

**Department of Biological Sciences  
COLLEGE OF ARTS AND SCIENCES**

**SUMMER RESEARCH OPPORTUNITIES  
FOR UNDERGRADUATE WOMEN**

**APPLICATION DEADLINE: March 2, 2015**

*The Department of Biological Sciences is pleased to offer the following research project for the summer of 2015. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.*

**PROJECT TITLE: Eye growth and optical properties of diving beetle larvae.**

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**Project Description**

Vision is a particularly prominent sense in many organisms and likely the most important one for the predatory larvae of the Sunburst Diving Beetle *Thermonectus marmoratus*. However in order to function properly, their eyes must be optimally focused. These larvae have two particularly prominent eyes that allow them to see their prey, and previous work in our laboratory has demonstrated that one of these eyes is focused into infinity (is far-sighted) whereas the other one is focusing near (is near sided). We also know that emmetropia (correct focusing) is particularly critical for distance vision in this species' single-chamber eyes. But their eyes are not static. As the larvae grow their eyes also have to grow, and we have some data that suggests that this growth can be dramatic, and is taking place rapidly. For example, we found that the eyes grow by 130% between consecutive instars, and that this remodeling occurs in just a few hours. But how can such dramatic growth take place in such short period of time, and how is larval eye growth regulated? Preliminary data suggest that the rapid eye growth is mediated by osmotic pressure, a concept that we plan to investigate further throughout this summer by conducting eye-growth experiments under different osmotic conditions. This project involves a combination of histology, optical imaging and molecular manipulations, to investigate how these eyes can grow so rapidly, and to test how quickly they regain proper function thereafter.