



Research Experience for High School Students- Summer 2009

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In the Lab



Figure 1: Wendy and Marlie in the Conway lab, transferring rats into a visually based training apparatus for learned associations between a particular behavior (licking a water port) and reward (receiving water).

Introduction

The goal of this newly launched program was to provide an opportunity for high school students in the later stages of their high school academic careers to explore the excitement of doing original research at the college level.

Michelle Cunningham, Wendy Feinstein, and Natasha Scaria are rising high school junior and senior women with experience in Advanced Placement or honors science classes at Framingham High School.

In early June of 2009, mentorees and mentors were matched based on their mutual research interests, and starting in late June, students came to campus for 10 hours each week.

Their time spent on campus included attending lectures, group discussions, journal clubs, and lab meetings in addition to their lab work, for a total of 60 hours this summer, for which they will also receive high school credit.

The following is a description of their research projects, a summary of skills learned this summer, and their parting impressions of being a scientist at the college level as well as commentary from the mentors, Stefanie Chan, Ryann Guayasamin, and Marlie Philiossaint.

Research Projects

The Elmore Lab (Mentor: Ryann Guayasamin)

"The bCNG ion channels are recently discovered ligand-gated channels found in bacteria. They work well as models for gated ion channels in complex eukaryotic cells. To prove the model of Ss-bCNGa, Ryann has been mutating amino acids into cysteines. Since there are no natural cysteines in the channel, any crosslinking shows that amino acids predicted to be close together are in fact so. To accomplish this, we mutated the Ss-bCNGa plasmids using PCR, after which the mutant DNA is electroporated into cells, and grown up on plates. Colonies are picked and incubated, then an agarose gel is run to compare the wildtype Ss-bCNGa to the mutants to see if they have actually mutated. These first steps of proving the model were my job this summer." (Michelle)

The Cameron Lab (Mentor: Stefanie Chan)

"This summer I studied the effects of hypoxia on gold fish heart tissue. We were specifically looking at ion channels on the surface of heart muscle tissue membranes. We were working on two questions: what physiological adaptations allow goldfish to withstand environmental hypoxia and anoxia and are there changes in gene expression in response to low oxygen that lead to tolerance in these environments? We used patch clamp and qRT-PCR for these experiments as well as gel electrophoresis. Currently, our data is inconclusive and we want to gather more patch clamp data and look into some other relevant genes." (Natasha)

The Conway Lab (Mentor: Marlie Philiossaint)

"The objective was to learn more about vision in animals and how it relates to brain function. (I worked with the human tests and the rat testing.) To test humans, subjects were presented with elliptical-shaped stimuli, and had to draw it themselves. The images were then put through software to analyze the black-to-white ratios, so the accuracy could be compared to the actual stimuli. To test vision/perception in rats and squirrels, they will be put through a series of stages: In the first stage they learn that ports dispense a reward. In the next stage they learn that ports dispense the reward only if licked. In the following stage, they are presented with an image on one side of a screen while the other side is blank; if they lick the port on the same side as the image, they get a reward. In the last stages, they are presented with an image on both sides, and must lick the correct port for a reward." (Wendy)

Mentoring Women in Science

"I feel it is important for Wellesley students to mentor up and coming women in science because it is important to keep up the interest in the sciences and to foster the next generation of would-be scientists, perhaps one that I may work with in the field some day. It's a way to keep the ball rolling, so to speak. It's also a valuable experience for the mentor and the mentoree; I wish I had had an opportunity to work in a research lab when I was in high school, and although I didn't have such a chance, mentoring someone that does is the next best thing.

This experience has certainly made me more interested in getting involved with mentoring younger students; it wasn't something I had considered seriously up until now. Now that I have had a positive first experience, I'd like to continue mentoring in the sciences. I hope I have imparted an introduction, however brief, to the world of research, and showed that the field of science is extremely broad and has lots of space for expansion." (Stefanie Chan)

Lasting Impressions

"This experience definitely changed my outlook on studying science at the college level. Researchers can go about their objective in a variety of ways, and they are free to do it their own way. They have a team of people who they can work with, ask for assistance, and spend time with. Also, the feeling of trying to do solve for something and achieving it is really great. There are so many unanswered questions, that the science field will always be growing." (Wendy)

"These are skills which I could only have acquired by working in a lab, and give me a head start if I choose to work in one in college." (Michelle)

"This experience has changed my outlook on studying science at the college level. Although I already plan on studying biology in college, this experience has given me the chance to explore a topic I had never heard of before. It allowed me to see just how many different fields there are in science. I learned how easy and fulfilling it is to do research in college. This opportunity has made me want to pursue biology even more. Now, I cannot wait to work in a lab in college." (Natasha)

In the Lab



Figure 2: Michelle and Ryann in the Elmore lab, preparing PCR reactions to study mutations in Ss-bCNGa plasmids for their investigation of bacterial ion channels.

Acknowledgements

We would like to thank the faculty who shared their labs this summer, including Bevil Conway, Don Elmore, and John Cameron.

Many thanks go to Zehra Omer ('10) for developing the program, Matthew Corcoran (Science Department Head, FHS) and Linda Curtis (Career Specialist, FHS) for their contributions and continued support of the program. This program would not have been possible without their hard work.

Christa Skow acted as Program Coordinator this summer and Janet McDonough is the Science Outreach Director.

The program was funded by HHMI VI and supported by the Science Outreach Program at Wellesley College.

If you are interested in participating in this program in the future, please contact Janet McDonough (jmcdonou@wellesley.edu).