

Final Report Requirements

A. Header: including Proposal Title/Instrument, PI, Co-Is, Department, College, Award Information (*type, date of award, amount of award*).

Proposal Title: "Comparing Immunological Strategies and Life Spans in Diverse Ungulate Species"

PI: Alcantar, Benjamin (Dept. of Biomedical Sciences, College of Veterinary Medicine)

Co-I: Jolles, Anna and Dolan, Brian (Dept. of Biomedical Sciences, College of Veterinary Medicine)

Award Information: General Research Fund research award, Spring 2013-2014, \$10,000

B. A brief summary of the hypothesis or goals and the scholarly work/activities performed using the GRF support.

Hypothesis: Life history strategies employed by different organisms can have profound effects on the type of immune response mounted to combat diseases. We hypothesize that short-lived species will mount faster, innate-like responses, while long-lived species will invest in more adaptive immune responses. In order to address this hypothesis, we will need to develop new methodologies for measuring the immune response non-model animal species, such as ungulates.

Objective 1: To expand the immunological tool-kit available for use in studies comparing immunity across mammal species. Specifically, we will validate an assay quantifying the diversity and expression of MHCII genes (coding for immune receptor molecules) in a broad range of mammals.

Objective 2: To begin compiling comparative immunological data across ungulate species, with the aim of understanding how interspecific variation in immunity relates to each species' overall life history.

Scholarly work/activities performed: During the period of this project we collected numerous blood samples from ungulates at Wildlife Safari Park (WSP) in Winston, OR with the assistance of the park staff and veterinary office. With a single blood sample we were able to derive a great deal of information: (1) the total and differential numbers of white blood cells in the individual, (2) the ability of both whole blood (including white blood cells, red blood cells, and serum components) and plasma alone to inhibit bacterial growth and (3) the levels of mRNA transcript for different immune related genes to determine how individual animals were detecting bacterial pathogens. Our initial analysis of the results indicate that there is a wide variation in the ability of different animals to detect and kill bacteria, but neither of these parameters seem to be related. Additionally, there does not seem to be a correlation between different life history traits associated with longevity and immune responses, contrary to our hypothesis. Our on-going work will determine the extent of inter-species variation to determine what the expected experimental variability is and also determine if there is variation in immune responses related to the change of seasons as has been observed in the wild.

C. A brief summary of any additional scholarly activities the GRF funding made possible for the investigator(s).

The project has provided research experience for 3 veterinary students (including one from an outside institute), and 1 undergraduate student, as well as contributing to the dissertation work of graduate student Brian Dugovich.

Papers in preparation:

- Dugovich, B., C. Behnke, R. Sullivan, L. Craine, B. Alcantar, A.E. Jolles, and B.P. Dolan (in prep).
Variation in anti-bacterial immune responses in different ungulate species.

D. How and/or on what were the GRF funds expended?

| | |
|----------------------|-----------|
| Pharmaceuticals - | \$4711.00 |
| Laboratory Supplies- | \$3880.72 |
| Travel Costs - | \$1218.42 |

E. List all external funding requests (*i.e. proposals*) that have been developed and submitted as a result of the GRF Funding.

External grant proposals and fellowships developed and submitted:

Not funded:

- Trait based disease ecology: linking life histories, immunity, and disease dynamics. **A. Jolles, L. Martin, R. Ostefeld, F. Keesing, P. Hosseini.** National Science Foundation EID.

- CAREER: Beyond mice and men: understanding interspecific variation in immunity. **A. Jolles** National Science Foundation
- Preliminary Proposal: Influence of habitat fragmentation on genetic diversity, immunity, parasite communities, and reproductive fitness in desert bighorn sheep. **A. Jolles and C. Epps**. National Science Foundation

Internal grant proposals and fellowships developed and submitted:

Funded:

- MHC diversity in Desert Bighorn Sheep. **B. Dolan, A. Jolles, C. Epps**. OSU College of Veterinary Medicine: \$10,000

Not funded:

- MHC Diversity in Bighorn Sheep. **A. Edgemon**. OSU/URISC: \$1,000.

Submit the final report electronically to Debbie Delmore, Research Office, Incentive Programs at debbie.delmore@oregonstate.edu.

Principal Investigators/award recipients who fail to submit the required final report will be ineligible to receive future funding from the Research Office, Incentive Programs.