Final Narrative, Anthony Acevedo, Spring 2020 SEF

The Student Engagement Fund granted my lab an opportunity to embark onto a new frontier in Medical and agricultural entomology. With prior molecular biology experience, I was able to explore the world of pest control and mutation analysis by harmonizing the ever-emerging fields of medical entomology and molecular biology. Inaugurating a new section of biology into an already existing research lab is not simple. Logistical issues with laboratory space could arise, depending on the lab size and the number of students willing to work in that lab, and this became an issue as space was needed to dedicate to this project. The main issue with introducing molecular biology projects into a laboratory not set up for that field of study are the cost of equipment and reagents needed to conduct those experiments.

With the allocated funds by the Office of Student Engagement and Experiential Learning, I was able to initiate the experiment: Determining Changes to the Voltage-Sensitive Sodium Channel and Detoxification Enzymes of Field-Collected House Flies. The experiment had a very simple outline, with complex details to complete. The goal of the experiment was to determine the frequency of particular target site mutations in the voltage-sensitive sodium channel that confer resistance to pyrethroids, a common class of insecticide used to control house flies. The experiment was categorized into 3 phases: Phase I: fly specimen and DNA extraction, Phase II: fly DNA handling and amplification, and Phase III: sequencing and genetic analysis.

Due to the Pandemic caused by SARS-CoV-2, the third phase of the project was halted, due to the need for sequencing facilities for the novel virus. Our collaborator at Cornell university notified us that the sequencing unit would be unavailable until further notice. Without the sequencing data, we were not able to successfully determine if any mutations existed in the strain of house fly we were working with.

On an optimistic note, the first two phases were performed and were very successful, with DNA quantities within a very good range and were of a very good quality for downstream processing via PCR. PCR was conducted on 15 specimens, all with positive amplification. We successfully produced 15 PCR fragments at the expected 390 bp length. The following photograph demonstrates the PCR results:

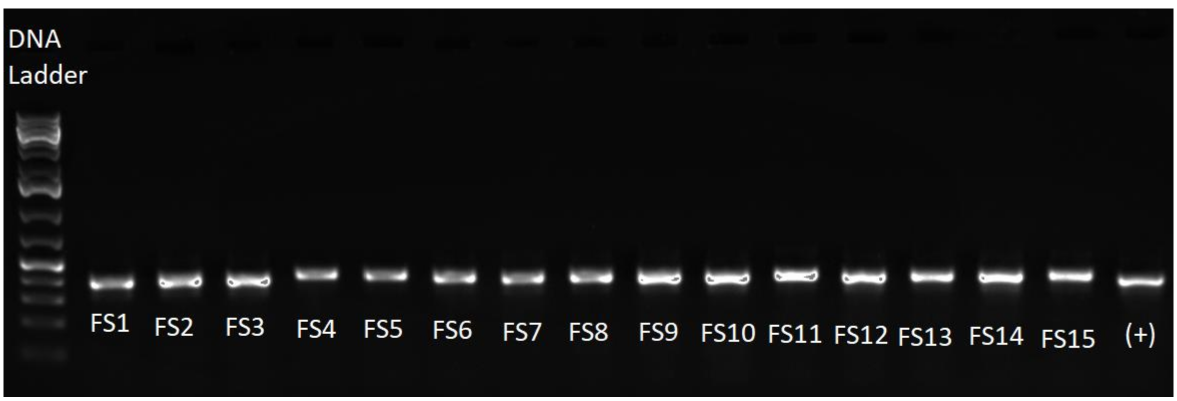

Figure: Gel electrophoresis from Polymerase chain reaction, March 14, 2020.

The project overall contributes to the question of where exactly in the genetic markers for insecticidal resistance lie. Information obtained from this experiment can pinpoint the location of these markers and provide a better explanation for the resistance alleles found in house flies, and how evolution can assist the propagation of resistance. Knowing the frequency of mutations by area can also help farmers and animal producers on the efficacy of using certain pesticides by the proportion of insecticide resistance house flies.

Although limited, this project helped to further my molecular biology skills in the lab and this ultimately has netted me a very well-paying job in a molecular biology lab with the Illinois Department of Public Health, highlighted in NIU Today: https://www.niutoday.info/2020/04/20/senior-biology-major-puts-skills-to-work-in-coronavirus-battle/

I am currently helping in the fight against SARS-COV-2 by working as a molecular diagnostician on presumptive COVID samples across the state. My work hours are very long, so finding time to write this was a challenge, but I am so grateful to be able to share with OSEEL that this funding had a profound impact on my career.