

Part II: Project Proposal

Project title — Effect of bang-sensitive mutations on memory in *Drosophila melanogaster*

Faculty Mentor — Christopher Jones, Associate Professor of Biological Sciences

Student Researcher — Kayli Silimperi

Project duration — 10 weeks, Tuesday May 31 through Friday August 5

Description of the project —

Studying bang-sensitive mutations in the fruit fly *Drosophila melanogaster* has been a long-term focus of my laboratory. Any one of these mutations results in the fly displaying seizures and paralysis upon violent stimulation (e.g. “banging” the container it’s held in, thus the name of the mutant class). Although researchers are still at an early stage in the study of these genetic lesions, they hold promise for better understanding human seizure disorders such as epilepsy.

Like many animals, fruit flies have a complex ritual associated with courtship. In order to successfully mate, males must go through a series of actions to convince the female to mate with him. Successful males will successively court numerous receptive females with the same stereotyped series of actions until he is rejected by a previously-mated female. Once that happens, the male will not attempt to court additional receptive females for an hour or so; this phenomenon, called “courtship depression,” has been shown to depend on memory. This project will focus on using courtship depression to assess the memory abilities of bang-sensitive mutants: do these mutations affect flies’ ability to remember? What about seizures, do frequent seizures affect it?

Roles and responsibilities —

Kayli will be responsible for background research (reviewing what has been published about bang-sensitive mutants, courtship in fruit flies, and testing memory), growing and maintaining the appropriate fly stocks, planning and carrying out the experiments, and analyzing the results.

My role will be to guide Kayli’s background research, coordinate the various aspects of the project (I will have a better idea than Kayli how much time will be required for the different stages and so will need to plan for how to best optimize the limited time we’ll have) and to serve as a voice of experience, having conducted many *Drosophila* behavior projects myself.

Weeks 1–3: Literature research and review; establish fly stocks and begin to collect virgin females for courtship assays, carry out courtship assays with wild-type flies in order to become familiar with the assay.

Weeks 4–8: Test various bang-sensitive mutants in courtship assays, varying parameters such as age and gender.

Weeks 9–10: Begin to prepare results for presentation at Scholars Day, the NCUR conference, and the Drosophila Research Conference (if appropriate).

Student engagement in discipline-appropriate scholarly research —

The experiments proposed here are all standard for behavioral research using model organisms. Kayli will be carrying out the necessary review of the existing literature, familiarizing herself with the behavioral assay, growing and maintaining different mutant fly stocks, testing these stocks, and recording and analyzing her results. Hopefully we will go on to publish her results, which will further expand her experience with discipline-appropriate research.

Student contributions to the discipline —

If the project is successful, I fully expect that we will be able to publish Kayli's results, contributing directly to our knowledge of behavior genetics. I also expect this work to suggest further research avenues, contributing indirectly to the discipline but directly to the opportunities for students to carry out research in my laboratory in the future.

I anticipate that Kayli's work will be more than sufficient to merit presentation at regional and national conferences. In years past my SOAR students have presented their work at the regional Beta Beta Beta convention (Tri-Beta is the undergraduate biology honor society), the National Council for Undergraduate Research conference, and at the national Drosophila Research Conference.

Part III: Student Statement of Purpose

Project title — Effect of bang-sensitive mutations on memory in *Drosophila melanogaster*

Student Researcher — Kayli Silimperi

Faculty Mentor — Christopher Jones

Housing requested — no

Before transferring to Moravian, I earned an Associate in Applied Science Biotechnology Degree from Northampton Community College. While preparing to transfer, the possibility of participating in the SOAR program was suggested to me. I was interested in attending Moravian since I graduated high school, but now I felt an even greater validation that this was the right choice for me. I recognized the unique opportunity this program offered immediately. I realized being given the opportunity to complete this program would be an indispensable part of my education.

I was able to work with Professor Jones throughout the 2015–2016 school year. From my studies at Northampton Community College, I began to understand the power of genetic research. Through Professor Jones's classes, I was exposed to what applicable genetics is truly

about. This experience further solidified my interest in the scientific field. I find the concept of genetics truly fascinating because DNA acts as a giant puzzle. It provides the basis for life as we know it, and yet the way it interacts with the environment is what leads to the complexity of life. It is truly humbling to try and comprehend how something so small it cannot even be seen by human eyes is responsible for most of what we see. It's truly chaotic structure, and I find that beautiful. Trying to make sense of this chaos is daunting, but it is something I wish to spend my future doing.

I specifically want to focus on genetics' influence in medicine. My goal is to try and make medicine more accessible and efficient. The ability for the research done with bang-sensitive mutations on memory in *Drosophila melanogaster* to be correlated back to human seizures, is one reason why I am interested in it. Being able to spend the summer gaining experience in a research laboratory would be invaluable to my education. Because of the genetics classes I have taken with Professor Jones, I have some understanding of what is required to work with fruit flies. However, this will be my first opportunity to work independently in a research laboratory. I am looking forward to the challenge of being able to take a concept and see where it takes me. The ability of this research to keep expanding even after this proposal is finished is another reason why I find it appealing. My desire to forward science, while helping others is a major reason behind my future career plans. Being able to spend just this small amount of time working in this capacity would be an irreplaceable experience for which I would be extremely grateful.

Part IV: Expense Proposal

Expenses for this project (e.g. routinely-used laboratory supplies, fly food ingredients, specialized equipment) will be covered by the Department of Biological Sciences.