Kylee R. Hillman

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**Kylee R. Hillman - Curriculum Vitae 2023**

**Education**

B.S. with Honors, Florida State University, Tallahassee, FL, 32301, 2018-2022

College of Arts and Sciences, Department of Biology

Major: Biology, Minor: Chemistry, GPA: 3.9

**Research Experience**

**August 2022-Present:***Characterization of a Novel, Putative, Thermotolerance Gene by using Chlamydomonas reinhardtii (Lab of Dr. Ru Zhang, Donald Danforth Plant Science Center)* Understanding how photosynthetic organisms respond and adapt to temperature stress is important to the generation of thermotolerant crops. Using a combination of molecular techniques, multidimensional phenotyping, and fluorescence microscopy, I established that the protein HTG1 relocalizes from surrounding the nucleus to distinct donut shapes in the cytoplasm when the cell undergoes stress. Loss of this gene leads to a decreased ability to recover from heat stress and an overall decreased growth rate, suggesting an important role in heat tolerance. Our current data suggests that this gene has a role in the autophagy pathway. This gene has orthologs in many crop species and therefore could serve as a target for future engineering of thermotolerant crops.

**August 2019- May 2022:** *Investigating Factors Promoting Speciation Through Comparing Frog Hybrid Zones (Lab of Dr. Emily Lemmon, College of Arts and Sciences, Florida State University)-* Understanding how species are generated and maintained is important for the understanding of evolution and maintenance of biodiversity. My Honors Thesis compared two hybrid zones of chorus frog in the genus *Pseudacris*, analyzing how geography and behavior interact to promote speciation. I found that in these two separate hybrid zones of the same species, there was a difference in hybridization which I attributed to mating call characteristics and species contact time.

**May - July 2021*:*** *Increasing Production of Biotherapeutic Curcumin in Escherichia coli (Lab of Dr. Jixun Zhan, College of Engineering, Utah State University)* – Curcumin is a pharmaceutically important compound with anti-inflammatory and anti-cancer benefits. This project aimed to increase the yield of curcumin production using alternative feruloyl-CoA synthetase genes in *Escherichia coli.* I constructed and transformed the plasmids into bacteria and quantified how two feruloyl-CoA synthases affected curcumin production using HPLC. None of the new FCS genes were able to improve curcumin yield in *E. coli*, suggesting that modulation of enzyme expression levels may be a better way to engineer increased curcumin production and further investigate its expression levels.

**December 2019 – March 2020:** *Assessing proto-carnivory in Silene antirrhina (Lab of Dr. Thomas Miller, Florida State University)* I maintained greenhouse plants and collected data on seed germination and plant growth rates of *Silene antirrhina* for later analysis of potential proto-carnivory. This lab project was cut short due to the COVID-19 pandemic.

**Lab Skills**

Confocal and super-resolution microscopy, use of photobioreactors to phenotype algae, algal culture maintenance, sterile technique, plant and animal DNA extraction, plasmid construction and extraction, bacterial and algal transformation, PCR, cell counting, chlorophyll extraction, RNA extraction, protein extraction, and western blotting.

**Computational Skills**

Coursework: Introduction to Scientific Computing, Intro to C++, Data, Algorithms and Programming 1, and Advanced Programming in Java.

 Research: Experience processing and visualizing SNP and acoustics data in R to do various clustering analyses. Proficient in using R for statistical analysis.

**Outreach, Service and Teaching**

**January 2023- Present**: Volunteer, *The Magic House*, St. Louis, MO – The Magic House is an interactive museum that uses hands-on activities to increase engagement with and interest in science among elementary school children. I helped run activities for museum guests and guided children through activities such as 3D printing and laser cutting.

**May – August 2023**: Research Experience for Undergraduates Mentor, *Donald Danforth Plant Science Center,* St. Louis, MO – I mentored Kamal Ehrlich, a Research Experiences for Undergraduates (REU) student in the Zhang lab. I guided them in developing an independent research project focused on the phenotypic and genetic validation of a heat-sensitive *Chlamydomonas* mutant. I taught them all the lab skills necessary to complete the project and mentored them in creating an oral presentation and written research paper. They presented this project at the REU student symposium at the Danforth Center.

**August 2021- April 2022**: Teaching Assistant, *Florida State University*, Tallahassee, FL – I taught two three-hour sections of General Biology Lab for Non-Majors and led hands-on labs for students. I also graded students' work and held weekly office hours. The purpose of this class was to engage non-STEM majors in biology and allow them to think critically about this subject. The content of these labs ranged from identifying important adaptations organisms have for their environment to learning about how scientists reconstruct dinosaur bones to understanding macromolecules that make up the food they eat.

**September 2020- September 2021**: Lesson Planning Coordinator, *STEMs4Girls*, Tallahassee, FL - STEMs4Girls is a nonprofit organization that seeks to increase the representation of women in STEM. I planned lessons on topics including the physics of motion and human anatomy for STEM Saturday sessions, basing activities on Florida education standards. I also facilitated Saturday sessions and ensured activities ran smoothly and students were engaged in the material.

**August 2019- December 2020**: Learning Assistant, *Florida State University -* Many students in large lecture courses struggle as there are no opportunities for one-on-one teaching of material or time for their specific questions to be answered. By acting as a one-on-one peer mentor, I helped students fully engage with and understand key concepts in biology by holding office hours, leading exam review sessions, and helping answer questions in class.

**Grants, Scholarships and Awards**

2023 – 20th International Conference on the Cell and Molecular Biology of Chlamydomonas Travel Award ($1300)

2023 – CSTM Professional Development Award ($1000)

2022 – 2nd Place Poster Award, Institute of Biological Engineering ($75)

2022 – FSU Outstanding Senior Scholar Award

2022 – Francenia E. Fisher Scholarship ($2500)

2021 – Barry Goldwater Scholarship ($7500)

2021 – Utah State University Plant-STEM REU ($6000)

2020 – Ben and Karen Thrower Scholarship ($500)

2019 – Emerald Coast AFCEA STEM Scholarship Award ($500)

2018-2022 – Bright Futures Academic Scholarship ($5000 annually)

2018-2022 – Florida State University Grant ($1800 annually)

**Presentations**

Poster Presentation at the 20th International Conference on the Cell and Molecular Biology of Chlamydomonas

(June 4-9, 2023, Princeton, NJ)

Title: “Identifying and Investigating Uncharacterized Genes with Putative Roles in Thermotolerance by Using *Chlamydomonas reinhardtii*”

Poster Presentation at the Institute of Biological Engineering Annual Meeting (April 9th, 2022, Athens GA)

2nd Place Poster Competition Winner

Title: “Increasing Microbial Production of Biotherapeutic Curcumin by Testing Different Feruloyl-CoA Synthases”

Talk at Evolution Conference (June 21-25, 2021, Virtual)

Title: “Identifying and Analyzing a Potential Hybrid Zone”

Poster Presentation at Tri-Beta Annual Poster Competition (November 20th, 2019, Tallahassee, FL)

Title: “Identifying and Analyzing a Potential Hybrid Zone”