

## **Part II: Project Proposal**

Project title — Intergenic effects of bang-sensitive mutations in *Drosophila melanogaster*

Faculty Mentor — Christopher Jones, Associate Professor of Biological Sciences

Student Researcher — Gautam Kanakamedala

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.

A number of different genes can be mutated to yield this bang-sensitive phenotype. We currently have bang-sensitive mutants in 7 of these genes in the Jones laboratory. The functions of the products of many of these genes have been determined, but it still isn’t clear how these products interact (or whether they do) to trigger this phenotype. In order to better understand the genetic architecture underlying bang-sensitivity, we propose to expand on work carried out 5 years ago by an Honors student, Ryan O’Donnell. Gautam will use traditional genetic techniques to combine the existing mutations to see what effect carrying multiple bang-sensitive mutations has on the fly: will the phenotype show additivity? Synergy? No difference from one of the component mutations? This project will confirm previous work and extend it by including newly-discovered bang-sensitive mutants.

### **Roles and responsibilities —**

Gautam will be responsible for background research (reviewing what has been published about bang-sensitive mutants, including Ryan’s Honors thesis), growing and maintaining the appropriate fly stocks, designing the necessary crosses to create the multiply-mutated flies, planning and carrying out the experiments, and analyzing the results.

My role will be to guide Gautam’s background research, coordinate the various aspects of the project (I will have a better idea than Gautam 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; decide on crossing strategies, establish fly stocks and begin to collect virgin females for crosses, carry out paralysis assays with wild-type and single-mutant flies to become familiar with normal results.

Weeks 4–8: Test various bang-sensitive mutant combinations in paralysis assays, varying parameters such as age and gender as appropriate.

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. Gautam will be carrying out the necessary review of the existing literature, familiarizing himself with the behavioral assay, growing and maintaining different mutant fly stocks, testing these stocks, and recording and analyzing his results. Hopefully we will go on to publish his results, which will further expand his 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 Gautam'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 Gautam'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 — Intergenic effects of bang-sensitive mutations in *Drosophila melanogaster*

Student Researcher — Guatam Kanakamedala

Faculty Mentor — Christopher Jones

Housing requested — yes

I would highly value the research experience that this SOAR project would offer me since my plans are to pursue a career in the medical field. The topic of this project deals with a disease in the fruit fly *Drosophila melanogaster*, which may be the equivalent of human diseases such as epilepsy. The project's goal is to identify behavioral abnormalities associated with mutant flies possessing the disease. The project's outcome has the potential to offer many insights into the behavioral aspects associated with such diseases in *Drosophila*. In addition, since *Drosophila melanogaster* is a model organism, any discoveries may hold relevance to human seizure diseases such as epilepsy, prompting the call for further research.

During my fall semester genetics class, one of my favorite aspects of the class was the laboratory work. I enjoyed using my classroom learning and readings in a tangible and experimental manner. I enjoyed setting up crosses and later working through the results when preparing laboratory reports. I believe this project would help me expand upon my current level of laboratory experience and help me focus it on more medically related topics.

The medical field is constantly looking to develop more findings on various diseases in order to design the best strategy to treat or care for the diseases. By undertaking this research project I wish to gain experience with the type of research geared toward the medical profession. Currently, I am not sure exactly what area of medicine I would like to specialize in, however medical research is still under consideration. This project would help me determine if medical research is a field I would like to pursue professionally, and if not, the project would give me a greater appreciation for the of work of medical researchers in addition to providing me with valuable research experience in a laboratory setting that would help me during medical school. I hope you take my goals, motivation, and career plans under consideration when evaluating my proposal.

#### **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.

