

Jacob Fyda '22

Spring and Summer 2021

I used my Byrne funds to spend two terms this year doing remote research at the Wenner-Gren Institute for Molecular Biosciences at Stockholm University in Stockholm, Sweden. My research involved molecular and evolutionary biology, and I worked with PhD student Michael Gaudry under the supervision of principal investigator Dr. Martin Jastroch.

My work primarily involved brown adipose tissue, a heat producing organ found in placental mammals and commonly referred to as “brown fat,” and several associated genes, including UCP1, CLSTN3B, CHKB, CPT1B, and TRPC2. I conducted a comprehensive study of the evolutionary history of CLSTN3B in mammals. I identified pseudogenes in several mammalian lineages and provided evidence for co-evolution with other genes associated with brown adipose tissue. I explored recent findings about synteny in the location of CHKB and CPT1B in placental mammals compared to marsupials and other tetrapods, and I also examined the evolution of TRPC2 in mustelids. I also continued my previous work with UCP1. I identified pseudogenes and assembly errors of known genomes in pinnipeds, work that will be published in the Proceedings of the National Academy of Sciences of the United States of America in a letter entitled: “Evolution of pinniped UCP1 is not linked to aquatic life but neonatal thermogenesis and body size.”

My work involved the analysis and annotation of the genomes of several hundred representative animal species, as well as phylogenetic analysis, selection pressure analysis, and the construction of evolutionary trees. Our findings helped provide additional insight into the evolution of brown adipose tissue and associated genes, with the eventual goal of applying this functional and molecular knowledge to enhance treatment of metabolic diseases, including obesity and diabetes. I am incredibly grateful for the generosity of Jack and Dorothy Byrne which allowed me to develop this relationship with the lab, and this research would not have been possible without the Jack Byrne Scholars Program.