

DEPARTMENT OF GEOLOGY
ARTS & SCIENCES

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE WOMEN

FOR APPLICATION YEAR: 2021

PROJECT TITLE: Assessing land snail foraging ecology in a warming world

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Project Description

Rapid climate change forces animals to adapt by modifying behaviors like dietary habits to ensure their survival. While changes in diet may seem trivial, they could eventually lead to broader modifications in energy flows and nutrient cycling at the larger, community and ecosystem scales. Under current global warming scenarios, the effect of rising temperature on wildlife foraging ecology remains uncertain.

Land snails are key organisms in the ecosystem because they influence carbon and calcium cycles through their diet. However, specific dietary preferences are unknown, and no scientific studies to date have assessed how climate change might drive shifts in diet. Most importantly, land snails are among the most vulnerable groups, comprising ~40% of observed animal extinctions since 1500 CE.

The great majority of land snails have been regarded as generalized herbivores, but the specific diets and degree of foraging flexibility is unknown for most species. Recent investigations revealed that snails may follow more complex diets than previously thought, often consuming “brown foods,” like fungi, in addition to or instead of “green foods,” like fresh plant material. Furthermore, some species may be truly omnivorous, consuming “animal protein” from earthworms and other small invertebrates.

This research project will fill this knowledge gap by measuring snail diet preference of the species *Anguispira alternata* (Mollusca: Discidae) from temperate woodlands in Ohio under laboratory control combined with stable isotope biogeochemistry. Stable isotopes are used to assess the diet of species that are difficult or impossible to study by other means. The ratio of the light and heavy carbon and nitrogen stable isotope measured in animal

tissues reflect assimilated foods and position on the food chain. About 250 specimens will be kept in three 40-gallon tanks with various climate control devices, set to 20C, 25C, and 30C. Specimens of each tank will be given access to all “green food” (lettuce), “brown food” (fungi), and “animal protein” (earthworms) at different temperatures. Based on a few published studies on other invertebrate animals, it is hypothesized that snails will consume more food amount and select for plant matter (or “green foods”) under warmer conditions to meet increased energy requirements.

The WISE student will work closely with the professor and her graduate student collaborating in field sample collection in East Fork Lake (OH) and laboratory experiments. The WISE student will receive training on climate change, isotope geochemistry and snail ecology, and will participate in a scientific conference to disseminate results and enhance communication skills.