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Midyear Progress Report

Biology 197 (Undergraduate Research)

December 1, 2015

A survey and correlational study of tracheal mites (*Locustacarus buchneri)* and *Nosema bombi* in bumble bees throughout Northern Vermont.

**What has been done?**

While there is still much to be done as far as bee dissections and data analysis are concerned, most of the technical and experimental processes have been solidified and next semester, when I continue my research in Biology 298 (advanced undergraduate research), I will be able to streamline the remaining lab work and begin to analyze and report these data. In addition, I have completed the parasite surveys of 6 field sites that represent the geographic spread of the total 13 sites and have quickly analyzed those data (fig. 1). These preliminary results……

In this semester I learned how to use a hemocytometer to accurately count the *Nosema* spores in each specimen, and adapted honeybee equations to determine the estimated spore load per bee. I am also storing the dissected bee on -80oC and homogenizing the ventriculi in a stabilizing GITC buffer so that I can return to these samples at a later time and use PCR to gain more detailed data. In addition to *Nosema* counts, I learned how to efficiently dissect a bumblebee while a searching them for *Locustacarus buchneri* (tracheal mites), nematodes and canopid flies (a parasitoid fly).

This semester I was also the recipient of two grants, an APLE Award, which will be used to fund the supplies I need to further conduct this study, and the Ronald Suiter Prize, which will allow me to attend the American Beekeeping Federation Conference and Tradeshow in Florida to gain valuable information via presentations and networking opportunities, on the current state of bee research. Many of the top bee research labs will be sending members, which will allow me to interface with people who are conducting research that is similar to mine. In addition, I have applied to the Accelerated Master’s Program (AMP) in biology and am currently awaiting the graduate college’s admittance decision. If accepted, I intend to use the data obtained in this year of undergraduate research as pilot data for a larger project involving a correlational study between RNA virus and parasite prevalence in Vermont bees.

**What has yet to be completed?**

Next semester (spring 2016), I will complete the dissections for all sites and will proceed to analyze these data. I wish to contrast the prevalence of these different parasites between species, between sites, between castes (queens, males and workers) and compare parasite prevalence to forage quality and bee density using the vegetation and bee surveys completed at each site. I intend to write up my findings and present them to the biology department. Also, as I believe the work that I have done is scientifically sound, important to the field of bee research and of a quality that is in keeping with the University of Vermont’s high academic standards, I hope to publish this study in an academic journal and would like to begin the process in my senior year as I hopefully begin my master’s thesis.

There is still much to be done, however. I believe that much of the much of the experimental design process, which I found to be the most laborious part of the project, was solidified in this past semester (Fall 2015). With all of my protocols tested and determined to be sound, I believe the remaining lab work will be conducted quickly and efficiently next semester. This will leave ample time for the analysis, writing and presentation processes in the second half of this upcoming semester. I am pleased with my progress so far and look forward to the work that will be completed in the future.