

SURE: Biology Research with Laurie Dizney

Research Project Description

The purpose of this project is to examine the relationships among human-caused habitat disturbance, wildlife stress, and wildlife immune function. Humans have altered most habitats on earth, with urbanization the most drastic form of alteration.

Urbanization ranges from intense (city centers) to suburban to rural to relatively unaltered. Little is known about the effects of these varying levels of urbanization on physiological factors in wildlife. For example, does alteration of habitat act as a long-term (chronic) stressor? Chronic stress has many negative effects in humans and lab animals, including suppression of immune function, which increases vulnerability to parasites and pathogens. Whether the same holds true for wildlife species is mostly unknown. These habitat changes are also expected to affect soil microbial communities, which in turn likely affect the gut microbial communities of the resident wildlife. Recent research has highlighted the major role gut microbiomes play in immune function in human and lab animals, but their effect on the immunology of wildlife hosts is unknown. The goal of this research is to investigate the effects of habitat disturbance on environmental and wildlife health. Working with a team of researchers from three academic institutions, we will assess soil microbial communities, wildlife gut microbiomes, wildlife stress, and several measures of immunology along an urbanization gradient. Specifically, the UP team will trap small mammals in areas of differing levels of urbanization, collect and prepare blood samples for three different types of assays, adapt one assay used in humans (total IgG ELISA) for use with wildlife, and perform white blood cell counts and the adapted assay on the samples that we collect. Study sites for small mammal trapping are in and around Spokane WA, where we will spend one week collecting samples. The rest of the time (5 weeks) will be spent at UP. This is the first year of what we hope becomes a multi-year project: the pilot data we generate this summer will be used in a grant submission to obtain long-term funding. Students will be involved in all aspects of the project, including trapping and collecting samples from wildlife, analyzing and comparing results from the three immunological assays among levels of urbanization, writing up the protocols that we establish in the field and in the lab, and making posters for presentation at various symposia and meetings.

Undergraduate Researcher Position Description

Students will be involved in all aspects of the project and perform all activities except for obtaining blood samples from small mammals. They will help trap and handle small mammals, prepare blood slides for white blood cell counts, prepare serum samples for flow cytometry and ELISAs, and perform the white blood cell counts and ELISAs. They will read papers that we will discuss as a group to give context to the project. Additionally, they will enter data into our database, perform statistical analyses, and make a poster about our research to present at UP's Fall Research Symposium and Founder's Day plus several regional meetings including Oregon Academy of Sciences and Sigma Xi.

We will spend one of the six weeks in Spokane WA where our field sites are located. We will drive together to and from Spokane: housing and meals will be provided for this week. The other five weeks will be spent at UP in my lab in Swindells.

The project will start May 9 and run for 6 weeks; student researchers are expected to be working on the project full-time. One week (likely the week of May 23) will be spent in Spokane WA collecting data on our field sites; the other 5 weeks will be spent at UP in my lab in Swindells. Most weeks we will work M-F only, but the week in Spokane will involve working on one weekend.

Minimum Qualifications

The only requirement is a valid driver's license. While there are no specific prerequisite skills, students must be willing and able to walk up to 2 miles round trip carrying equipment, get up as early as 5 a.m. for the week we are in the field, spend time outdoors regardless of weather, learn a lot of new skills, stay focused and engaged during long days in the field and lab, and work as part of a team.

Preferred Qualifications

Strong work ethic, positivity, creativity, flexibility.

Other Information

This is the first year of what we hope will become a long-term project with collaborators from Gonzaga University and Carroll College. Therefore, much of what we will do this year will be initial attempts at finding suitable field sites, adapting assays that are designed for use in humans to instead be used with wildlife, establishing the best ways to perform many of the tasks and writing them up into protocols. Students need to be comfortable with things not going as planned, adapting to unforeseen circumstances, and troubleshooting problems that arise. The flip side is that students will be generating data that will be essential to the future of this project, will be establishing the way things will be done in the future (the protocols), will learn how research is done from the inception of a project, will likely get a lot of practice in troubleshooting, and will add meaningfully to the success of this research.