

## Professional Development Grant Report

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A. Project Title: Population genetics of the striped scorpion (*Centruroides vittatus*): Expanding previous studies and identifying new genetic markers.

### B. Abstract:

In previous research, the population genetic structure of the striped scorpion (*Centruroides vittatus*) was investigated, and it was determined that these scorpions expanded their geographic range into the Ozarks and Ouachitas of Arkansas within the past 4,000 to 8,000 years. In addition, analysis of toxin genes in this scorpion revealed distinct genetic changes have occurred in the toxin proteins when compared to other, more toxic members of the same genus. I plan to further my investigations with an expanded analysis of scorpion populations as well as identifying new genetic markers to better discriminate among similar populations of this scorpion.

### C. Purpose/Objectives

This project is focused upon conducting further analyses of striped scorpion populations and identifying better genetic markers for population level analyses that may be fruitful in later investigations. These additional studies are primarily planned because reviewers of a submitted manuscript to the journal *Molecular Ecology* suggested gathering further samples from populations as this scorpion encompasses a large geographic range (see attached manuscript review). This journal is regarded as one of the best journals in ecology and evolutionary studies, with these rankings- ISI Journal Citation Reports® Ranking: 2005: 60/261 (Biochemistry & Molecular Biology); 10/112 (Ecology); 7/33 (Evolutionary Biology) Impact Factor: 4.301. I plan to complete these objectives to complete the project goals.

A. Collect ten to 15 individuals from approximately 15 new populations across its large US geographic range (TX, NM, CO, KS, OK, AR, MO, and LA)

B. Conduct a screening of scorpion DNA to identify specific regions that house genetic markers (microsatellites) for population analyses.

C. Expand the data base of nucleotides employed in the current DNA sequence analysis from 600 nucleotide to 1400 nucleotides.

### D. Activities conducted and Results:

A. Collection trip (May 20 –June 3): 12 new populations were visited with individuals collected at seven of the 12 sites. Cooler and wetter weather conditions prevented collection in the five sites where no scorpions were seen. Striped scorpions were collected at the following locations: Falcon Lake, TX; Seminole Canyon, TX; Big Bend National Park; Terlingua Ranch, TX; Chinati Hot Springs, TX; Balmorhea, TX; and Hueco Tanks, TX. Striped scorpions were not seen at the following locations: Lake Livingston, TX; Goliad, TX; Guadalupe National Park; Las Cruces, NM; and Sevilleta, NM.

DNA for sequence analysis will be extracted from scorpions from these populations to provide more data for a revised manuscript.

B. DNA sequencing analysis: 80 DNA samples from previous analyses were re-sampled for further DNA work. The DNA segment used in previous work was expanded to 1500 nucleotides from the previous length of 600 nucleotides. This expansion was conducted through overlapping analyses along the gene. I also added 45 new individuals to the analysis; most of these individuals were from the summer collection trip. In addition, a new gene with an additional 300 nucleotides was identified and included in this work. During the 2007 summer, over 450 sequences were obtained from DNA and sent to the UAMS DNA sequencing center. This work is scheduled to be completed in fall 2007 with a revised manuscript prepared for publication in early spring 2008.