2006 Funded Section 6 Plant Proposals – AZ

The following proposals were funded in 2006 (Segment 9). Award does not include administrative costs.

1) A multivariate study of morphological characters in populations of ***Echinocactus horizonthalonius*** (Cactaceae).
Principal Investigator(s): **Dr. Marc Baker**, private
Award: $23,490

Objective(s): To conduct a biosystematic study on *Echinocactus horizonthalonius* primarily to ascertain the taxonomic validity of *E. horizonthalonius* var. *nicholii*, which is presently listed endangered by the USFWS. The present taxonomic status of the variety is tenuous and there is marked disagreement among authors of classical taxonomic treatments. In order to test the hypothesis that individuals of *E. horizonthalonius* var. *nicholii* are morphologically unique from those of the typical variety, a multivariate study is proposed to compare the degree of morphological variation among stem characters within populations to that among populations of *E. horizonthalonius* throughout its known range. Proponents for the validity of *E. horizonthalonius* var. *nicholii* list only stem characteristics for the taxon.

Final Report Abstract: A biosystematic study is underway primarily to ascertain the taxonomic validity of *E. horizonthalonius* var. *nicholii*, which is listed as endangered by the USFWS. The present taxonomic status of the variety is tenuous and there is marked disagreement among authors of classical taxonomic treatments. In order to test the hypothesis that individuals of *E. horizonthalonius* var. *nicholii* are morphologically unique from those of the typical variety, a multivariate study is being done to compare the degree of morphological variation among stem characters within populations to that among populations of *E. horizonthalonius* throughout its known range. *Echinocactus texensis* is being used for outgroup comparison. Stem characters were chosen for this analysis because they represent the only diagnostic characters used by proponents of *E. horizonthalonius* var. *nicholii*. Thus far, a single population of *E. horizonthalonius* var. *nicholii*, six populations of *E. horizonthalonius* var. *horizonthalonius*, and three populations of *E. texensis* have been measured. Further attempts are being made to measure two additional populations of *E. horizonthalonius* var. *horizonthalonius*, access to which have been thus far denied by property owners.

2) Lemmon's fleabane (***Erigeron lemmonii***)
Principal Investigator(s): **Jim Malusa**, private
Award: $4,871

Objective(s): a) Establish permanent monitoring plots of at least 10% of the population in Scheelite Canyon, Huachuca Mts.; b) Systematic survey of similar habitat within the

Huachuca Mts., to establish total population of Erigeron lemmonii; c) Assess threats to population in Scheelite Canyon and, if found, elsewhere.

Final Report Abstract: In 2006, five permanent photo plots were established in Scheelite Canyon in the Huachuca Mountains of southern Arizona. Each plot was marked with a stainless steel anchor bolt with a numbered tag both in plot corner and location where camera tripod should stand. Photographs were taken of each plot. The objective was to document recruitment and survival. A total of 58 *E. lemmonii* are in the monitoring plots. Descriptions of each plot are provided.

3) **Investigations of four rare pre-Columbian cultivated agaves (Agavaceae) in central Arizona.**
Principal Investigator(s): **Wendy Hodgson, Desert Botanical Garden**
Award: $10,820

Objective(s): 1) Survey for additional populations of each agave and identify potential threats; 2) Monitor selected populations of each agave for population trend information; 3) Help clarify taxonomic status of each agave.

Final Report Abstract: This study provided baseline data regarding pre-Columbian agaves' distribution and documentation, morphology, cytology, and palynology, providing numerous opportunities for future research. It is critical that we determine relationships and affinities with other agaves, and to determine putative parents for those that may be a result of hybridization, which will involve fieldwork in northern Mexico. In addition, additional cytological studies of the cultivars, *A. chrysantha*, *A. parryi*, and *A. shrevei* need to be done to 1) determine and analyze the plants' DNA content, 2) obtain better resolution for determining exact number (aneuoploid, autoploid, etc) and behavior (degree of pairing, presence of fragments, bridges, etc.), based on a greater sampling size and 3) analyze and determine percentages of cells with normal and irregular anaphase, correlating this with pollen grain viability, based on a greater sampling size. Additional palynological studies are needed and should include a greater sample size of at least 3 different plants per taxon to determine percent viability and non-viability. We are documenting pollen from all of the proposed agave cultivars and agaves found in Arizona and the Southwest; eventually, all agaves will have a corresponding SEM of their sampled pollen. Additional molecular work will provide insights and information regarding the agaves' affinities between and among the cultivated populations (ex., Hassayampa, Grand Canyon and Verde Valley clones of A. phillipsiana; see Parker et al in press).

4) **Surveys of *Coryphantha robbinsorum* and other rare plants in northeastern Sonora and adjacent Chihuahua**
Principal Investigator(s): **Dr. Tom Van Devender, Arizona Sonora Desert Museum**
Award: $20,522

Objective(s): The objective of this project is to assess the distribution, abundance, and status of *C. robbinsorum* in northeastern Sonora and adjacent Chihuahua through field surveys by a binational group of botanists. Rocky limestone (both Permian and Cretaceous) slopes and hilltops at 1100-1700 m elevation with Chihuahuan desertscrub/desert grassland vegetation similar to those in the San Bernardino Valley in southeastern Cochise County, Arizona will be searched in the primary reproductive season (March-June) of *C. robbinsorum*. A secondary objective is to record other rare plants encountered during the surveys.

Final Report Abstract: After surveying in appropriate habitat in Chihuahua and Sonora, we conclude that the Lopresti (1984) publication reporting *Coryphantha robbinsorum* in Mexico was a fabrication to cover illegal trade in specimens collected from Arizona populations of *C. robbinsorum*. Inaccurate habitat, vegetation, substrate, and floristic descriptions suggest that the author had not really been in the likely limestone areas. We did not find *C. robbinsorum* on one transect in Chihuahua and fifteen in the Agua Prieta area in Sonora. It is possible that we missed it in our surveys, but the plants on each transect were carefully observed, especially in bedrock crevices. From 43 to 121(average 76.6) plant taxa were observed on the transects, including many small species or small individuals of larger species. In conclusion, the presence of *C. robbinsorum* in Mexico is in doubt, although seemingly suitable habitats are present. This little cactus appears to be a very local endemic species that warrants its federal protection status in the United States.

5) **Distribution and status of the recently described *Tetraneuris verdiensis* in the Verde Valley**

Principal Investigator(s): **Dr. John R. Spence, Julie Crawford, Barbara Phillips, Sheila Murray, Arboretum at Flagstaff**

Award: $4,433

Objective(s): To determine the current status of *T. verdiensis* in north-central Arizona in the Verde Valley, to establish long-term monitoring plots, gather information on natural history, and to collect genetic material (seeds) for long-term storage and germination trials. This project will provide valuable data on whether this species is at threat from development and recreational activities, or is fairly common and stable.

Final Report Abstract: A new species, *Tetraneuris verdiensis*, from Yavapai County, Arizona is restricted to lacustrine marl in the Verde Formation. We visited potential *T. verdiensis* habitats near the type specimen. Many of the sites had similar associated species, including three Forest Service Sensitive species (*Eriogonum ericifolium* var. *ericifolium*, *Salvia dorrii*, and *Polygala rusbyi*), but did not have any *T. verdiensis*. Our surveys have concluded that populations of *T. verdiensis* are limited to the four low hills previously documented by Godec (2000). The populations occur on U.S. Forest Service Lands. However, the gypsum mine located adjacent to the population could have additional potential habitat, or

populations. Heavy off-highway vehicle use was observed in and around the populations. Long-term monitoring plots were established. All plants were in flower, but no pollinators were observed.