

## PROFILE

### Kelley Schultheis, NSF Graduate Fellow

**NSF GK-12 Project:** Northeastern University  
[GK-12-PLUS \(Partners Linking Urban Schools\)](#)  
URL: <http://www.gk12.neu.edu>

**Thesis Title:** The Role of Termite Endosymbionts in Host Defense.  
**College/University:** Northeastern University

**Research Advisor:** Rebecca Rosengaus

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#### Degree Sought

Masters

#### University Department and/or Lab

Department of Biology

#### Research Focus

The role of endosymbionts in the disease resistance of *Zootermopsis angusticollis*

#### Description of Research

As a social animal, termites are constantly at risk for disease. They live in close quarters, which may be damp and full of potentially infectious microorganisms. They also engage in grooming behavior and engage in trophallaxis (the transfer of food and fluids), which increases their exposure risk to pathogens. Despite the increased disease risk of sociality, termites are a very successful social animal and have adapted a variety of ways in which to combat these potential pathogens.

In addition to living amongst so many nestmates, termites also play host to a variety of organisms that live in their guts. It is well documented that the endosymbiotic protists and bacteria living in the hindgut of termites play a key role in the digestion of wood cellulose. When these symbionts are removed, within a period of 3-4 weeks the termites will starve to death. If the termites are reinoculated with these symbionts they will live out their normal lifespan. The relationship between this community of organisms (termite, protists, and bacteria) is very complex and not all aspects are understood.

My research will be looking at the role the endosymbionts might play in disease resistance. Diseases that infect the host are going to have consequences for the symbionts as well. It is possible that the symbionts, in addition to being vital for food consumption, may also produce secretions that slow or inhibit the bacteria or fungus invading the termite's body.

#### Example of how my research is integrated into my GK-12 experience

The eighth grade science curriculum will spend 9-10 weeks on ecosystems and populations. Termites play a vital role in the ecosystem as decomposers, as well as providing food for other animals. I plan to bring the termites into the classroom for hands-on observation and learning. As the students learn about food webs, adaptations, environmental restraints, and reproductive biology the termites will provide rich examples for students to observe. In addition, I will work throughout the year to develop activities that help the students understand the scientific method, drawing on my own experiences in the lab.