



CAMERON UNIVERSITY
SCHOOL OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF BIOLOGICAL SCIENCES

July 24, 2014

To: Curator & Staff, Museum of Southwestern Biology, Mammal Division.

RE: Loan of *Dipodomys ordii* Skins

This request is for the loan of *Dipodomys ordii* skins housed in the Mammal collection at the Museum of SW Biology. I previously visited the mammal collection on 15 July, 2014 and was allowed to examine the diversity of specimens of the species and also made a list of specimens for which I am applying for loan. Museum Assistant Curator, Adrienne Raniszewski was extremely helpful and accommodating during the visit. I am requesting the specimens for non-destructive / non-invasive sampling described below.

I am currently analyzing reflectance values of various morphological markings of *D. ordii* (e.g., pre-orbital, post-auricular, flank stripe, lateral tail stripe) including 350-390nm wavelengths (upper UV) and comparing to the reflectance values of background pelage. The hypothesis being tested is: "significant patterns of contrast exist among the morphological markings and background pelage." We now have data (N=52) that supports this hypothesis but we still need more specimens for increased statistical power and a sampling across the relatively large geographic range of the species. In addition to quantitative UV-VIS data, we have qualitative data from UV-photography that indicates the pelage morphology of this species does display contrasting patterns of reflection in the upper UV spectrum; this characteristic is a sign of potential signaling in the upper UV. The adaptiveness or neutrality of such signaling is yet to be determined. Signaling in the UV has been known to take on many roles in vertebrates, invertebrates, and plants (intra-specific and inter-specific communication, foraging, pollination,). For mammals however, very few examples of **signaling** and **perception** of UV-signals have been observed; most notably the degu (genus *Octodon*, see Chavez et al.).

To date, we have analyzed *D. ordii* specimens from nine populations across Oklahoma (the species eastern range margin) and in eastern New Mexico (Union & Roosevelt counties). We have found significant differences in morphological UV-contrast patterns among these populations. In fact, a pattern has begun to emerge, and with more sampling of western *D. ordii* specimens, we can determine if there is clinal variation in the potential UV-signals.

We expect the analysis of the loaned specimens to complete within 4 months of arrival. This figure is somewhat of an overestimation although unanticipated delays are common and I would rather prepare for them in advance.

This experiment is one of several in an interdisciplinary project here at Cameron University aimed at examining the potential for UV-communication in *D. ordii*. Related experiments include: (1) "Transmittance Spectra of the Lens, Cornea, and Ocular Media of *D. ordii*" (2) "Ratio of Cones and Rods in the Retina of *D. ordii*" (3) "Expression of UV-Op sin, Medium Wavelength Op sin, and Rhodopsin in the Retina of *D. ordii*." (4) Modeling of the Vision System of the Kangaroo Rat (*Dipodomys ordii*) and implications for UV-communication.

METHODS

An Ocean Optics UV-VIS Probe will be used to measure reflection of light wavelengths (300-700nm) among the white morphological markings and adjacent darker pelage of *D. ordii*. This technique requires a blunt pencil-like sampling probe to be held gently against the specimen for a few seconds until an integrated

computer records the reflectance data. This technique is completely non-destructive. Publications outlining this method are available if desired.

I have been working with small mammals and mammal collections for over 10 years now. My experiences include collecting trips to Mexico and the Southwestern United States, teaching students in areas of field techniques and Mammalogy, and maintenance of the mammal collection here at Cameron University Museum of Zoology (CUMZ). For this project alone, I have already requested, acquired, utilized, and returned specimens from the Natural Science Research Laboratory of the Texas Tech Museum, Sam Noble Oklahoma Museum of Natural History at the University of Oklahoma, the Vertebrate collections of the University of Central Oklahoma.

I hope this letter reflects the scientific merit of my research and justifies the requested loan of specimens. For any additional information, please feel free to contact me on my mobile phone (405) 249-7076. Attached is a spreadsheet containing information regarding specimens being requested and the CV's mentioned previously.

A handwritten signature in black ink, appearing to read 'Brandon McDonald', written in a cursive style.

Best regards,

Brandon McDonald
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