

FLORISTIC SURVEY OF GYP HILLS

1997

BY

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March 1997

Site Description

The Gyp Hills are a series of gypsum outcrops that run roughly northeast to southwest, about five km west of (and parallel to) the Grand Wash Cliffs in northwestern Mohave County, Arizona. A small portion (approximately six square km) of the southwestern extension of these Hills is located within the boundary of Lake Mead National Recreation Area. The LMNRA portion is dissected by Pigeon Wash (Canyon), which drains in a southwesterly direction from Grand Wash Cliffs and the Shivwits Plateau to Tassi Ranch and Spring, and into Lake Mead. The area surveyed ranged in elevation from 584 to 670 m (1917 to 2200 ft), with map coordinates of T34N, R15W, Sections 32 and 33, and T33N, R15W, Sections 4 and 9 (USGS Gyp Hills, AZ, Quad. 7.5 minute series).

Results

Vegetation of gypsum outcrops in the eastern Mojave Desert is characterized by low plant densities, as compared to those found on adjacent alluvial soils (Meyer 1980). The Gyp Hills are no exception to this feature. The dominants, *Larrea tridentata* and *Ambrosia dumosa*, are present in reduced densities. Few annuals were found on gypsum itself; most of those recorded were located at the base of gypsum outcrops or were in the sands and gravels of Pigeon Wash.

Meyer (1980), has classified plant taxa according to their response to a gypsum environment. These categories are (1) **gypsophiles**: taxa which have not been observed to occur on any substrate other than gypsum; (2) **gypsoclines**: taxa which occur commonly and characteristically on gypsum, but which never occur as part of the zonal (*Larrea-Ambrosia*) community; (3) **gypsovags**: taxa which occur regularly both on and off gypsum (i.e., they are indifferent to substrate type); (4) **waifs**: taxa which are very rarely encountered on gypsum, usually as single individuals; and (5) **gypsophobes**: taxa which have never been encountered on gypsum. The last two categories contain species which, as a rule, avoid gypsum.

Following the classification of Meyer, plant taxa recorded from the Gyp Hills and immediately adjacent areas can be assigned as follows:

Gypsophiles:

Enceliopsis argophylla

Gypsoclines:

Eriogonum insigne

Gypsovags:

<i>Acacia greggii</i>	<i>Hymenoclea salsola</i>
<i>Ambrosia dumosa</i>	<i>Larrea tridentata</i>
<i>Astragalus preussii laxiflorus</i>	<i>Lepidium fremontii</i>
<i>Atrichoseris platyphylla</i>	<i>Lepidium lasiocarpum</i>
<i>Atriplex confertifolia</i>	<i>Lesquerella palmeri</i>
<i>Baileya multiradiata</i>	<i>Lycium andersonii</i>
<i>Bebbia juncea</i>	<i>Mentzelia tricuspidata</i>
<i>Bromus rubens</i>	<i>Neolloydia johnsonii</i>
<i>Camissonia brevipes</i>	<i>Petalonyx nitidus</i>
<i>Ceratoides lanata</i>	<i>Phacelia crenulata</i>
<i>Chorizanthe rigida</i>	<i>Plantago insularis</i>
<i>Cryptantha confertiflora</i>	<i>Psoralea fremontii</i>
<i>Cryptantha recurvata</i>	<i>Schismus barbatus</i>
<i>Ephedra torreyana</i>	<i>Sphaeralcea ambigua</i>
<i>Eriogonum deflexum</i>	<i>Stanleya pinnata</i>
<i>Eriogonum inflatum</i>	<i>Stephanomeria pauciflora</i>
<i>Eriogonum trichopes</i>	<i>Streptanthella longirostris</i>
<i>Erodium cicutarium</i>	<i>Suaeda torreyana</i>
<i>Geraea canescens</i>	<i>Tiquilia latior</i>
<i>Gutierrezia sarothrae</i>	<i>Vulpia octoflora</i>

Waifs:

Amphipappus fremontii
Chorizanthe brevicornu
Cryptantha nevadensis
Erodium texanum
Krameria parvifolia
Mentzelia albicaulis
Pectocarya platycarpa
Plagiobothrys arizonica

Gypsophobes:

Amsinckia tessellata
Astragalus amphioxys
Camissonia refracta
Cryptantha pterocarya
Echinocereus engelmannii
Ephedra nevadensis
Krameria grayii
Opuntia echinocarpa

Some taxa recorded in the study site are not assigned to a particular category by Meyer in her work. The majority of these could probably be grouped with the gypsovags. These are:

Ambrosia eriocentra
Astragalus nuttallianus
Bromus tectorum
Bromus trinii
Chrysothamnus paniculatus
Cryptantha angustifolia
Cryptantha barbigera
Cryptantha utahensis
Descurainia pinnata
Eriastrum diffusum
Eriophyllum lanosum
Erodium texanum
Ferocactus acanthodes
Gilia inconspicua
Linanthus jonesii
Mentzelia nitens
Opuntia acanthocarpa
Opuntia basilaris
Penstemon palmeri
Phoradendron californicum
Plantago patagonica
Sphaeralcea grossulariifolia
Stylocline micropoides
Tidestromia oblongifolia
Tiquilia canescens
Yucca schidigera

Discussion

The vegetation of Gyp Hills is similar in many aspects to that described for other gypsum localities in the eastern Mojave Desert (Meyer 1980). It is comprised mainly of gypsovags, especially *Psorothamnus fremontii*, *Ephedra torreyana*, *Atriplex confertifolia*, and to a lesser degree, *Ambrosia dumosa*. Also occurring regularly but at lower densities, are *Sphaeralcea ambigua*, *Lepidium fremontii*, and *Stephanomeria pauciflora*. Of the annuals, only *Plantago insularis* occurs at frequencies approaching that of the zonal vegetation. Two selenium indicator species, *Stanleya pinnata* and *Astragalus preussii laxiflorus*, while not on gypsum, were present in the general vicinity.

Only one recognized gypsophile, *Enceliopsis argophylla*, was present. Other recognized taxa in this category, *Anulocaulis leiosolenus*, *Petalonyx parryi*, *Phacelia palmeri*, *Mentzelia pterosperma*, and *Psathyrotes pilifera* were absent. Two of the better known gypsoclines, *Phacelia pulchella* and *Arctomecon californica* were also missing from the site.

Two collections of milk-vetches made during this survey, one from Gyp Hills and another from Tassi Spring, may be of added taxonomic interest. Within the genus *Astragalus* there is a group of ill-scented, perennial species which are similar in appearance and in distribution within southern Nevada, Utah, and northern Arizona. These include *A. preussii*, *A. mokiensis*, and *A. praelongus*. The type collection localities for each of these milk-vetches are in the vicinity of the Virgin River drainage (*A. preussii* by Fremont in 1844, *A. mokiensis* by Palmer in 1877, and *A. praelongus* by Palmer in 1872). These species are reported from Clark County, Nevada, and they are specifically associated with the Muddy, Virgin, and Colorado River corridors within and adjacent to Lake Mead National Recreation Area. The diagnostic features for distinguishing these taxa are the length of the inflorescence and the shape and width of the pod (fruit).

Relationships within this complex are further complicated by the recognition of three varieties of *A. preussii* (varieties *culteri*, *preussii*, and *laxiflorus*). The latter two varieties are limited in their distribution to the eastern Mojave Desert, both occurring in and around the Lake Mead National Recreation Area. These two varieties are separable by the presence or absence of a stipe (a stalk attaching an ovary to the receptacle within the flower), the length of the inflorescence, and by flower size. Barneby (1964) describes the Preuss milk-vetch as a "coarse, ill-scented but rather handsome *Astragalus*, and perplexingly variable."

Astragalus pruessii var. *laxiflorus* is locally common at the base of the gypsum badland soils of the Gyp Hills. These plants are consistent with the varietal characteristics as noted by Barneby, with the exception of flower color, which for both varieties is described as "petals pink or (when dried) bluish-purple, sometimes pallid but distally suffused with lilac-purple." The observed Gyp Hills population was consistently unique in its flower color, all were ochroleucous (pale yellow) or "pallid" in color, but lacking the lilac-purple tips. A white-flowered specimen of variety *laxiflorus* was collected at Tassi Spring. Other populations of *Astragalus pruessii* var. *laxiflorus* known from North Shore Road and the Overton Arm of Lake Mead display the typical flower characteristics, i.e., petals pink or with lilac-purple tips; collections of this taxon in the UNLV Herbarium are also similarly colored.

The significance of these populations of *Astragalus pruessii* var. *laxiflorus* with atypical floral coloration is not yet understood. These observed features have apparently not been documented in the literature. Their occurrence tends to further support Barneby's description of *Astragalus pruessii* as a "perplexingly variable" entity.

PLANT LIST

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Tassi Spring and Ranch, Pigeon Wash, Lake Mead National Recreation Area; T33N, R16W, Sec 13; elev. 494 m (1620 ft); Mohave Co., AZ.

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<i>Acacia greggii</i>	<i>Cryptantha utahensis</i> (flr)
<i>Achnatherum speciosum</i>	<i>Cucurbita palmata</i>
<i>Ambrosia dumosa</i> (bud)	<i>Cynodon dactylon</i> (flr)
<i>Ambrosia eriocentra</i> (bud)	<i>Datura metaloides</i>
<i>Amsinckia tessellata</i> (flr)	<i>Descurainia pinnata</i> (flr, frt)
<i>Anemopsis californica</i>	<i>Echinocereus engelmannii</i>
<i>Artemisia ludoviciana</i>	<i>Eleocharis parishii</i>
<i>Astragalus lentiginosus</i>	<i>Eleocharis rostellata</i> (flr) C
<i>Astragalus</i> (purshii ?)	<i>Epilobium</i> sp.
<i>Avena sativa</i> (flr) C	<i>Eriogonum deflexum</i> (skeleton)
<i>Baccharis glutinosa</i>	<i>Eriogonum fasciculatum</i>
<i>Baileya multiradiata</i> (flr)	<i>Eriogonum inflatum</i>
<i>Bebbia juncea</i>	<i>Eriogonum insigne</i> (skeleton)
<i>Brickellia atractyloides</i>	<i>Erioneuron pulchellum</i>
<i>Brickellia longifolia</i>	<i>Erodium cicutarium</i> (flr, frt)
<i>Bromus inermis</i> (flr)	<i>Eucnide urens</i>
<i>Bromus rubens</i> (flr)	<i>Eucrypta micrantha</i>
<i>Bromus tectorum</i> (flr)	<i>Euphorbia polycarpa</i>
<i>Bromus trinii</i> (flr)	<i>Gilia inconspicua</i>
<i>Calochortus flexuosus</i>	<i>Gnaphalium luteo-album</i> (flr) C
<i>Camissonia chamaenerioides</i>	<i>Gutierrezia microcephala</i>
<i>Camissonia multijuga</i>	<i>Hordeum murinum</i> (flr, frt)
<i>Capsella bursa-pastoris</i> (frt)	<i>Hydrocotyle verticillata</i>
<i>Chenopodium album</i> (flr)	<i>Hymenoclea salsola</i> (flr, frt)
<i>Chilopsis linearis</i>	<i>Langloisia setosissima</i>
<i>Chorizanthe brevicornu</i>	<i>Larrea tridentata</i> (flr, frt)
<i>Chrysothamnus paniculatus</i>	<i>Lepidium lasiocarpum</i> (flr)
<i>Cirsium virginensis</i>	<i>Lesquerella tenella</i> (flr, frt)
<i>Conyza canadensis</i>	<i>Lycium torreyi</i> (flr) C
<i>Cryptantha barbiger</i> (flr)	<i>Machaeranthera pinnatifida</i>
<i>Cryptantha pterocarya</i> (flr)	<i>Malva neglecta</i> (flr)

PLANT LIST (Tassi Spring and Ranch)

Malva parviflora
Mammillaria tetrancistra
Marrubium vulgare
Medicago lupulina
Medicago sativa
Mimulus guttatus
Mirabilis bigelovii
Nicotiana trigonophylla (flr)
Opuntia acanthocarpa
Opuntia basilaris
Opuntia phaeacantha
Parietaria pensylvanica (flr, frt)
Pectocarya recurvata (flr, frt)
Penstemon palmeri (flr)
Phoradendron californica (frt)
Physalis crassifolia (flr)
Plantago ovata (flr, frt)
Plantago major
Pluchea sericea
Poa annua (flr, frt)
Poa bigelovii (flr, frt)
Polypogon monspeliensis (flr, frt)
Populus fremontii
Prosopis glandulosa torreyana
Psoralea argemone
Rorippa nasturtium-aquaticum
Rumex crispus
Salix lasiolepis
Schismus arabicus (flr, frt)
Senecio douglassii (bud)
Sisymbrium irio (flr, frt)
Solanum nigrum (flr, frt) C
Sonchus sp. (flr, frt)
Sphaeralcea ambigua (flr, frt)
Sphaeralcea grossulariifolia
Thysanocarpus curvipes (flr, frt)
Typha sp.
Vitis arizonica
Vulpia octoflora (flr, frt)

References

- Barneby, R.C. 1964. Atlas of North American Astragalus. Mem. New York Bot. Gard. Vol. 13. 1188 pp.
- Meyer, S.E. 1980. The ecology of gypsophily in the eastern Mojave Desert. Unpublished Ph.D. dissertation. Claremont Graduate School. 199 pp.