al., 1955, 1959, 1961, 1964, and 1969; Jepson, 1909-1922, 1925, 1936, 1939, and 1943; Munz, 1959 and 1968; and various local floras with relevance to the plants found at the Vaca Mountains), monographs, synopses, and other pertinent works. Where necessary these specimens were compared to those deposited at major herbaria, especially UC and JEPS.[1] Expert help was solicited in several groups of plants. The assistance of these specialists has been acknowledged in the Preface.

A second major approach taken by this study involved herbarium surveys to locate plants collected in

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[1]Herbarium symbols used here and in the following text correspond to those found in Holmgren & Keuken (1974).

the Vaca Mountains by other workers. Because Willis Linn Jepson was the most important of these, a complete survey was made of the Jepson Herbarium at the University of California, Berkeley, where most of Jepson's collections are housed. Other herbaria less intensively searched include UC, CAS, DS, DAV, SACT, and CDA.

The sequence of families in the following Catalogue is alphabetical within classes and divisions. The same is true for genera within families and species within genera. Nomenclature in most cases follows the most recent treatments of the respective taxa. The checklist of Kartesz and Kartesz (1980) was helpful but was not followed in most cases where no published source was available to document nomenclatural changes found therein or where I have disagreed with their treatment. Synonyms have been provided only where the names used differ from those found in Munz (1959 and 1968) or where it was thought necessary to avoid confusion.

I have made no attempt to standardize infraspecific names in the manner of Thorne (1978b). Although I personally tend to the use of subspecies, I feel that to erect new subspecific combinations for validly published varietal names is to add unnecessarily to the already large numbers of synonyms existing for most taxa. Certainly, as Thorne (1978a) points out, there has been an uneven use of the category variety, some authors using it to refer to geographically distinct entities that fit the modern day view

of subspecies and others bestowing it upon minor genetic variants which are often sympatric. Where a varietal name is given in the following Catalogue, that entity usually corresponds, insofar as I have been able to determine, to the concept of subspecies. In a few cases varieties are retained that do not appear to have geographical significance; many of these seemed to have such significance prior to this study. Those varieties of questionable significance are so indicated.

Common names are given for the majority of taxa, but no attempt has been made to supply these for every taxon. "Common" names derived from a mere English translation of the Latin binomial have largely been avoided.

Frequency ratings have been given for most species. These were subjectively assigned based on my own observations and/or the number of collections on file. Five such frequency ratings have been recognized. In the order of increasing abundance they are: rare, infrequent, occasional, frequent, and common. These ratings should be viewed with reservations, especially those for annual species, the abundance of which can vary greatly from year to year.

Collections of the author are indicated by a "W" preceding the collection number. Unless otherwise indicated all of these are deposited in the herbarium of California State University, Sacramento. With some exceptions only two collections are cited for each locality.

When more than two collections of a taxon have been gathered from the same locality, these will be disseminated to other herbaria in the following order: JEPS, CAS, and DAV. The same is true for duplicates of those cited. Jepson collections, unless otherwise indicated, are found in JEPS. For all other collections the repository is indicated using the herbarium abbreviations of Holmgren and Keuken (1974).

In a few places references are made to Jepson's Field Books. These books are maintained at the Jepson Herbarium. Citations are by volume and page number.

ANNOTATED CATALOGUE OF VASCULAR PLANTS

DIVISION EQUISETOPHYTA

EQUISETACEAE. Horsetail Family

Equisetum arvense Linnaeus. Common Horsetail. Apparently rare, in moist situations. Reported from upper Cold Canyon by Stebbins and Webster (1981).

Equisetum hyemale Linnaeus var. affine (Engelmann) A.A. Eaton. Common Scouring-rush. Apparently rare, on wet ground. Reported from upper Cold Canyon by Stebbins and Webster (1981).

Equisetum laevigatum A. Braun. Smooth Scouring-rush. Rare, in moist ground of riparian woodland. Along Putah Creek, W 1840.

Equisetum telmateia Ehrhart var. braunii (Milde) Milde. Giant Horsetail. Infrequent, on moist ground, as along streams. Gates Canyon, along Alamo Creek, W 688; Mix Canyon, along Ulatis Creek, W 1880.

DIVISION POLYPODIOPHYTA

This treatment of the families of ferns follows that used in Kartesz and Kartesz (1980).

ADIANTACEAE. Maidenhair Fern Family

Adiantum jordanii K. Mueller. California Maidenhair Fern. Occasional, in damp shaded areas. Mix Canyon, W 583, W 1149; Cold Canyon, W 758; east of Tolenas Springs, W 4132.

Pellaea andromedaefolia (Kaulfuss) Fée var. andromedaefolia. Coffee Fern. Frequent, in open or shaded areas of foothill woodland and chaparral. Gates Canyon, W 641, W 662, Jepson 18719; Mix Canyon, W 1246, W 2448; near Tolenas Springs, W 4133; Cold Canyon.

Pellaea mucronata (D.C. Eaton) D.C. Eaton var. mucronata. Bird's-foot Fern. Frequent, in mostly open areas of foothill woodland or chaparral, often in rock outcroppings. Mix Canyon, W 559, W 2010; southwest of Monticello Dam, W 2293; west of Mount Vaca, W 2144; near Signal Hill, W 4261; Cold Canyon.

Pityrogramma triangularis (Kaulfuss) Maxon var. triangularis. Goldenback Fern. Frequent, in shaded areas. Mix Canyon, W 548, W 1141; Gates Canyon, Jepson 18725; Cold Canyon; along Blue Ridge north of Signal Hill; east of Tolenas Springs.

ASPLENIACEAE. Spleenwort Family

Dryopteris arguta (Kaulfuss) Watt. California Wood Fern. Infrequent, in damp shaded areas of foothill

woodland. Mix Canyon, W 167, W 4390; Gates Canyon, W 611; Cold Canyon.

AZOLLACEAE. Water Fern Family

Azolla filiculoides Lamarck. American Water Fern. In quiet pools along Putah Creek, W 1572. Assigned to this species on the basis of vegetative characters only.

BLECHNACEAE. Deer Fern Family

Woodwardia fimbriata J.E. Smith. Giant Chain Fern. Rare, in moist places. Known only from upper Cold Canyon (Stebbins and Webster, 1981).

DENNSTAEDTIACEAE. Cup Fern Family

Pteridium aquilinum (Linnaeus) Kuhn var. pubescens Underwood. Bracken Fern. Jepson cites this taxon (as Pteris aquilina Linnaeus) from Mix Canyon (Field Book 10:8). I have not observed this plant in Mix Canyon or at any other location in the Vaca Mountains, nor have I seen any collections from the range.

POLYPODIACEAE. Polypody Family

Polypodium californicum Kaulfuss. California Polypody. Occasional, in shaded areas of canyons. Gates Canyon, W 610; Mix Canyon, W 1148, W 1665; Cold Canyon.

DIVISION PINOPHYTA

PINACEAE. Pine Family

Pinus sabiniana Douglas. Digger Pine. Frequent throughout the range; an important component of the foothill woodland community. Cold Canyon, W 767.

TAXACEAE. Yew Family

Torreya californica Torrey. California Nutmeg. Rare, known only from one site just below the summit of Mount Vaca on the east side, where a colony of three individuals occurs in chaparral at an elevation of 700 m, W 695, W 1894. This species occurs in a wide variety of habitats in California, ranging from redwood forest to chaparral. Whether the small colony near Mount Vaca is a remnant of a formerly more extensive population or the result of a much more recent, chance introduction by natural agents such as birds is a matter of conjecture. Whatever explanation one chooses must also apply to the many other small isolated stands present in California. The Vaca Mountains colony was threatened with destruction by fire prevention activities in 1978, when the dirt road adjacent to the stand was mechanically widened to provide a firebreak. Fortunately the crew involved in this activity recognized that these trees were different from the surrounding shrubs and spared them. As of 1981 they remain healthy.

DIVISION MAGNOLIOPHYTA

CLASS MAGNOLIOPSIDA. Dicotyledons

ACERACEAE. Maple Family

Acer macrophyllum Pursh. Big-leaved Maple. Frequent, along streams and on north-facing slopes of canyons. A few trees occur along Blue Ridge, as near Signal Hill. Mix Canyon, W 567, W 1266; Gates Canyon, W 1499, Jepson 13944; Miller Canyon, Jepson 13945.

Acer negundo Linnaeus subsp. californicum (Torrey & Gray) Wesmael. California Box-elder. Occasional in the riparian woodland community along Putah Creek, W 1230, W 2348.

AMARANTHACEAE. Amaranth Family

Amaranthus albus Linnaeus. Tumbleweed. Infrequent, in disturbed areas such as roadsides and plowed fields. Mix Canyon, W 1039, W 4387. Native of tropical America.

Amaranthus blitoides Watson. Prostrate Amaranth. Infrequent, in disturbed areas such as roadsides and plowed fields. Along Ridge Road north of junction with Mix Road, W 4380; along Pleasants Valley Road between Vaca Valley and Mix roads, W 1759.

Amaranthus retroflexus Linnaeus. Rough Pigweed. Infrequent, in disturbed areas such as fields, roadsides, and dry streambeds. Gates Canyon, W 4102; along Pleasants Valley Road between Vaca Valley and Mix roads, W 1758. Native of tropical America.

ANACARDIACEAE. Sumac Family

Rhus trilobata Nuttall ex Torrey & Gray var. quinata (Greene) Jepson. Squaw Bush. Common in the north end of the range, especially in canyons; infrequent in canyons on the east side and in chaparral along Blue Ridge. Cold Canyon, W 746, W 985, W 1295; Mix Canyon, W 1083, Jepson 13919; Blue Ridge between Gates and Mix canyons, W 903; Miller Canyon, Jepson 13915.

Toxicodendron diversilobum (Torrey & Gray) Greene [Rhus diversiloba Torrey & Gray]. Poison-oak. Very common throughout the range in all plant communities; especially abundant in the foothill woodland of canyons. Mix Canyon, W 2443; Cold Canyon; along Putah Creek; in black oak groves along Blue Ridge; east of Tolenas Springs; along Blue Ridge north of Signal Hill; along Blue Ridge in northern part of range. One of the two most common shrubs in the Vaca Mountains (the other being Adenostoma fasciculatum).

APIACEAE. Carrot Family

Angelica tomentosa Watson. California Angelica. Occasional in the foothill woodland of canyons and in mostly shaded areas of chaparral. Mix Canyon, W 841, W 1067, W 1782; Blue Ridge between Gates and Mix canyons, W 893, W 906; Gates Canyon, Jepson 14246, Jepson 14250; Vaca Mountains, Jepson 13485. Vaca Mountains plants represent the variety californica Jepson, the type locality of which is Gates Canyon (the holotype is Jepson 14246). This variety, known only from the Vaca Mountains, was originally described as a separate species, Angelica californica Jepson (1893:8), later reduced to varietal status by Jepson (1936:649). The characters upon which this variety is based--very unequal rays which are scaberulous at their ends and a greater number of oil tubes in the fruits than the typical variety--have not been considered by recent workers to be constant or significant enough to warrant even varietal treatment. Following treatments in Abrams (1951) and Munz (1959), the variety is here considered synonymous with Angelica tomentosa.

Anthriscus caucalis Bieberstein [A. scandicina (Weber) Mansfield]. Bur-chervil. Weed of moist and disturbed areas. Cold Canyon, near ruins of old homestead, W 738, W 1562; along Putah Creek, in riparian woodland, W 2332. Native of Europe.

Apiastrum angustifolium Nuttall. Wild Celery. Infrequent component of chaparral, except in areas that have been burned or otherwise disturbed, where it is locally common; rare in foothill woodland and grassland communities. Mix Canyon, W 2039; Cold Canyon, W 1315, W 1553; west side of range, just below Mount Vaca, W 2173; southwest of Monticello Dam, W 2259, W 2289; near Collins Camp, Jepson 14207.

Caucalis microcarpa Hooker & Arnott. California Hedge-parsley. Occasional, in shaded and open areas of foothill woodland and chaparral; sometimes colonizing burned areas. Cold Canyon, W 1540, W 1561; Cold Canyon, burned area, W 1314; Mix Canyon, W 1270; near Monticello Dam, W 2283; Walker Canyon, Jepson 14200.

Conium maculatum Linnaeus. Poison Hemlock. Rare weed of moist and disturbed areas. Along Putah creek, W 1566. Native of Europe.

Coriandrum sativum Linnaeus. Coriander. Rare, known only from a disturbed area near the mouth of Cold Canyon, W 2394. Native of southern Europe. Cultivated for its fruits and foliage which are used as seasoning in a variety of foods.

Daucus pusillus Michaux. Rattlesnake Weed. Frequent, in grassland and open areas of chaparral and foothill woodland; locally abundant on chaparral burns. Mix Canyon, W 711; Cold Canyon, W 749; Cold Canyon, burned area, W 1313; west side of range just below Mount Vaca,

W 2205; near Monticello Dam, W 2263; southwest of Monticello Dam, chaparral burn, W 2290; Blue Ridge near Signal Hill, W 4293; Blue Ridge, northern part of range.

Foeniculum vulgare Miller. Sweet Fennel. Weed of moist and disturbed areas. Mix Canyon, W 1051; north side of Lake Solano (=Putah Creek), W 1839; east of Tolenas Springs. Native of Europe.

Lomatium californicum (Nuttall) Mathias & Constance. Chu-chu-pate. Occasional, mostly on north-facing slopes, usually in foothill woodland but sometimes in chaparral. Mix Canyon, W 1654, W 1706; Cold Canyon, W 1292; near Monticello Dam, W 2269; Gates Canyon, Jepson 14248, Jepson 14249; slopes below Collins Camp, Jepson 14245; Devil's Gate, Putah Pass, Jepson 10408; east of Tolenas Springs; along Blue Ridge north of Signal Hill. Jepson's Gates Canyon collection (14248) is the type of Leptotaenia californica var. platycarpa Jepson (1893:8), later reduced to synonymy under Leptotaenia californica Nuttall by Jepson himself (1936:633). The species was later transferred (along with the other species of Leptotaenia) to the genus Lomatium by Mathias and Constance (1942:246), a treatment followed by all recent workers.

Lomatium dasycarpum (Torrey & Gray) Coulter & Rose subsp. dasycarpum. Lace Parsnip. Frequent, in chaparral, especially in open and rocky areas. Top of Blue Ridge

near Mount Vaca, W 584, W 892; along Blue Ridge in northern part of range, W 1648; west side of range below Mount Vaca, elevation 600 m, W 2183; near top of Signal Hill, W 689; English Hills, W 1903; near Collins Camp, Jepson 14301, Jepson 14302. Theobald (1966) transferred the closely related species, Lomatium tomentosum Bentham, to L. dasycarpum, recognizing two subspecies, L. dasycarpum subsp. dasycarpum and L. dasycarpum subsp. tomentosum (Bentham) Theobald. The two subspecies are geographically distinct, the former occurring in the Coast Ranges from Baja California to Del Norte County, California, the latter being found in the Sierra Nevada foothills, the Great Valley, and the Tehachapi Mountains.

Lomatium macrocarpum (Hooker & Arnott) Coulter & Rose. Sheep Parsnip. Blue Ridge above Cold Canyon (Stebbins and Webster, 1981).

Lomatium repostum (Jepson) Mathias. Napa Lomatium. Infrequent, mostly in chaparral but also found under the black oak groves along Blue Ridge north of Mix Canyon. Blue Ridge, between Gates and Mix canyons, W 901, W 2468; Blue Ridge north of Mix Canyon, chaparral, W 4374; in black oak grove along Blue Ridge north of Mix Canyon, W 927; slopes near Collins Camp, Jepson 14309; summit of the Vaca Mountains, Jepson 14308. Although called "Napa Lomatium" by Abrams (1951:249) and Smith et al. (1980), the type locality for this species is in the Solano County portion of the Vaca Mountains. Originally described by Jepson

(1923) as Lomatium lucidum var. repostum, the taxon was later elevated to specific rank by Mathias (1938). The type collection is Jepson 14309 (see above). Lomatium repostum is considered to be rare but not endangered by the California Native Plant Society (Smith et al., 1980). It is known only from Napa, Lake, Sonoma, and Solano counties. The localities in the Vaca Mountains probably represent the southernmost stations for this species.

Lomatium utriculatum (Nuttall) Coulter & Rose. Bladder Parsnip. Frequent, in grassland and foothill woodland. Mix Canyon, north-facing slope, W 1403; Mix Canyon, south-facing slope, W 505, W 2038; southwest of Monticello Dam, W 784; Cold Canyon, burned area, W 1530; west side of range, in shallow draws just below ridge near Mount Vaca, in Quercus agrifolia woodland, W 2157; west side of range, below head of Seventy Acre Canyon, W 2192; near Collins Camp, Jepson 14291.

Perideridia kelloggii (Gray) Mathias. Dobie Spindleroot. Kellogg's Yampah. Infrequent, in foothill woodland and along streams. Mix Canyon, W 1760, W 4444; Cold Canyon, along Cold Creek, W 974, W 980; Blue Ridge, north of Mix Canyon, wooded area, W 4381.

Sanicula bipinnata Hooker & Arnott. Poison Sanicle. Occasional, in foothill woodland and grassland. Mix Canyon, W 521, W 2043; Cold Canyon, W 1200, W 1296; Gates Canyon, W 1490; hills north of Highway 128 at north end of range, W 1973.

Sanicula bipinnatifida Douglas ex Hooker. Purple Sanicle. Occasional, in foothill woodland and grassland, sometimes in chaparral. Mix Canyon, W 549, W 1393; southwest of Monticello Dam, W 780; hills north of Highway 128 at north end of range, W 1972; west side, just below Mount Vaca, locally common, W 2136; summit of Mix Canyon, Jepson 18775; Cold Canyon.

Sanicula crassicaulis Poeppig ex Candolle. Pacific Sanicle. Gamble Weed. Frequent, usually in shade of foothill woodland but also in chaparral, where it is usually found in the shade of shrubs but sometimes occurs in open and cleared areas. Mix Canyon, W 511, W 1450; Cold Canyon, W 1216; east of Tolenas Springs; along cleared margins of Ridge Road north of Signal Hill; along cleared margins of Ridge Road in northern part of range.

Sanicula tuberosa Torrey. Turkey Pea. Infrequent, mostly at higher elevations in chaparral or wooded areas. Blue Ridge between Gates and Mix canyons, W 594; near Torreya californica population, W 687; Blue Ridge north of Signal Hill, W 4255; in black oak grove along Blue Ridge north of Mix Canyon, W 4339.

Scandix pecten-veneris Linnaeus. Shepherd's Needle. Rare weed of heavily grazed grassland. East of Tolenas Springs, W 4114. Native of Eurasia.

Torilis arvensis (Hudson) Link subsp. purpurea (Tenore) Hayek [T. heterophylla Gussone]. Infrequent, in

foothill and riparian woodland. Mix Canyon, W 860; along Putah Creek. Native of the Mediterranean region.

Torilis nodosa (Linnaeus) Gaertner. Knotted Hedge Parsley. Frequent, in shaded and open areas, especially in foothill woodland; sometimes found in burned areas of chaparral. Mix Canyon, W 525, W 857; Cold Canyon, burned area, W 1507; Cold Canyon, base of talus slope, W 1524; southwest of Monticello Dam, W 781; west side of range, below head of Seventy Acre Canyon, woodland/chaparral ecotone, W 2191. This native of Europe is, unfortunately, widespread in the Vaca Mountains. The fruits have the objectionable tendency to cling rather tenaciously to clothing and body hair, a dispersal mechanism which is no doubt largely responsible, not only for the species' introduction into California, but for its success in the State.

APOCYNACEAE. Dogbane Family

Vinca major Linnaeus. Periwinkle. Rare, found only on a shaded bank along Mix Canyon Road, 2.7 km west of its junction with Pleasants Valley Road, where probably planted, W 2045. It is persisting from cultivation and slowly spreading. A native of Europe, this species is widely cultivated as a ground cover.

ARISTOLOCHIACEAE. Birthwort Family

Aristolochia californica Torrey. Dutchman's Pipe. California Pipevine. Occasional, mostly in streamside and

riparian woodland. Mix Canyon, streamside woodland, W 1117, G. Muth s.n., 1967 (PUA); along Putah Creek, riparian woodland, W 1919; Gates Canyon, Jepson 20766; Cold Canyon; south of Signal Hill, foothill woodland; woodland along Soda Springs Creek.

ASCLEPIADACEAE. Milkweed Family

Asclepias cordifolia (Bentham) Jepson. Purple Milkweed. Infrequent, in open areas and foothill woodland, usually about rocks. Mix Canyon, W 487; Blue Ridge south of Signal Hill, W 4225; Cold Canyon. The southernmost station for this species in the Coast Ranges is in the Vaca Mountains. In the Sierra Nevada it ranges as far south as Kern County.

Asclepias eriocarpa Bentham. Kotolo. Indian Milkweed. Rare, known only from Putah Pass, Putah Canyon, on the Yolo-Napa County line, Jepson 14534.

Asclepias fascicularis Decaisne. Narrow-leaved Milkweed. Occasional, in dry streambeds, disturbed areas, and open grassy places. Mix Canyon, along road, W 1075, W 1753; Mix Canyon, along Ulatis Creek, W 950; Cold Canyon, near Cold Creek, W 981.

ASTERACEAE. Sunflower Family

Achillea millefolium Linnaeus var. californica (Pollard) Jepson [A. borealis Bongard subsp. californica (Pollard) Keck]. Yarrow. Occasional, in woodland or on

open grassy slopes. Mix Canyon, W 854, W 1480, H.K. Sharsmith 4207 (DAV); Cold Canyon, W 726, W 1514; west side of range, below head of Seventy Acre Canyon, W 2188; near Monticello Dam, W 2317; Putah Canyon, P.B. Kaufman 36 (DAV); open grassy areas along Blue Ridge south of Signal Hill; Pansy Flat; east of Tolenas Springs.

Achyrachaena mollis Schauer. Blow-wives. Occasional, in grassy areas at lower elevations. Mix Canyon, W 878, W 1435, Jepson 18731.

Agoseris grandiflora (Nuttall) Greene. California Dandelion. Occasional, in foothill woodland and chaparral, usually among rocks; also found in disturbed areas along roads. Mix Canyon, below 300 m, W 856, W 2432; along Mix Canyon Road, W 2431; Mix Canyon, chaparral, W 1743; Blue Ridge between Gates and Mix canyons, W 894; Gates Canyon, Jepson s.n., May 20, 1892, Jepson 27530; Cold Canyon.

Agoseris heterophylla (Nuttall) Greene. Occasional, in grassy places. Cold Canyon, W 4495; Gates Canyon, Jepson s.n., May 20, 1892; Pansy Flat.

Ambrosia psilostachya Candolle var. californica (Rydberg) Blake. California Ragweed. Infrequent, in moist, usually disturbed areas in and near riparian woodland. Along Putah Creek, northern part of range, W 4397; near Lake Solano (=Putah Creek), W 1826.

Anthemis cotula Linnaeus. Mayweed. Dog-fennel. Weed of disturbed areas, mostly at lower elevations. Infrequent, but can be locally abundant in certain years.

Mix Canyon, disturbed margin of road, W 2464; abundant (in 1979) in dry pasture at mouth of Gates Canyon. Native of Europe.

Arnica discoidea Bentham [A. discoidea var. alata (Rydberg) Cronquist; A. discoidea var. eradiata (Gray) Cronquist]. Coast Arnica. Occasional, in chaparral at higher elevations (275 m and above). Mix Canyon, W 814, W 1677, W 1742; near top of Mount Vaca, W 1702; Blue Ridge between Gates and Mix Canyons, W 590, W 911; Cold Canyon; Blue Ridge north of Signal Hill; Blue Ridge at north end of range. Vaca Mountains specimens conform to A. discoidea var. alata in possessing cauline leaves with broadly winged petioles but seem to best fit A. discoidea var. eradiata with respect to the size of the heads, the involucres averaging shorter than those of A. discoidea var. alata. Because of this, and because the geographic ranges of these two varieties are not distinct, they are here treated in synonymy under A. discoidea.

Artemisia californica Lessing. California Sagebrush. Rare, known only from near Tolenas Springs, on a south-facing, open slope above Soda Springs Creek, not far below the springs, elevation 215 m, W 4127. This is probably the easternmost station for this species north of San Francisco Bay. Although Jepson (1925) gives its northern limits as Marin County and southwestern Solano County, Munz (1959) correctly adds Napa County, where the species is locally common in the Mayacmas Mountains west of the town

of Napa. California Sagebrush is also known from the western slopes of the Howell Mountains east of Yountville, Napa County (P.H. Raven 5180, CAS, JEPS) and occurs as far north as Mendocino County, near Fort Bragg (A. Eastwood s.n., 1894, CAS).

Artemisia douglasiana Besser. California Mug-wort. Occasional, along streams, in disturbed areas, and in foothill woodland. Mix Canyon, W 1069, W 1766, W 4392; Cold Canyon; east of Tolenas Springs, in woodland and along Soda Springs Creek; along Putah Creek.

Aster radulinus Gray. Rough-leaved Aster. Infrequent, in chaparral, especially in disturbed areas. Mix Canyon, W 1778, W 4369, Jepson s.n., September 3, 1887, Jepson s.n., September 13, 1891; junction of Mix Canyon Road and Ridge Road, W 1790; ridge above Collins Camp, Jepson s.n., August, 1892; Cold Canyon.

Baccharis pilularis Candolle subsp. consanguinea (Candolle) C.B. Wolf. Coyote Brush. Occasional, in disturbed areas, mostly in chaparral but also in open areas of foothill woodland; infrequent in streamside and riparian woodlands. Mix Canyon, W 1999; Cold Canyon; along Blue Ridge near Signal Hill; along Putah Creek.

Baccharis viminea Candolle. Mule Fat. Occasional, along streams. Mix Canyon, along Ulatis Creek, W 605; Cold Canyon, in bed of Cold Creek, W 1544; along Putah Creek, W 1981, W 2336.

Brickellia californica (Torrey & Gray) Gray. California Brickellbush. Occasional, along rocky streambeds and among rocks in canyons. Mix Canyon, W 1011, W 1876, Jepson s.n., September 13, 1891; along Putah Creek, rocky floodplain adjacent to riparian woodland, W 4395; Cold Canyon.

Calycadenia pauciflora Gray. Small-flowered Calycadenia. Habitat unspecified, but probably open rocky slopes in the canyons. Mix Canyon, Jepson s.n., September 3, 1887; Miller Canyon, Jepson s.n., September 21, 1891. Carr (1975a) has gone into considerable detail in explaining the evolution of this species and its close relatives. The complex is comprised of several races in the North Coast Ranges, all of which have the chromosome number n=6, except for one race which has a chromosome number of n=5. The latter race is adapted to more severe habitats bordering the Central Valley; it is to this race that the Vaca Mountains plants belong (Carr, 1975a:685, Figure 1). Although Carr states that this race occurs on serpentine substrate, this is certainly not true of the population in the Vaca Mountains, the substrate of which must be sedimentary rock.

Sierra Nevada populations formerly assigned to Calycadenia pauciflora have been shown by Carr (1975b) to be more closely related to other species in the genus; he has described these plants as C. hooveri G.D. Carr. The

Vaca Mountains, therefore, represent the southernmost station for C. pauciflora.

Calycadenia truncata Candolle subsp. truncata. Rosin Weed. Apparently rare, at higher elevations in chaparral. Vaca Mountain, altitude 700 m, Jepson 2457; western slope of Mount Vaca, "a hundred yards or so below the summit," Jepson s.n., June 1892-3. On the herbarium label of the latter collection Jepson states the following: "I think this does not occur on eastern slopes or in Vaca Valley."

Carduus pycnocephalus Linnaeus. Italian Thistle. A much too common weed of disturbed places and overgrazed grassy areas. Mix Canyon, W 499, W 1453; Cold Canyon, W 2415; west side of ridge just below Mount Vaca, W 2156; along Putah Creek, W 2340; along Pleasants Valley Road between Gates and Mix canyons, W 2230; upper Gates Canyon, Jepson 27531; east of Tolenas Springs; along road near Pansy Flat; near Signal Hill. Native of the Mediterranean region.

Centaurea calcitrapa Linnaeus. Purple Starthistle. Infrequent weed of disturbed areas; locally abundant in a few overgrazed areas at lower elevations. Mix Canyon, W 1017, W 1018; east of Tolenas Springs not far west of Interstate 80 freeway, W 4135; northwest corner of Gates Canyon Road and Pleasants Valley Road. Native of Eurasia.

Centaurea melitensis Linnaeus. Napa Thistle; Tocalote. Occasional weed of disturbed areas. Mix Canyon, W 931; Cold Canyon, W 963, W 2410; west side of ridge just below Mount Vaca, on old chaparral burn, W 2124.5. Native of the Mediterranean region.

Centaurea solstitialis Linnaeus. Yellow Star-thistle. Barnaby's Thistle. Common weed of disturbed areas and overgrazed grassland; locally abundant in some places. Mix Canyon, W 2377, W 2455; junction of Mix Canyon Road and Ridge Road, W 1884; west side of ridge just below Mount Vaca, on old chaparral burn, W 2124; Cold Canyon; Blue Ridge south of Signal Hill; Blue Ridge, northern part of range; Tolenas Springs; along Putah Creek; north of Pleasants Valley School site. Native of southern Europe and the Mediterranean region. Jepson, in his Field Book for the year 1919 (36:147), states the following regarding this species' distribution near Vacaville: "It is 1000 times as common as ten years ago, perhaps even six years ago. It takes the place that used to be occupied by Madia [Hemizonia] luzulaefolia."

Chaenactis glabriuscula Candolle var. gracilenta (Greene) Keck [C. tanacetifolia Gray]. Rare, on open slopes. Cold Canyon, near mouth, W 1517; Gates Canyon, W.D. Clark 261 (SACT).

Cichorium intybus Linnaeus. Chicory. Weed of roadsides and disturbed areas at lower elevations; also

found in riparian woodland. Along Putah Creek, W 1810. Native of Europe.

Cirsium proteanum J.T. Howell. Venus Thistle. Occasional, in open areas in chaparral and foothill woodland at higher elevations. Mix Canyon, W 932, Jepson 10514; Gates Canyon, Jepson s.n., July 7, 1891; west side of ridge just below top, near Mount Vaca, W 1683; along Blue Ridge north of Mix Canyon, W 4377; Blue Ridge south of Signal Hill; Blue Ridge between Mix and Gates canyons.

Cirsium vulgare (Savi) Tenore. Bull Thistle. Weed of moist and disturbed areas. Mix Canyon, W 1767, W 4385; junction of Mix Canyon Road and Ridge Road, W 1787; along cleared margins of Ridge Road north of Signal Hill; margins of stock pond in Pansy Flat; along Ridge Road in northern part of range; along Putah Creek. Native of Eurasia. This introduced thistle differs from all other members of the genus Cirsium found in California in having leaves which are scabrous-hispid on the upper surface.

Conyza bonariensis (Linnaeus) Cronquist. Infrequent weed of disturbed areas at lower elevations. Gates Canyon, along road near mouth, W 4098. Native of South America.

Conyza canadensis (Linnaeus) Cronquist. Horseweed. Occasional weed of moist and disturbed areas. Mix Canyon, W 1012, W 1774; Mix Canyon, near Ulatis Creek, W 1044; Gates Canyon, margins of Alamo Creek, W 4104; fishing

access along Putah Creek, disturbed area near parking lot, W 4412. Probably introduced from eastern North America.

Cotula australis (Sieber) J.D. Hooker. Australian Brass-buttons. Rare weed of disturbed areas. Cold Canyon, near mouth, W 2413; Mix Canyon, along road, W 577.5. Native of Australia.

Erigeron foliosus Nuttall var. hartwegii (Greene) Jepson. Leafy Daisy. Reported from Blue Ridge above Cold Canyon by Stebbins and Webster (1981).

Erigeron philadelphicus Linnaeus. Philadelphia Daisy. Rare, along streams. Walker Canyon, Jepson s.n., May 17, 1892.

Eriophyllum lanatum (Pursh) Forbes var. achillaeoides (Candolle) Jepson. Oregon Sunshine. Frequent, in open areas of foothill woodland and chaparral. Mix Canyon, W 493, W 599, Jepson 14566, Jepson 7195; Gates Canyon, W 640, Jepson 18881; west side of ridge just below top, near Mount Vaca, W 1689; Blue Ridge between Gates and Mix canyons, W 886, W 905; along Blue Ridge north of Mix Canyon, W 4373; slopes north of State Highway 128 at north end of range, W 2329; ridges below Collins Camp, Jepson 14551; Cold Canyon; near Signal Hill. Jepson's collection number 14551 is the type specimen of his Eriophyllum idoneum (Jepson, 1901:524), reduced to synonymy under E. lanatum var. achillaeoides by Jepson himself (1925:1118-1119). This taxon ranges north to middle Oregon; hence, the common name, Oregon Sunshine.

Evax sparsiflora (Gray) Jepson. Reported from Cold Canyon by Stebbins and Webster (1981).

Filago californica Nuttall. California Cotton-rose. Frequent, especially in open grassy areas, but also in open areas of chaparral and on chaparral burns. Mix Canyon, W 2610; west side of ridge just below Mount Vaca, on chaparral burn, W 2126; west side of range below head of Seventy Acre Canyon, W 2150; Cold Canyon, W 3061; south of Signal Hill just below ridge on east side, W 4237; cleared areas along Blue Ridge north of Signal Hill, W 4252.

Filago gallica Linnaeus. Narrow-leaved Filago. Frequent, in open grassy areas, disturbed places, openings in chaparral, and on burns. Mix Canyon, W 2019.5; foothills north of State Highway 128 at north end of range, W 1990; cleared areas along Blue Ridge north of Signal Hill, W 4251; cleared areas along Blue Ridge in northern part of range, W 4214; west side of range not far below Mount Vaca, W 2202; west side of range below head of Seventy Acre Canyon, W 2196; southwest of Monticello Dam, on chaparral burn, W 2291; Collins Ridge south of Gates Canyon, Jepson 27532A; Cold Canyon. Native of Europe.

Filago vulgaris Lamarck. Rare, known only from one collection on the west side of the range at the approximate latitude of Mount Vaca, in dry soil among rocks in chaparral, elevation above 450 m, W 2139. This native of Europe,

widely naturalized in the eastern United States, has heretofore been reported from Mendocino County, California, and Douglas County, Oregon (Munz, 1968; Abrams and Ferris, 1960). The above collection represents a new record for this species, which differs from other species of Filago in California by its cuspidate receptacular bracts and subulate receptacle.

Gnaphalium beneolens A. Davidson. Fragrant Everlasting. Rare, in rocky areas in chaparral. West side of ridge just below Mount Vaca, W 1686.

Gnaphalium californicum Candolle. California Cudweed. Green Everlasting. Occasional, in foothill woodland and chaparral, often in open, rocky areas, sometimes on margins of streams. Mix Canyon, W 1772, W 2376; Mix Canyon, along Ulatis Creek, W 1050; Blue Ridge between Gates and Mix canyons, W 904; Blue Ridge north of Mix Canyon, W 4376; Cold Canyon.

Gnaphalium luteo-album Linnaeus. Weedy Everlasting. Infrequent, mostly in moist, disturbed areas but sometimes in foothill woodland. Along Putah Creek, W 4429; margins of stock pond at Pansy Flat, W 4318; south of Signal Hill, just below ridge on east side, foothill woodland, W 4270. Native of Europe.

Gnaphalium palustre Nuttall. Lowland Cudweed. Rare, known only from a shallow, intermittent drainage along Ridge Road, 3.9 km north of its junction with Mix

Canyon Road, W 4186, W 4275. To be expected in similar situations elsewhere in the range.

Grindelia camporum Greene. Gum Plant. Occasional, in grassy open areas and along ridgetops; rarely found in closed woodland. Mix Canyon, W 1081, W 1752; Blue Ridge between Gates and Mix canyons, W 1885; along Pleasants Valley Road, 4.0 km south of Putah Creek, W 1796; along Putah Creek, in dry open areas adjacent to riparian woodland, W 4401; along Putah Creek, in riparian woodland, W 2342; Pansy Flat.

Helenium puberulum Candolle. Rosilla. Infrequent, in moist areas, as along margins of streams. Along Putah Creek, W 1809; Mix Canyon, along Ulatis Creek.

Helianthella californica Gray var. californica. Frequent, mostly in relatively open areas of chaparral, but also found on north-facing slopes in foothill woodland. Mix Canyon, W 867, W 2364, W 2434; Gates Canyon, W 628; Blue Ridge near Mount Vaca, W 898, W 2469; Blue Ridge in northern part of range, W 4193; west side of range near head of Seventy Acre Canyon, W 2149; Collins Camp, Jepson 27534; Cold Canyon.

Helianthella californica Gray var. nevadensis (Greene) Jepson. Apparently rare, along Blue Ridge in the vicinity of Mount Vaca, in chaparral. Near top of Mount Vaca, W 1701; along Blue Ridge, a few hundred meters north of Mount Vaca, W 2473. This variety differs from H. californica var. californica in having a pappus of two

awns about 1-2 mm in length (and often a border of short lacerate squamellae), whereas the latter variety has no pappus (although occasionally, as in my collection number 898, the achenes may have two minute bristles when young). The above collections represent an extension of the known range of H. californica var. nevadensis, the range of which had previously been reported as Lake County to Trinity County in the inner Coast Ranges (Abrams and Ferris, 1960; Munz, 1959); it is the only variety found in the Sierra Nevada. The fact that these two varieties are sympatric in the Vaca Mountains (my collection numbers 2469 and 2473 were found just a few meters apart) and occur in similar habitats raises questions concerning the validity of maintaining two separate taxa. My collection number 2473 may, in fact, represent an intermediate. This individual possesses achenes with one well developed awn of about 1-2 mm length and one awn reduced to a much smaller bristle. Moreover, on some of the achenes both awns are reduced. In the absence of a more complete study, the traditional treatment of these varieties is here retained.

Helianthus annuus Linnaeus. Common Sunflower. Rare, in disturbed areas at lower elevations. Mix Canyon, W 1059. Native of the Great Plains region of North America.

Helianthus californicus Candolle. California Sunflower. Rare, growing in moist areas along streambeds. Mix Canyon, along Ulatis Creek, W 1042. This represents

one of the northernmost stations for this species. The northern limit of distribution appears to be in Napa County, where it has been collected at Angwin's Meadows, Howell Mountain (Jepson 13424). California Sunflower ranges south to Baja California.

Helianthus gracilentus Gray. Chaparral Sunflower. Rare, in open areas of chaparral on ridgetops; somewhat gregarious. Cleared margins of Ridge Road north of Signal Hill, W 4254. This collection represents the first record of this species north of Mount Diablo. The species is apparently rare in the Vaca Mountains based on this sole collection (it has also been observed in the vicinity of Mount Vaca), but its abundance may be linked, as suggested by Bowerman (1944:254), to disturbance, especially fire. The above collection came from an area adjacent to Ridge Road which was mechanically cleared for fire control.

Hemizonia fitchii Gray. Fitch's Spikeweed. Although this species has not been found within the actual boundaries of the Vaca Mountains as defined by this study, its occurrence, based on the following collection, in the foothills just north of the range makes it very likely that it will be found at lower elevations on the east side of the Vaca Mountains. Low foothills north of State Highway 128, about 2.1 km northeast of its junction with Pleasants Valley Road (County Road 86), W 1947. The species also occurs on the valley floor near Vacaville, Jepson s.n., in 1894.

Hemizonia luzulaefolia Candolle subsp. rudis (Bentham) Keck. Hayfield Tarweed. Occasional, sometimes locally abundant, in open grassy areas at lower elevations, especially where heavily grazed. Mix Canyon, near mouth, W 1070, W 4443; rolling, grassy hills west of Pleasants Valley Road south of Foothill Drive, W 1873; overgrazed grassland north of Pleasants Valley School site. Hoover (1970:289) questions whether this subspecies is genetically distinct from H. luzulaefolia subsp. luzulaefolia which differs in its lack of a well formed rosette and somewhat smaller involucres. The ranges of the two subspecies are very similar. Only the form corresponding to H. luzulaefolia subsp. rudis has been found in the Vaca Mountains.

Hemizonia pungens (Hooker & Arnott) Torrey & Gray subsp. maritima (Greene) Keck. Common Spikeweed. Rare, known only from Tolenas Springs, in alkaline bald spots and adjacent grassland, W 4146. This subspecies, which is also known from the Sacramento Valley near Vacaville (Jepson s.n., May 16, 1892), is very similar to Hemizonia pungens subsp. pungens. The distinctions between these two subspecies, and H. pungens subsp. septentrionalis Keck, are rather nebulous, especially in the absence of clear-cut geographic separation. The three subspecies are perhaps best treated as mere forms of Hemizonia pungens.

Heterotheca oregona (Nuttall) Shinners [Chrysopsis oregona (Nuttall) Gray]. Oregon Golden-aster. Rare, known

only from the open floodplain of Putah Creek, inland from the riparian woodland, W 4432. These plants represent Chrysopsis oregona var compacta Keck, which has been reduced to synonymy in the treatment found in Kartesz and Kartesz (1980:83).

Hieracium albiflorum Hooker. White Hawkweed. Rare, in the foothill woodland of the canyons. Mix Canyon, W 1720.

Hypochoeris glabra Linnaeus. Smooth Cat's-ear. Common, especially in grassland, but also in foothill woodland, openings in chaparral, and disturbed areas. Mix Canyon, W 1397, W 1469; Cold Canyon, W 743, W 1550; along Blue Ridge north of Mix Canyon, W 4279; west side of ridge just below Mount Vaca, W 2167; near Monticello Dam, W 2275; hills north of State Highway 128 at north end of range, W 1987; along Blue Ridge south of Signal Hill; Tolenas Springs. Native of the Old World.

Hypochoeris radicata Linnaeus. Hairy Cat's-ear. Rare weed of disturbed areas. Along Blue Ridge north of Signal Hill, W 4258. Native of the Old World.

Lactuca serriola Linnaeus. Prickly Lettuce. Occasional weed of disturbed areas and moist ground. Mix Canyon, W 1049, W 1082; Mix Canyon, along Ulatis Creek, W 1769; along Pleasants Valley Road between Mix Canyon Road and Vaca Valley Road, in agricultural area, W 1756; along Putah Creek, in riparian woodland; overgrazed area north of Pleasants Valley School site. Native of Europe.

Lagophylla ramosissima Nuttall. Slender Hareleaf. Rare, in foothill woodland. Cold Canyon, W 954.

Madia elegans D. Don ex Lindley subsp. densifolia Keck. Infrequent, at lower elevations in the canyons on the east side. Mix Canyon, W 1077. This is the fall-flowering lowland ecotype of Keck's treatment (in Abrams and Ferris, 1960:168).

Madia elegans D. Don ex Lindley subsp. vernalis Keck. Infrequent, in foothill woodland and grassy openings. Mix Canyon, W 830, W 1400, W 2361; along Blue Ridge north of Mix Canyon, in grove of Quercus kelloggii, W 922; west side of ridge, just below Mount Vaca, in foothill woodland, W 1692; Cold Canyon. This is the spring-flowering lowland ecotype of Keck's treatment (in Abrams and Ferris, 1960: 168).

Madia exigua (Smith) Gray. Small Tarweed. Infrequent, in more or less open areas in chaparral and foothill woodland, and on disturbed ground. Mix Canyon, W 1597; along Blue Ridge in northern part of range, W 4194; on cleared margins of Ridge Road, northern part of range, W 4215; Blue Ridge north of Mix Canyon, W 918; Blue Ridge between Gates and Mix canyons, W 712, W 883, W 913; vicinity of Signal Hill, W 4264. This species shows considerable variation in the Vaca Mountains. Height ranges from as little as 2 cm to as much as 25 cm. Some collections (numbers W 883, W 913, W 918) have elongated peduncles while others (W 712, W 1597, W 4194, W 4264) have heads on

very short peduncles. The length of the peduncles seems to be at least partially correlated with season, those specimens collected later in the year (e.g., June) having elongated peduncles. Howell (1970:278) has noted considerable size variation in Marin County.

Madia gracilis (Smith) Keck subsp. gracilis. Slender Tarweed. Frequent, in foothill woodland and grassland, sometimes near streams. Mix Canyon, W 947, W 1427; Mix Canyon, along Ulatis Creek, W 939, W 863; Gates Canyon, W 635, W 685; Cold Canyon, W 976, W 1505; near Monticello Dam, W 2278, W 2304; south of Signal Hill, just below Blue Ridge on east side, W 4234. This is the most common member of the Madiinae in the Vaca Mountains.

Malacothrix clevelandii Gray. Rare, at higher elevations in chaparral and foothill woodland. Along Blue Ridge near the head of Gates Canyon, W 805; south of Signal Hill along Blue Ridge, in woodland, W 4271. This species superficially resembles a Senecio. The purple-tipped inner phyllaries and the shorter outer phyllaries which are also purple-tipped resemble the black-tipped involucral bracts and bracteoles of Senecio vulgaris. Both Malacothrix and Senecio have a pappus of capillary bristles. It is here, of course, that the resemblance ends.

Malacothrix floccifera (Candolle) Blake. Woolly Malacothrix. Rare, on open rocky slopes, mostly in chaparral. Mix Canyon, talus, south-facing bluff, W 1460, W 2454; west side of ridge, not far below Mount Vaca,

W 2179; along State Highway 128 about 1.6 km southwest of Monticello Dam, W 2300.

Matricaria matricarioides (Lessing) Porter. Pineapple Weed. In hard packed disturbed ground, as along roads; sometimes in heavily grazed grassland. Mix Canyon, along road, W 569; Cold Canyon, near old homestead, W 1347; along dirt road to Tolenas Springs.

Micropus californicus Fischer & Meyer. Slender Cottonweed. Common, in grassland, foothill woodland, and open areas in chaparral; also found on burns. Mix Canyon, W 494, W 1405, W 2019; Cold Canyon, W 739, W 760; Cold Canyon, burned area, W 1506, W 4212; west side of range just below Mount Vaca, W 2166; near Monticello Dam, W 2255, W 2313; foothills north of State Highway 128 at north end of range, W 1991; Pansy Flat; along Blue Ridge south of Signal Hill.

Microseris douglasii (Candolle) Schultz-Bipontinus subsp. tenella (Gray) Chambers. Rare, in grassland at low elevations. Hills north of State Highway 128 at north end of range, W 2248.

Microseris heterocarpa (Nuttall) Chambers. Rare, in grassland at low elevations. Hills north of State Highway 128 at north end of range, W 2247.

Microseris lindleyi (Candolle) Gray [M. linearifolia (Nuttall) Schultz-Bipontinus]. Frequent, most common in chaparral, but also in grassland and foothill woodland. Mix Canyon W 1260, W 1465, W 2391; Gates

Canyon, Jepson 18717, Jepson s.n., June 20, 1892; high slopes of Miller Canyon, Jepson s.n., May 23, 1897; Walker Canyon, Jepson s.n., May 17, 1892; Cold Canyon, W 1525; Blue Ridge near Mount Vaca, W 2479; Blue Ridge north of Signal Hill, W 4246; east of Tolenas Springs, W 4123; near Monticello Dam, W 2282, W 2424; west side of range, just below Mount Vaca, W 2134; along Blue Ridge north of Mix Canyon, in black oak grove, W 1634; along Blue Ridge in northern part of range, in chaparral. This species is most attractive in fruit, with its heads of spreading achenes with silvery paleae.

Picris echioides Linnaeus. Bristly Ox-tongue. Rare weed of disturbed, alkaline, and moist areas. Along Cherry Glen Road, about 1.6 km west of the Interstate 80 freeway, in moist drainage along road, W 1852; at Tolenas Springs, in grassland; along Pleasants Valley Road. This native of Europe, rare in the Vaca Mountains, is far more common in saline and alkaline areas on the floor of the Sacramento Valley in Solano County, especially along the edges of brackish marshes.

Psilocarphus oregonus Nuttall. Oregon Woolly-heads. Rare, known only from a shallow, intermittent drainage along Ridge Road, 3.9 km north of its junction with Mix Canyon Road, W 4185. This species, quite rare in the Vaca Mountains, is rather frequently found in vernal pools on the floor of the Sacramento Valley.

Psilocarphus tenellus Nuttall var. tenellus. Slender Woolly-heads. Occasional, on bare, hard packed ground and on burns. Mix Canyon, near mouth, Jepson 18799; Cold Canyon, W 1309, W 2407, W 3048; in cleared areas along Ridge Road in northern part of range, W 4211; along Ridge Road, just north of Pansy Flat, W 4333.

Rafinesquia californica Nuttall. California Chicory. Infrequent, usually in shaded areas under trees or shrubs or in rocky areas; also found in disturbed areas in chaparral; to be expected on chaparral burns. Gates Canyon, W 675; Cold Canyon W 2408, W 3056; cleared margins of Ridge Road, north of Signal Hill, W 4244.

Rigiopappus leptocladus Gray. Bristle-head. Occasional, mostly in chaparral or grassy areas at higher elevations; sometimes found in foothill woodland. Cold Canyon, W 3059; south of Signal Hill, just east of Blue Ridge, W 4290; along Blue Ridge in northern part of range, W 4171, W 4203; west side of ridge not far below Mount Vaca, W 2160; hills north of State Highway 128 at north end of range, W 2235; near Pine Peak, Jepson s.n., no date.

Senecio aronicoides Candolle. Butterweed. Occasional, in open or disturbed areas of chaparral at higher elevations. Gates Canyon, Jepson s.n., 1892; Blue Ridge between Gates and Mix canyons, W 593, W 798; Blue Ridge in northern part of range, W 1652; below Collins Camp, Jepson s.n., 1893; Blue Ridge north of Signal Hill.

Senecio douglasii Candolle var. douglasii. Rare, known only from Mix Canyon, Jepson s.n., 1891. I have not seen this plant in the Vaca Mountains. Although its habitat was not indicated by Jepson, it is likely that it was collected along the bed of Ulatis Creek.

Senecio eurycephalus Torrey & Gray var. eurycephalus. Cut-leaved Butterweed. Rare, known only from Devil's Gate, Putah Pass, Jepson 9050, Jepson 10409. Devil's Gate is the narrow canyon cut by Putah Creek at the north end of the Vaca Mountains. Monticello Dam now spans its breadth. This is the southernmost reported station for this taxon.

Senecio vulgaris Linnaeus. Common Groundsel. Common weed of open and disturbed areas; in grassland, woodland, and chaparral; also present on chaparral burns. Mix Canyon, W 1183, W 1193; Cold Canyon, W 1222, W 2399; Cold Canyon, in burned area near mouth, W 1318; west side of range not far below Mount Vaca, W 1380; cleared margins of Ridge Road in northern part of range, W 4207; cleared margins of Ridge Road north of Signal Hill; east of Tolenas Springs, along road. Native of Europe.

Silybum marianum (Linnaeus) Gaertner. Milk-thistle. Occasional weed of disturbed areas such as roadsides and overgrazed grassland. Gates Canyon, near mouth, W 1682; Cold Canyon; Tolenas Springs. Native of the Mediterranean region.

Solidago californica Nuttall. California Goldenrod. Infrequent, in dry open areas or moist places. Mix Canyon, near Ulatis Creek, W 1043; along Cherry Glen Road just east of its junction with Pleasants Valley Road, moist ground near irrigation ditch, W 1865; along Ridge Road north of Mix Canyon, W 4375; Cold Canyon.

Solidago occidentalis (Nuttall) Torrey & Gray. Western Goldenrod. Rare, in riparian woodland along Putah Creek, W 1813. This species is sometimes placed in the segregate genus, Euthamia Elliot, as E. occidentalis Nuttall.

Soliva pterosperma (Jussieu) Lessing. Rare weed of disturbed ground. Cold Canyon, in compacted soil, W 2406, W 3058. This native of Argentina differs from Soliva sessilis Ruiz & Pavon in having achene wings that are notched on either side near the base; the achene wings of S. sessilis are entire. Munz (1959) reports the range of S. pterosperma in California as the Sierran foothills. It has since been discovered on Angel Island, Marin County, by Ripley (1969:91; reported in Howell, 1970:360) and in the vicinity of Dozier Station, south of Dixon, Solano County, W 2732, W 2769. (It is also included on an unpublished list of plants of the Dozier Station area prepared by Jack Major in 1975.) The Cold Canyon collections cited above extend the species' range into the Vaca Mountains. Either this South American native is in the process of expanding its range, or it has previously been mistaken

for S. sessilis. Some evidence suggests the latter. Two specimens from Howell Mountain, Napa County (Jepson 14874, May 8, 1893, and Jepson 18856, May 25, 1938) and one from between Bird's Landing and Denverton, Solano County (Jepson s.n., May 14, 1892) were originally determined by Jepson to be S. sessilis. They have since been annotated by G.T. Robbins as S. pterosperma.

Sonchus asper (Linnaeus) Hill. Prickly Sow-thistle. Occasional weed of disturbed areas; sometimes found near streams and other moist places. Mix Canyon, W 946, W 1709; Gates Canyon, W 678; cleared margins of Ridge Road north of Signal Hill; along Putah Creek in riparian woodland. Native of Europe.

Sonchus oleraceus Linnaeus. Common Sow-thistle. Occasional weed of disturbed areas and moist ground. Mix Canyon, W 1247, W 1718; along Putah Creek, riparian woodland, W 1811, W 2352. Native of Europe.

Bowerman (1944:240) states that Sonchus asper differs from S. oleraceus in having peduncles which often possess gland-tipped hairs; the latter species lacks these gland-tipped hairs. Although this difference seems to hold for Vaca Mountains plants, specimens of S. oleraceus from other areas in California (e.g., Santa Monica Mountains, Raven 14165, JEPS; Marin County, Penalosa & Howell 1646, JEPS) have obvious gland-tipped hairs.

Stephanomeria virgata Bentham. Infrequent, in dry open areas of chaparral and foothill woodland. Mix Canyon,

W 1046, W 1062; at junction of Mix Canyon Road and Ridge Road, W 1883; along Ridge Road north of Mix Canyon, W 4389; Cold Canyon.

Stylocline filaginea (Gray) Gray. Rare, open areas in chaparral. Cleared margins of Ridge Road, in northern part of range, W 4213; along Blue Ridge north of Mix Canyon, W 1651.

Tragopogon porrifolius Linnaeus. Salsify. Oyster Plant. Rare weed of disturbed areas at lower elevations. Along Pleasants Valley Road at bridge over Encinosa Creek, W 2229; at junction of Interstate 80 frontage road and road to Tolenas Springs. Native of Europe.

Wyethia angustifolia (Candolle) Nuttall. Narrow-leaved Mule-ears. Infrequent, in grassland and rather open areas in foothill woodland. Near Pansy Flat, W 4329; hills north of State Highway 128 at north end of range, W 2231; English Hills, W 2218; hillslopes on edge of Vaca Valley, Jepson 18780.

Wyethia helenioides (Candolle) Nuttall. Woolly Mule-ears. Frequent, in open grassy areas and along ridges in chaparral. Mix Canyon, W 504, W 1448; ridge at head of Mix Canyon, Jepson 2184, Jepson 18770; Walker Canyon, Jepson 21448; Collins Camp, Jepson 27533; Cold Canyon, W 1500; Blue Ridge between Gates and Mix canyons, W 912; south of Signal Hill on east side of ridge, W 4241; east of Tolenas Springs, W 4121; near Monticello Dam, W 2303. Individuals of this species vary considerably in the

amount of tomentum present. Because of a tendency to become glabrate, many individuals display tomentum only at the bases of the involucres, at the nodes, and near the base of the plant.

Wyethia glabra Gray has been reported from Mix Canyon by Jepson (Field Book 10:5-11). It is closely related to W. helenioides, differing from that species in its complete lack of tomentum and smaller achenes. I have not found W. glabra in Mix Canyon or at any other location in the Vaca Mountains, nor have I seen any herbarium specimens from the range. Wyethia glabra is more commonly encountered in the outer and middle Coast Ranges. Bowerman (1944:254) reports both W. helenioides and W. glabra from Mount Diablo; the former is frequent there, while the latter is rare.

Xanthium spinosum Linnaeus. Spiny Clotbur. Infrequent weed of disturbed and moist areas at lower elevations; sometimes gregarious. In irrigated pasture west of Pleasants Valley Road, north of its junction with Cherry Glen Road, abundant, W 1869; in low swales north of Pleasants Valley School site. According to Abrams and Ferris (1960:154), this cosmopolitan weed is a native of South America but was originally described from Portugal. An aggressive weed of pastures, Xanthium spinosum is poisonous to livestock, and the burs cause mechanical damage (Robbins et al., 1951).

Xanthium strumarium Linnaeus var. canadense (Miller) Torrey & Gray. Cocklebur. Infrequent weed of moist areas at lower elevations. Gates Canyon, in dry bed of Alamo Creek, W 4101; along Putah Creek, in riparian woodland, W 1821. (The latter specimen was collected in vegetative condition; it can be confidently assigned to Xanthium strumarium, but whether it represents the variety canadense is impossible to determine.) This cosmopolitan and doubtfully native weed shares the same obnoxious qualities as X. spinosum.

BERBERIDACEAE. Barberry Family

Berberis dictyota Jepson [Mahonia dictyota (Jepson) Fedde]. California Mahonia. Infrequent, on ridges in chaparral or foothill woodland. Along Blue Ridge north of Mix Canyon, W 1361; along Blue Ridge south of Signal Hill, W 4233; west of the ridge at head of Mix Canyon, Jepson 2185. The name Berberis dictyota, as used by some authors, is restricted to plants from the Marysville (Sutter) Buttes. Following this treatment, Vaca Mountains plants would be assigned to B. californica Jepson, the type locality of which is the nearby Pellejo Hills (Jepson s.n., March 16, 1896).

BETULACEAE. Birch Family

Alnus rhombifolia Nuttall. White Alder. Occasional, in streamside and riparian woodland. Mix Canyon,

along Ulatis Creek, W 2462; Gates Canyon, along Alamo Creek, W 656; along Putah Creek, W 1820.

BORAGINACEAE. Borage Family

Allocarya bracteata Howell [Plagiobothrys bracteatus (Howell) Johnston]. Rare, known only from moist areas on the margin of a stock pond in Pansy Flat, W 4310. To be expected in similar situations elsewhere.

Amsinckia intermedia Fischer & Meyer. Common Fiddleneck. Common, in grassland and open areas of foothill woodland; occasional in chaparral openings. Mix Canyon, W 1195, W 1285, W 1420; Cold Canyon, W 1201; orchard along Pleasants Valley Road between Mix and Gates canyons, W 1905; east of Tolenas Springs, W 4156; west side of ridge, just below Mount Vaca, W 2172.

Amsinckia lycopsoides Lehmann. Infrequent, in grassland and open areas of foothill woodland. Mix Canyon, W 1468; Gates Canyon, W 1946.

Amsinckia menziesii (Lehmann) Nelson & MacBride. Narrow-leaved Fiddleneck. Open areas at higher elevations. Cold Canyon (Stebbins and Webster, 1981).

Cryptantha flaccida (Douglas) Greene. Nievitas. Occasional, in open and disturbed areas, on talus slopes, and on burns. Mix Canyon, W 1462, W 2014, W 2217; Cold Canyon, W 1519, W 3054; Cold Canyon, in burned area, W 1316; west side of range not far below Mount Vaca, W 2175.

Cryptantha microstachys (Greene ex Gray) Greene. Tejon Cryptantha. Probably in open areas of chaparral or foothill woodland. Walker Canyon, north fork, Jepson 21124.

Cryptantha muricata (Hooker & Arnott) Nelson & Macbride var jonesii (Gray) Johnston. Prickly Cryptantha. Rare, collected on a chaparral burn south of State Highway 128, 1.1 km southwest of Monticello Dam, W 2292.

Cynoglossum grande Douglas ex Lehmann. Western Hound's Tongue. Occasional, in both foothill woodland and chaparral, usually in shaded areas. Mix Canyon, W 561; Gates Canyon, Jepson 25073; Blue Ridge north of Mix Canyon, in black oak grove, W 1370; west side of ridge not far below Mount Vaca, W 1379; Cold Canyon; along Blue Ridge north of Signal Hill.

Heliotropium curassavicum Linnaeus var. oculatum (Heller) Johnston. Heliotrope. Rare, in open, disturbed area adjacent to the riparian woodland along Putah Creek, W 4396. This taxon is much more frequent in moist, alkaline or saline areas on the floor of the Sacramento Valley in Solano County.

Plagiobothrys canescens Bentham. Valley Popcorn Flower. Rare, in open, grassy areas at lower elevations. Cold Canyon, W 3065; hills north of State Highway 128 at north end of range, W 1966.

Plagiobothrys fulvus (Hooker & Arnott) Johnston var. campestris (Greene) Johnston. Rare, in grassland at

lower elevations. Putah Creek Bluffs, west of Winters, Jepson 21145.

Plagiobothrys nothofulvus (Gray) Gray. Foothill Snowdrops. Rusty Popcorn Flower. Common, in open grassy areas, openings in chaparral, and burned places. Mix Canyon, W 552, W 1995; Cold Canyon, W 1207, W 1518; Cold Canyon, in burned area, W 1312, W 1502; south of State Highway 128, southwest of Monticello Dam, on chaparral burn, W 2286; hills north of State Highway 128 at north end of range, W 1988; below head of Seventy Acre Canyon, W 2199; Pansy Flat, W 4319; summit of Pine Peak, Jepson 21153; trail to Signal Hill via Walker Canyon, Jepson 21150. This is by far the most common "popcorn flower" in the Vaca Mountains.

Plagiobothrys tenellus (Nuttall) Gray. Slender Popcorn Flower. Reported from Cold Canyon by Stebbins and Webster (1981).

BRASSICACEAE. Mustard Family

Arabis modesta Rollins. Modest Rock Cress. Rare, known only from the north-facing, nearly sheer rock face of Putah Canyon in the vicinity of Monticello Dam, D.V. Hemphill, s.n., in 1967 (PUA), G.J. Muth 593 (PUA). This is the southernmost station for this species, which ranges north to southwestern Oregon.

Athysanus pusillus (Hooker) Greene. Sandweed. Frequent, in grassland and foothill woodland. Cold Canyon,

W 1305; hills north of State Highway 128 at north end of range, W 1967; west side of range above head of Seventy Acre Canyon, in woodland, W 2153.

Barbarea orthoceras Ledebour. American Winter Cress. Occasional, growing mostly in disturbed areas in chaparral and on burns; sometimes found in foothill woodland. Gates Canyon, W 1935; Blue Ridge between Gates and Mix canyons, W 914, W 1376; Cold Canyon, in burned area, W 1329; west side of ridge near summit of Mount Vaca, W 2125; cleared margins of Ridge Road north of Signal Hill.

Brassica campestris Linnaeus. Field Mustard. Occasional weed of disturbed areas at lower elevations. Gates Canyon, near mouth, W 1943; along Pleasants Valley Road between Gates and Mix canyons, in orchard, W 1907; along Interstate 80 frontage road, 1.6 km east of North Texas Street overcrossing, W 1927; east of Tolenas Springs, along road, W 4134. Native of Europe.

Brassica geniculata (Desfontaines) J. Ball. Mediterranean Mustard. Summer Mustard. Occasional weed of disturbed and vernally moist areas. Along Putah Creek, W 2422, W 4433; Cold Canyon, W 989; near Monticello Dam, W 783; along Interstate 80 frontage road, 1.6 km east of North Texas Street overcrossing, W 1930. Native of the Mediterranean region.

Brassica kaber (Candolle) Wheeler. Charlock. Rather frequent weed of disturbed areas and grazed grasslands, mostly at lower elevations; sometimes found on

burns. Mix Canyon, W 1422, W 1440; Gates Canyon, W 1945; Cold Canyon, W 1348, W 1534; Cold Canyon, in burned area, W 1319; disturbed area near roadside park along State Highway 128 at north end of range, W 1921; along Interstate 80 frontage road, 1.6 km east of North Texas Street overcrossing, W 1928; north of Pleasants Valley School site, W 4442. Native of Europe.

Brassica nigra (Linnaeus) Koch. Black Mustard. Rare weed of disturbed areas. Along Ridge Road between Gates and Mix canyons, W 1695. Native of Europe. This annual species often reaches heights of 2 m or more.

Capsella bursa-pastoris (Linnaeus) Medicus. Shepherd's Purse. Occasional weed of disturbed areas and grazed grasslands; sometimes found on burns. Cold Canyon, in burned area, W 1215; west side of ridge not far below Mount Vaca, W 2209; English Hills, W 1904; east of Tolenas Springs. Native of Europe.

Cardamine integrifolia (Nuttall) Greene subsp. cardiophylla (Greene) Willoughby, comb. nov. [C. cardiophylla Greene; Dentaria cardiophylla Robinson; Dentaria integrifolia Nuttall var. cardiophylla Jepson; Dentaria californica Nuttall var. cardiophylla (Greene) Detling]. Heart-leaved Toothwort. Occasional, in shaded areas, mostly in woodland. Mix Canyon, Jepson 14731, W 1145, J.M. Tucker 2761 (UC), R.F. Hoover 2770 (UC); Gates Canyon, W 614; Cold Canyon. One of the earliest

plants to flower, Heart-leaved Toothwort reaches its southern limit of distribution in the Vaca Mountains.

Mix Canyon is the type locality (Jepson 14731, cited above) for this taxon, originally described as Cardamine cardiophylla by Greene (1891:266). It was later transferred to the genus Dentaria Linnaeus and was retained there by Detling (1936) as D. californica var. cardiophylla. As Hitchcock (1964:471) and Hoover (1970:149) have pointed out, the specific epithet, "integrifolia," rather than "californica," is the legitimate name, following Article 67 of the International Code of Botanical Nomenclature (latest edition: Stafleu, 1978), because Jepson (1925:426) included the latter as a variety of the former. Although a validly published name is available under Dentaria, D. integrifolia Nuttall var. cardiophylla (Greene) Jepson (1925:426), no valid combination exists under Cardamine whereby the treatment of Detling can be retained. Because the current practice of workers in the Brassicaceae is to submerge Dentaria into Cardamine, it has been necessary to form the above new combination in order to follow the treatment of Detling, which represents the most recent published work dealing with this taxon and its close relatives. I have employed the rank subspecies rather than variety because of my own predilection for that taxonomic category and because it seems clear to me that Detling's use of variety in this case is consistent with the modern-day subspecies.

Cardamine oligosperma Nuttall. Few-seeded Bitter Cress. Occasional, in foothill woodland and vernally moist areas; sometimes in disturbed areas. Mix Canyon, W 1181, W 1253; Gates Canyon, W 617; Cold Canyon, W 1306; cleared margins of Ridge Road in northern part of range.

Cardamine pensylvanica Muhlenberg ex Willdenow. Pennsylvania Bitter Cress. Rare, known only from the mouth of Cold Canyon, in foothill woodland, W 1224. Although the above collection seems to represent this species, my determination is based on only one specimen with slightly immature fruits. The occurrence of this species in the Vaca Mountains is, therefore, somewhat questionable.

Cardaria draba (Linnaeus) Desvaux. Whitetop. Hoary Cress. Rare, known only from a small colony in a disturbed area at the mouth of Cold Canyon, W 1501, W 4499. This native of Europe is a serious agricultural pest (Robbins et al., 1951).

Caulanthus lasiophyllus (Hooker & Arnott) Payson var. inalienus (Robinson) Payson [Thelypodium lasiophyllum (Hooker & Arnott) Greene var. inalienum Robinson]. Rare, in grassy open areas. Mix Canyon, W 2004. This variety reaches its northern limit of distribution in the Vaca Mountains.

Caulanthus lasiophyllus (Hooker & Arnott) Payson var. lasiophyllus [Thelypodium lasiophyllum (Hooker & Arnott) Greene var. lasiophyllum]. California Mustard.

Occasional, more frequent than the preceding, in shaded and open areas of foothill woodland and chaparral; also found in disturbed areas and among rocks. Mix Canyon, W 600; Gates Canyon, Jepson 13349; Cold Canyon, W 2409, W 3060; west side of ridge above head of Seventy Acre Canyon, W 2204; cleared margins of Ridge Road in northern part of range, W 4202.

Caulanthus lasiophyllus var. inalienus, with reflexed siliques, is doubtfully distinct, even at the varietal level, from the much more widespread C. lasiophyllus var. lasiophyllus, which has spreading siliques, especially in light of their sympatric occurrence in the Vaca Mountains. Hoover (1970:170) has pointed out, however, that the former variety, except for a single record in San Luis Obispo County, occurs only in the vicinity of San Francisco Bay, whereas C. lasiophyllus var. lasiophyllus is widely distributed in the Pacific States. More study is clearly in order before reducing them to synonymy. For a discussion of the reasons for including these taxa in Caulanthus rather than Thelypodium or Streptanthus, the reader is referred to Al-Shehbaz (1973).

Descurainia sophia (Linnaeus) Webb ex Prantl. Tansy Mustard. Rare weed of disturbed ground. Cold Canyon, W 2405. Native of Europe.

Erophila verna (Linnaeus) Chevallier subsp. praecox (Steven) Walters [Draba verna Linnaeus var. aestivalis

Lejeune]. Whitlow-grass. Reported from Cold Canyon by Stebbins and Webster (1981). Native of Europe.

Erysimum capitatum (Douglas) Greene var. capitatum. Western Wallflower. Occasional, in open areas of foothill woodland and chaparral, often among rocks. Mix Canyon, W 531, W 1396; Blue Ridge south of Signal Hill, W 4232; Cold Canyon; east of Tolenas Springs.

Lepidium nitidum Nuttall var. nitidum. Shining Pepper-grass. Common in grassy areas, especially where grazed. Mix Canyon, W 1421; hills north of State Highway 128 at north end of range, W 1975; in open field west of Pleasants Valley Road, at junction with Vaca Valley Road, W 2026; Tolenas Springs.

Lepidium strictum (Watson) Rattan. Wayside Pepper-grass. Rare weed of compacted soil. Cold Canyon, W 3049. Native of South America.

Raphanus raphanistrum Linnaeus. Jointed Charlock. Infrequent weed of disturbed areas at lower elevations. Mix Canyon, W 1418. Native of Europe.

Raphanus sativus Linnaeus. Wild Radish. Occasional weed of disturbed areas at lower elevations. Near State Highway 128 at north end of range, W 1983. This native of Europe is far more common in cultivated areas on the floors of the valleys adjacent to the Vaca Mountains.

Rorippa curvisiliqua (Hooker) Bessey ex Britton. Western Yellow Cress. Rare, in moist areas. Pansy Flat,

margins of stock pond, W 4311. To be expected elsewhere in moist ground.

Rorippa nasturtium-aquaticum (Linnaeus) Schinz & Thellung [Nasturtium officinale R. Brown]. Water Cress. Occasional, in shallow water and on the margins of streams. Gates Canyon, in water of small creek, W 716; Mix Canyon, Ulatis Creek, Jepson 13401; in quiet water along Putah Creek. Native of the Old World.

Sisymbrium altissimum Linnaeus. Tumble Mustard. This weed has been reported from Cold Canyon by Stebbins and Webster (1981). Native of Europe.

Sisymbrium officinale (Linnaeus) Scopoli. Hedge Mustard. Rather common weed of disturbed and overgrazed areas; also found in burned areas. Mix Canyon, W 541, W 2451; Gates Canyon, W 652, W 657; Cold Canyon, W 1504, W 2398; west side of ridge not far below summit of Mount Vaca, W 2128; below head of Seventy Acre Canyon, W 2194; Pansy Flat; Tolenas Springs. Native of Europe.

Streptanthus glandulosus Hooker subsp. glandulosus. Jewel Flower. Infrequent, on rocky slopes and grassy hillsides. Mix Canyon, W 1466, W 2009, Gould 262 (UC); Gates Canyon, W 626; head of Miller Canyon, Jepson 13413; Walker Canyon, north fork, Jepson 13410; east of Tolenas Springs, W 4130; west side of range, near head of Seventy Acre Canyon, W 2145; Cold Canyon. Although this beautiful plant is found largely on serpentine outcrops throughout most of

its range (Kruckeberg, 1958), in the Vaca Mountains it occurs on rock of sedimentary origin.

Thysanocarpus curvipes Hooker var. curvipes. Hairy Fringe-pod. Frequent, on grassy or rocky slopes; sometimes found in disturbed and burned areas. Mix Canyon, W 1194, W 1997; Gates Canyon, Jepson 26d (cited in Jepson, 1936: 99); Cold Canyon, W 1299, W 1344; Cold Canyon, in burned area, W 1321; west side of ridge, not far below Mount Vaca, in foothill woodland, W 2154; near Monticello Dam, W 2311. Many of the Vaca Mountains specimens assigned to this taxon have perforated silicles as found in T. elegans Fischer & Meyer. The petals of these individuals, however, are about 1 mm long and shorter than the stamens, rather than 2-3 mm long and longer than the stamens as in T. elegans. The silicles of these plants, moreover, are mostly about 4 mm broad (sometimes 4-5 mm), and therefore fall within the general limits of T. curvipes var curvipes.

Thysanocarpus elegans Fischer & Meyer [T. curvipes Hooker var. elegans (Fischer & Meyer) Robinson]. Elegant Fringe-pod. Rare, known definitely only from Walker Canyon, Jepson 30j (cited in Jepson, 1936:99). I have not seen the above cited Jepson collection and can make no comment on the accuracy of his determination. The Vaca Mountains certainly seem to fall within the distributional range of this species, and it is probably to be expected elsewhere in these mountains.

Tropidocarpum gracile Hooker var. gracile. Dobie Pod. Rare, in open grassy areas. Cold Canyon, W 1325.

CALLITRICHACEAE. Water Starwort Family

Callitriche marginata Torrey. California Water Starwort. Rare, known only from a shallow drainage along Ridge Road, 3.9 km north of its junction with Mix Canyon Road, growing in mud, W 4188. To be expected in similar situations elsewhere in the Vaca Mountains.

CALYCANTHACEAE. Sweet Shrub Family

Calycanthus occidentalis Hooker & Arnott. Western Spice Bush. Occasional, along streams in shaded canyons. Mix Canyon, W 564, W 825; Gates Canyon, Jepson 561; Vaca Mountains, Napa County, Jepson s.n., 1891; Cold Canyon. This fragrant shrub with its beautiful red flowers reaches, or at least very closely approaches, its southernmost limit of distribution in the Coast Ranges in the Vaca Mountains. In the Sierra Nevada it ranges as far south as Tulare County (Munz, 1959).

CAMPANULACEAE. Bellflower Family

Githopsis diffusa Gray subsp. robusta Morin. Known definitely only from Walker Canyon, Jepson s.n., May 17, 1892. Another Jepson collection (Jepson 14772) from Walker

Canyon has been determined by Nancy Morin to be intermediate between this taxon and G. specularioides Nuttall. See discussion below.

Githopsis specularioides Nuttall. Common Bluecup. Occasional, in open areas in foothill woodland and chaparral. Mix Canyon, W 1594; just below Signal Hill on the east side, W 4260; Blue Ridge in northern part of range, W 4190, W 4206. The above collections represent G. specularioides as defined by Ewan (1939). A recent treatment by Morin (1980), however, has expanded the previously understood range of G. diffusa Gray, and she has described a new subspecies, G. diffusa subsp. robusta Morin. Although G. diffusa subsp. robusta and G. specularioides are quite distinct karyotypically, they apparently are quite similar morphologically, at least in the Vaca Mountains. This fact is evidenced by the annotation by Morin of Jepson's collection number 14772 as intermediate between the two taxa. Until such time as Dr. Morin is able to pass judgement on my collections, they are here retained under G. specularioides.

Heterocodon rariflorum Nuttall. Rare, known only from a shallow drainage along Rioge Road, 3.9 km north of its junction with Mix Canyon Road, in moist ground, W 4276, W 4336. To be expected in similar situations elsewhere in the Vaca Mountains.

CANNABACEAE. Hemp Family

Cannabis sativa Linnaeus. Hemp. Marijuana. Rare, only a few plants found growing on the margins of streams and in other moist areas, where quite probably they were planted. Along Cherry Glen Road, about 0.8 km west of Interstate 80 freeway, in irrigated vineyard, W 1863; Mix Canyon, moist area along road; Cold Canyon, margins of Cold Creek. Native of southeastern Russia according to Howell (1970: 338).

CAPRIFOLIACEAE. Honeysuckle Family

Lonicera hispidula (Lindley) Douglas ex Torrey & Gray [L. hispidula var. vacillans Gray]. California Honeysuckle. Rare, in shaded canyons, especially near streams. Mix Canyon, W 2461.

Lonicera interrupta Bentham. Chaparral Honeysuckle. Occasional, in foothill woodland and chaparral. Mix Canyon, W 842, W 2380; Cold Canyon, W 953.

Sambucus mexicana Presl ex Candolle. Blue Elderberry. Occasional, occurring in a wide variety of habitats including riparian and streamside woodlands, foothill woodland, and chaparral. Mix Canyon, W 509; Cold Canyon, W 748, W 1529; in small drainage at the junction of Mix Canyon Road and Ridge Road, W 1749; along Blue Ridge south of Mount Vaca, W 2481; near Monticello Dam, W 775; east of

Tolenas Springs, near Soda Springs Creek; south of Signal Hill, in chaparral and woodland.

Symphoricarpos albus (Linnaeus) Blake var. laevigatus (Fernald) Blake [S. rivularis Suksdorf]. Common Snowberry. Occasional, in wooded canyons. Mix Canyon, W 1708, W 2425, W 4353; east of Tolenas Springs.

Symphoricarpos mollis Nuttall. Trailing Snowberry. In chaparral at higher elevations. Reported from Cold Canyon by Stebbins and Webster (1981).

CARYOPHYLLACEAE. Pink Family

Arenaria douglasii Fenzl ex Torrey & Gray var. douglasii. Douglas' Sandwort. Infrequent, on open, rocky slopes; locally common but the stations few. West side of ridge above head of Seventy Acre Canyon, W 2140; near Pine Peak, Jepson s.n., 1892. Some authors place this taxon in the segregate genus Minuartia Linnaeus, as M. douglasii (Fenzl ex Torrey & Gray) Mattfeld var. douglasii, a treatment followed by McNeill (1980) and Kartesz and Kartesz (1980:151). Wofford (1981) does not believe that the single character used to separate Arenaria from Minuartia, that of capsule dehiscence (the capsule of the former opening by 6 valves, that of the latter by 3 valves), results in natural biological units. He prefers retention of Arenaria sensu lato.

Cerastium glomeratum Thuillier. Mouse-ear Chickweed. Common, in grassland and woodland; also found on

burns. Mix Canyon, W 1269; Cold Canyon, W 1220, W 1317; west side of ridge, just below Mount Vaca, W 2162; along Blue Ridge north of Mix Canyon, in black oak grove, W 4283; east of Tolenas Springs, W 4116; "Vaca Mountains," Jepson s.n., 1890. Native of Europe.

Sagina occidentalis Watson. Western Pearlwort. Rare, open or vernally moist areas in chaparral. Blue Ridge in northern part of range, W 4210; in shallow drainage along Ridge Road, 3.9 km north of its junction with Mix Canyon Road, W 4159, W 4191.

Silene gallica Linnaeus. Windmill Pink. Catchfly. Campion. Frequent, on open slopes, burned areas, and disturbed ground; sometimes found in foothill woodland that is not too dense. Mix Canyon, W 495, W 2007; Gates Canyon, Jepson 556-H; Cold Canyon, W 768, W 1512, W 2396; Blue Ridge north of Mix Canyon, in black oak grove, W 926; southwest of Monticello Dam, burned area in chaparral, W 2297; west side of ridge, above head of Seventy Acre Canyon, W 2170; along Blue Ridge south of Signal Hill. Native of Europe.

Spergula arvensis Linnaeus. Spurry. Infrequent weed of disturbed and cultivated areas at lower elevations. Gates Canyon, cultivated field near mouth, W 1942; Vaca Valley, in orchard, W 1197. Native of Europe.

Spergularia rubra (Linnaeus) J. & C. Presl. Sand Spurry. Rare weed of disturbed areas, often in compacted

soil. Along Ridge Road in the northern part of the range, W 4197. Native of Europe.

Stellaria media (Linnaeus) Villars. Chickweed. Frequent, in open grassland, shaded woodland, and cultivated areas. Mix Canyon, W 1142; Gates Canyon, W 618; Cold Canyon, W 1203; near Monticello Dam, W 2281; Pansy Flat. Native of Eurasia.

Stellaria nitens Nuttall. Shiny Chickweed. Occasional, in grassland and woodland. Near Monticello Dam, W 2312; Cold Canyon; "Vaca Mountains," Jepson s.n., 1890.

CHENOPODIACEAE. Goosefoot Family

Chenopodium ambrosioides Linnaeus. Mexican Tea. Rare weed of moist stream margins. Mix Canyon, along Ulatis Creek, W 4357; along Putah Creek. Native of tropical America.

Chenopodium berlandieri Moquin. Rare weed of disturbed areas. Along Putah Creek in open, disturbed area, W 4402. This species, a native of the southwestern United States and Mexico, was likely introduced into the Vaca Mountains. It is questionably distinct from C. album Linnaeus (Hitchcock et al., 1964:195).

Chenopodium californicum (Watson) Watson. California Goosefoot. Soap Plant. Rare, in wooded canyon bottoms. Cold Canyon, W 2395, W 2412.

Chenopodium murale Linnaeus. Wall Goosefoot. Rare weed of disturbed ground. Roadside park along State Highway 128 at north end of range, W 1801. Native of Europe.

Salsola australis R. Brown [S. iberica Sennen & Pau; S. kali Linnaeus var. tenuifolia Tausch]. Russian-thistle. Rare weed of disturbed areas at lower elevations. West side of Pleasants Valley Road, 4.0 km south of Putah Creek, W 1795. Native of Eurasia. Salsola australis is the correct name for the Russian-thistle, according to Dr. T.C. Fuller (personal communication, 1981).

CISTACEAE. Rock-rose Family

Helianthemum scoparium Nuttall [H. scoparium var. vulgare Jepson]. Rush-rose. Occasional, in open and disturbed areas in chaparral; to be expected on burns. Cleared margins of Ridge Road north of Signal Hill, W 4224; Blue Ridge between Gates and Mix canyons, W 900, W 2475.

CONVOLVULACEAE. Morning-glory Family

Calystegia occidentalis (Gray) Brummitt. Western Morning-glory. Infrequent, in wooded canyons. Mix Canyon, W 847, W 933; Walker Canyon, Jepson 14506; Pleasants Valley, Jepson 14513. Both of the Jepson collections have been annotated by R.K. Brummitt as C. occidentalis. This is quite possibly the southernmost station for this species as it is here defined, but see the comments following the next entry.

Calystegia purpurata (Greene) Brummitt subsp. solanensis (Jepson) Brummitt. Occasional, in foothill woodland and chaparral. Mix Canyon, W 701, W 817, Jepson 18761; Gates Canyon, halfway to summit, Jepson 14509; Miller Canyon, Jepson 14519; Cold Canyon, W 734, W 979; vicinity of Signal Hill, W 4266. Gates Canyon (Jepson 14509) is the type locality for this subspecies, originally described as Convolvulus luteolus Gray var. solanensis Jepson (1901:388).

The above treatment of Calystegia in the Vaca Mountains follows that of Brummitt (1965). All of the Jepson collections cited above have been annotated by Brummitt (the specimens ascribed to C. purpurata ssp. solanensis were annotated simply as C. purpurata; this may indicate that Brummitt no longer considers this a valid subspecies). Because, as I understand it, the chief difference between C. purpurata and C. occidentalis is the presence of pubescence in the latter species, I believe these taxa are perhaps better treated as varieties or subspecies of the same species, a treatment they have been afforded in the past. Those plants (including the annotated Jepson collections) referred to C. occidentalis are pubescent, but the amount of pubescence present varies greatly. Furthermore, the range of the two species is sympatric in the Vaca Mountains.

Convolvulus arvensis Linnaeus. Field Bindweed. Occasional weed of disturbed areas, cultivated fields, and

overgrazed grassland. Gates Canyon, along road, W 650; Blue Ridge, between Gates and Mix canyons, W 910; along Pleasants Valley Road, just north of its junction with Cherry Glen Road, in orchard and on roadside, W 1871; Tolenas Springs. This native of Europe is a pernicious weed of cultivated lands. It is a deep-rooted perennial (the tap root may penetrate to a depth of 3 meters or more) which reproduces vegetatively from rhizomes (Robbins et al., 1951).

Cuscuta californica Hooker & Arnott. California Dodder. Reported from Cold Canyon by Stebbins and Webster (1981).

Cuscuta ceanothii Behr [C. subinclusa Durand & Hilgard]. Canyon Dodder. Occasional, parasitic on a variety of hosts, in foothill woodland and chaparral. Mix Canyon, on Aesculus, W 4352, on Toxicodendron, Jepson 4c; along Mix Canyon Road near junction with Ridge Road, on Aster radulinus, W 4370; along Blue Ridge in northern part of range, W 4389.5; Gates Canyon, on Heteromeles, Jepson 4a.

CORNACEAE. Dogwood Family

Cornus glabrata Bentham. Brown Dogwood. Rare, along streams which are permanent or nearly so. Along Putah Creek, W 4404; Wild Horse Canyon, Jepson 2451b.

CRASSULACEAE. Stonecrop Family

Crassula erecta (Hooker & Arnott) Berger [Tillaea erecta Hooker & Arnott]. Pigmyweed. Common, in dry open areas, especially where cover is sparse, and in disturbed areas; sometimes found in beds of shallow drainages. Hills north of Highway 128 at north end of range, W 1974; along Blue Ridge north of Mix Canyon, W 4163, W 4274; Mix Canyon; Gates Canyon; Cold Canyon.

Crassula muscosa (Linnaeus) Roth [Tillaea muscosa Linnaeus]. Rare, known only from Cold Canyon, W 1298. This native of Europe has a limited distribution in California. It has previously been reported from Amador and Calaveras counties (Munz, 1959 and 1968) and from the Sacramento Valley in Solano County (Lin, 1970). Additional collections at CAS place it in Placer and Santa Clara counties. The above collection from Cold Canyon extends its known range into the Vaca Mountains. Very similar to Crassula erecta, this species differs in having three sepals with long acerose tips, rather than four sepals with slender tips as in C. erecta. The carpels of the latter are mostly two-seeded, whereas those of C. muscosa usually have only one seed each.

Dudleya cymosa (Lemaire) Britton & Rose subsp. cymosa. Rock Lettuce. Occasional, on rock outcrops and bluffs. Mix Canyon, W 532, W 2375, W 2460; Vaca Ridge,

Jepson s.n., 1893, Jepson 13416; slopes of Signal Hill; bluffs of Putah Canyon at Monticello Dam.

Sedum spathulifolium Hooker subsp. spathulifolium. Pacific Stonecrop. Moss Sedum. Rare, on north-facing cliffs of Putah Canyon near Monticello Dam, W 4494.

CUCURBITACEAE. Gourd Family

Marah fabaceus (Naudin) Greene var. agrestis (Greene) Stocking [including M. inermis (Congdon) Dunn]. Valley Manroot. Wild Cucumber. Occasional, mostly in woodland but also found in chaparral. Mix Canyon, W 1900, W 2003; along Putah Creek, in riparian woodland, W 1918, W 1925; Cold Canyon, W 1293; east of Tolenas Springs.

Marah oreganus (Torrey & Gray) Howell. Coast Manroot. Rare, known only from Gates Canyon, Jepson 14126. The above specimen is vegetative; it was annotated by R.A. Schlising in 1966 as "probably Marah oreganus." The presence of this species (which is more common nearer the coast) in the Vaca Mountains is, therefore, questionable. I have not seen any plants referable to this species in the course of my field work.

Marah watsonii (Congdon) Greene. Taw Manroot. Occasional, in both foothill woodland and chaparral. Mix Canyon, W 1248, W 2216, Jepson 2188; Gates Canyon, W 1932, Jepson s.n., 1892 (UC); Cold Canyon, W 3062; ridge above Collins Camp, Jepson 14135; below Collins Camp, Jepson s.n., 1892 (UC); summit of the ridge at head of Mix Canyon,

Jepson 18732; Pleasants Valley, R.F. Hoover 2763 (UC); east of Tolenas Springs; cleared areas along Ridge Road north of Signal Hill; along Blue Ridge in northern part of range. This is the most common species of Marah in the Vaca Mountains. While, like M. fabaceus var. agrestis, it occurs in woodland, it is equally at home in chaparral, occupying dry sites along the ridges. The Vaca Mountains may well be the southernmost station for this species in the Coast Ranges. Although Abrams and Ferris (1960:68) state that it ranges south to San Mateo County, Thomas (1961) does not include it in his flora which includes all of that county. Marah watsonii occurs south to Mariposa County in the Sierra Nevada.

DATISCACEAE. Datisca Family

Datisca glomerata (Presl) Baillon. Durango Root. Occasional, along streams with a permanent or semipermanent water source; locally common. Mix Canyon, along Ulatis Creek, W 702, W 1058, W 4364, Jepson 10573, Jepson 13949; Gates Canyon, along Alamo Creek, W 668, Jepson 556f; Cold Canyon, along Cold Creek, W 725; along Putah Creek.

ERICACEAE. Heath Family

Arbutus menziesii Pursh. Madrone. Madroño. Rare, positively known only from upper Cold Canyon, where there is a small grove. Jepson (Field Book 10:8) reports "...a small cluster of Madroños!!" from Mix Canyon. In a much

later notation (Field Book 53:193) he states, "There are 2 or 3 madrones in Weldon [=Mix] Canyon says Neal Tate." I have not seen Madrone at any location in the Vaca Mountains other than Cold Canyon, but it is certainly possible--especially in light of Jepson's above statements--that it occurs in other canyons of the range.

Arctostaphylos glandulosa Eastwood subsp. glandulosa [including A. glandulosa var. cushingiana (Eastwood) Adams]. Eastwood Manzanita. Common, in chaparral; occurring only rarely in foothill woodland. Mix Canyon, W 169, W 170, W 400; head of Mix Canyon, A. Lewis 111 (UC); Gates Canyon, Jepson 2331, Jepson 14709; Blue Ridge between Gates and Mix canyons, W 1158, W 1159; Cold Canyon, W 744, W 1339; just below summit of Mount Vaca on east side, W 1888; Miller Canyon, Jepson 14702; along Blue Ridge north of Signal Hill; Blue Ridge in northern part of range. This is one of the dominant chaparral shrubs in the Vaca Mountains. A burl former, this species is a vigorous sprouter following fires.

Many of the Vaca Mountains plants of this taxon lack glandular hairs; these correspond to Arctostaphylos glandulosa var. cushingiana (Eastwood) Adams. P.V. Wells (1968:204) has reduced this variety to a mere form, A. glandulosa subsp. glandulosa f. cushingiana (Eastwood) P.V. Wells. Wells states, "The eglandular 'A. cushingiana' and the glandular A. glandulosa occur as alternate intrapopulational forms (morphs) over much of the range of

subsp. glandulosa." Observations of the two forms in the Vaca Mountains support Wells' conclusion.

The presence of Arctostaphylos glandulosa subsp. glandulosa f. cushingiana in the Vaca Mountains may account for reports of A. canescens Eastwood from the range. Three Jepson collections (Gates Canyon, Jepson 2331, Jepson 14709; Mix Canyon, Jepson 7198) are labelled as A. canescens, a species quite distinct from A. glandulosa in that it lacks the burl present in the latter species. There are no notations, however, regarding the presence or absence of a burl on any of the above three collections. The two Gates Canyon collections appear to belong to A. glandulosa subsp. glandulosa f. cushingiana; Jepson 14709 has sparsely hairy ovaries and rather short bracts, and Jepson 2331 has long bristly hairs in the inflorescence, some of which are glandular. I have included both of these collections under A. glandulosa subsp. glandulosa above. The identity of the third specimen, Jepson 7198, collected from Mix Canyon at an elevation of 1,700 feet, is more ambiguous. There are no long bristly hairs present in the inflorescence, no glandular hairs are present, and the mature fruits have quite a few eglandular white hairs. The bracts, however, are relatively short. While it is possible that this specimen may represent A. canescens, in the absence of more convincing evidence or additional specimens I must conclude that A. canescens does not occur in the Vaca Mountains.

Arctostaphylos manzanita Parry. Parry Manzanita. Common, in chaparral and foothill woodland. Mix Canyon, W 168, W 1232, Jepson 14708; head of Mix Canyon, Jepson 7198; Gates Canyon, Jepson 14706, Jepson 20252; Blue Ridge between Gates and Mix canyons, W 1161; south of Signal Hill, W 4292; Cold Canyon; east of Tolenas Springs; Blue Ridge in northern part of range. Although a relatively common component of chaparral, this species is not as common as A. glandulosa subsp. glandulosa. Fire may play a large role in determining its relative abundance; frequent fires would probably favor the latter species because it is a sprouter, whereas A. manzanita is not. Arctostaphylos manzanita, however, is commonly found in foothill woodland, a habitat only rarely exploited by A. glandulosa subsp. glandulosa.

EUPHORBIACEAE. Spurge Family

Chamaesyce maculata (Linnaeus) Small [Euphorbia maculata Linnaeus; E. supina Rafinesque]. Spotted Spurge. Rare, in disturbed areas at lower elevations. At junction of State Highway 128 and Pleasants Valley Road, W 1799. Native of eastern North America.

Chamaesyce serpyllifolia (Persoon) Small [Euphorbia serpyllifolia Persoon]. Thyme-leaved Spurge. Rare, on disturbed ground and in areas which are vernally moist. Along Ridge Road north of its junction with Mix Canyon

Road, W 4379; along Cherry Glen Road west of Interstate 80 freeway, W 1844; Putah Creek near Winters, Jepson 13933.

Eremocarpus setigerus (Hooker) Bentham. Turkey Mullein. Doveweed. Occasional, in open disturbed areas such as roadsides and overgrazed grassland, at lower elevations. Corner of Pleasants Valley Road and Vaca Valley Road, in cultivated ground, W 1754; Cold Canyon; open areas adjacent to riparian woodland along Putah Creek; north of Pleasants Valley School site, in overgrazed grassland.

Euphorbia crenulata Engelmann. Chinese Caps. Western Wood Spurge. Occasional, in shaded areas of foothill woodland. Mix Canyon, W 845, W 1180; Gates Canyon, W 674, W 1494.

Euphorbia oblongata Grisebach. Oblong Spurge. Rare, known in the mountains proper only from one rather large clump along Mix Canyon Road, about 3.4 km west of its junction with Pleasants Valley Road, W 4198. This native of the Mediterranean region is considered to be a potentially serious pest of agricultural lands. It is the target of eradication efforts by personnel of the California Department of Food and Agriculture and the various County Agricultural Commissioners. The above population (or clone) has probably been eradicated by the Solano County Agricultural Department. Other nearby localities for this species, according to records on file at the California Department of Food and Agriculture, are the following (no herbarium specimens are available): Ditch Bank,

Ulatis Creek, Pleasants Valley Road; south side of Interstate 80 freeway, near Fairfield. The plants at these localities have since been extirpated.

Euphorbia spathulata Lamarck. Rare, known definitely only from Cold Canyon, on bank along dirt road, W 1349. To be expected elsewhere in the Vaca Mountains.

FABACEAE. Pea Family

Astragalus gambelianus Sheldon. Gambel's Locoweed. Little Bill Loco. Occasional, in grassy areas, openings in chaparral, and burned places; sometimes locally common. Mix Canyon, W 2016; north of Signal Hill, W 4253; south slope of Pine Peak, Jepson 13752; southwest of Monticello Dam, in burned area, W 2287; Cold Canyon.

Cercis occidentalis Torrey ex Gray. Western Redbud. Frequent in canyons at the north end of the Vaca Mountains; infrequent in canyons on the eastern side. Mix Canyon, W 2018; Gates Canyon, Jepson 13579; Miller Canyon, Jepson 13581; Pleasants Valley, Jepson 13576; Cold Canyon, W 747, W 1199; Devil's Gate, Putah Pass, Jepson 10410. This beautiful shrub, attractive at all times of the year, apparently reaches its southernmost limit of distribution in the Coast Ranges in the Vaca Mountains. It ranges as far south as Tulare County in the Sierra Nevada; it also occurs in mountains of the southwestern deserts. A spring drive along State Highway 128 through Putah Canyon at the north end of the range is an unforgettable experience when

the Western Redbud is in full bloom; the plants here are common and each is resplendent with hundreds of magenta flowers which appear before the leaves.

Cytisus monspessulanus Linnaeus. French Broom. Rare, known only from near the mouth of Gates Canyon, along Alamo Creek, W 1485. Native of the Canary Islands. This naturalized shrub, a pernicious weed in many other areas of California, especially near the coast, has not so far become a problem in the Vaca Mountains. Perhaps the drier climate of the Vacas is not conducive to its spread.

Glycyrrhiza lepidota (Nuttall) Pursh var. glutinosa (Nuttall) Watson. Wild Licorice. Rare, in moist areas at lower elevations. Along Putah Creek, in riparian woodland, W 4427; along Cherry Glen Road west of Interstate 80 freeway, in orchard.

Lathyrus tingitanus Linnaeus. Tangier Pea. Rare, in Mix Canyon, along road in foothill woodland, W 570, W 2453. This escape from cultivation is a native of Eurasia.

Lathyrus vestitus Nuttall ex Torrey & Gray subsp. puberulus (White ex Greene) C.L. Hitchcock. Pacific Pea. Frequent, in foothill woodland and chaparral. Mix Canyon, W 1182, W 2382; Gates Canyon, W 672, Jepson 556, Jepson 13620; Miller Canyon, Jepson 13643; east of Tolenas Springs, W 4120; Tolenas Springs, W.A. Sitchell s.n., 1898 (UC); Cold Canyon, W 1342; west side of ridge just below Mount Vaca, W 2123, W 2164; along Blue Ridge north of Mix

Canyon, in black oak grove, W 1362, W 4346; along Blue Ridge in northern part of range, in chaparral, W 4221; south bank of Solano Lake [=Putah Creek], G.L. Webster 7683 (DAV). The three Jepson collections cited above were assigned by Jepson to Lathyrus watsonii White, a synonym of L. jepsonii Greene subsp. californicus (Watson) C.L. Hitchcock. Only one of these collections, Jepson 13620, was seen by Hitchcock, who annotated the specimen as L. jepsonii subsp. californicus. After examining the three Jepson collections, I have concluded that all three belong to L. vestitus subsp. puberulus. The stems are essentially wingless (although the very sharply raised angles on the stems could be interpreted as very narrow wings), and the calyces fit the description of L. vestitus subsp. puberulus given by Hitchcock (1952), the lower calyx lobes being flared above their point of separation from the tube. The three Jepson collections contrast sharply with material from the Sacramento Valley near Vacaville; valley specimens have stems which are very markedly winged and quite clearly belong to L. jepsonii subsp. californicus. The Sitchell collection from Tolenas Springs cited above has been annotated by Hitchcock as L. vestitus subsp. puberulus. It compares quite favorably to the three Jepson collections, as well as to my own. My specimens have been examined by Steven Broich of Oregon State University. He maintains (personal communication, 1981) that they definitely represent L. vestitus within the limits of Hitchcock. Although

Mr. Broich, who is currently studying the systematics of this group of Lathyrus, has not seen the Jepson collections from the Vaca Mountains, he believes--based on my description--that they are all referable to L. vestitus and that Jepson's collection number 13620 was misannotated by Hitchcock. Based on the above discussion I must infer that L. vestitus is the only native species of Lathyrus present in the Vaca Mountains, L. jepsonii being confined, at least in our area, to the valleys.

The validity of maintaining Lathyrus vestitus subsp. puberulus as a separate subspecies has been challenged by Hoover (1970:183-184), who has stated that L. vestitus subsp. puberulus is "...hardly different from typical L. vestitus and is certainly not distinctive enough to rank as a subspecies." This problem awaits the results of Broich's study, and the Vaca Mountains plants are here treated in the manner of Hitchcock.

Lotus corniculatus Linnaeus. Bird's Foot Trefoil. Rare, in moist places at lower elevations. Along Putah Creek, in riparian woodland, W 4403. Native of Europe.

Lotus crassifolius (Bentham) Greene. Buck Lotus. Broad-leaved Trefoil. Occasional, in openings and disturbed areas in chaparral, and on burns. Mix Canyon, W 579, W 2379; Wild Horse Canyon, Jepson 24528; near Collins Camp, Jepson 13782; south of Signal Hill, in burned area; along Ridge Road in northern part of range.

Lotus grandiflorus (Bentham) Greene var. mutabilis Ottley. Frequent, in open and disturbed places in chaparral. Blue Ridge between Gates and Mix canyons, W 713, W 797; Blue Ridge north of Mix Canyon, W 1649; Collins Camp, Jepson 13808; Vaca Ridge back of Miller Canyon, Jepson 13809; Blue Ridge north of Signal Hill.

Lotus humistratus Greene. Colchita. Common, on open slopes, especially where rocky, and in disturbed or burned areas; occurring at all elevations, but most abundant near the summits of the ridges. Mix Canyon, W 1463; Gates Canyon, W 623; Walker Canyon, Jepson 13812; Cold Canyon W 1520; Blue Ridge between Gates and Mix canyons, W 693; head of Mix Canyon, Jepson 18766; Blue Ridge north of Mix Canyon, W 1643, W 4209; near Monticello Dam, W 773, W 2251.

Lotus micranthus Bentham. Hill Lotus. Frequent, in grassland and open or disturbed areas in chaparral; rarely found in foothill woodland. Near summit of Mount Vaca, W 694; Blue Ridge between Gates and Mix canyons, W 714; along Blue Ridge north of Mix Canyon, in black oak grove, W 1394, W 1633; near summit of Signal Hill, open slopes among rocks, W 4296; Cold Canyon, W 1532.

Lotus purshianus (Bentham) Clements & Clements var. purshianus. Spanish-clover. Occasional, in disturbed or open areas at lower elevations; locally common. Mix Canyon, W 943, W 1733; along Putah Creek, in open floodplain adjacent to riparian woodland, W 4398.

Lotus scoparius (Nuttall) Ottley subsp. scoparius. Deerweed. Occasional, in open and disturbed areas of chaparral, grassland, and foothill woodland. Mix Canyon, W 704, W 2441, Jepson 13804; Cold Canyon, W 971; along Blue Ridge south of Signal Hill; along Blue Ridge in northern part of range.

Lotus subpinnatus Lagasca. Calf Lotus. Common, in grassland, in openings in foothill woodland, and on burns, mostly at lower elevations. Mix Canyon, W 496, W 1451; Gates Canyon, W 680; Cold Canyon, burned area, W 1322.

Lupinus albifrons Bentham. Silver Bush Lupine. Occasional, on hillsides in chaparral and foothill woodland; more rarely in open, flat areas at lower elevations. Mix Canyon, W 1394; Cold Canyon, W 1513; near summit of Signal Hill, W 690; west side of ridge below summit of Mount Vaca, W 2131; along Blue Ridge in northern part of range; open floodplain of Putah Creek, inland from the riparian woodland. Because of the questionable taxonomic merit of the several varieties often recognized in this species and the difficulty in separating them, no attempt has been made to do so here. Vaca Mountains material would correspond either to L. albifrons var. albifrons or to L. albifrons var. eminens (Greene) C.P. Smith.

Lupinus bicolor Lindley subsp. tridentatus (Eastwood ex C.P. Smith) D. Dunn. Frequent, in open grassy areas; infrequent in foothill woodland; locally abundant. Mix Canyon, W 1404, W 2008; Cold Canyon, W 1554; Blue

Ridge, north of Mix Canyon, grassy openings in black oak grove, W 1636; head of Mix Canyon, Jepson 18769.

Lupinus densiflorus Bentham var. aureus (Kellogg) Munz. Chick Lupine. Occasional, in open grassy places in the canyons, and on disturbed areas such as roadbanks. Mix Canyon, W 555, W 1475, Jepson 14t; Gates Canyon, Heller & Brown 5381 (cited in Smith, 1918; specimens in US, PA, G); Cold Canyon, W 745, W 751; along State Highway 128 in Putah Canyon, W 1226; Putah Creek, E. Ferguson 338 (JEPS). Charles Piper Smith (1918) recognized 26 varieties of Lupinus densiflorus. Material from the Vaca Mountains seems to correspond most closely to L. densiflorus var. perfistulosus C.P. Smith, except that the flowers are uniformly yellow (whereas according to Smith L. densiflorus var. perfistulosus has flowers which are rose-tinted and usually not yellow). Some of the Vaca Mountains plants with smaller corollas (e.g., W 751) may more closely fit L. densiflorus var. menziesii (J.G. Agardh) C.P. Smith. Munz (1959) placed both of these varieties in synonymy under L. densiflorus var. aureus, and his treatment is followed here.

The key character used in Munz (1959:804) to separate L. densiflorus and L. luteolus Kellogg is apparently not constant. According to that key the keel of L. densiflorus is ciliate above near the claws but not ciliate on the lower edges, whereas the keel of L. luteolus is ciliate both above and below near the claws. Material from

the Vaca Mountains, which in all other respects conforms to L. densiflorus, possesses flowers with the keels often at least slightly ciliate on the lower edges near the claws. My collection number 745, for example, has flowers with the keel quite obviously ciliate below; the stems, however, are very evidently fistulose, a character not shared by L. luteolus. The same holds true for W 1475.

Lupinus formosus Greene. Lunara Lupine. Summer Lupine. Rare, in open, often disturbed areas at low elevations. Vicinity of Pleasants Valley School site, in plowed field, W 1794.

Lupinus latifolius J.G. Agardh subsp. latifolius. Broad-leaved Lupine. Occasional, in foothill woodland and chaparral, in canyons on the eastern slope of the Vaca Mountains. Mix Canyon, W 2381, W 2433; Gates Canyon, W 642, W 718, Jepson 18877; south of Signal Hill, W 4289; Vaca Mountains, Napa County, Jepson 52t.

Lupinus polycarpus Greene [L. micranthus Douglas]. Occasional, in grassland and open foothill woodland; locally abundant. Mix Canyon, W 1388, W 1408; east of Tolenas Springs, W 4115.

Lupinus succulentus Douglas ex Koch. Frequent, in grassland and foothill woodland of canyons; infrequent in partially shaded areas of chaparral. Mix Canyon, W 556, W 1282; along frontage road west of Interstate 80 freeway at south end of range, W 1926; along State Highway 128 in Putah Canyon, W 1227; Cold Canyon.

Lupinus vallicola Heller subsp. apricus (Greene) D. Dunn. Frequent, in grassland and mostly open areas of foothill woodland; locally abundant. Mix Canyon, W 491, W 1291, W 1998; hills north of State Highway 128 in Putah Canyon, W 1971.

Medicago polymorpha Linnaeus [M. hispida Gaertner]. Bur-clover. Common weed of grassland, open foothill woodland, and disturbed areas. Mix Canyon, W 1476, W 1477; Gates Canyon, W 633, W 719; Cold Canyon, W 762, W 1510; hills north of State Highway 128 in Putah Canyon, W 1963; Tolenas Springs; Pansy Flat. Native of Europe. Although individuals of this species having fruits without prickles have been given varietal status, as M. polymorpha var. brevispina (Bentham) Heynhold, the fact that these plants occur with the typical form with no evidence of intermediates argues against such a treatment. Both forms are present in the Vaca Mountains. Collections W 762 and W 1963 consist of individuals of both forms, and W 1476 and W 1477, representing each form, were found growing together. Recent treatments such as Kartesz and Kartesz (1980) include M. polymorpha var. brevispina in synonymy under M. polymorpha.

Medicago sativa Linnaeus. Alfalfa. Rare escape from cultivation, occurring in moist areas at low elevations. Along Putah Creek, in riparian woodland, W 2339, W 4431. Native of the Old World.

Melilotus alba Desrousseaux. White Sweet-clover. Infrequent, in moist places, especially along streams. Mix Canyon, W 1073, W 1669; Cold Canyon, along creek, W 978, W 1558; along Putah Creek. Native of Eurasia.

Melilotus indica (Linnaeus) Allioni. Indian Sweet-clover. Occasional weed of moist and disturbed areas. Mix Canyon, W 604, W 709; Gates Canyon, W 648; Cold Canyon, along creek, W 970, W 1564; along Putah Creek, W 1570, W 2355. Native of Eurasia.

Pickeringia montana Nuttall subsp. montana. Chaparral Pea. Occasional, in chaparral; locally frequent, especially in burned areas, but never dominant. Upper Mix Canyon, W 866; Gates Canyon, Jepson 13586; Collins Camp, Jepson 13587; Miller Canyon, Jepson 13588; Cold Canyon; south of Signal Hill, in burned area; along Blue Ridge in northern part of range.

Psoralea macrostachya Candolle. Leather Root. California Hemp. Occasional, along streams and about springs. Mix Canyon, W 1765, W 4360, Jepson 10575; Gates Canyon, Jepson 13592; Cold Canyon, W 964; Wild Horse Canyon, Jepson 2452; along Putah Creek, W 4419.

Psoralea physodes Douglas. California Tea. Frequent component of foothill woodland in Cold Canyon, W 776. To be expected in similar situations elsewhere in the Vaca Mountains.

Robinia pseudo-acacia Linnaeus. Black Locust. Rare, in moist places at lower elevations. Along Pleasants

Valley Road between Gates and Mix canyons, W 2223; along Putah Creek, in riparian woodland. Native of eastern North America.

Spartium junceum Linnaeus. Spanish Broom. Rare escape from cultivation. Gates Canyon, near Alamo Creek, W 1491, W 1985; at junction of State Highway 128 and Pleasants Valley Road, where possibly planted, W 2249. Native of the Mediterranean region.

Trifolium amplectens Torrey & Gray var. truncatum (Greene) Jepson. Sack Clover. Rare, in vernally moist ground surrounding ponds. Pansy Flat, margins of stock pond, W 4314. This species and its varieties are rather common about vernal pools in the valleys adjacent to the Vaca Mountains.

Trifolium barbigerum Torrey. Bearded Clover. Colony Clover. Rare, known definitely only from Mix Canyon, in moist soil along Ulatis Creek, W 4359. To be expected in similar situations elsewhere in the Vaca Mountains.

Trifolium bifidum Gray [including T. bifidum var. decipiens Greene]. Pinole Clover. Frequent, in foothill woodland and grassland; sometimes found in chaparral. Mix Canyon, W 1407, W 1581; hillslope near mouth of Mix Canyon, Jepson 18729; Cold Canyon, W 757, W 1556; hills north of State Highway 128 in Putah Canyon, W 2246; near Monticello Dam, W 2279. The leaf-form in which the leaflets are narrow and deeply notched (T. bifidum var. bifidum) is the

most common in the Vaca Mountains. Individuals are found, however, which correspond to T. bifidum var. decipiens Greene with leaflets broader and entire or slightly emarginate at the apex. Both of these forms have been found growing together, and I do not consider them to be distinct.

Trifolium ciliolatum Bentham. Tree Clover. Occasional, more prevalent in foothill woodland and grassland, but also occurring in chaparral. Mix Canyon, W 1467, W 2608; south of Signal Hill, W 4228, W 4267.5; west side of ridge not far below summit, W 2137.

Trifolium columbinum Greene [T. olivaceum Greene; T. olivaceum var. columbinum (Greene) Jepson]. Dove Clover. Infrequent, in foothill woodland, grassland, and chaparral. Near Monticello Dam, W 785; west side of ridge below summit of Mount Vaca, W 2138, W 2169; near Putah Bluffs, Jepson s.n., 1890; Putah Canyon, L.F. Robbins s.n. (SACT). The name Trifolium columbinum is used here for the species including both T. columbinum and T. olivaceum Greene for reasons given by Hoover (1970:175-176). My three collections cited above, with glabrous pods, correspond to T. columbinum var. olivaceum (Greene) Jepson. The type locality of T. columbinum is Vacaville (E.L. Greene s.n., 1892, UC).

Trifolium hirtum Allioni. Rose Clover. Frequent, in grassland and foothill woodland; rare in chaparral. Mix Canyon, W 498, W 1585; Gates Canyon, W 634, W 717; above

Tolenas Springs, W 4149; Pansy Flat. Native of Europe. According to Crampton (1980:4) the presence of this species in and around the Sacramento Valley results from range reseeding experiments begun in the 1940s. Of three species of annual clovers introduced at that time and subsequently used as forage plants (the other two being T. subterraneum Linnaeus and T. incarnatum Linnaeus), this is the most commonly found species of grazing lands at the margins of the Sacramento Valley (ibid.).

Trifolium microcephalum Pursh. Maiden Clover. Small-headed Clover. Common, in grassy areas and open foothill woodland; infrequent in open places in chaparral; most abundant where herbaceous cover is sparse, as on burns, talus slopes, and somewhat disturbed places. Mix Canyon, W 1290, W 1580; head of Mix Canyon, Jepson 18768; Gates Canyon, W 632, W 681, Jepson 18716; Cold Canyon, W 742, W 1521, W 1552; near Monticello Dam, W 2256, W 2294; west side of ridge just below summit of Mount Vaca, in woodland, W 2165; Pansy Flat, W 4325; Blue Ridge south of Signal Hill.

Trifolium microdon Hooker & Arnott. Thimble Clover. Square-head Clover. Valparaiso Clover. Occasional, mostly in grassland but also found in open foothill woodland. Mix Canyon, W 1598; Cold Canyon, W 4496; Pansy Flat, W 4322. Keys in both Howell (1970) and Thomas (1961) maintain that the involucres of this species are

glabrous (Thomas states that a few abaxial hairs may occasionally be present). Specimens from the Vaca Mountains have involucres which are definitely villous.

Trifolium obtusiflorum Hooker. Creek Clover. Infrequent, in canyons on the eastern slope of the range. Mix Canyon, W 837, W 839, Jepson s.n., 1891; Miller Canyon, Jepson 13689.

Trifolium oliganthum Steudel. Lanky Clover. Infrequent annual of canyons, mostly in wooded areas. Mix Canyon, W 1411, W 1613; Cold Canyon, W 1218.

Trifolium subterraneum Linnaeus. Subterranean Clover. Subclover. Rare, in moist areas below stock pond in Pansy Flat, where it is locally common, W 4299. Native of Eurasia. This is currently a commonly planted forage crop which escapes into moist areas.

Trifolium tridentatum Lindley [including T. tridentatum var. aciculare (Nuttall) McDermott]. Tomcat Clover. Common, in grassland and foothill woodland. Mix Canyon, W 515, W 1389, Jepson 13677; summit of ridge at head of Mix Canyon, Jepson 18765; Gates Canyon, W 664; Cold Canyon, W 1308; Pansy Flat, W 4324; near Monticello Dam, W 2271; ridge near Pine Peak, Jepson s.n., 1892; along Blue Ridge south of Signal Hill, in grassland.

Trifolium variegatum Nuttall. White-tip Clover. Rare, known in the mountains proper only from the moist margins of a stock pond in Pansy Flat, W 4301, W 4313.

Vicia angustifolia Linnaeus [including V. angustifolia var. segetalis (Thuillier) Koch]. Narrow-leaved Vetch. Common Vetch. Occasional weed of roadsides and other disturbed areas; also found in grassland and foothill woodland which is grazed. Mix Canyon, W 489, W 2359; Mix Canyon, near Ulatis Creek, W 2613. Native of Europe.

Vicia dasycarpa Tenore. Occasional weed of disturbed areas including grassland and foothill woodland where grazed; sometimes found in moist places. Mix Canyon, W 488, W 1426; Mix Canyon, moist ground along Ulatis Creek, W 4366; Gates Canyon, W 647; along Putah Creek, in riparian woodland, W 2356; along Pleasants Valley Road between Mix Canyon Road and Vaca Valley Road, in drainage canal, W 2024. Native of the Mediterranean region.

FAGACEAE. Oak Family

Quercus agrifolia Neé var. agrifolia. Coast Live Oak. Encina. Locally common in woodland along Blue Ridge in the southern part of the Vaca Mountains and in the shallow canyons on the western slope; rare in canyons on the eastern slope. West side of ridge below summit of Mount Vaca, in draws, W 1684; south of Signal Hill on Blue Ridge and just below to the east, W 4267; Gates Canyon, W 682; Pansy Flat. This oak, while not at all common in the Vaca Mountains as a whole, is the dominant component of the

foothill woodland community along Blue Ridge in the southern part of the range (from Mount Vaca south). Stands are found in draws on the western slope and in favorable sites on the eastern side not far below the summit of the ridge. It is usually associated with Pinus sabiniana. Coast Live Oak is apparently absent from the northern part of the range.

Quercus chrysolepis Liebmann [Q. chrysolepis var. nana (Jepson) Jepson]. Canyon Live Oak. Maul Oak. Goldcup Oak. In canyons and, more commonly, on or near ridge tops where it often is a dominant species. Gates Canyon, W 612; just below summit of Mount Vaca on east side, W 1892; west side of ridge near summit of Mount Vaca, W 1372; near Collins Camp, Jepson s.n., 1892. Although the name, Q. chrysolepis var. nana (Jepson) Jepson, might be applied to those shrubby plants which behave as chaparral components along the ridges, there is evidence to suggest that this form might merely represent an edaphic response with little, if any, genetic basis. Larger plants that are more properly called trees are found along the ridges where the soils are deeper. Canyon Live Oak is often found in association with Umbellularia californica.

Quercus douglasii Hooker & Arnott. Blue Oak. Common component of foothill woodland, especially at lower elevations, occurring in relatively pure, open stands interspersed with grassland; on south-facing slopes; and in association with Pinus sabiniana and other oaks, especially

Quercus wislizenii var. wislizenii, on north-facing slopes. Western slope below head of Seventy Acre Canyon, W 2189; Mix Canyon; Gates Canyon; Miller Canyon; Walker Canyon; Cold Canyon; Pansy Flat; east of Tolenas Springs; Putah Canyon.

Quercus dumosa Nuttall. Scrub Oak. Common in chaparral; occasional in foothill woodland. Mix Canyon, W 1153, W 1290.5; Gates Canyon, W 645, Jepson 2328, Jepson 27505; Cold Canyon, W 752; Vaca Mountains, elevation 600 m, Jepson 2327, Jepson 2329; along Blue Ridge north of Signal Hill. In the northern part of the Vaca Mountains this species intergrades with Q. durata.

Quercus durata Jepson. Leather Oak. Infrequent component of chaparral in the northern part of the Vaca Mountains. Along Blue Ridge north of Mix Canyon, W 1387; Miller Canyon, Jepson 1387. Although primarily restricted to serpentine substrate, Leather Oak occurs on sedimentary rock in the Vaca Mountains. Forde and Faris (1962) conducted a study of the scrub oaks along Blue Ridge north of Mix Canyon and concluded that the population consists in part of Q. durata introgressed by Q. dumosa. Intergrades between these two species are prevalent along the ridge, showing characteristics more typical of one or the other. The two collections cited above are considered to represent "pure" or nearly pure Q. durata (Jepson's specimen has been annotated by Dr. J.M. Tucker as Q. durata). Two additional collections, intermediate between Q. dumosa and Q. durata,

but thought to be more closely allied to the latter, are the following: just below summit of Mount Vaca on east side, W 1890; along Ridge Road, 3.9 km north of its junction with Mix Canyon Road, W 4281.

Quercus kelloggii Newberry. California Black Oak. Occasional, in canyons and on ridge tops and hillsides. Mix Canyon, lower part, Jepson 2454; Miller Canyon, Jepson 14830; along Blue Ridge north of Mix Canyon, W 924; Pansy Flat; north of Signal Hill. A few pure stands of Quercus kelloggii occur along Blue Ridge north of Mix Canyon. At least one of these is rather extensive, extending down the east side of the ridge for some distance. These are doubtless remnant stands which have persisted here. Similar stands of California Black Oak can be found on the eastern slopes of the Mayacmas Range west of Clear Lake. It is interesting to speculate whether these stands would be capable of reestablishing themselves following fire or other disturbance or if they would be replaced by another plant community.

Quercus lobata Neé. Valley Oak. Roble. Occasional, mostly at lower elevations in canyons, but also found in favorable sites along ridges in the southern part of the Vaca Mountains. Mix Canyon, W 1433; Cold Canyon, W 763; along Putah Creek, in riparian woodland, W 2349, W 2421; east of Tolenas Springs, W 4157; Pansy Flat, W 4326. In some areas (e.g., in the canyon formed by Soda Springs Creek) Valley Oak occurs in rather dense stands;

in other places there may be only a few scattered trees present. Pansy Flat sports a few very large and venerable trees.

Quercus x morehus Kellogg. Oracle Oak. This hybrid between Q. kelloggii and Q. wislizenii is rare in the Vaca Mountains, known only from Mix Canyon, along Ulatis Creek, W 4367. Because both parents are relatively common, it is to be expected elsewhere in the range.

Quercus wislizenii A. Candolle var. frutescens Engelmann. This shrubby form of Interior Live Oak is a common constituent of chaparral on the higher slopes of the Vaca Mountains. Just below summit of Mount Vaca, W 1889, W 1891; slopes of Signal Hill; along Blue Ridge in northern part of range.

Quercus wislizenii A. Candolle var. wislizenii. Interior Live Oak. Common component of foothill woodland on both sides of the Vaca Mountains; occasional in riparian woodland. Gates Canyon, Jepson 2330; western slope, below head of Seventy Acre Canyon, W 2190; Mix Canyon; Miller Canyon; Walker Canyon; Cold Canyon; east of Tolenas Springs; along Putah Creek.

Another member of the oak family, Castanopsis sempervirens (Kellogg) Dudley, has been reported from the Vaca Mountains by Jepson (1909:364), who states that the species occupies high rocky or gravelly mountain summits or slopes in the Coast Ranges, "...as on the Vaca Mts., Mt. St. Helena, Oakland Hills, Mt. Diablo, and Santa Lucia

Mts." I have not found this species in the Vaca Mountains, nor have I seen any collections from the range. It is perhaps significant that, although Jepson reports this species from Mount Diablo, Bowerman (1944) does not. A possible explanation for this discrepancy is that Jepson mistook the shrubby form of Quercus chrysolepis, common on ridges of both Mount Diablo and the Vaca Mountains, for Castanopsis sempervirens.

FUMARIACEAE. Fumitory Family

Dicentra chrysantha (Hooker & Arnott) Walpers. Golden Ear-drops. Rare, known only from an old collection in Miller Canyon, Jepson s.n., 1897. This species is a common fire follower in the South Coast Ranges. Its occurrence in the Vaca Mountains may also be dependent on fire, although I have not observed it on any of the several burns I have inspected.

GARRYACEAE. Silk Tassel Family

Garrya flavescens Watson subsp. pallida (Eastwood) Dahling. Occasional, in chaparral of the higher slopes and ridges. Upper Mix Canyon, W 172, W 1156; summit of the Mix Canyon Grade, Jepson 14156; west side of ridge below Mount Vaca, W 692; along ridge north of Mount Vaca, B. Crampton 7421 (UC); Blue Ridge between Gates and Mix canyons, W 888. Using previous treatments of Garrya, plants from the Vaca Mountains would have been referred to G. fremontii

Torrey on the basis of their nearly glabrous leaves. Following the treatment of Dahling (1978), however, these plants belong to G. flavescens subsp. pallida because of their pale, usually gray or blue-tinged leaves and appressed pubescent fruits. Mount Diablo collections considered by Bowerman (1944) to be G. fremontii have been annotated by Dahling as G. flavescens subsp. pallida.

GERANIACEAE. Geranium Family

Erodium botrys (Cavanilles) Bertoloni. Broad-leaved Filaree. Grape Stork's-bill. Common, in grassland, open foothill woodland, and disturbed areas. Tolenas Springs, W 4148; hills north of State Highway 128 in Putah Canyon, W 2250; Mix Canyon; Gates Canyon; Cold Canyon. Native of the Mediterranean region.

Erodium cicutarium (Linnaeus) L'Heritier. Red-stemmed Filaree. Very common, in grassland, open woodland, and disturbed areas. Mix Canyon, W 1277, W 2015; top of Blue Ridge near Mount Vaca, W 1373; along Putah Creek, in riparian woodland, W 1922; along frontage road next to Interstate 80 freeway at south end of range, W 1929; Gates Canyon; Cold Canyon; Tolenas Springs; along Ridge Road in northern part of range, open and disturbed places in chaparral. Native of the Mediterranean region.

Erodium moschatum (Linnaeus) L'Heritier. White-stemmed Filaree. Frequent weed of grassland, open woodland, and disturbed areas, including burns. Mix Canyon,

W 1437; Gates Canyon, W 1938; Cold Canyon, W 2403; Cold Canyon, in burned area, W 1204, W 1503; Tolenas Springs. Native of the Mediterranean region.

Erodium obtusiplicatum (Maire, Weiller, & Wilczek) J.T. Howell. Occasional, in grassland, open foothill woodland, and disturbed areas, including burns. Mix Canyon, W 2372; Cold Canyon, in burned area, W 1210; Tolenas Springs, W 4148.5; western slope, below head of Seventy Acre Canyon, W 2208; junction of Pleasants Valley and Vaca Valley roads, in orchard on southeast corner, W 2027. Native of North Africa. This species is very similar to Erodium botrys. Because a rather close inspection is necessary to separate the two species, and because plants of each species are often found growing together, my estimates of abundance for both species may not reflect the true nature of their occurrence in the Vaca Mountains. This species is placed in synonymy under E. brachycarpum (Godron) Thellung by Kartesz and Kartesz (1980).

Geranium dissectum Linnaeus. Cut-leaved Geranium. Frequent, in grassland, foothill woodland, and moist places. Mix Canyon, W 526, W 538; Gates Canyon, W 659; Tolenas Springs, W 4147; Pansy Flat, moist area below stock pond, W 4302. Native of Europe.

Geranium molle Linnaeus. Cranesbill. Dove's-foot Geranium. Common, in grassland, foothill woodland, and disturbed areas. Mix Canyon, W 522, W 1238; Gates Canyon, W 660; Cold Canyon, W 1205, W 1547; east of Tolenas

Springs, W 4117; Pansy Flat, W 4332; western slope below head of Seventy Acre Canyon, W 2193. Native of Europe.

HALORAGIDACEAE. Water Milfoil Family

Myriophyllum exalbescens Fernald. American Milfoil. Rare, known only from along Putah Creek, where it grows in quiet water and ponds near the stream, W 1814, W 4422.

HIPPOCASTANACEAE. Buckeye Family

Aesculus californica (Spach) Nuttall. California Buckeye. Frequent component of the foothill woodland community, most commonly found on north-facing slopes of canyons and draws, but in some places locally common on rather exposed slopes of other aspect. Mix Canyon, W 848, Jepson 2186; Gates Canyon; Miller Canyon; Cold Canyon; east of Tolenas Springs; west side of ridge south of Signal Hill. The California Buckeye is beautiful at all times of the year, as Howell (1970:188) so colorfully relates.

HYDROPHYLLACEAE. Waterleaf Family

Emmenanthe penduliflora Bentham. Whispering Bells. Locally common, mostly on chaparral burns, but also growing in mechanically disturbed areas in chaparral; rare in open, undisturbed places in chaparral. West side of ridge not far below summit of Mount Vaca, W 2174, W 2203; Blue Ridge between Gates and Mix canyons, in burned area, W 812; along

Ridge Road, 3.9 km north of its junction with Mix Canyon Road, on cleared margins of road, W 4248; slopes below Collins Camp, Jepson 20949; southwest of Monticello Dam, on chaparral burn, W 2284; north of Signal Hill, in cleared areas. Although locally common in suitable habitat, this species is, on the whole, rare.

Eriodictyon californicum (Hooker & Arnott) Torrey. Yerba Santa. Frequent shrub of openings, burns, and disturbed areas in chaparral; also growing on disturbed sites in open foothill woodland and, infrequently, in grassy areas. Mix Canyon, W 545, W 1276, Jepson 21006; Gates Canyon, Jepson 18722; Collins Camp, Jepson s.n., 1893; Cold Canyon; Blue Ridge south of Signal Hill, in grassland; south of Signal Hill, abundant on chaparral burn; along Blue Ridge north of Signal Hill; along Blue Ridge in northern part of range; along Putah Creek, in open floodplain adjacent to the riparian woodland.

Eucrypta chrysanthemifolia (Bentham) Greene var. chrysanthemifolia. Rare, known only from Cold Canyon, where it was locally common on a burned, west-facing slope near the mouth of the Canyon, W 1301, W 1531. This is quite possibly the northernmost station for this taxon, which ranges south to Baja California. North of San Francisco Bay it is known only from Angel Island in Marin County; its occurrence there is recorded by only a single collection (Ripley, 1969:68).

Nemophila heterophylla Fischer & Meyer. White Nemophila. Canyon Nemophila. Common, especially in wooded canyons, but also occurring in shaded or open areas of chaparral, in grassland, and in burned areas. Mix Canyon, W 582, W 2001 (JEPS, SACT); Gates Canyon, W 661, W 1495 (JEPS); Cold Canyon, in burned area, W 1223; east of Tolenas Springs, W 4118; along Blue Ridge in northern part of range, W 4170, W 4208 (JEPS, SACT); vicinity of Signal Hill, W 4263; west side of ridge not far below summit of Mount Vaca, W 2121; near Monticello Dam, W 2309 (JEPS); bluff above Putah Creek on Monticello-Winters Road, L. Constance 2045 (JEPS).

Phacelia distans Bentham. Fern Phacelia. Infrequent, but locally common, in rocky places and on burns. Gates Canyon, Jepson 15070; western slope, above head of Seventy Acre Canyon, W 2142 (JEPS, SACT); Blue Ridge south of Signal Hill, W 4230; Tolenas Springs, W 4140.

Phacelia egena (Brand) J.T. Howell. Occasional, in relatively open areas, usually about rocks. Mix Canyon, W 1256, W 1600; Miller Canyon, Jepson 21053; west side of ridge, not far below summit of Mount Vaca, W 1688 (JEPS), W 2171 (JEPS); ridge above Collins Camp, Jepson 21051; near Monticello Dam, W 2268 (JEPS). This species is closely related to Phacelia imbricata Greene, and separation of the two species is difficult. All of the Vaca Mountains collections cited above have been determined by L.R. Heckard, who has annotated them as P. egena aff. P. imbricata subsp.

imbricata. He believes all are probably tetraploid. Phacelia egena appears to be more common than P. imbricata subsp. imbricata in the Vaca Mountains.

Phacelia imbricata Greene subsp. imbricata. Rock Phacelia. Infrequent, known certainly only from rocky areas in Cold Canyon (W 750, W 959) and from Walker Canyon (Jepson 21050). The Jepson collection from Walker Canyon was determined to be this taxon by Heckard, who added to the annotation label: "Probably tetraploid, possibly intergrading with P. egena."

Phacelia suaveolens Greene. Sweet-scented Phacelia. Rare, occurring in open and disturbed areas in chaparral, and probably also on burns. Along Ridge Road, 3.9 km north of its junction with Mix Canyon Road, in areas cleared for firebreak, W 4204; along Blue Ridge, 0.6 km north of above site, open areas in chaparral, in loose soil, W 4167; Vaca Mountains, R.H. Platt s.n., 1898 (JEPS).

Phacelia tanacetifolia Bentham. Tansy-leaf Phacelia. Rare, in rather disturbed places at the bottom of Cold Canyon, W 3064, W 3066 (JEPS).

HYPERICACEAE. St. John's Wort Family

Hypericum concinnum Bentham. Gold Wire. Occasional, in open areas of chaparral; locally common in some places. Blue Ridge between Gates and Mix canyons, W 884, W 1735; upper Mix Canyon, W 870, W 1779, Jepson 7193; Gates

Canyon, Jepson 13959; head of Gates Canyon, W 1710; top of Signal Hill; along Blue Ridge north of Signal Hill. The Vaca Mountains represent one of the southernmost stations for this species in the Coast Ranges. Hypericum concinnum is also known from Mount Tamalpais and San Anselmo Canyon in Marin County (Howell, 1970:193) and from the Howell Mountains, Napa County. It does not occur in the Coast Ranges south of San Francisco Bay. In the Sierra Nevada foothills it ranges as far south as Mariposa County (Munz, 1959:192).

JUGLANDACEAE. Walnut Family

Juglans hindsii (Jepson) Jepson. California Black Walnut. Infrequent, in moist places along streams. Cold Canyon, near Cold Creek, W 732; along Putah Creek, W 2343. According to Fuller (1978), Juglans hindsii forms hybrids with all native and introduced species of Juglans in California; the species and, more often, the hybrids, are secondarily naturalized in central and northern California. Trees referred to Juglans hindsii in the Vaca Mountains almost certainly belong to the secondarily naturalized group, but whether they represent hybrids or relatively "pure" stock is not known.

LAMIACEAE. Mint Family

Lamium amplexicaule Linnaeus. Henbit. Giraffe Head. Rare in the Vaca Mountains proper, occurring in

cultivated ground at low elevations. Near Pleasants Valley Road between Mix and Gates canyons, in orchard, W 1906. This native of Europe is much more frequent in cultivated land in the valleys adjacent to the Vaca Mountains.

Lepechinia calycina (Bentham) Epling. Pitcher Sage. Frequent, in chaparral, especially where cover is sparse, as on burns and other disturbed ground; infrequent in foothill woodland. Lower Mix Canyon, W 846; upper Mix Canyon, W 867, Jepson 7194; Gates Canyon, Jepson 5568; Cold Canyon, W 754; Wild Horse Canyon, Jepson 2452c; Blue Ridge between Gates and Mix canyons, W 1015; west side of ridge, not far below summit of Mount Vaca, W 2168; along Blue Ridge south of Signal Hill, in burned area; along Blue Ridge at north end of range.

Marrubium vulgare Linnaeus. Horehound. Occasional weed of disturbed areas and moist ground. Mix Canyon, along Ulatis Creek, W 1728, W 2042; Mix Canyon, in disturbed area, W 1283; Cold Canyon, disturbed ground near old homestead, W 737; along Putah Creek, in riparian woodland, W 2354. Native of Europe.

Mentha arvensis Linnaeus var. villosa (Bentham) S.R. Stewart. Rare, in moist ground along Putah Creek, W 1829, W 4415, Jepson 14916. Kartesz and Kartesz (1980: 263) use the combination M. arvensis subsp. haplocalyx Briquet for this taxon.

Mentha spicata Linnaeus. Spearmint. Infrequent weed of moist ground, as along streams and in irrigated

areas; sometimes locally common. Mix Canyon, along Ulatis Creek, W 1052, W 4355; Gates Canyon, edge of Alamo Creek, W 4108; along Putah Creek, in riparian woodland, W 1834; near Cherry Glen Road west of Interstate 80 freeway, in irrigated vineyard, W 1861. Native of Europe.

Monardella villosa Bentham. Coyote Mint. Frequent, in open or rocky places in chaparral and foothill woodland; infrequent in more wooded areas. Mix Canyon, W 942, W 2449, Jepson 50n; south of Signal Hill, W 4268; along Blue Ridge north of Mix Canyon, W 4372; Cold Canyon. Most plants from the Vaca Mountains seem to represent M. villosa subsp. villosa, but some (e.g., W 4372) conform to M. villosa subsp. subserrata (Greene) Epling. Mix Canyon (Jepson 50n) is the type locality of M. villosa var. interior Jepson, included by Munz (1959:713) in synonymy under M. villosa subsp. subserrata.

Salvia columbariae Bentham var. columbariae. Chia. Occasional, on open and talus slopes, mostly in chaparral, and in burned areas. Upper Mix Canyon, W 2465, A.R. Kruckeberg culture S-151 (UC; grown in garden from seed collected in Mix Canyon); Cold Canyon, W 1511; west side of ridge near summit of Mount Vaca, on chaparral burn, W 2118; west-facing slope near State Highway 128 about 1.6 km southwest of Monticello Dam, W 2301.

Salvia spathacea Greene. Crimson Sage. Pitcher Sage. Occasional, in foothill woodland of the canyons on the eastern slope of the Vaca Mountains and the southern

part of the range; locally common. Mix Canyon, W 486, Jepson 10578, Jepson s.n., 1898, R.F. Hoover 3183 (UC), V. & A. Grant 7947 (UC); Gates Canyon, Jepson 553, Jepson s.n., 1893, H.K. Sharsmith 4247 (UC), A. Lewis 2488 (UC); along Blue Ridge south of Signal Hill, in foothill woodland; east of Tolenas Springs, in canyon formed by Soda Springs Creek. One of the most spectacular plants of the Vaca Mountains, the Crimson Sage here reaches its northernmost limit of distribution. It is restricted to the southern part of the range and the steep canyons of the eastern slope, presumably where moisture is sufficient to support it. It is absent from the drier canyons at the north end of the mountains. Not known north of San Francisco Bay except in Solano County, Salvia spathacea ranges south, mostly near the coast, to Orange County.

Scutellaria tuberosa Bentham subsp. tuberosa. Blue Skullcap. Infrequent, in open and disturbed areas of chaparral and foothill woodland. Gates Canyon, W 673; along Blue Ridge north of Mix Canyon, W 4166; near summit of Mount Vaca; Cold Canyon.

Stachys rigida Nuttall ex Bentham subsp. quercetorum (Heller) Epling. Rigid Hedge-nettle. Occasional, mostly in wooded canyons, but also found in chaparral. Gates Canyon, W 654, W 1711, Jepson 556, Jepson 14972; Gates Canyon, growing in brush, Jepson 18875; Walker Canyon, Jepson 14980; English Hills, W 1624.

Stachys stricta Greene. Rare, known only from moist ground along the banks of Putah Creek, W 4416. This is probably the southernmost station in the Coast Ranges for this species, heretofore known from Mendocino and Glenn to Lake and Sonoma Counties. In the Sierra Nevada and Great Valley Stachys stricta ranges south to Merced County.

Trichostema lanceolatum Bentham. Vinegar Weed. Infrequent, in grassy areas at lower elevations. Gates Canyon, W 4096.

Trichostema laxum Gray. Turpentine Weed. Rare, known in the Vaca Mountains only from a collection at Devil's Gate, Putah Canyon, Jepson 14848. This appears to be the southern limit of distribution for this species which, according to Munz (1959:693), ranges from Napa and Sonoma counties to southwestern Oregon. Napa County collections on file at UC are from the northern part of the county.

LAURACEAE. Laurel Family

Umbellularia californica (Hooker & Arnott) Nuttall var. californica. California Bay. California Laurel. Oregon Myrtle. Common in canyons, especially on wooded north-facing slopes and along streams; also a common chaparral component in some places along ridges and on burns. Mix Canyon; Gates Canyon; Miller Canyon; Cold Canyon; along

Blue Ridge south of Signal Hill, in burned area; along Blue Ridge north of Signal Hill; along Blue Ridge in northern part of range.

LINACEAE. Flax Family

Hesperolinon breweri (Gray) Small. Brewer's Dwarf Flax. Vaca Flax. Rare, apparently occurring in chaparral or on partially wooded slopes. Mix Canyon, Jepson s.n., 1891 (UC); Gates Canyon, Jepson 13533; Miller Canyon, Jepson 13534. This species reaches its northernmost limit of distribution in the Vaca Mountains and in Capell Valley to the west of the range; it is known elsewhere only from Mount Diablo and vicinity (Sharsmith, 1961). I have not found this species in the Vaca Mountains. Since all of the above collections are old (there is none on record in this century) the species may no longer be extant in the range (although it is equally possible that I have merely overlooked it). One thing, however, seems certain: the species is at least very rare in the Vaca Mountains. The Capell Valley collections--H.K. Sharsmith 4183 and 4711 (UC), P.H. Raven 3078 (UC, CAS)--are more recent, dating from the 1950s.

Hesperolinon clevelandii (Greene) Small. Rare, in open and disturbed areas of chaparral along Blue Ridge north of Mix Canyon. Along Ridge Road, 3.9 km north of its junction with Mix Canyon Road, in dry open areas in chaparral among rocks, W 4195; along Ridge Road, north of

the locked gate located 4.3 km north of the junction with Mix Canyon Road, frequent in cleared areas along road, W 4200. This species, which differs from H. micranthum (Gray) Small in having yellow (rather than white or pink) flowers, has not previously been reported from the Vaca Mountains. Hesperolinon clevelandii has been heretofore known to occur only on soils of serpentine or volcanic origin. This is the first record of the species on soils derived from sedimentary rock. Forde and Faris (1962) discussed possible reasons for the presence of Quercus durata (introgressed to some extent by Q.dumosa), a serpentine endemic, in the northern part of Blue Ridge on sedimentary substrate. They found that, like serpentine soils, the soils here are low in calcium (although this deficiency is far less pronounced than that of serpentine soils) and speculated that other unfavorable growing conditions, such as exposure, soil acidity, and general infertility, may reinforce the partial calcium deficiency to the point that the total environment favors the growth of Quercus durata. This may also explain the presence of Hesperolinon clevelandii in this same area of Blue Ridge. A complete explanation awaits further study.

Hesperolinon micranthum (Gray) Small. Small-flowered Dwarf Flax. Occasional, in rocky, open areas in chaparral. Mix Canyon, H.K. Sharsmith 4223 (UC); Mount Vaca, H.K. Sharsmith 4233 (UC); below Collins Camp, Jepson

13543; summit of main ridge below old Signal Hill station site, Jepson 275328; along Blue Ridge between the head of Gates Canyon and Signal Hill, W 4222.

LYTHRACEAE. Loosestrife Family

Lythrum californicum Torrey & Gray. California Loosestrife. Rare, known in the study area only from along Putah Creek, Jepson 14097. This species, rare in the Vaca Mountains, is more frequent in moist ground of the Sacramento Valley in Solano County. It ranges as far north as Sutter and Colusa counties and south to Baja California.

Lythrum hyssopifolia Linnaeus. Grass Poly. Infrequent, in vernally moist areas. Mix Canyon, moist area along road, W 1036; Pansy Flat, moist margins of stock pond, W 4316; along Putah Creek, W 1827.

MALVACEAE. Mallow Family

Malva nicaeensis Allioni. Bull Mallow. Occasional weed of disturbed areas. Gates Canyon, W 2225; Cold Canyon, W 2414. Native of Europe.

Malva parviflora Linnaeus. Cheeseweed. Occasional weed of disturbed areas. Cold Canyon, W 2414.5; roadside parking area along State Highway 128 at north end of range, W 2346. Native of Europe.

Sida leprosa (Ortega) K. Schumann var. hederacea (Douglas) K. Schumann [S. hederacea (Douglas) Torrey].

Alkali Mallow. Whiteweed. Infrequent, but locally abundant, weed of cultivated and disturbed areas at low elevations. In prune orchard along Pleasants Valley Road west of its junction with Cherry Glen Road, W 1870; in almond orchard along Cherry Glen Road west of Interstate 80 freeway, W 1848.

Sidalcea diploscypha (Torrey & Gray) Gray. Fringed Sidalcea. Rare, in grassland and open areas of foothill woodland. Walker Canyon, Jepson 14067; mouth of Cold Canyon, W 777; hills north of State Highway 128 at north end of range, W 2238.

MORACEAE. Mulberry Family

Ficus carica Linnaeus. Common Fig. An escape from cultivation, sparingly naturalized in riparian and streamside woodlands. Mix Canyon, along Ulatis Creek, W 1657; along Putah Creek, W 1980. Native of Asia Minor.

OLEACEAE. Olive Family

Fraxinus dipetala Hooker & Arnott. Flowering Ash. Foothill Ash. Occasional, on north-facing wooded canyonsides; infrequent at higher elevations in chaparral. Mix Canyon, W 597, Jepson 2187; Mix Canyon, upper slopes, Jepson 18728; Cold Canyon, W 2400; west side of Vaca Mountains at approximate latitude of Mount Vaca, not far below ridge, W 2200. The Flowering Ash is a beautiful shrub when

in bloom, with its many clusters of white flowers. In some places, such as Mix and Gates canyons, it is locally plentiful.

Fraxinus latifolia Bentham. Oregon Ash. Occurring in the Vaca Mountains only along Putah Creek, where it is an occasional component of the riparian woodland community, W 1806.

ONAGRACEAE. Evening Primrose Family

Boisduvalia stricta (Gray) Greene. Rare, known in the Vaca Mountains only from along Blue Ridge north of Mix Canyon, in vernally moist area in chaparral, W 915. To be expected in similarly moist areas elsewhere in the range.

Camissonia hirtella (Greene) Raven [Oenothera micrantha Hornemann ex Sprengel var. jonesii (Léveillé) Munz]. Rare, in open, usually disturbed areas of chaparral. Along Ridge Road north of its junction with Mix Road, on cleared road margins, W 4168; near Collins Camp, Jepson s.n., 1892. This species is a common fire follower in other regions such as Mount Diablo (Bowerman 1944:192). Although on the whole rare in the Vaca Mountains, it is locally common in disturbed areas and may be expected to appear on chaparral burns.

Clarkia affinis Lewis & Lewis. Infrequent, in open foothill woodland. Mix Canyon, W 608; near Monticello Dam, on north-facing rocky slope, W 2265.

Clarkia concinna (Fisher & Meyer) Greene. Red Ribbons. Frequent and locally common, in relatively open foothill woodland of canyons; occasional in the shade of chaparral shrubs at higher elevations. Mix Canyon, W 843, W 2435; Gates Canyon, Jepson 14424, Jepson 14425; Cold Canyon, W 721. One of the most spectacular wildflowers of the Vaca Mountains.

Clarkia gracilis (Piper) Nelson & Macbride subsp. albicaulis (Jepson) Lewis & Lewis. Rare, known in the Vaca Mountains only from a collection from Walker Canyon, Jepson 14351. This collection, originally annotated in 1951 by Margaret and Harlan Lewis as C. affinis, was later (in 1959) determined to be C. gracilis subsp. albicaulis by Richard Snow. Harlan Lewis later concurred in Snow's diagnosis. The Vaca Mountains represent the southernmost station for this taxon, which otherwise ranges from Lake and Colusa counties north to Butte, Shasta, and Tehama counties.

Clarkia purpurea (Curtis) Nelson & Macbride subsp. quadrivulnera (Douglas) Lewis & Lewis. Common, especially in grassland and relatively open foothill woodland, but also occurring in open and disturbed areas in chaparral. Mix Canyon, W 850, W 2373; Cold Canyon, W 720, W 736; Vaca Ridge, above Collins Camp, Jepson 13340; below summit of Signal Hill, W 4287; south of Signal Hill, W 4227; along Blue Ridge north of Mix Canyon, W 4344; north-facing slope

near Monticello Dam, W 2306. There are two Jepson collections bearing the number 13340 (see above). One is the type of Godetia quadrivulnera (Douglas) Spach forma flagellata Jepson; the other is the type of G. quadrivulnera var. vacensis Jepson. Both of these were reduced to synonymy by Lewis and Lewis (1955) under Clarkia purpurea subsp. quadrivulnera, and the specimens have been so annotated.

Clarkia rhomboidea Douglas. Rare, known certainly only from along Blue Ridge north of Mix Canyon, in black oak grove, W 4345. To be expected elsewhere in the range.

Clarkia unguiculata Lindley. Elegant Clarkia. Occasional, in grassland and open foothill woodland. Mix Canyon, W 849, W 2447; Gates Canyon, Jepson 14419; Cold Canyon, W 753, W 764, near Monticello Dam, W 778.

Epilobium brachycarpum Presl [E. paniculatum Nuttall ex Torrey & Gray]. Summer Cottonweed. Infrequent, in open disturbed areas such as roadsides. Mix Canyon, along road, W 1878; upper Mix Canyon, in disturbed area near road, W 4371; junction of Ridge Road and Mix Canyon Road, W 1882; along Cherry Glen Road west of Interstate 80 freeway, W 1842. My collection number 4371 corresponds to Epilobium paniculatum var. laevicaule (Rydberg) Munz, with glabrous pedicels; this taxon is here treated in synonymy with E. brachycarpum.

Epilobium canum (Greene) Raven subsp. mexicanum (Presl) Raven [Zauschneria californica Presl subsp.

mexicana (Presl) Raven]. California Fuchsia. Mexican Balsamea. Occasional, in dry, usually rocky areas of woodland and chaparral. Mix Canyon, W 1066, W 1875, Jepson 14427; Gates Canyon, W 4107; Tolenas Springs, Jepson 14430; floodplain of Putah Creek, in dry, open areas among rocks, W 4394; Cold Canyon; slopes of Signal Hill.

Epilobium ciliatum Rafinesque subsp. ciliatum [E. adenocaulon Haussknecht var. holosericeum (Trelease) Munz; E. adenocaulon var. parishii (Trelease) Munz]. California Cottonweed. Occasional, in moist places. Mix Canyon, W 1763, W 4384, Jepson 14459; along Putah Creek, W 4417, W 4439; moist area along Cherry Glen Road west of Interstate 80 freeway, W 1855. Both the gray-hairy form, formerly referred to E. adenocaulon var. holosericeum, and the nonglandular, sparsely pubescent form, previously known as E. adenocaulon var. parishii, are present in the Vaca Mountains. Both of these forms are now regarded as synonymous with E. ciliatum subsp. ciliatum.

Epilobium minutum Lindley ex Hooker. Chaparral Cottonweed. Chaparral Willow Herb. Rare, in open and disturbed areas in chaparral. Cleared margins of Ridge Road north of its junction with Mix Canyon Road, W 4205; Cold Canyon.

OROBANCHACEAE. Broomrape Family

Orobanche bulbosa (Gray) G. Beck. Chaparral Broomrape. Rare, in chaparral. Parasitic on Adenostoma

fasciculatum. Along Blue Ridge north of Signal Hill, W 4242; Miller Canyon, Jepson s.n., 1897. Although reported by Munz (1959:683) as ranging from Solano, Marin, and El Dorado counties south, this species occurs at least as far north as Lake (Mrs. H. Merritt s.n., no date, UC) and Colusa (F. Chisaki 1165, UC) counties.

Orobanche fasciculata Nuttall var. franciscana Achey. Occasional, usually gregarious, in chaparral. Parasitic on Eriodictyon californicum and possibly other hosts. Blue Ridge between Mix and Gates canyons, W 879, W 899; near top of Mount Vaca, W 1738; west side of ridge not far below summit of Mount Vaca, W 2207; head of Wild Horse Canyon, W 4196; Collins Camp, Jepson s.n., 1892; Vaca Mountains (no further information given), M. Sharpe s.n. (JEPS); Blue Ridge north of Signal Hill.

OXALIDACEAE. Oxalis Family

Oxalis pes-caprae Linnaeus. Bermuda Buttercup. Rare weed of disturbed areas. Mix Canyon, near road, W 1154; Gates Canyon, along road, W 1498. Native of South Africa.

PAPAVERACEAE. Poppy Family

Dendromecon rigida Bentham subsp. rigida. Bush Poppy. Rare, known only from along Blue Ridge about midway between Signal Hill and the head of Gates Canyon, where two

plants occur within 25 m of a metal cabin, W 4223. Whether these plants represent native components of the chaparral community or persist from cultivation is unknown.

Eschscholzia caespitosa Bentham subsp. caespitosa. Common, in open, often rocky or shaly areas in grassland, foothill woodland, and chaparral, and on chaparral burns. Mix Canyon, W 1189, W 1446; Miller Canyon, high slopes, Jepson s.n., 1897; Walker Canyon, Jepson s.n., 1892; Pine Peak, Jepson s.n., 1892; Cold Canyon, W 723, W 1333; Cold Canyon, in burned area, W 1302; south-facing hills north of Putah Creek, W 1833; southwest of Monticello Dam, on chaparral burn, W 2295; near Monticello Dam, W 2258; west side of ridge just below summit of Mount Vaca, W 2120; near head of Seventy Acre Canyon, W 2148; cleared margins of Ridge Road north of Signal Hill; along Blue Ridge in northern part of range.

Eschscholzia californica Chamisso. California Poppy. Rare, in open, usually grassy areas. Tolenas Springs, in rocky areas surrounding quarry, W 4143; road-bank of State Highway 128 at north end of range, W 1327; along Ridge Road, 0.5 km north of its junction with Mix Canyon Road. The California Poppy, rare in the Vaca Mountains proper, is a far more common component of the flora of the surrounding valley floors.

PLANTAGINACEAE. Plantain Family

Plantago erecta Morris [P. hookeriana Fischer & Meyer var. californica (Greene) Poe]. California Plantain. Common, in open or disturbed areas of grassland, foothill woodland, and chaparral. Often forming dense colonies. Mix Canyon, W 1582; Cold Canyon, W 1340, W 1526; along Blue Ridge near head of Wild Horse Canyon, W 1641; along Ridge Road south of Signal Hill, W 4239, W 4291; west side of ridge, not far below summit of Mount Vaca, W 2159.

Plantago lanceolata Linnaeus. English Plantain. Ribgrass. Buckhorn. Infrequent weed of disturbed and moist places. Mix Canyon, moist ground along Ulatis Creek, W 4358; along Putah Creek, W 1569; near metal cabin on Blue Ridge about midway between Signal Hill and the head of Gates Canyon. Native of Europe.

Plantago major Linnaeus. Common Plantain. Rare weed of moist ground. Along Putah Creek, W 1828. Native of Europe.

POLEMONIACEAE. Phlox Family

Allophyllum divaricatum (Nuttall) A. & V. Grant. Infrequent, in open and disturbed areas in chaparral, often about rocks. Mix Canyon, Willoughby s.n., 1974; Blue Ridge south of Signal Hill, W 4229; Blue Ridge north of Signal Hill, W 4245; west side of ridge not far below summit of

Mount Vaca, W 2127; southwest of Monticello Dam, on chaparral burn, W 2288.

Allophyllum gilioides (Bentham) A. & V. Grant. Reported from slopes above the mouth of Cold Canyon by G. Ledyard Stebbins (personal communication, 1981).

Gilia achilleaefolia Bentham subsp. multicaulis (Bentham) V. & A. Grant. Rare, known only from an old collection, annotated by Alva Day, from Walker Canyon, Jepson 15068. To be expected elsewhere in the range. This is possibly the northernmost station for this taxon, which ranges south in the Coast Ranges to Santa Barbara County. North of San Francisco Bay it is known only from Marin County and the Vaca Mountains.

Gilia capitata Sims subsp. capitata. Globe Gilia. Occasional, in open, often rocky areas of canyonsides and ridges. Mix Canyon, W 832, W 2371, Jepson 15076; higher slopes near Collins Camp, Jepson 15078; Cold Canyon; along Blue Ridge south of Signal Hill.

Gilia capitata Sims subsp. staminea (Greene) V. Grant. Range Gilia. Rare, known only from an old collection, annotated by Alva Day, from Mix Canyon, Jepson 15080. To be expected elsewhere in the range. This is quite possibly the northernmost station for this taxon, known elsewhere only south of San Francisco Bay.

Gilia clivorum (Jepson) V. Grant. Occasional, in grassland. Mix Canyon, W 1993, W 2044; Gates Canyon,

Jepson 15069; Putah Canyon, H. Cohen (collection cited by Grant 1954:32, with no indication of repository).

Gilia tricolor Bentham subsp. tricolor. Bird's-eye Gilia. Infrequent, but locally abundant, on grassy slopes. Mix Canyon, W 2037; hills north of State Highway 128 at north end of range, W 1964; Cold Canyon.

Linanthus androsaceus (Bentham) Greene. Frequent and locally abundant, in grassland and more or less open areas of foothill woodland and chaparral; all exposures. Mix Canyon, W 542, W 1399; Miller Canyon, Jepson 20903; Cold Canyon, W 772, W 1328; rocky, north-facing slope near Monticello Dam, W 2308; west side of ridge not far below summit of Mount Vaca, W 2178; Signal Hill, Jepson 20904. Following the treatments of Hoover (1970), Howell (1970), and Thomas (1961), I am recognizing of Mason's Linanthus androsaceus complex (in Abrams, 1951) only L. androsaceus and L. parviflorus (Bentham) Greene, the latter of which was reduced by Mason to subspecific rank under L. androsaceus.

Linanthus bicolor (Nuttall) Greene. Infrequent, but locally abundant, especially in the northern part of the Vaca Mountains. Cold Canyon, W 1323; hills north of State Highway 128 at north end of range, W 1970.

Linanthus ciliatus (Bentham) Greene. Whisker Brush. Occasional, in open areas. Mix Canyon, W 554,

Jepson 20908; Cold Canyon, W 771; Vaca Ridge near Collins Camp, Jepson 20915; Blue Ridge south of Signal Hill, W 4226.

Linanthus parviflorus (Bentham) Greene [L. androsaceus (Bentham) Greene subsp. luteus (Bentham) Mason]. Rare, on open, grassy hillsides. Mix Canyon, W 1438.

Microsteris gracilis (Hooker) Greene subsp. gracilis [Phlox gracilis (Hooker) Greene]. Frequent, sometimes locally abundant, in grassland and foothill woodland, usually, but not always, in rather open areas. Mix Canyon, W 1239, W 2012; Cold Canyon; east of Tolenas Springs.

Navarretia cotulaefolia (Bentham) Hooker & Arnott. Rare, known only from Walker (=Dutton) Canyon, Jepson 21104. This collection has not been located but is based on a citation in Jepson (1943:151-152), where the collection is listed under the taxon N. bowmanae Eastwood. Mason (in Abrams, 1951:445) treats N. bowmanae (spelled "bowmaniae") as a synonym of N. cotulaefolia but states that this is not the N. bowmanae of Jepson (1943). Mason, however, gives no indication of the taxonomic disposition of those collections ascribed by Jepson to N. bowmanae. Until the Walker Canyon collection is found, it seems best to tentatively assign it to N. cotulaefolia, which is known from several collections at and near Vacaville.

Navarretia intertexta (Bentham) Hooker. Rare, known only from a vernally moist area along Ridge Road north of its junction with Mix Canyon Road, W 917.

Navarretia mellita Greene. Infrequent, occurring mostly in open and disturbed areas in chaparral. Blue Ridge between Gates and Mix canyons, W 880, W 887; along Ridge Road north of its junction with Mix Canyon Road, W 4378; mouth of Gates Canyon, Jepson s.n., 1892.

Navarretia pubescens (Bentham) Hooker & Arnott. Occasional, in grassland and openings in foothill woodland. Mix Canyon, W 2374, W 2446; Miller Canyon, Jepson 15036; Cold Canyon, W 735, W 955; hills north of State Highway 128 at north end of range, W 2236.

Navarretia viscidula Bentham subsp. viscidula. Rare, known in the Vaca Mountains proper only from two collections from Gates Canyon, Jepson 505, Jepson 15033 (the latter collection from the mouth of the canyon).

POLYGONACEAE. Buckwheat Family

Chorizanthe membranacea Bentham. Occasional, on rocky or talus slopes, mostly of south or west exposure. Mix Canyon, W 1461; Cold Canyon, W 1523; Walker Canyon, Jepson s.n., 1892; Collins Camp, Jepson s.n., 1893.

Eriogonum dasyanthemum Torrey & Gray. Occasional, on sparsely vegetated slopes, especially of south aspect. Mix Canyon, W 1725, W 2457, Jepson s.n., 1891; Gates Canyon Jepson s.n., 1887, Jepson s.n., 1892; Miller Canyon, Jepson

s.n., 1891. Reveal (in Munz, 1968:60) gives the distribution of this species as Lake County to Tehama County. In addition to the Solano County collections cited above the species is also known from Napa County as evidenced by collections deposited in CAS and UC. The Vaca Mountains quite possibly represent the southernmost limit of distribution of this species. The type locality of E. dasyanthemum var. jepsonii Greene is Gates Canyon (the holotype is the 1887 collection by Jepson cited above); this variety is reduced to synonymy by Reveal.

Eriogonum gracile Bentham. Rare, known only from Gates Canyon, Jepson s.n., 1887. This species reaches its northernmost limits of distribution in the Vaca Mountains and at Sage Canyon in the Howell Mountains to the west. It ranges south to Baja California. Eriogonum gracile is also known from other stations in the valleys and low hills bordering the Vaca Mountains on the southeast.

Eriogonum nudum Douglas ex Bentham var. nudum. Tibinagua. Frequent, in dry, rocky or gravelly slopes in open areas. Mix Canyon, W 1045, W 4383, Jepson 20989; Gates Canyon; Cold Canyon.

Eriogonum roseum Durand & Hilgard. Rare, known only from the bed of Putah Creek, Jepson s.n., 1887.

Eriogonum vimineum Douglas ex Bentham. This species has been reported from Cold Canyon by Stebbins and Webster (1981). It is possible that the Cold Canyon population belongs to E. luteolum Greene. Collections from

near Cordelia, Solano County (Jepson 1742), and from the Wooden Valley Grade, Napa County (Jepson s.n., 1893), were originally annotated in 1966 by James L. Reveal as E. vimineum. Reveal reannotated these same specimens in 1978 as E. luteolum.

Eriogonum wrightii Torrey ex Bentham var. trachygonum (Torrey ex Bentham) Jepson. Rare, known only from the bed of Putah Creek, Jepson s.n., 1887.

Polygonum aviculare Linnaeus. Dooryard Knotweed. Common weed of compacted soil in disturbed areas. Mix Canyon, along road W 1076, W 4354; junction of Mix Canyon Road and Ridge Road, in compacted ground of turnaround, W 1788; Gates Canyon, along road, W 2226; along Cherry Glen Road west of Interstate 80 freeway, W 1850; on unpaved road to Tolenas Springs; in disturbed, open area adjacent to the riparian woodland along Putah Creek. Native of Eurasia.

Pterostegia drymarioides Fischer & Meyer. Frequent, in grassland and foothill woodland, often about rocks; also found on chaparral burns and in rocky areas adjacent to chaparral. Mix Canyon, W 529, W 1994; Cold Canyon, W 1551; Cold Canyon, in burned area, W 1310, W 1336; along Blue Ridge south of Signal Hill.

Rumex acetosella Linnaeus. Sheep Sorrel. Reported from Cold Canyon by Stebbins and Webster (1981). Native of Eurasia.

Rumex conglomeratus Murray. Green Dock. Infrequent weed of moist ground, as along streams. Gates Canyon, along Alamo Creek, W 4105; along Putah Creek, W 1816, W 4418; Pansy Flat, in moist area below stock pond, W 4303; along Cherry Glen Road west of Interstate 80, in drainage ditch, W 1862. Native of Europe.

Rumex crispus Linnaeus. Curly Dock. Occasional weed of vernally moist places. Mix Canyon, W 1038, W 1727; Gates Canyon, W 679; Cold Canyon, W 961; Tolenas Springs; along Putah Creek, north of Pleasants Valley School site. Native of Eurasia.

PORTULACACEAE. Purslane Family

Calandrinia breweri Watson. Rare, in burned or otherwise disturbed areas in chaparral. Along Blue Ridge near the head of Wild Horse Canyon, cleared margins of road, W 4201; Blue Ridge between Gates and Mix canyons, W 715; southwest of Monticello Dam, on chaparral burn, W 2296.

Calandrinia ciliata (Ruiz & Pavon) Candolle var. menziesii (Hooker) Macbride. Red Maids. Infrequent, in grassland and cultivated areas at lower elevations. Mix Canyon, W 2011; Gates Canyon, W 1941; Cold Canyon.

Claytonia perfoliata Donn ex Willdenow [Montia perfoliata (Donn ex Willdenow) Howell]. Miner's Lettuce. Common, primarily in wooded areas, but also occurring on chaparral burns and under chaparral shrubs. Mix Canyon,

W 1143, W 1259; Gates Canyon, W 1936; Cold Canyon, in burned area, W 1208; Blue Ridge near head of Wild Horse Canyon, cleared margins of road, W 4219; east of Tolenas Springs. At least three forms of this very variable species appear to be present in the Vaca Mountains, all of which have been given names of various ranks. These three forms represent Montia perfoliata forma perfoliata, M. perfoliata forma angustifolia (Greene) J.T. Howell, and M. perfoliata forma parviflora (Douglas ex Hooker) J.T. Howell. The latter form has been reelevated to the rank of species (as Claytonia parviflora Douglas ex Hooker) in Kartesz and Kartesz (1980:376). In the absence of documentation supporting this treatment, I prefer to consider these entities as no more than mere forms within a highly variable species.

PRIMULACEAE. Primrose Family

Anagallis arvensis Linnaeus. Scarlet Pimpernel. Occasional, in grassland and openings in foothill woodland; sometimes found in burned areas. Mix Canyon, W 536, W 1452; Cold Canyon, in burned area, W 1213; west side of range, in vicinity of Seventy Acre Canyon, W 2195. Native of Europe. Only the pink-flowered form seems to be present in the Vaca Mountains.

Dodecatheon hendersonii Gray subsp. hendersonii. Shooting Star. Occasional, mostly on wooded canyonsides,

but also found in the shade of chaparral shrubs. Mix Canyon, W 166, W 1139; ridge above Collins Spring, Jepson 14586; Cold Canyon; along Blue Ridge in black oak grove, east of Tolenas Springs.

RANUNCULACEAE. Buttercup Family

Clematis lasiantha Nuttall. Old Man's Beard. Virgin's Bower. Occasional vine, climbing in chaparral shrubs. Upper Mix Canyon, W 574, Jepson 18757, Jepson 18762; Miller Canyon, Jepson s.n., 1897; Pleasants Valley, Jepson s.n., 1885; Cold Canyon, W 730; along Blue Ridge near head of Wild Horse Canyon, W 1647, W 4174; along Blue Ridge south of Signal Hill, W 4334; near Monticello Dam, W 2260.

Clematis ligusticifolia Nuttall. Western Virgin's Bower. Rare vine of streamside and riparian woodlands. Mix Canyon, Jepson s.n., 1891; along Putah Creek, W 4414.

Delphinium hansenii (Greene) Greene. Rare, known in the Vaca Mountains only from a north-facing road cut along State Highway 128 just east of its junction with Pleasants Valley Road, W 2392. Delphinium hansenii is primarily a Sierran species which occurs in the Coast Ranges only in Colusa, Yolo, and Contra Costa counties. It is also known from the Marysville Buttes.

Delphinium hesperium Gray subsp. hesperium. Western Larkspur. Infrequent, in grassland and more or less open areas in foothill woodland. Walker Canyon,

Jepson 21385; Cold Canyon, W 3050; east of Pleasants Valley Road just south of Putah Creek, G.D. Barbe 688 (CDA); along State Highway 128 just east of its junction with Pleasants Valley Road, W 2392; Mix Canyon.

Delphinium hesperium Gray subsp. pallescens (Ewan) Lewis & Epling. Rare, known only from Cold Canyon, W 722. This subspecies differs from D. hesperium subsp. hesperium primarily in having white to light blue or pink flowers rather than the dark blue-purple flowers characteristic of the latter subspecies. According to Lewis and Epling (1954:11), D. hesperium subsp. pallescens is a more stocky plant with broader and coarser segments in the basal leaves than D. hesperium subsp. hesperium and occupies a drier, more interior habitat than the latter subspecies. They note that intermediate and variable colonies between these two subspecies are found from Contra Costa to Napa counties. It would appear that plants from Cold Canyon fall into this intermediate category. The Cold Canyon collection (W 3050) cited under D. hesperium subsp. hesperium consists of some individuals with dark blue flowers and some with almost white flowers. Although this sympatry and the resulting genetic exchange would seem to argue against the maintenance of separate subspecies, the fact that the ranges and habitats of these two subspecies are elsewhere discrete (see the distributional maps in Lewis and Epling 1954:7) may be sufficient justification to continue to treat them as separate subspecies.

Delphinium nudicaule Torrey & Gray. Red Larkspur. Occasional, but locally gregarious, on open rocky banks of north or east exposure. Cold Canyon, W 1337; Blue Ridge north of Mix Canyon, W 1337; Mix Canyon; Gates Canyon; along Blue Ridge in northern part of range.

Delphinium patens Bentham subsp. patens. Infrequent, on wooded canyonsides. Mix Canyon W 401, W 580; Cold Canyon, W 1541.

Isopyrum occidentale Hooker & Arnott. Rare, in moist or heavily shaded places of canyons. Mix Canyon, W 1678, Jepson s.n., 1885; J.M. Tucker 2760 (UC); Gates Canyon, W 613. The Vaca Mountains appear to represent one of the northernmost distributional limits of this species in the Coast Ranges. It ranges south in the Coast Ranges to Los Angeles County and occurs in the Sierra Nevada from Butte to Kern counties.

Ranunculus canus Bentham. Frequent, and locally common, in grassland and foothill woodland. Mix Canyon, W 528, W 1233; Gates Canyon, W 1489, W 1933, Jepson s.n., 1892; east of Tolenas Springs, W 4112. Ranunculus californicus Bentham is not thought to be present in the Vaca Mountains, but the differences between that species and R. canus (and, for that matter, R. occidentalis Nuttall) are obscure. Inasmuch as the distinctions between these species are cloudy, no attempt has been made to assign infraspecific names to the plants found in the Vaca Mountains.

Ranunculus hebecarpus Hooker & Arnott. Downy Buttercup. Frequent, and locally common, mostly in shaded places in foothill woodland, but sometimes occurring in open grassy places and on burns. Mix Canyon, W 1243, W 2021; Cold Canyon, in burned area, W 1209; hills north of State Highway 128 at north end of range, W 1976; east of Tolenas Springs.

Ranunculus lobbii (Hiern) Gray. Rare, known only from a pond near Pine Peak, Jepson s.n., 1892.

Ranunculus muricatus Linnaeus. Spiny-fruited Buttercup. Rare weed of moist ground. Pansy Flat, moist areas below stock pond, W 4300. Native of Europe.

Ranunculus occidentalis Nuttall. Occasional, in shaded areas in woodland. West side of range, vicinity of Seventy Acre Canyon, W 2186; along Blue Ridge north of Mix Canyon, in black oak grove, W 697, W 1368; Cold Canyon. The Vaca Mountains apparently represent the southern distributional limit for this species in the Coast Ranges. In the Sierra Nevada it ranges south to the Tehachapi Mountains. Vaca Mountains plants appear to fit R. occidentalis var. eisenii (Kellogg) Gray.

RHAMNACEAE. Buckthorn Family

Ceanothus cuneatus (Hooker) Nuttall. Buck Brush. Common component of chaparral throughout the Vaca Mountains; infrequent in woodlands. Mix Canyon, Jepson 13995; Gates Canyon, Jepson 13988; Miller Canyon, Jepson 13992;

Cold Canyon, W 1345; Collins Camp, Jepson 13991; Blue Ridge between Gates and Mix canyons, on chaparral burn, W 1739; along Putah Creek, in riparian woodland, W 1916.

Ceanothus sorediatus Hooker & Arnott. Jim Brush. Frequent, in chaparral and rather open foothill woodland. Mix Canyon, W 573; upper Mix Canyon near summit, Jepson 2453; Gates Canyon, W 1496, Jepson 13999, Jepson 14000, Jepson 14001; Cold Canyon, W 727; southwest of Monticello Dam, W 2261; along Blue Ridge south of Signal Hill, in foothill woodland; along Blue Ridge at north end of range.

The above two species are the only naturally occurring members of the genus Ceanothus in the Vaca Mountains. A third species, C. parryi Trelease, Lady Bush, has been planted at a fishing access to Putah Creek along State Highway 128 at the north end of the range, where two individuals now occur. Lady Bush is a native of the outer and middle Coast Ranges from Humboldt to Napa and Sonoma counties.

Rhamnus californica Eschscholtz subsp. californica. California Coffee Berry. Common shrub of chaparral and open foothill woodland throughout the Vaca Mountains. Upper Mix Canyon, W 1746; Gates Canyon, W 667, Jepson 19973, Jepson 19974; Miller Canyon, Jepson 13972; Blue Ridge between Gates and Mix canyons, W 895, W 907; Cold Canyon; Blue Ridge south of Signal Hill; Blue Ridge north of Mix Canyon, in black oak grove; Blue Ridge at north end of range.

Rhamnus crocea Nuttall subsp. ilicifolia (Kellogg) C.B. Wolf. Hollyleaf Redberry. Frequent, in foothill woodland and chaparral. Mix Canyon, W 1084, W 1667; Gates Canyon, W 644, W 2228; Miller Canyon, Jepson 13969; Cold Canyon, W 2401; slopes of Signal Hill; slopes of Mount Vaca.

ROSACEAE. Rose Family

Adenostoma fasciculatum Hooker & Arnott. Chamise. Very common, a dominant shrub of much of the chaparral of the Vaca Mountains. Upper Mix Canyon, W 868; Collins Camp, Jepson 13832; Gates Canyon; Miller Canyon; Walker Canyon; Cold Canyon; along Blue Ridge north of Signal Hill; along Blue Ridge in northern part of range; summit of Mount Vaca. Chamise and Poison-oak (Toxicodendron diversilobum) are the two most common shrubs in the Vaca Mountains. Although chamise is often a dominant or subdominant of the chaparral community in the range, seldom does it form the pure stands characteristic of many chaparral communities in the South Coast Ranges.

Alchemilla arvensis (Linnaeus) Scopoli [A. occidentalis Nuttall]. Lady's Mantle. Occasional, in grassland, open woodland, and on rocky slopes. Cold Canyon, W 1332; hills north of State Highway 128 at north end of range, W 1969; Mix Canyon. This small, inconspicuous annual has been treated by many California authors as a native species (A. occidentalis Nuttall). I agree with

Jepson (1925:502) and Hitchcock (1961:93), who believe the species to be introduced from Europe. The treatment in Kartesz and Kartesz (1980:391) supports this conclusion.

Cercocarpus betuloides Nuttall ex Torrey & Gray subsp. betuloides. California Mountain Mahogany. Hard Tack. Frequent, in chaparral and open foothill woodland. Mix Canyon, W 1262, W 2031; Gates Canyon, W 637, Jepson 13869; Vaca Mountains, Jepson 14807; Cold Canyon; along Blue Ridge near head of Wild Horse Canyon. Kartesz and Kartesz (1980:392) use the combination C. montanus Rafinesque var. glaber (S. Watson) F.L. Martin for this taxon. Following the lead of most California authors, I have chosen to retain our plants as a species separate from C. montanus of the Great Basin and Rocky Mountains. The subspecific epithet is based on the publication by Thorne (1978a) of the new combination C. betuloides subsp. blancheae (C.K. Schneider) Thorne for plants from the California islands and the coastal region of part of southern California.

Heteromeles arbutifolia (Lindley) Roemer. Toyon. Christmas Berry. Common, in woodland and chaparral. Cold Canyon, W 984; Mix Canyon; Gates Canyon; along Blue Ridge south and north of Signal Hill; along Blue Ridge in northern part of range; along Putah Creek, in riparian woodland; east of Tolenas Springs.

Holodiscus discolor (Pursh) Maximowicz. Cream Bush. Ocean Spray. Occasional, occurring primarily in shaded places in chaparral, but sometimes found in foothill woodland. Upper Mix Canyon, W 596, W 1780; Blue Ridge between Gates and Mix canyons, W 908. Our plants correspond to H. discolor var. franciscanus (Rydberg) Jepson. Based on the observations of Hoover (1970:162) and Howell (1970:156), it would seem that this variety, recognized by its smaller and more pubescent leaves, is of doubtful significance.

Osmaronia cerasiformis (Torrey & Gray) Greene. Oso Berry. Rare, known only from east of Tolenas Springs, in the wooded canyon of Soda Springs Creek, where it occurs in association with Quercus douglasii and Q. lobata, W 4129, R.H. Platt s.n., 1892 (JEPS). Oso Berry is more frequent in the outer and middle Coast Ranges. The colony at Tolenas Springs certainly represents one of the easternmost stations for this species in the Coast Ranges.

Potentilla glandulosa Lindley subsp. glandulosa. Sticky Cinquefoil. Infrequent, in woodland. Mix Canyon, in streamside woodland, W 2368; Gates Canyon, Jepson 130p, Jepson 131p; Blue Ridge near head of Wild Horse Canyon, in shade of Quercus kelloggii, W 4169.

Prunus dulcis (Miller) D.A. Webb [P. amygdalus Batsch]. Almond. The cultivated almond is persisting from cultivation at an old homestead in Mix Canyon, W 4368,

and is apparently spontaneous on the south side of State Highway 128 at its junction with Pleasants Valley Road, W 1986. Native of Eurasia.

Prunus subcordata Bentham. Sierra Plum. Rare, known certainly only from near the mouth of Mix Canyon, on wooded, north-facing slopes, W 1231, Jepson 13833.

Prunus virginiana Linnaeus var. demissa (Nuttall) Torrey. Western Choke Cherry. Rare, known only from Mix Canyon, Jepson 2181.

Rosa californica Chamisso & Schlechtendal. California Rose. Occasional, occurring mostly in streamside woodland at elevations below 300 m; sometimes locally common. Mix Canyon, W 1074, W 2452; Gates Canyon, W 4103; Miller Canyon, Jepson 13885; Cold Canyon, W 958; along Cherry Glen Road just east of its junction with Pleasants Valley Road, near drainage ditch, W 1864.

Rosa gymnocarpa Nuttall. Wood Rose. Rare, known certainly only from upper Cold Canyon where it has been reported by Stebbins and Webster (1981). To be expected in other canyons in the Vaca Mountains.

Rosa spithamea Watson var. sonomensis (Greene) Jepson. Ground Rose. Occasional, in chaparral and sometimes in woodland along the high ridges of the range. At junction of Mix Canyon Road and Ridge Road, W 1748, W 1784; along Blue Ridge between Gates and Mix canyons, W 889, W 902; along Blue Ridge north of Mix Canyon, in black oak

grove, W 925. This rose seldom flowers except after fire or other disturbance.

Rubus discolor Weihe & Nees [R. procerus P.J. Mueller]. Himalaya Berry. Occasional, along stream courses at lower elevations, in places forming dense thickets. Mix Canyon, along Ulatis Creek, W 1459; along Putah Creek, in riparian woodland, W 1837. Native of Europe.

Rubus ursinus Chamisso & Schlechtendal [R. vitifolius Chamisso & Schlechtendal]. California Blackberry. Pacific Blackberry. Occasional, along streams and in similarly moist places. Mix Canyon, along Ulatis Creek, W 2450; along Putah Creek, in riparian woodland, W 2337; along Cherry Glen Road just east of its junction with Pleasants Valley Road, along irrigation ditch, W 1867; Cold Canyon.

RUBIACEAE. Madder Family

Cephalanthus occidentalis Linnaeus var. californicus Bentham. California Button-willow. California Buttonbush. Rare, occurring only in riparian woodland along Putah Creek, W 1805, Jepson 17655. Our variety has been reduced to synonymy under the eastern North American C. occidentalis in the treatment in Kartesz and Kartesz (1980:411). Dempster (1979:1-2), however, continues to recognize the western variety as a separate entity.

Galium aparine Linnaeus. Goose Grass. Rough Bedstraw. Common, mostly in shaded areas of woodland and chaparral, but occasionally occurring in more open areas and on burns. Mix Canyon, W 1251, W 2002; Walker Canyon, Jepson s.n., 1892; Cold Canyon, W 1307, W 2404; Cold Canyon, in burned area, W 1206; Blue Ridge between Gates and Mix canyons, W 602, W 603; west side of range near head of Seventy Acre Canyon, W 2132; near Monticello Dam, W 2276; along Putah Creek, in riparian woodland, W 2341; frontage road of Interstate 80 freeway, in southern part of range, on road cut, W 1931; east of Tolenas Springs, W 4125; Pansy Flat; along Blue Ridge north of Mix Canyon, in black oak grove; along Blue Ridge north of Signal Hill; along Blue Ridge in northern part of range. By far the most common Galium in the Vaca Mountains, this species, according to Dempster (1979:12-14), may be a very early introduction from the Old World.

Galium bolanderi Gray. Bolander's Bedstraw. Frequent, in more or less shaded places in foothill woodland and chaparral. Mix Canyon, W 1773, W 2360; Gates Canyon, G.L. Stebbins 6124 (JEPS), Jepson 27532c; Collins Camp, Jepson s.n., 1892; junction of Mix Canyon Road and Ridge Road, W 1781, W 1785; along Blue Ridge between Gates and Mix canyons, W 882; along Blue Ridge south of Signal Hill, W 4238; north of Signal Hill, east of and just below Blue Ridge, W 4262; west side of range near head of Seventy Acre

Canyon, W 2133; east of Tolenas Springs, W 4124; Cold Canyon. This species reaches its southern distributional limit in the Coast Ranges in the Vaca Mountains. In the Sierra Nevada, however, it ranges as far south as the Tehachapi Mountains (Dempster and Stebbins, 1968; Dempster, 1979).

Galium murale (Linnaeus) Allioni. Tiny Bedstraw. Infrequent, but in some places locally abundant, in grassland and shaded, often somewhat moist places in foothill woodland and chaparral. Mix Canyon, W 1443, W 1606; Cold Canyon, W 4498; along Blue Ridge north of Mix Canyon. This tiny annual, a native of Europe, may be more abundant than I have indicated. Its small size and its tendency to grow amongst mosses and grasses combine to make it extremely easy to overlook.

Galium parisiense Linnaeus. Wall Bedstraw. Rare, in foothill woodland and chaparral. Cold Canyon, W 967; Blue Ridge between Gates and Mix canyons, W 881. Native of the Mediterranean region.

Galium porrigens Dempster var. porrigens [G. nuttallii Gray subsp. ovalifolium (Dempster) Dempster & Stebbins]. Climbing Bedstraw. Frequent, in foothill woodland and chaparral, usually in the shade of trees or shrubs, but occasionally found in open places and on burns. Mix Canyon, W 820, W 1263, W 2456; Cold Canyon, W 731, W 1331; near junction of Mix Canyon Road and Ridge Road, W 1774; west side of ridge just below summit of Mount Vaca,

W 1385, W 2122; west side of range, in vicinity of Seventy Acre Canyon, W 2187; Vaca Mountains, Jepson s.n., 1892.

Galium porrigens Dempster var. tenue (Dempster) Dempster [G. nuttallii Gray subsp. tenue (Dempster) Dempster & Stebbins]. Apparently rare, in foothill woodland and chaparral. Mix Canyon, W 1144; west side of Blue Ridge not far below summit of Mount Vaca, W 2176. The above two collections were annotated by Lauramay T. Dempster as "tending toward the variety tenue." The line between G. porrigens var. porrigens and G. porrigens var. tenue is not a sharp one, especially in the Coast Ranges (Dempster, personal communication, 1981). The two varieties are separated chiefly by the width of the leaves, G. porrigens var. tenue having narrower leaves than the typical variety.

Galium tricornutum Dandy. Rough Corn Bedstraw. Rare weed of somewhat moist areas, known in the Vaca Mountains only by a collection from a drainage ditch along State Highway 128 at the north end of the range, W 2417. Native of Europe.

SALICACEAE. Willow Family

Populus fremontii Watson subsp. fremontii. Fremont Cottonwood. Occasional, along streams. Mix Canyon; Gates Canyon; Cold Canyon; along Putah Creek, in riparian woodland. The Fremont Cottonwood is infrequent along intermittent streams, apparently occurring only where water is near

the surface. It is more common along permanent streams (Putah Creek).

Salix bonplandiana Humboldt, Bonpland & Kunth [S. laevigata Bebb]. Bonpland Willow. Red Willow. Frequent, along permanent and intermittent streams. Mix Canyon, W 1473, W 2370; Gates Canyon, W 1712, W 1937, Jepson 2358; Cold Canyon, W 769; along Putah Creek, in riparian woodland, W 1225, W 2334; along Soda Springs Creek, east of Tolenas Springs. The plants here assigned to Salix bonplandiana were formerly considered to belong to a different species, S. laevigata Bebb. Dorn (1976) merged these two taxa under the former name, a treatment followed by Little (1979:260). As now circumscribed, S. bonplandiana ranges from California and the southwestern United States south through Mexico to Guatemala.

Salix gooddingii Ball. Goodding's Black Willow. Rare, known only from the riparian woodland along Putah Creek, W 4407, W 4434. Salix gooddingii has been included in S. nigra Marshall by Little (1979:264-265) but is maintained as a separate species by Dorn (1976).

Salix hindsiana Bentham. Sandbar Willow. Hinds Willow. Occasional, along streams at lower elevations. Mix Canyon, W 1288, W 2444, Jepson s.n., 1891; Cold Canyon, W 1545; along Putah Creek, W 1568, W 1924.

Salix lasiandra Bentham.· Yellow Willow. Pacific Willow. Rare, known only from the riparian woodland along Putah Creek, W 4405.

Salix lasiolepis Bentham. Arroyo Willow. Frequent, along streams. Mix Canyon, W 1901, W 2041; along Putah Creek, in riparian woodland, W 1567, W 1923; Cold Canyon. Two collections of female plants from along Putah Creek (W 2335, W 2420) are tentatively assigned to S. lasiolepis. These plants have capsules that are tomentose and sessile (or nearly so). The capsules are about 4-5 mm long with evident styles (about 0.7 mm long). The catkin scales are reddish but are not as dark as in other specimens of S. lasiolepis from the Vaca Mountains. The leaves are tomentose beneath. Although Munz (1959) and Hitchcock et al. (1964) describe the capsules of S. lasiolepis as glabrous, Jepson (1925) states that the capsules are glabrous or puberulent. These two Putah Creek collections may represent S. lasiolepis var. bakeri (von Seemen) Ball, in which the capsule is thinly pubescent and slightly larger than in the typical variety. The range of this variety, now treated as a synonym of S. lasiolepis, is given by Abrams (1923:497) as occurring "sparingly about San Francisco Bay." Were it not for their obvious styles and the rather short capsules, I would be disposed to place the two Putah Creek specimens in question (W 2335, W 2420) in S. scouleriana Barratt ex Hooker.

Salix melanopsis Nuttall. Dusky Willow. Frequent, along intermittent and permanent streams. Mix Canyon, W 1054, W 1653, W 2440; Miller Canyon, Jepson s.n., 1897; Cold Canyon, W 755; Putah Creek bed, Jepson s.n., 1887.

This species is closely related to S. exigua Nuttall and has been treated as a subspecies, S. exigua subsp. melanopsis (Nuttall) Cronquist (in Hitchcock et al., 1964: 51-52). It has been retained at the species rank by Kartesz and Kartesz (1980:426) and by Little (1979:264). Although the Coast Range distribution of Salix melanopsis is given by Munz (1959) as from Lake and Sonoma counties north, there are collections in UC from Monterey and Santa Clara counties.

SAXIFRAGACEAE. Saxifrage Family

Lithophragma affine Gray subsp. affine. Woodland Star. Infrequent, in foothill woodland. East of Tolenas Springs, W 4119; west side of ridge, in wooded draws, not far below summit of Mount Vaca, W 2161.

Lithophragma heterophyllum (Hooker & Arnott) Torrey & Gray [L. bolanderi Gray]. Hill Star. Occasional, in shaded areas of foothill woodland; rarely found in open grassland. Mix Canyon, W 546, W 1236, W 2211; Gates Canyon, W 633; Cold Canyon, W 1221, W 1343; east of Tolenas Springs, in canyon of Soda Springs Creek, W 4113; near Monticello Dam, W 2315. Collections W 546, W 1221, and W 4113 seem to correspond to L. bolanderi Gray in having the base of the petal blade serrate. Although Taylor (1965:61-63) considers L. bolanderi to be a separate species, the characters used to distinguish the two are rather

obscure. I have chosen, therefore, to follow the treatment of Bacigalupi (in Abrams, 1944:369), who reduces L. bolanderi to synonymy under L. heterophyllum.

Ribes malvaceum Smith. Chaparral Currant. California Black Currant. Occasional, in openings in chaparral, or, rarely, in open foothill woodland. Mix Canyon, W 175, W 547, Jepson s.n., 1892; Gates Canyon, Jepson 13503; at junction of Mix Canyon Road and Ridge Road, W 1887; Cold Canyon, W 1338; along Blue Ridge south of Signal Hill.

Ribes menziesii Pursh var. victoris (Greene) Janczewski [R. victoris Greene]. Victor's Gooseberry. Occasional, in foothill woodland and shaded places in chaparral. Mix Canyon, W 595, W 1666, Jepson 18763; Gates Canyon, W 638, W 1488, Jepson 13506; east of Blue Ridge between Gates and Mix canyons, by Torreya californica, W 2384. The combination used here, Ribes menziesii var. victoris, is that employed by Howell (1970:154). Hoover (1966:345) has treated this taxon as a mere form, R. menziesii forma victoris (Greene) Hoover, stating, with regard to a specimen from San Luis Obispo County assigned by him to this taxon, "Finding this variant at the southern end of the range of the species takes away the geographic significance which it previously seemed to have." Hoover mentions only the calyx color of his specimen (pale green rather than deep purple) and does not discuss the seemingly significant character possessed by the fruits of Victor's

Gooseberry: all spines short and stout, of the same length. Until further study can clarify the relationship of the San Luis Obispo County plants, I have chosen to treat Victor's Gooseberry as a variety of Ribes menziesii. Except for the possible occurrence of R. menziesii var. victoris in San Luis Obispo County, the taxon is confined to Marin, Napa, Sonoma, and Solano counties.

Plants from the Vaca Mountains here assigned to Ribes menziesii var. victoris correspond to R. victoris var. greeneianum Jepson, the type locality of which is the Vaca Mountains. The latter name is considered to be synonymous with the former.

Saxifraga californica Greene. California Saxifrage. Occasional, in shaded places in foothill woodland. Mix Canyon, W 1146, W 1155, W 2034; Cold Canyon.

Whipplea modesta Torrey. Yerba de Selva. Modesty. Occasional, in chaparral at higher elevations, primarily in shaded areas. Upper Mix Canyon, W 1575, Jepson 18776; Miller Canyon, Jepson 14650; Blue Ridge between Gates and Mix canyons, W 592; Cold Canyon. This trailing, suffrutescent species, a typical component of redwood and Douglas-fir forests in the outer Coast Ranges, seems out of place in the chaparral of the Vaca Mountains.

SCROPHULARIACEAE. Figwort Family

Antirrhinum breweri Gray. Brewer's Snapdragon. Rare, in disturbed openings in chaparral. Upper Mix Canyon, W 4388. The Vaca Mountains (and the Pellejo Hills just south of Vacaville) represent the southern limit of distribution for this species in the Coast Ranges. It occurs as far south as Mariposa County in the Sierra Nevada.

Castilleja affinis Hooker & Arnott subsp. affinis. Indian Paintbrush. Rare, occurring in rocky areas of chaparral. West side of range, vicinity of Seventy Acre Canyon, W 2143.

Castilleja foliolosa Hooker & Arnott. Woolly Paintbrush. Frequent, in chaparral or, occasionally, in open foothill woodland. Mix Canyon, W 553, W 1151, Jepson 18756a; Miller Canyon, Jepson 21365, Jepson 21473; Cold Canyon, W 960; ridge above Collins Camp, Jepson 21471, Jepson 21472; along Blue Ridge between Gates and Mix canyons, W 809; west side of Blue Ridge not far below summit of Mount Vaca, W 2119; along Blue Ridge north of Signal Hill.

Castilleja martinii Abrams var. martinii [C. roseana Eastwood]. Infrequent, in chaparral and open foothill woodland, primarily in the northern part of the range. Cold Canyon, W 2402; near Monticello Dam, W 2264; Thompson Canyon north-northeast of Monticello Dam, J.F. Emmel 338

(JEPS); Blue Ridge north of Mix Canyon, in chaparral adjoining black oak grove, W 923.

Collinsia heterophylla Buist ex Graham var. heterophylla. Chinese Houses. Common, in shaded places in foothill woodland; occasional in the shade of chaparral shrubs and in open grassy areas. Mix Canyon, W 551; upper Mix Canyon, W 2467; Gates Canyon, Jepson 556d; Cold Canyon, W 761, W 1538; along Blue Ridge south of Signal Hill, in grassy openings in Quercus agrifolia woodland, W 4231; east of Tolenas Springs.

Collinsia sparsiflora Fischer & Meyer. Frequent, in open foothill woodland and grassland. Mix Canyon, Jepson 18727; Cold Canyon, W 1304; near Monticello Dam, W 2280; Putah Creek Canyon, R.F. Hoover 2767 (JEPS). Vaca Mountains plants seem to correspond to C. sparsiflora var. sparsiflora and C. sparsiflora var. bruceae (M.E. Jones) Newsom. However, Jepson's Mix Canyon collection (cited above) has been referred to C. sparsiflora var. collina (Jepson) Newsom. Because of the sympatric occurrence of these varieties in the Vaca Mountains and elsewhere and the somewhat questionable taxonomic characters upon which these varieties are based, I am here including them in synonymy.

Cordylanthus pilosus Gray subsp. pilosus. Hairy Bird's Beak. Rare, in dry, open, often somewhat disturbed areas. Mix Canyon, W 1010, W 1770.

Diplacus aurantiacus (Curtis) Jepson subsp. aurantiacus [Mimulus aurantiacus Curtis subsp. aurantiacus]. Bush Monkey Flower. Frequent, in open foothill woodland and chaparral, mostly on south-facing slopes, but also occurring on north-facing slopes, often about rocks; sometimes colonizing burned areas. Mix Canyon, W 516, W 1275; near Monticello Dam, W 782, W 2274; west side of ridge below summit of Mount Vaca, in rocky areas, W 2147; Cold Canyon; along Blue Ridge south of Signal Hill, on chaparral burn and in Quercus agrifolia woodland.

Keckiella lemmonii (Gray) Straw [Penstemon lemmonii Gray]. Bush Beard-tongue. Occasional, in streamside and foothill woodland of canyons and, rarely, in disturbed open places in chaparral. Mix Canyon, W 937, W 1016, Jepson 10577, Jepson 21425; Cold Canyon, W 986; Putah Canyon, H. Popenoe 33 (UC); junction of Mix Canyon Road and Ridge Road, disturbed opening in chaparral, W 1783. The southern limit of distribution of this species in the Coast Ranges is the Vaca Mountains. In the Sierra Nevada it ranges south to El Dorado County.

Kickxia elatine (Linnaeus) Dumortier. Sharp-leaved Fluellin. Infrequent weed of disturbed areas such as roadsides and floodplains. Roadside park along State Highway 128 at north end of range, W 1802; flood bed of Putah Creek on Monticello-Winters Road, H.K. Sharsmith 4196 (JEPS). Native of Europe.

Mimetanthe pilosa (Bentham) Greene [Mimulus pilosus (Bentham) Watson]. Rare, in vernally moist places. Along Ridge Road, 3.9 km north of its junction with Mix Canyon Road, in shallow drainage, W 4187, W 4272; river bed of Putah Creek, near Winters, Jepson 21454.

Mimulus cardinalis Douglas ex Bentham. Cardinal Monkey Flower. Scarlet Monkey Flower. Rare, known only from Mix Canyon, Jepson 25m.

Mimulus douglasii (Bentham) Gray. Purple Mouse-ears. Douglas Monkey Flower. Rare, on open canyonsides. Southern slopes of Walker Canyon, about 1.6 km south of Pine Peak, Jepson 61m.

Mimulus guttatus Fischer ex Candolle [M. nasutus Greene]. Common Monkey Flower. Common, in moist places in all plant communities. Mix Canyon, along Ulatis Creek, W 535, W 1658, Jepson 66m; along Soda Springs Creek, east of Tolenas Springs, W 4144; Tolenas Springs, in moist swale, W 4151; Cold Canyon, along Cold Creek, W 3067; Pansy Flat, moist areas below stock pond, W 4308. Our plants are referable to M. guttatus subsp. guttatus, M. guttatus subsp. arvensis (Greene) Munz, or M. nasutus Greene. All of these are considered here to represent no more than mere forms of this highly variable species.

Mimulus kelloggii (Curran ex Greene) Curran ex Gray. Kellogg Monkey Flower. Rare, on open slopes in foothill woodland and chaparral. Crest above Collins Camp, Jepson 68m; Mix Canyon. The Vaca Mountains (and Capell

Valley to the west of the range) represent the southern limit of distribution in the Coast Ranges for this species, which ranges south in the Sierra Nevada to Kern County.

Mimulus pulsiferae Gray. Rare, known only from a vernally moist drainage along Ridge Road, 3.9 km north of its junction with Mix Canyon Road, W 4158, W 4184, W 4273. These collections represent a significant range extension for this species, which, except for collections from Howell Mountain, Napa County, has previously been reported in the Coast Ranges only from Lake County north, mostly at higher elevations than those at which it is found in the Vaca Mountains. In the Sierra Nevada M. pulsiferae ranges south to Mariposa County.

Orthocarpus attenuatus Gray. Valley Tassels. Frequent, in grassland and open foothill woodland. Mix Canyon, W 490, W 1484; Gates Canyon, W 624; Cold Canyon, W 1539; Tolenas Springs; Blue Ridge south of Signal Hill, in grassland.

Orthocarpus erianthus Bentham var. erianthus. Johnny-tuck. Occasional, in grassland and open foothill woodland. Tolenas Springs, W 4145; rolling hills north of Pleasants Valley Road, near junction of Pleasants Valley and Vaca Valley roads, W 2025; along Blue Ridge north of Mix Canyon, W 930. Jepson has remarked of the abundance of this species in the early days (Field Book 6:58), but in the spring of 1942 he saw "scarcely any" (Field Book 48:178).

Orthocarpus purpurascens Bentham var. purpurascens. Purple Owl's Clover. Infrequent, in grassland and open foothill woodland at lower elevations. Cold Canyon, W 3053; hills north of State Highway 128 at north end of range, W 1965; English Hills, W 1630; Pleasants Valley, Jepson 8258.

Pedicularis densiflora Bentham ex Hooker subsp. densiflora. Indian Warrior. Occasional, at bases of shrubs in chaparral. Upper Mix Canyon, W 575; Cold Canyon, W 1341; near head of Walker Canyon, Jepson 21547; west side of range, in vicinity of Seventy Acre Canyon, W 2184.

Penstemon centranthifolius Bentham. Scarlet Bugler. Rare, known only from Gates Canyon, Heller and Brown (reported in Keck, 1937). This species is also known from near Dunns Peak on the eastern side of Vaca Valley, Jepson 21297.

Penstemon heterophyllus Lindley subsp. purdyi Keck. Foothill Penstemon. Occasional, in dry, often rocky areas in open foothill woodland and chaparral, and along intermittent streams. Mix Canyon, along Ulatis Creek, W 852, W 940; Cold Canyon, W 988; upper Gates Canyon, along ridge, W 2483; south-facing slope north of State Highway 128 at north end of range, W 2328; along Blue Ridge north of Mix Canyon, W 921; west side of ridge just below summit of Mount Vaca, W 1691.

Scrophularia californica Chamisso & Schlechtendal subsp. floribunda (Greene) Shaw. California Bee-plant. California Figwort. Occasional, in open foothill woodland and chaparral. Mix Canyon, W 598, W 1449, Jepson 18760; Tolenas Springs; Cold Canyon; just east of Blue Ridge south of Signal Hill, locally abundant on chaparral burn; along Blue Ridge in the northern part of the range. The type locality for this subspecies is the Pellejo Hills (Jepson 21290) on the southeastern side of Lagoon Valley.

Tonella tenella (Bentham) Heller. Infrequent, in foothill woodland. Mix Canyon, W 1242, W 2035.

Verbascum blattaria Linnaeus. Moth Mullein. Rare weed of moist areas. In drainage ditch along State Highway 128 at north end of range, W 2416. Native of Eurasia.

Verbascum thapsus Linnaeus. Common Mullein. Rare weed of disturbed areas and floodplains. Along Pleasants Valley Road about 100 m south of Putah Creek, W 1798; Putah Creek near Devil's Gate, Jepson s.n., no date; riparian woodland along Putah Creek. Native of Eurasia.

Veronica persica Poiret. Persian Speedwell. Rare weed of open, disturbed areas. Cold Canyon, along dirt road, W 1324. Native of Eurasia.

SIMAROUBACEAE. Quassia Family

Ailanthus altissima (Miller) Swingle. Tree of Heaven. Naturalized in a few places in Pleasants Valley and in the riparian woodland of Putah Creek. Along

Pleasants Valley Road, 3.2 km south of Putah Creek, W 1797; Pleasants Valley, Jepson 6844; along Putah Creek at north end of range. Native of China.

SOLANACEAE. Nightshade Family

Datura meteloides A. Candolle. Tolguacha. Rare, in floodplain of Putah Creek, W 4399. This species, included in D. innoxia P. Miller by some authors, is, according to Munz (1959), possibly an introduction from Mexico. The occurrences of this species in and around the lower Sacramento Valley are most likely the result of introductions from the American Southwest.

Nicotiana bigelovii (Torrey) Watson. Indian Tobacco. Rare, in disturbed ground along drainages at low elevations. Along small drainage north of Pleasants Valley School site, in overgrazed grassland, W 4440.

Nicotiana glauca Graham. Tree Tobacco. Frequent in Putah Canyon at north end of range, W 1228. Unknown elsewhere in the Vaca Mountains. Native of South America.

Solanum parishii Heller. Rare, known only from Putah Canyon, near Monticello Dam, in foothill woodland, W 786, W 2253. An additional collection, R.H. Platt s.n., 1898 (JEPS) gives only the Vaca Mountains for locality information. The Vaca Mountains represent the southern limit of distribution for this species in the Coast Ranges.

Solanum xantii Gray var. intermedium Parish. Purple Nightshade. Frequent, in chaparral and foothill woodland. Mix Canyon, W 510, W 563, Jepson 21262; Gates Canyon, W 621, Jepson 20765; Miller Canyon, Jepson 21262; Cold Canyon, W 1294, W 1546; west side of ridge not far below summit of Mount Vaca, W 1372, W 2163; along Blue Ridge between Gates and Mix canyons, W 731, W 1386; along Blue Ridge north of Signal Hill; in burned area on east side of Blue Ridge, south of Signal Hill.

TAMARICACEAE. Tamarisk Family

Tamarix parviflora Candolle. Rare escape from cultivation along Pleasants Valley Road between Mix Canyon and Vaca Valley roads, growing in drainage along road, W 2023. Native of the eastern Mediterranean region.

URTICACEAE. Nettle Family

Urtica holosericea Nuttall. Creek Nettle. Hoary Nettle. Rare, known only from quiet waters along Putah Creek, W 4411.

VALERIANACEAE. Valerian Family

Plectritis ciliosa (Greene) Jepson subsp. ciliosa. Rare, known certainly only from Cold Canyon, in open areas along dirt road, W 1326. To be expected elsewhere in the Vaca Mountains.

Plectritis macrocera Torrey & Gray subsp. macrocera [P. jepsonii Davy; P. eichleriana (Suksdorf) Heller; P. macrocera var. eichleriana (Suskdorf) Dempster]. Common, in grassland and open foothill woodland. Mix Canyon, W 1249, W 2609; Miller Canyon, Jepson s.n., 1885; Walker Canyon, Jepson s.n., 1892; Cold Canyon, W 1533; near Monticello Dam, W 2310, L.T. Dempster P 10 B (JEPS; specimen grown from seed collected near dam); Putah Creek, Jepson s.n., 1890. The Jepson collection from Putah Creek is the type specimen for P. jepsonii Davy, now considered to be synonymous with P. macrocera subsp. macrocera.

VERBENACEAE. Verbena Family

Phyla nodiflora (Linnaeus) Greene [Lippia nodiflora (Linnaeus) Michaux]. Garden Lippia. Rare, known only from along Putah Creek, in sandy soil in somewhat open canopied riparian woodland, W 1571, W 4421. These specimens seem to correspond to P. nodiflora var. reptans (Humboldt, Bonpland, & Kunth) Moldenke. Native of South America.

Verbena robusta Greene. Rare, known only from the riparian woodland along Putah Creek, W 4406.

VIOLACEAE. Violet Family

Viola lobata Bentham var. lobata. Rare, known only from the eastern slope of Mount Vaca near the summit, growing in the shade of Umbellularia californica and Quercus chrysolepis, W 686.

Viola quercetorum Baker & Clausen. Rare, along upper ridges of the Vaca Mountains. Along Blue Ridge north of Mix Canyon, in black oak grove, W 1366; summit of ridge opposite head of Mix Canyon, Jepson 2183.

VISCACEAE. Mistletoe Family

Phoradendron tomentosum (Candolle) Engelmann subsp. macrophyllum (Engelmann) Wiens. Occasional parasite on Populus, Juglans, etc. Gates Canyon, on Juglans hindsii, W 1944; along Putah Creek, on Populus fremontii, W 1978.

VITACEAE. Grape Family

Vitis californica Bentham. California Grape. Frequent, in streamside and riparian woodlands. Mix Canyon, along Ulatis Creek, W 1056, W 1704; Miller Canyon, Jepson 13936; Cold Canyon, near Cold Creek, W 724; along Putah Creek, in riparian woodland, W 2353.

ZYGOPHYLLACEAE. Caltrop Family

Tribulus terrestris Linnaeus. Puncture Vine. Infrequent weed of ruderal areas at lower elevations. Roadside park along State Highway 128 at north end of range, in hard packed soil at margin of parking lot, W 4400; along Pleasants Valley Road just north of its junction with Cherry Glen Road, on roadside, W 1872. Native of the Old World.

CLASS LILIOPSIDA. Monocotyledons

AMARYLLIDACEAE. Amaryllis Family

Allium amplectens Torrey. Narrow-leaved Onion. Occasional, mostly along ridges in chaparral, sometimes in open foothill woodland; occurring primarily in rather dry places. Near summit of Mount Vaca, W 1699; along Blue Ridge between Gates and Mix canyons, W 890, W 2480; ridge above Collins Camp, Jepson 20987; along Ridge Road north of junction with Mix Road, W 916, W 4277. An unnumbered collection by Jepson from the ridge above Collins Camp is the type of Allium monospermum Jepson (Jepson 20987 is the isotype), now included in synonymy under A. amplectens.

Allium serratum Watson. Serrated Onion. Occasional, in foothill woodland, especially on north-facing slopes. Mix Canyon, W 1595, W 2362; east-west trending ridge above Mix Canyon, W 508; Walker Canyon, Jepson s.n., 1892; Tolenas Springs, in rocky areas around quarry, W 4139; east of Tolenas Springs, W 4122; near Monticello Dam, W 2266; hills north of State Highway 128 at north end of range, W 2242; Cold Canyon.

Brodiaea elegans Hoover subsp. elegans. Harvest Brodiaea. Occasional, mostly in grassland, but also occurring in open foothill woodland and in open places in chaparral. Mix Canyon, W 877; Gates Canyon, Jepson 554; hills north of State Highway 128 at north end of range, W 2240; along Blue Ridge north of Mix Canyon, W 920.

Dichelostemma congestum (Smith) Kunth [Brodiaea congesta Smith]. Ookow. Occasional, occurring mostly at higher elevations, along ridges in open places in chaparral or foothill woodland. Blue Ridge between Gates and Mix canyons, W 800; west side of ridge not far below summit of Mount Vaca, W 1690; head of Gates Canyon, W 2482; near top of Signal Hill, W 4286; along Ridge Road north of its junction with Mix Canyon Road, W 919, W 4192, W 4282 (the latter in black oak grove); Cold Canyon. Curiously, Kartesz and Kartesz (1980:275) include Dichelostemma congestum in D. pulchellum (Salisbury) Heller. Not only are the two species well defined on the basis of several floral characters, the most notable of which is the presence of 3 anthers in flowers of the former species and 6 in flowers of the latter, but their flowering periods differ: D. pulchellum flowers relatively early in the season, usually in March and April, whereas D. congestum flowers later, from late April to June. The amount of overlap in flowering periods is slight. Part of the confusion in nomenclature between these two species stems from the incorrect use in earlier works (e.g., Jepson, 1925; Bowerman, 1944) of the binomial Brodiaea pulchella to refer to plants now considered to belong to Dichelostemma (formerly Brodiaea) congestum. Niehaus (1980) has given a synopsis of the taxonomy of the Brodiaea complex (including the genera Brodiaea, Triteleia, and Dichelostemma); his treatment is followed here.

Dichelostemma pulchellum (Salisbury) Heller [Brodiaea pulchella (Salisbury) Greene]. Blue Dicks. Wild Hyacinth. Common, in grassland and open foothill woodland, infrequently occurring in open places in chaparral. Mix Canyon, W 520, W 1395; Cold Canyon, W 1214; southwest of Monticello Dam, W 2298; Gates Canyon; along Blue Ridge at north end of range; Tolenas Springs; etc.

Dichelostemma volubile (Kellogg) Heller [Brodiaea volubilis (Kellogg) Baker]. Twining Brodiaea. Snake Lily. Occasional, mostly in foothill woodland, but sometimes found in grassland and chaparral. Mix Canyon, W 534, R.F. Hoover 3184 (UC); Gates Canyon, W 639, Jepson 555; Blue Ridge between Gates and Mix canyons, W 897; near Monticello Dam, W 2307; Putah Pass, west of Winters, E. Ferguson 341 (JEPS); Cold Canyon; east of Tolenas Springs; along Blue Ridge south of Signal Hill, in grassland. Twining Brodiaea reaches its southern limit of distribution in the Coast Ranges in the Vaca Mountains. In the Sierra Nevada it ranges south to Kern County.

Triteleia hyacinthina Greene [Brodiaea hyacinthina (Lindley) Baker]. White Brodiaea. Rare, known certainly only from moist ground below the stock pond at Pansy Flat, W 4297. This species is more common in moist areas on the floors of the surrounding valleys and is to be expected in similar situations elsewhere in the Vaca Mountains.

Triteleia laxa Bentham [Brodiaea laxa (Bentham) Watson]. Ithuriel's Spear. Grass Nut. Frequent, in grassland and open woodland; occasionally found in open or disturbed areas in chaparral. Mix Canyon, W 862, W 1436; Gates Canyon, W 653, Jepson 18880; Walker Canyon, Jepson 20981; Blue Ridge between Gates and Mix canyons, W 799; slopes of Signal Hill, W 4284; near Monticello Dam, W 2252; along Putah Creek, in riparian woodland, W 1920; east of Tolenas Springs; Cold Canyon.

Triteleia lugens Greene [Brodiaea lugens (Greene) Baker; B. ixioides Watson var. lugens (Greene) Jepson]. Infrequent, in open areas in chaparral, mostly on ridge-tops. Near top of Mount Vaca, W 587, W 1700; along Blue Ridge between Gates and Mix canyons, W 698; open slopes of Signal Hill, W 4285; near Signal Station, Sharpe s.n. (JEPS); along Blue Ridge near head of Wild Horse Canyon, W 4165; Vaca Mountains, R.H. Platt s.n., 1898 (UC). The type locality for this species is the Vaca Mountains; Lenz (1975:247) has designated the R.H. Platt collection cited above as the neotype. Triteleia lugens has a disjunct distribution, occurring north of San Francisco Bay in Lake, Napa, and Solano counties and in Monterey and San Benito counties, about 225 air km south (Lenz, 1975; Hoover, 1957). Hoover (1941 and 1957) reports this species from Guadalupe Island, Baja California, and from the San Gabriel Mountains, Los Angeles County, California. Lenz (1975) treats the Guadalupe Island plants as a separate species,

I. guadalupensis Lenz, and refers material from the San Gabriel Mountains to I. dudleyi Hoover. E.C. Stone (1951), working in Topanga Canyon, Los Angeles County, found that fire stimulated the flowering of plants he determined to represent I. lugens (these, using Lenz' treatment, probably belong to I. dudleyi). According to Stone, flowering is stimulated by the removal of shade, and the mechanical clearing of chaparral shrubs is as effective as fire in this regard. Similar responses have been observed in the Vaca Mountains: plants in flower have been noted only in areas which have been mechanically cleared of brush or in open, unshaded areas in chaparral.

CYPERACEAE. Sedge Family

Carex barbarae Dewey. Santa Barbara Sedge. Infrequent, in moist areas, as along streams. Mix Canyon, in bed of Ulatis Creek, W 1573; along Cherry Glen Road just east of its junction with Pleasants Valley Road, in irrigation ditch, W 1866.

Carex multicaulis Bailey. Rare, known only from along Blue Ridge north of Mix Canyon, in black oak grove, W 1638. Probably occurring in wooded areas elsewhere in the Vaca Mountains.

Carex nudata W. Boott. Torrent Sedge. Frequent, along both intermittent and permanent streams, often found in the beds of the former. Mix Canyon, along Ulatis Creek,

W 844, W 1271, W 1392; Gates Canyon, along Alamo Creek, W 665, W 1486; Cold Canyon, in bed of Cold Creek, W 972; along Putah Creek, W 2351. This is the most common sedge in the Vaca Mountains, forming dense clumps in and near streams. Considerable variation exists in the Vaca Mountains material, in the shape and length of the spikelets and, especially, in the degree of development of the lowest bract in the inflorescence. Some of the plants in the range may represent Carex senta Boott, which has been reported from Solano County. Until further study can better determine the relationships of the Vaca Mountains plants, they are all referred to C. nudata.

Cyperus eragrostis Lamarck. Umbrella Sedge. Occasional, in moist places. Mix Canyon, in moist seep along road, W 1037, W 1776; Cold Canyon, along Cold Creek, W 982; along Putah Creek, W 1815, W 4436; along Cherry Glen Road west of the Interstate 80 freeway, in moist situation along road, W 1856.

Eleocharis macrostachya Britton. Wire Grass. Common Spike-rush. Infrequent, in moist places such as swales and along streams. Tolenas Springs, in water of Soda Springs Creek above quarry, W 4136; Tolenas Springs, in swale in midst of grassland, W 4150; moist area below stock pond in Pansy Flat, W 4304.

Scirpus acutus Muhlenberg ex Bigelow. Common Tule. Rare, along permanent streams and drainages. Along Putah Creek; in drainage ditch along State Highway 128 at north end of range.

Scirpus microcarpus Presl. Rare, in moist ground adjacent to Putah Creek, W 1818, W 2350.

HYDROCHARITACEAE. Frogbit Family

Elodea canadensis Michaux. Canadian Waterweed. Rare, known only from quiet water and in permanent ponds along Putah Creek, W 1836, W 4438.

IRIDACEAE. Iris Family

Iris fernaldii Foster. Frequent, in foothill woodland and shaded places in chaparral. Mix Canyon, W 1662, W 2466, Jepson 7192; Gates Canyon, W 669, Jepson s.n., 1893, Jepson 20767; Wild Horse Canyon, Jepson 2456; along Blue Ridge just north of Mount Vaca, W 2470; just below ridge on west side near Mount Vaca, in wooded draws, W 1685, W 2151; along Blue Ridge north of Signal Hill, W 4259; along Blue Ridge north of Mix Canyon, in black oak grove, W 1632; Cold Canyon. This appears to be the only native iris in the Vaca Mountains. It is closely allied to I. macrosiphon Torrey and has been included in that species by some authors. According to Lenz (1958), I. fernaldii ranges from Sonoma and Lake counties to Santa Cruz County.

Iris germanica Linnaeus. German Iris. Apparently persisting from cultivation and spreading, in an open, grassy area along Ridge Road, 4.3 km north of the junction of Ridge and Mix Canyon roads, W 4172. Native of Europe.

Sisyrinchium bellum Watson. Blue-eyed Grass. Frequent, in foothill woodland and, occasionally, in grassland. Mix Canyon, W 544, W 1619; along Blue Ridge north of Mix Canyon, in black oak grove, W 1631; near Monticello Dam, W 2277; Cold Canyon; Tolenas Springs; along Blue Ridge south of Signal Hill, in grassland and woodland.

JUNCACEAE. Rush Family

Juncus balticus Willdenow var. balticus. Baltic Rush. Rare, in moist places at lower elevations. Cold Canyon, in dry bed of Cold Creek, W 973; Cherry Glen Road west of Interstate 80 freeway, in moist situation near road, W 1868.

Juncus balticus Willdenow var. mexicanus (Willdenow) Kuntze [J. mexicanus Willdenow]. Mexican Rush. Rare, known only from the vicinity of Tolenas Springs, where it is locally common in Soda Springs Creek above the quarry, occurring with Eleocharis macrostachya, W 4137.

Juncus bufonius Linnaeus [J. sphaerocarpus Nees]. Toad Rush. Occasional, in vernally moist places. Gates Canyon, in dry bed of Alamo Creek, W 4106; Cold Canyon, in dry bed of Cold Creek, W 968; margins of stock pond at

Pansy Flat, W 4312; along Ridge Road, 3.9 km north of its junction with Mix Canyon Road, in shallow drainage near road, W 4160. Some of our material with smaller flowers (e.g., W 4160) seems to correspond to what has been called J. sphaerocarpus Nees, but according to Cronquist et al. (1977:63) this name is perhaps applicable to a related Mediterranean species. In any event, the smaller flowered specimens are here considered to represent mere variants of J. bufonius. The Cold Canyon collection (W 968) corresponds to J. bufonius var. congestus Wahlenberg, an ill-defined taxon here reduced to synonymy.

Juncus kelloggii Engelmann. Kellogg's Rush. Rare, known only from a shallow drainage along Ridge Road, 3.9 km north of the junction of Ridge and Mix canyon roads, W 4161. To be expected in similar situations elsewhere in the Vaca Mountains. Although the above specimen seems to conform to J. kelloggii sensu stricto, I agree with Cronquist et al. (1977:63-64), who reduce the numerous segregate species recognized by F.J. Hermann and others to synonymy under J. kelloggii.

Juncus patens E. Meyer. Common Rush. Occasional, along streams and in other moist places. Gates Canyon, along creek, W 630; along Putah Creek, W 1803, W 4420; Wild Horse Canyon, beside dry stream, Jepson 2455; along Cherry Glen Road west of Interstate 80 freeway, in drainage ditch, W 1860.

Juncus xiphioides E. Meyer. Iris-leaved Rush. Frequent, along streams, about springs, and in other moist places. Mix Canyon, moist areas along road, W 707, W 1080; Mix Canyon, near Ulatis Creek, W 1729, W 4365; Gates Canyon, along creek, W 620; Cold Canyon, along Cold Creek, W 957; along Putah Creek, W 4425; above Tolenas Springs quarry, in Soda Springs Creek.

LEMNACEAE. Duckweed Family

Lemna minor Linnaeus. Lesser Duckweed. Infrequent, but locally abundant, in quiet waters along Putah Creek, W 4424.

LILIACEAE. Lily Family

Asparagus officinalis Linnaeus. Garden Asparagus. Rare, known only from the riparian woodland along Putah Creek, W 1808, W 4435. Native of Europe.

Calochortus amabilis Purdy. Golden Fairy Lantern. Frequent, in foothill woodland and grassland; occasionally found in chaparral. Mix Canyon, W 530, R.F. Hoover 3186 (UC); head of Mix Canyon, Jepson 18778; Cold Canyon, W 728, W 1528; southwest of Monticello Dam, W 2302; Blue Ridge just north of Mount Vaca, W 2385; along Blue Ridge near head of Wild Horse Canyon; along Blue Ridge north of Signal Hill. The beautiful Golden Fairy Lantern reaches its southern limit of distribution in Marin County. Its

southernmost stations in the inner Coast Ranges are in the Vaca Mountains. The closely related Calochortus pulchellus Douglas ex Bentham is a Mount Diablo endemic (Bowerman, 1944:120-121).

Calochortus luteus Douglas ex Lindley. Yellow Mariposa Lily. Infrequent, in grassland at lower elevations. Mix Canyon, near mouth, W 876; hills north of State Highway 128 at north end of range, W 2237.

Chlorogalum pomeridianum (Candolle) Kunth. Soap Plant. Soap Root. Amole. Frequent, in grassland, chaparral, and foothill woodland. Gates Canyon, W 629; Cold Canyon, W 969; along Blue Ridge south of Signal Hill; along Blue Ridge near head of Wild Horse Canyon; Mix Canyon; east of Tolenas Springs.

Fritillaria lanceolata Pursh. Checker Lily. Infrequent, in wooded canyons. Mix Canyon, W 1172, W 1274; Cold Canyon.

Zigadenus fremontii Torrey var. fremontii. Star Zigadene. Frequent, mostly in openings and burns in chaparral, but sometimes found in open foothill woodland. Mix Canyon, W.D. Clark s.n. (SACT); Gates Canyon, W 625; Cold Canyon, in burned area, W 1303, W 1535; near summit of Mount Vaca, W 585; along Blue Ridge north of Mix Canyon, in black oak grove, W 1367; west side of ridge not far below summit of Mount Vaca, W 1382; west side of ridge in

wooded draws just below Mount Vaca, W 2152; along Ridge Road north of Signal Hill, in cleared areas; along Blue Ridge near head of Wild Horse Canyon.

ORCHIDACEAE. Orchid Family

Epipactis gigantea Douglas ex Hooker. Stream Orchis. Giant Helleborine. Rare, known only from along Putah Creek, in riparian woodland, W 4413, W 4428.

Piperia elegans (Lindley) Rydberg var. elata (Jepson) Luer [Habenaria unalascensis (Sprengel) Watson var. elata (Jepson) Correll; H. unalascensis subsp. elata (Jepson) Calder & Taylor; H. elegans (Lindley) Bolander var. elata Jepson; Plantanthera unalascensis (Sprengel) Kurtz subsp. elata (Jepson) Taylor & MacBryde]. Rare, in wooded canyons. Gates Canyon, Jepson 21286, 1892; reported from Cold Canyon by Stebbins and Webster (1981). Although no varietal name is given by Stebbins and Webster (they list merely Habenaria elegans), the Cold Canyon plants are tentatively considered to represent Piperia elegans var. elata. Jepson's Gates Canyon collection cited above is the type collection for this taxon, which has undergone several nomenclatural changes, only some of which are listed above. Ackerman (1977) reduces this taxon to synonymy under P. elongata Rydberg subsp. elongata, the type locality of which is northern Idaho. I prefer the treatment used here, which is that of Luer (1975).

Piperia unalascensis (Sprengel) Rydberg [Habenaria unalascensis (Sprengel) Watson]. Alaska Rein Orchis. Rare, known only from Mix Canyon, on a shaded, relatively moist, north-facing slope in foothill woodland, W 2358. Although this specimen has more basal leaves (6) than typical for this species, it seems to conform in all other respects to P. unalascensis.

POACEAE. Grass Family

Agrostis exarata Trinius var. pacifica Vasey. Pacific Bentgrass. Infrequent, along streams. Mix Canyon, along Ulatis Creek, W 1730; Cold Canyon, along Cold Creek, W 977.

Agrostis tenuis Sibthorp. Colonial Bent. Rare weed of moist ground along Putah Creek, W 1835. Native of Europe.

Aira caryophyllea Linnaeus. Silver Hairgrass. Common, in disturbed and overgrazed areas in grassland and open foothill woodland and, less frequently, in disturbed and open places in chaparral. Cold Canyon, W 733; slopes of Signal Hill, in cleared areas, W 4294; along Blue Ridge north of Mix Canyon. Native of Europe.

Aira elegans Willdenow ex Gaudin. Apparently rare (but distinguishable from A. caryophyllea only upon close inspection), in foothill woodland. Mix Canyon, W 1584.

Native of Europe. This species differs from A. caryophyllea in possessing spikelets in which the lower floret is awnless (or nearly so).

Arundo donax Linnaeus. Giant Reed. Rare, along streams. Mix Canyon, along Ulatis Creek, W 174. Native of Europe.

Avena barbata Brotero. Slender Wild Oat. Common, in grassland, foothill woodland, and in open and disturbed areas in chaparral. Mix Canyon, W 1191, W 1620; Gates Canyon, W 643; Cold Canyon, W 1211, W 1509; west side of range in vicinity of Seventy Acre Canyon, W 2182; Tolenas Springs, in rocky areas; along Blue Ridge at head of Wild Horse Canyon; in cleared areas along Ridge Road north of Signal Hill. Native of Europe.

Avena fatua Linnaeus. Wild Oat. Frequent, in grassland and woodland; infrequent in open and disturbed areas in chaparral. Mix Canyon, W 557, W 1192; Cold Canyon, W 1527; floodplain of Putah Creek. Native of Europe.

Brachypodium distachyon (Linnaeus) Beauvois. Frequent, in grassland, foothill woodland, and, more rarely, in open places in chaparral. Mix Canyon, W 700, W 1587, W 2427; along Blue Ridge in northern part of range, W 4216; east side of range, north of Seventy Acre Canyon, W 2198. Native of Eurasia.

Briza minor Linnaeus. Little Quaking Grass. Occasional, in grassland and foothill woodland, often where disturbed by grazing. Mix Canyon, W 1591; Gates Canyon, W 655; along Blue Ridge north of Signal Hill, W 4247; Pansy Flat, W 4309; Cold Canyon; Tolenas Springs. Native of Europe.

Bromus carinatus Hooker & Arnott [B. marginatus Nees ex Steudel]. California Brome. Frequent, in foothill woodland; occasionally found in chaparral. Mix Canyon, W 1615; at junction of Mix Canyon Road and Ridge Road, W 1747; along Blue Ridge between Gates and Mix canyons, W 2474, W 2476; along Blue Ridge north of Mix Canyon, in black oak grove and in adjacent chaparral, W 1635, W 4341; west side of ridge, in wooded draws, not far below summit of Mount Vaca, W 1694; Cold Canyon.

Bromus diandrus Roth [B. rigidus of American authors]. Ripgut Grass. Common, in grassland, woodland, and openings in chaparral. Mix Canyon, W 838, W 2439; upper Mix Canyon, W 816; Gates Canyon, W 651; along Putah Creek, W 1984, W 2338; Pansy Flat, W 4331; near summit of Mount Vaca, W 1377; Cold Canyon; Tolenas Springs; along Blue Ridge north of Mix Canyon. Native of Europe.

Bromus laevipes Shear. Woodland Brome. Occasional, primarily a component of foothill woodland, but sometimes found in chaparral. Mix Canyon, W 1609, W 2459; Gates Canyon, W 631, W 683; Cold Canyon, W 3068; along Blue Ridge between Gates and Mix canyons, W 929.

Bromus madritensis Linnaeus. Spanish Brome. Frequent, in foothill woodland and chaparral. Mix Canyon, W 1412, W 2437; Tolenas Springs, W 4142; along Blue Ridge between Gates and Mix canyons, W 808; west side of ridge, not far below summit of Mount Vaca, W 2135; near Monticello Dam, W 2270; Cold Canyon. Native of Europe.

Bromus mollis Linnaeus. Soft Chess. Common, in grassland and open foothill woodland; infrequently found in open places in chaparral. Mix Canyon, W 501, W 1284; Gates Canyon, W 615, W 646; Cold Canyon, W 729; near summit of Mount Vaca, W 1375, W 1384; along Blue Ridge north of Mix Canyon, in black oak grove, W 1369; Tolenas Springs; Pansy Flat; along Blue Ridge north of Signal Hill; along Blue Ridge in northern part of range. Native of Europe.

Bromus rubens Linnaeus. Foxtail Chess. Frequent, in disturbed and open areas in chaparral, and in heavily grazed grassland. Upper Mix Canyon, W 823; upper Gates Canyon, W 622; Cold Canyon, W 1335; along Blue Ridge between Gates and Mix canyons, W 589; west side of ridge, not far below summit of Mount Vaca, W 1381, W 2201; along Ridge Road north of Signal Hill, on cleared margins of road, W 4249; along Blue Ridge in northern part of range. Native of Europe.

Bromus sterilis Linnaeus. Barren Brome. Occasional, but locally common, in foothill woodland and in disturbed and burned areas. Mix Canyon, W 1458, W 1589;

Cold Canyon, along road, W 1548; Cold Canyon, in burned area, W 1508. Native of Europe.

Crypsis schoenoides (Linnaeus) Lamarck [Heleochloa schoenoides (Linnaeus) Host. Infrequent, in vernally moist areas. Mix Canyon, along Ulatis Creek, W 4361; Gates Canyon, edge of Alamo Creek, W 4100; north of Pleasants Valley School site, in dry bed of small drainage, W 4441. Native of Europe.

Cynodon dactylon (Linnaeus) Persoon. Bermuda Grass. Occasional, but locally common, in moist areas. Mix Canyon, along Ulatis Creek, W 4356; along Putah Creek, in riparian woodland, W 1817; along State Highway 128 at north end of range, in moist situation along road, W 2234; Cherry Glen Road west of Interstate 80 freeway, in moist area near road, W 1858. Native of the Old World.

Cynosurus echinatus Linnaeus. Dogtail Grass. Rare, in foothill woodland. Mix Canyon, W 1764. Native of Europe.

Deschampsia elongata (Hooker) Munro ex Bentham. Slender Hairgrass. Rare, in rather moist areas in chaparral. Near junction of Mix Canyon Road and Ridge Road, W 1745.

Distichlis spicata (Linnaeus) Greene [D. spicata var. stricta (Torrey) Scribner]. Saltgrass. Rare, but locally common, in somewhat saline or alkaline places at low elevations. Along State Highway 128 at north end of

range, in drainage ditch along road, W 2331; locally common along Soda Springs Creek, especially in vicinity of Tolenas Springs.

Echinochloa crusgalli (Linnaeus) Beauvois. Barnyard Grass. Rare, in moist situations at lower elevations. Mix Canyon, W 1020; Cherry Glen Road west of Interstate 80 freeway, W 1849. Native of the Old World.

Elymus glaucus Buckley [E. glaucus var. jepsonii Davy; E. glaucus subsp. jepsonii (Davy) Gould]. Blue Wildrye. Frequent, in foothill woodland and, infrequently, in chaparral. Mix Canyon, W 1014, W 1612, W 1705, W 1740; Gates Canyon, W 670; along Blue Ridge between Gates and Mix canyons, W 891, W 2471; west side of ridge not far below summit of Mount Vaca, in wooded draws, W 1687; Pansy Flat, W 4327; along Blue Ridge north of Mix Canyon, in black oak grove, W 4342; west of Monticello Dam, W 779; Cold Canyon. Some of the Vaca Mountains material (e.g., W 1014, W 1687, W 1705), with pubescent leaf-blades and sheaths, corresponds to E. glaucus var. jepsonii Davy. There seems to be no good reason to retain this variety (and even less to elevate it to the subspecific rank as has Gould). The ranges of the two forms overlap, not only in the Vaca Mountains but in the Santa Cruz Mountains (Thomas, 1961), on Mount Diablo (Bowerman, 1944), and, presumably, elsewhere. Moreover, there is a substantial amount of variation in the amount of pubescence present, even on the same

plant. This has also been noted in the Santa Cruz Mountains by Thomas (1961:87).

Elymus triticoides Buckley. Beardless Wildrye. Creeping Wildrye. Rare, but in places locally frequent, in moist areas. Along State Highway 128 at north end of range, in drainage ditch along road, W 2419; along Putah Creek, in riparian woodland.

Festuca arundinacea Schreber. Reed Fescue. Tall Fescue. Rare, known only from moist ground below the stock pond at Pansy Flat, W 4305. Native of Europe.

Festuca californica Vasey. California Fescue. Occasional, in places locally common, in foothill woodland. Mix Canyon, W 1244, W 1601; Gates Canyon, W 1492; along Blue Ridge north of Mix Canyon, in black oak grove, W 1371.

Festuca idahoensis Elmer. Idaho Fescue. Bluebunch Fescue. Rare, in foothill woodland. Along Blue Ridge south of Signal Hill, in woodland dominated by Quercus agrifolia and Pinus sabiniana, W 4236.

Festuca pratensis Hudson [F. elatior Linnaeus]. Meadow Fescue. Rare, in moist areas at lower elevations. Mix Canyon, W 858. Native of Europe.

Gastridium ventricosum (Gouan) Schinz & Thellung. Nitgrass. Occasional, in grassland and open foothill woodland. Mix Canyon, W 4393; Cold Canyon, W 3057. Native of Europe.

Hordeum depressum (Scribner & Smith) Rydberg. Rare, in alkaline areas at Tolenas Springs and along Soda Springs Creek. Margins of alkaline balds at Tolenas Springs, W 4152; along Soda Springs Creek just below Tolenas Springs, with Distichlis spicata, W 4121.

Hordeum geniculatum Allioni. Mediterranean Barley. Occasional, in vernally moist areas, waste places, and disturbed grassland. Mix Canyon, near mouth, W 1430; Cold Canyon, in whitish, probably alkaline soil near unimproved road, W 3063; Pansy Flat, in somewhat moist areas below stock pond, W 4307, W 4317; along Ridge Road between Gates and Mix Canyons, W 802. Native of Europe.

Hordeum leporinum Link. Farmer's Foxtail. Common, in grassland and woodland, and in disturbed areas in all plant communities. Mix Canyon, W 1241, W 1442; Tolenas Springs, W 4128, W 4153; along Putah Creek, in riparian woodland, W 2344; Pansy Flat, W 4330; along Ridge Road between Gates and Mix canyons, W 1374, W 1696; Gates Canyon; Cold Canyon. Native of Europe.

Hordeum vulgare Linnaeus. Common Barley. Rare escape from cultivation in disturbed places at lower elevations. Mix Canyon, near mouth, W 1429. Native of Eurasia.

Koeleria macrantha (Ledebour) Schultes [K. cristata Persoon; K. nitida Nuttall]. Junegrass. Occasional, in foothill woodland; rarely found in chaparral. Mix Canyon, W 558; along Blue Ridge south of Signal Hill, in foothill woodland, W 4235; along Blue Ridge north of Mix Canyon, in

black oak grove, W 4343; west side of ridge, in wooded draws not far below summit of Mount Vaca, W 1693; west side of ridge below Mount Vaca, in chaparral, W 2130; west side of range north of Seventy Acre Canyon, W 2197.

Leptochloa fascicularis (Lamarck) Gray. Sprangletop. Rare, known only from the junction of State Highway 128 and Pleasants Valley Road, in moist situation near road, W 1800.

Lolium perenne Linnaeus subsp. multiflorum (Lamarck) Husnot [L. multiflorum Lamarck]. Italian Ryegrass. Frequent, in woodland and grassland, and in disturbed areas in all plant communities; also found in moist ground. Mix Canyon, W 524, W 1578; Gates Canyon, W 649, W 2227; near Tolenas Springs, W 4155; Pansy Flat, in moist areas below stock pond, W 4306; along Blue Ridge south of Signal Hill, in foothill woodland, W 4269; hills north of State Highway 128 at north end of range, W 2233; along Putah Creek, in riparian woodland; along Ridge Road north of Signal Hill, in disturbed places in chaparral. Native of Europe.

Lolium temulentum Linnaeus. Darnel. Rare, in disturbed areas at low elevations. Along Pleasants Valley Road just south of Putah Creek, on roadside, G.D. Barbe 689 (CDA). Native of Europe.

Melica californica Scribner. California Melic. Frequent, in grassland, foothill woodland, and chaparral, often in rocky areas. Mix Canyon, W 1478; Cold Canyon,

W 1522, W 2411; near Monticello Dam, W 2273; west side of ridge, not far below summit of Mount Vaca, W 2181; west side of range, north of Seventy Acre Canyon, W 2146.5.

Melica torreyana Scribner. Frequent, in foothill woodland; sometimes found in chaparral. Mix Canyon, W 572, W 1245; Gates Canyon, W 616, W 1493; east of Tolenas Springs, W 4131; Cold Canyon, W 740, W 1346; along Blue Ridge between Gates and Mix canyons, W 928, W 2477; along Blue Ridge near the head of Wild Horse Canyon, W 1645, W 4338.

Oryzopsis miliacea (Linnaeus) Bentham & Hooker ex Ascherson & Schweinfurth. Smilo Grass. Rare, along Putah Creek, in riparian woodland, W 4408, W 4430. Native of the Mediterranean region.

Panicum hillmanii Chase. Infrequent weed of roadsides at low elevations. Mix Canyon, in somewhat moist area along road, W 1040; along Cherry Glen Road west of Interstate 80 freeway, near road in moist situation, W 1847. Native of Kansas, Oklahoma, and Texas.

Paspalum dilatatum Poiret. Dallis Grass. Infrequent weed of moist and disturbed ground at low elevations. Along Putah Creek, W 1832; at junction of Pleasants Valley and Vaca Valley roads, in moist situation along road, W 1755. Native of South America.

Phalaris aquatica Linnaeus [P. stenoptera Hackel; P. tuberosa Linnaeus; P. tuberosa var. stenoptera (Hackel)

Hitchcock]. Harding Grass. Infrequent, in moist and disturbed areas. Mix Canyon, along Ulatis Creek, W 1272; along Pleasants Valley Road between Mix Canyon Road and Vaca Valley Road, W 1757; along Putah Creek, in riparian woodland and adjacent open floodplain, W 4409; along Ridge Road just north of Mount Vaca, W 2472; along Ridge Road north of its junction with Mix Canyon Road, W 4382. This species, a native of the Mediterranean region, is seeded in valley and foothill areas to provide livestock forage and to control erosion on road cuts and other disturbed areas.

Phalaris paradoxa Linnaeus. Rare, known in the study area only from Putah Canyon, M. Wiesendanger s.n., 1927 (SACT). Native of the Mediterranean region.

Poa annua Linnaeus. Annual Bluegrass. Occasional, but locally abundant, in cultivated land, moist areas in grassland, and in disturbed ground. Mix Canyon, W 2612; Gates Canyon, W 1940; Cold Canyon, in burned area near mouth, W 1217; Pansy Flat, moist margins of stock pond, W 4315; cleared margins of Ridge Road in northern part of range, W 4220; at junction of Pleasants Valley and Vaca Valley roads, in orchard, W 2029; Tolenas Springs. Native of Europe.

Poa bulbosa Linnaeus. Bulbous Bluegrass. Rare, known only from a disturbed area in the vicinity of the

old homestead at Cold Canyon, W 4497. To be expected in similar situations elsewhere in the Vaca Mountains. Native of Europe.

Poa howellii Vasey & Scribner. Infrequent, known certainly only from open and disturbed areas in chaparral, but probably also occurring in foothill woodland. Blue Ridge between Gates and Mix canyons, W 591; along Ridge Road north of Signal Hill, locally abundant on cleared margins of road, W 4256; open, cleared slopes near the summit of Signal Hill, among rocks, W 4295.

Poa scabrella (Thurber) Bentham ex Vasey. Pine Bluegrass. Malpais Bluegrass. Frequent, in grassland, foothill woodland, and chaparral. Mix Canyon, W 507, W 1586; upper Mix Canyon, W 1576; Gates Canyon, W 671, W 1487; Tolenas Springs, in rocky area, W 4141; Cold Canyon, W 1542, W 3051; near Monticello Dam, W 2316; along Blue Ridge near head of Wild Horse Canyon, W 1644.

Polypogon interruptus Humboldt, Bonpland & Kunth. Ditch Beardgrass. Infrequent, in moist areas such as streams and springs. Mix Canyon, in moist seepage near road, W 1775, W 4386; Mix Canyon, along Ulatis Creek, W 2445, W 4362; along Putah Creek, W 1812, W 1819. Although some authors (e.g., Munz, 1959; Smith, 1976) have considered this species to be introduced from Europe, most (e.g., Hitchcock, 1950; Howell, 1970; Rubtzoff and Heckard,

1975) believe it to be native. Cronquist et al. (1977) state that it is introduced from South America. The species is here considered to be native.

Polypogon maritimus Willdenow. Apparently rare, along streams and in similarly moist areas. Mix Canyon, in dry bed of Ulatis Creek, W 2438.5; Cold Canyon in bed of Cold Creek, W 965, W 983. Native of Europe. Very similar to and often growing with Polypogon monspeliensis, from which it differs by its awnless lemmas and longer lobed glumes. The above collections were all found growing with plants of that species.

Polypogon monspeliensis (Linnaeus) Desfontaines. Rabbitfoot Grass. Occasional, in moist areas such as ditches and streams. Mix Canyon, moist area near road, W 934, W 1085; Mix Canyon, in dry bed of Ulatis Creek, W 2438; Cold Canyon, in bed of Cold Creek, W 962.5; along Putah Creek in moist ground in riparian woodland, W 1838; along Cherry Glen Road west of the Interstate 80 freeway, in moist situation near road, W 1846. Native of Europe.

Polypogon semiverticillatus (Forskal) Hylander [Agrostis semiverticillata (Forskal) Christensen]. Water Bent. Rare, in moist ground along Putah Creek, in riparian woodland, W 4426. Native of Europe.

Scribneria bolanderi (Thurber) Hackel. Rare, known only from chaparral along Ridge Road, 3.9 km north of its

junction with Mix Canyon Road, in a shallow, vernal drainage near the road, W 4189.5. To be expected in similar situations elsewhere in the Vaca Mountains.

Setaria glauca (Linnaeus) Beauvois [S. lutescens (Weigel) Hubbard]. Yellow Bristlegrass. Rare, in moist ground at low elevations. Gates Canyon, along edge of Alamo Creek, near mouth of canyon, W 4099. Native of Europe.

Sitanion jubatum J.G. Smith. Big Squirreltail. Rare, in foothill woodland. Along Blue Ridge north of Mix Canyon, in black oak grove, W 4340.

Sorghum bicolor (Linnaeus) Moench. Sorghum. Rare escape from cultivation. Gates Canyon, margins of irrigated area near mouth of canyon, W 4097. Native of Eurasia.

Sorghum halepense (Linnaeus) Persoon. Johnson Grass. Infrequent weed of moist and disturbed areas at low elevations. Along State Highway 128 at north end of range, in drainage ditch along road, W 2418; along Pleasants Valley Road north of its junction with Cherry Glen Road, on roadside, W 1874. Native of the Mediterranean region.

Stipa cernua Stebbins & Love. Rare, in grassland and open foothill woodland at lower elevations. Hills north of State Highway 128 at north end of range, W 1989, W 1992.

Stipa lepida Hitchcock [S. lepida var. andersonii (Vasey) Hitchcock]. Foothill Needlegrass. Occasional, in chaparral and, less frequently, in foothill woodland; also found on chaparral burns. Mix Canyon, W 864; Cold Canyon, W 3052; southwest of Monticello Dam, on chaparral burn, W 2299; west side of ridge, about 150 m below summit of Mount Vaca, W 2177, W 2180. All the above collections except W 3052, which approaches the typical variety, conform to S. lepida var. andersonii (Vasey) Hitchcock, with narrow, involute leaf blades and a narrower, reduced panicle. Because the ranges of these two forms overlap entirely and, according to Howell (1970:84), the two intergrade completely in Marin County, S. lepida var. andersonii is here relegated to synonymy, apparently representing only a nongenetically based response to an unfavorable environment.

Stipa pulchra Hitchcock. Purple Needlegrass. Occasional, in grassland and open foothill woodland. Pansy Flat, W 4323; hills north of State Highway 128 at north end of range, W 2232, W 2243, W 2330; Cold Canyon.

Vulpia bromoides (Linnaeus) S.F. Gray [Festuca bromoides Linnaeus; F. dertonensis (Allioni) Ascherson & Graebner]. Occasional, in grassland and foothill woodland. Mix Canyon, W 1618; Cold Canyon, W 1549; Pansy Flat, W 4328; along Blue Ridge north of Mix Canyon, in black oak

grove, W 1363. Native of Europe. The treatment of this and the remaining Vulpia taxa in the Vaca Mountains is that of Lonard and Gould (1974).

Vulpia microstachys (Nuttall) Bentham var. ciliata (Beal) Lonard & Gould [Festuca microstachys Nuttall var. ciliata Beal; F. grayi (Abrams) Piper]. Occasional, in grassland and foothill woodland. Mix Canyon, W 1409; hills north of State Highway 128 at north end of range, W 2245; Pansy Flat, W 4320.

Vulpia microstachys (Nuttall) Bentham var. confusa (Piper) Lonard & Gould [Festuca confusa Piper; F. tracyi Hitchcock]. Rare, in foothill woodland. Cold Canyon, W 3055; near Monticello Dam, W 2267.

Vulpia microstachys (Nuttall) Bentham var. microstachys [Festuca microstachys Nuttall]. Infrequent, in open areas in chaparral. Along Blue Ridge near head of Wild Horse Canyon, W 1646, W 1650; Cold Canyon.

Vulpia microstachys (Nuttall) Bentham var. pauciflora (Beal) Lonard & Gould [Festuca microstachys Nuttall var. pauciflora Beal; Festuca reflexa Buckley; Festuca pacifica Piper]. Common, in grassland, foothill woodland, and chaparral. Mix Canyon, W 1413, W 1583; Cold Canyon, W 756; near Monticello Dam, W 2314; Pansy Flat, W 4321; Blue Ridge north of Signal Hill, along unimproved road, W 4257; along Blue Ridge between Gates and Mix canyons, W 804, W 2478; along Blue Ridge in northern part of range, W 4217.

Vulpia myuros (Linnaeus) K.C. Gmelin var. hirsuta Hackel [Festuca myuros Linnaeus var. hirsuta (Hackel) Ascherson & Graebner; F. megalura Nuttall]. Common, in grassland, foothill woodland, and chaparral. Mix Canyon, W 1416, W 1588; upper Mix Canyon, W 815; Gates Canyon, W 636; W 1939; Tolenas Springs, W 4154; Cold Canyon, W 1202, W 1555; along Blue Ridge between Gates and Mix canyons, W 601, W 1383; along Blue Ridge near head of Wild Horse Canyon, W 4218, W 4280; along Blue Ridge north of Mix Canyon, in black oak grove, W 1365, W 1639; west side of ridge, not far below summit of Mount Vaca, in wooded draws, W 2155. Native of Europe. This is the most common species of Vulpia in the Vaca Mountains.

Vulpia myuros (Linnaeus) K.C.Gmelin var. myuros [Festuca myuros Linnaeus]. Rattail Fescue. Apparently rare, in foothill woodland and chaparral. Cold Canyon, W 1560; along Blue Ridge between Gates and Mix canyons, W 811. Probably a native of Europe according to Lonard and Gould (1974: 228-229). Number W 811 was found growing with individuals referable to V. myuros var. hirsuta Hackel.

Vulpia octoflora (Walter) Rydberg var. glauca (Nuttall) Fernald [Festuca octoflora Walter var. glauca (Nuttall) Fernald]. Six-weeks Fescue. Rare, known only from a vernal drainage along Ridge Road, 2.4 miles north of its junction with Mix Canyon Road, W 4189. To be expected elsewhere in the Vaca Mountains.

TYPHACEAE. Cattail Family

Typha angustifolia Linnaeus. Nail Rod. Narrow-leaved Cattail. Rare, in moist areas at lower elevations. Mix Canyon, along Ulatis Creek, W 4363; along Putah Creek.

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