**Title:** Sibling competition and cooperation in tadpoles

**Mentors:** Sara Garnett and Dr. Tom Getty

My research focuses on how animals alter their behavior when around relatives – in particular, what strategies they might have to minimize direct competition with one another. I look at these questions using tadpoles, asking what factors in the environment influence the balance between competition and cooperation.

In many animals, interactions between related individuals exhibit a puzzling interplay between competition and cooperation. Kin selection theory introduced the concept of inclusive fitness as a way to explain this paradox: individuals compete to maximize direct fitness (via reproduction), but cooperate to maximize indirect fitness (by helping other individuals propagate shared genes). Maximizing indirect fitness requires individuals to avoid competing with kin as much as possible, which may require different strategies in species with limited dispersal. I seek to understand how individuals adjust their behavior in the presence of relatives and how this might impact fitness.

Preliminary results in laboratory experiments suggest that American toad tadpoles in the laboratory show different patterns of development depending on whether they are exposed to siblings vs. non-siblings with different resource levels. The presence of relatives also impacts survival and growth and different densities. My goals for the upcoming summer involve trying to figure out whether conditions in natural ponds are likely to result in such patterns. In addition to trying to describe the kin structure of natural populations, we will also be investigating how other environmental factors influence behavior and development in pure- or mixed-kin groups.

The student will gain field and lab experience collecting adult toads from the field, making morphological measurements of tadpoles, categorizing the developmental stages of tadpoles, and maintaining tadpoles in the laboratory. If the student is motivated and wishes to develop some small piece of the project more independently, we will work together to accomplish this.