

## Biology Department Student Research Award Application

**Name:** Taylor Hawkins

**Date:** November 15<sup>th</sup>, 2017

**Anticipated Graduation Date:** May 2020

**Name of proposed project:** Effects of Royal Jelly in Combination with Juvenile Hormone Agonists and Antagonists on Madagascar Hissing Cockroaches

**Name of faculty mentor:** Dr. Jason Davis

**Semester/year research to be performed:** Summer 2018

**Please attach a copy of your *Curriculum vitae* (CV) and ask your faculty mentor to submit a recommendation form.**

### **Give a brief description of your research project (objectives / scientific importance) and your role and responsibilities in this project:**

Royal Jelly (RJ) is a complex mixture of hormones and nutrients secreted by honeybees to induce growth and reproductive superiority in the queen bee. Juvenile Hormone (JH) suppresses maturation and prevents larvae from developing into adults across a variety of arthropodal taxa. These two hormones can have drastically different effects on the development and reproductive success in fruit flies (*Drosophila melanogaster*). During the Fall of 2017, I have conducted a set of preliminary studies exploring the effects of RJ in combination with JH in *fruit flies* to determine the mechanisms and modalities by which they interact. I have also attempted to identify how RJ and JH contribute to mortality and reproduction. To this point I have seen that the combined effects of JH and RJ prevent death in fruit flies exposed to toxins, diverging substantially from previous explanations of their functions. With these findings and others, we can propose that JH and RJ work in a parallel rather than vertical fashion, but much further research is necessary to explain the exact nature of this hormonal interaction. To that end, I plan to use Madagascar hissing cockroaches (*Gromphadorhina portentosa*) to observe physiological and endocrine effects.

Previous work in our laboratory has led us to believe that JH+RJ can produce a larger phenotype of cockroaches, affectionately named "Roachzillas". This summer I will test the interactions of JH and RJ in the roaches, comparing the results with my previous findings in *drosophila* with a focus on growth, health and mortality. This research also extends beyond the laboratory. Roachzillas serve as an important outreach tool for our lab and for Radford's department of biology. People of all ages attending science fairs have become increasingly interested in our work with roaches. I would like to use this project to both increase our understanding of these hormones and to increase public knowledge of insects and endocrine physiology

### **Describe your long-term academic and career goals and how this research experience will help to prepare you (directly or indirectly) in attaining these goals.**

During my freshman year here at Radford, I looked for a research project where I could use humans in my studies. I quickly learned there is much more to the world than humans, and research rarely begins with us. I began working with fruit flies and developed an appreciation for their impact on the scientific community as a model organism for research. Through this work I became increasingly invested in research. Oddly enough, working in the lab with *Drosophila* has exponentially grown my excitement to pursue a career in the medical field. I thoroughly enjoy comparing humans against insects and understanding the depth of evolution that surrounds us daily. I do not aspire to tamper with insect hormones during my medical career, however I know that I can use the laboratory, theoretical, and research design skills and knowledge I will gain in my years of research here to better myself for a future career in medicine.