2019 Research Week Abstract

Title – *Solenopsis Invicta* Lipidomics—Fatty Acid Profiling of the two Social Forms of the Red Imported Fire Ant

Program of Study – Department of Biology and Chemistry, Cell and Molecular Biology

Presentation Type – Physical Poster

Subtype – Basic

Mentor and Mentor Email – Dr. Jeremy A. Sellers, Ph. D (jasellers@liberty.edu)

Student name and email – Jenna N. Donelson (jdonelson@liberty.edu)

Abstract:

Since their accidental introduction in Mobile, Alabama in the 1930's, the red imported fire-ant (*Solenopsis invicta*) has invaded the Southeastern US and continues to march north and westward. This is of growing concern to Virginians, as the state boundary with North Carolina has become the Mason-Dixon line of our un-civil war with these pests. Fire-ant colonies exist in two social forms, containing a single (monogyne) or multiple (polygyne) reproductive queens per mound. It is possible to identify the social form of worker ants by genotypic analysis of the Gp-9 gene. Monogyne ants bear the Gp-9^{BB} genotype, while polygyne workers exhibit the Gp-9^{Bb} genotype. Though the characterization of Gp-9 protein is ongoing, it is predicted to function as an odorant binding protein, likely associated with queen pheromone sensing. Several other characteristics have been ascribed to the Gp-9 alleles, but these are more likely related to Gp-9's position within a non-exchangeable supergene cluster, containing hundreds of other genes. As such, the specificity of the inherited Gp-9 allele is associated with a host of other factors that may influence metabolism and behavior. Among these, are numerous genes involved in lipid metabolism and transport. This is particularly significant, since monogyne and polygyne queens display dramatically different phenotypes with regard to their total mass, lipid deposition, and

gross adiposity. Further, because lipid metabolism and storage are of paramount importance to all animals, we have begun to explore the basis for these phenotypic differences. In this study, we analyzed the fatty acid profile of worker ants from monogyne and polygyne colonies and compared their lipidomes for notable differences. The results of this work provide novel insights into fire-ant lipid metabolism that may useful for controlling the spread of this invasive species.