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Major: Biological Sciences

*Critically Endangered Lemur Genera's (Propithecus) Habitat Use and Activity Budget:
A Wild-Captive Comparison*

Abstract

In this study I will compare habitat use and activity budgets of wild *Propithecus tattersali* in Daraina, Northeast Madagascar and captive *Propithecus coquereli* at the Duke Lemur Center in North Carolina, United States. I will spend two months (30 field days) in Daraina and one - two months (20-40 field days) in North Carolina. I will collect data through group scans during all-day follows, from the animals' waking to their sleeping (in the case of captive lemurs, as close to this schedule as the Lemur Center's operational hours allow).

I will collect data on behavior (resting, feeding, traveling, social) and general inhabited environment (light environment, ambient temperature, height, distance from forest edge). I will also collect information on microhabitat use (bracing and weight-supporting behaviors on man-made or natural substrates) and compare this microhabitat use to concurrent behaviors and environment characteristics. In my analysis, I will test for links between behavior and substrate use, identify characteristics of wild and captive *Propithecus*'s preferred environments, and assess wild-captive behavioral differences.

Keywords: microhabitat, habitat selection, *Propithecus tattersali*, *Propithecus coquereli*, light environment, fragmentation, substrate use, activity budget

Biographical Sketch

Last summer I researched foraging behaviors of lemurs at the Duke Lemur Center, the only place outside of Madagascar to observe lemurs free-ranging. In addition to practicing field research techniques, my team accomplished things that have never been done previously at the Center, including evaluations of forest composition for two natural habitat enclosures and creation of a dichotomous key of local plants to help future researchers with identifications.

This experience changed my life, and gave me new focus in my collegiate studies. To give myself greater independence as a data analyst, I took Introduction to Statistics and Research Design and Introduction to Matlab Computer Programming. To feed my passion for computational sustainability, I took Applied Population Ecology, which introduces dynamical systems and their applications to natural resource management, and Modeling Behavioral Evolution, which teaches high level models of animal behavior and culminates in each student designing their own model. Most significantly, to expand my understanding of the greater human world surrounding the lemurs I had studied, I searched for a study abroad program to take me to Madagascar.

Now, I type this proposal from my new home in Madagascar! (Can I say dreams come true?) For two months, I have been here studying with local CURSA University students alongside five other American students. We are learning Malagasy (the national language of Madagascar), practicing French and field research techniques, and traveling the SAVA region (found in

Northeastern Madagascar) to do so. In one week, we will set off for our chosen field sites to do our Independent Study Projects. For me, this Independent Study Project will form the basis for what I intend to become, with the help of this Tanner Dean's Scholars Grant, an honors thesis.

Two months after arriving in Madagascar, the connections are made, the data collection is about to begin, and it's time to think about next steps. I've been able to meet researchers and students here that I want to work with again and again. Even beyond college, I hope to continue working with them in a career of lemur ecology research - and I hope my honors thesis can be the start of that.

Statement of Purpose

For my senior honors thesis, I plan to compare the habitat characteristics, substrate use and activity budgets of wild *Propithecus tattersalli* and captive *Propithecus coquereli*. For this project, I will employ methods consulted in Sterling, Bynum, & Blair (2013). Advising me on methodology and data analysis is Dr. Leslie Digby, professor at Duke University, Duke Lemur Center associate, and specialist in primate microhabitat selection. Also advising me on site-specific logistics and data collection is Duke PhD candidate Brandon Semel, who studies foraging and ranging behavior by *Propithecus tattersalli* in the Binara Forest.

Regarding timeline, in April I will study *Propithecus tattersalli* habitat use and activity budgets in the Binara Forest Madagascar, supported by my study abroad program. However, I hope to return to this site for an additional month to continue data collection for my honors thesis. (This April, as it will be my first time visiting the field site, in addition to the already short time frame of three weeks, devoting additional time to familiarization with the site will restrict data collection time.) During this period, as later described in my budget, the Tanner Dean's Scholar grant will help cover the costs of international flights, food, travel to the field site, lodging, and the services of a guide/translator.

For the remainder of the summer, I wish to return to the Duke Lemur Center to collect data on captive *Propithecus coquereli* at the Duke Lemur Center. I have studied them before and am familiar with the site and the individuals. I will use the Tanner Dean's Scholars grant to cover rent, food and travel (plane and car) necessary for this research.

The reason this study compares captive *Propithecus coquereli* to wild *Propithecus tattersalli* as opposed to wild *Propithecus coquereli* is related to the availability and status of field sites. A study (Crane, M., 2018) last fall examined feeding and ranging behavior of *Propithecus tattersalli* in Daraina, Madagascar. Thus, returning to this field site now, in the wet season, has the added benefit of data taken in the dry season for comparison. Furthermore, as a 1993 study of captive *Propithecus coquereli* and captive *Propithecus tattersalli* showed some significant differences in activity budgets, in comparing these two species we can at least have an awareness of which interspecific differences may exist. Finally, I hope this research may lay the ground work for more wild-captive comparison studies, for example a companion study of wild *Propithecus coquereli*.

I know it is unusual for students to use the Tanner Dean's Scholar grant to study in a foreign country. Cornell may have special stipulations for students using University money to travel abroad, but I expect that given my current status as a Cornell student studying abroad in this same country, I have already met any such requirements. For example, all my health immunizations and examinations are complete and up-to-date, and I have a full set of prophylaxis and prescription medications to last through my return to the US in June. I will be on the Cornell Student Health Plan (which meets all requirements for Cornell students studying abroad anywhere in the world) through end of July. I also will be returning to a familiar field site, along a path I've recently traveled, in a region where I have local contacts ready to help if need be.

Furthermore, it is a rare, perhaps unique opportunity for the TDS grant to fund this foreign research, as well as to fund another unusual sort of research: research that compares wild and captive populations. While studying animals in captivity is more cost-and-time-effective, studies of captive animals are considered less desirable because it is unknown whether or how closely they represent the behavior of wild populations. Thus, direct study comparisons of wild and captive populations are necessary to take full advantage of captive animal studies. The primary goal of this research is to test the efficacy of using captive populations to predict the behavior of wild populations.

The second goal of this research is to understand on a general level the habitat characteristics used by these animals. I chose habitat characteristics for based on those that could be measured in both wild and captive populations' conditions. For example, height in forest, edge/open effects (presence to human disturbance/fragmentation), ambient temperature, light environments are applicable to both the Duke Lemur Center and the rainforests of Madagascar. Considering the species of trees, this data will be collected to categorize them as "feeding" and "sleeping" sites. Understanding habitat characteristics preferred by captive animals can improve husbandry conditions while understanding preferences of wild animals can guide conservation and protected area priorities (Clemmon, J. R. & Buccholz, R, 1998).

The final goal of this research is to analyze habitat use on the substrate level: which substrates bracing/weight-supporting behaviors require, and which other behaviors (feeding, resting, etc) are associated with them. Different positions assumed in relation to substrates can also be connected to energy-conserving or temperature-regulating effects. Thus, observing these different patterns of substrate use may reveal if and how lemurs, these most endangered creatures, are able to recognize and adapt to changing conditions.

Works Cited

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