James G. DuBose

Ph.D. Student
Population Biology, Ecology, and Evolution
Emory University

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Education

Georgia Institute of Technology — December 2022
M.S. in Bioinformatics

University of Central Arkansas — May 2021
B.S. in Biology
Minors: Chemistry and Anthropology

Fellowships

Graduate Research Fellowship (GRFP) — 2023 – Present
National Science Foundation (NSF)

Student Undergraduate Research Fellowship — 2019 – 2020
Arkansas Department of Higher Education

Research

Georgia Institute of Technology — January 2022 – December 2022
Principal Investigator: Dr. William Ratcliff
Synopsis: During my master's, I focused on developing new bioinformatic and statistical approaches to analyze variants in population genomic data. Recent work has shown that many types of variants that were presumed neutral can have large effects. My focus has been developing statistical models that can account for this variability of mutational effects and developing accompanying bioinformatic tools that allow others to implement these approaches as well. My work in the Ratcliff lab has primarily focused on using yeasts (*Saccharomyces cerevisiae*) to develop these approaches, with the intent that they will be applicable to other organisms as well.

Georgia Institute of Technology — August 2021 – April 2022
Principal Investigator: Dr. Kostas Konstantinidis
Synopsis: In the Environmental Microbial Genomic Laboratory I combined transcriptomic and proteomic approaches to study the physiology of obligate halogen-respiring bacteria. These soil-dwelling bacteria subsist on a rather rare soil compound and grow significantly slower than other bacteria. My objective was to understand what physiological adaptations allow for this lifestyle. Additionally, such bacteria have been implied in bio-remediation efforts, as halogen pollutants pose large risks for the environment.

University of Central Arkansas — January 2019 – April 2021
Principal Investigator: Dr. Tammy Haselkorn
Thesis: *The Ecological and Evolutionary Dynamics of Social Amoeba Microbiomes and Key Symbionts*
Synopsis: As an undergraduate student I studied the symbiotic interaction between soil dwelling amoebae, their persistent bacterial symbionts, and their transient bacterial microbiota. My thesis work focused on understanding the key ecological drivers of these symbiotic interactions, including how various symbionts

are transmitted, their relevance in shaping their host microbiota, and how abiotic soil factors influence the stability of their interactions. I have continued working with Dr. Haselkorn to study how abiotic and biotic soil factors influence amoeba-symbiont interactions and amoeba ecology in general. Recently, we have also started investigating how host genetics and diet contribute to shaping the gut microbiota of flies (*Drosophila sp.*) that feed exclusively on cactus, aiming to gain a broader understanding of how host diet, genetics, and population structure influence their gut microbiota.

Publications

J.G. DuBose, M. Robeson, M. Hoogshagen, H. Olsen, T.S. Haselkorn. 2022. The complexities of inferring symbiont function: Paraburkholderia symbiont dynamics in social amoeba populations and its impact on the amoeba microbiome. *Applied and Environmental Microbiology.* doi: 10.1128/aem.01285-22

J. T. Pentz, K. MacGillivray, **J.G. DuBose**, P. L. Conlin, E. Reinhardt, E. Libby, W. C. Ratcliff. 2022. Evolutionary consequences of nascent multicellular life cycles. *bioRxiv.* doi: 10.1101/2022.07.21.500805 - In review at *eLife*

Teaching

Graduate Teaching Assistantship
Course: Foundations of Modern Biology (Emory University: BIOL 141) Fall 2023
Description: I am currently a teching assistant for an introductory biology course at Emory University. My responsibilities include lecturing to teach primary material and holding office hours to answer specific questions regarding lecture material.

Graduate Teaching Assistantship
Course: Biological Principles (Georgia Institute of Technology: BIOS 1107) Fall 2022
Description: During the Fall semester of 2022, I was a teaching assistant for the Biological Principles course at Georgia Tech. Aside from grading, my primary responsibilities were to plan and hold recitations sessions to reinforce content covered in the course.

Talks and Presentations

Front Range Microbiome Symposium 2023, Poster April 28, 2023
James G. DuBose, Thomas B. Crook, Luciano Matzkin, Tamara S. Haselkorn. *Exploring the contributions of host evolutionary history and diet in shaping the gut microbiota of cactophilic flies*

ASM South Central Branch 2022, Poster October 27, 2022
Thomas B. Crook, **James G. DuBose**, Luciano Matzkin, Tamara S. Haselkorn. *Comparative Microbiome Analysis of Cactophilic Drosophila Species*

Arkansas INBRE 2022, Poster October 21, 2022
Thomas B. Crook, **James G. DuBose**, Luciano Matzkin, Tamara S. Haselkorn. *The Microbiota of Naturally Acquired Cactophilic Drosophila Species*

Evolution 2021, Talk June 23, 2021
James G. DuBose, Tamara S. Haselkorn. *The transmission and diversity of Paraburkholderia in natural D. discoideum populations and its impact on the D. discoideum microbiome*

Asilomar 2021, Talk January 08, 2021
James G. DuBose, Tamara S. Haselkorn. *The Domination of Paraburkholderia in the Social Amoeba D. discoideum microbiome and its Impact on the Ecological Relevance of the Farming Symbiosis*

Arkansas INBRE 2020, Talk November 06, 2020
James G. DuBose, Tamara S. Haselkorn. *The Genetic Diversity of Bacterial Symbionts in Dictyostelium discoideum Social Amoeba and Their Effect on the Amoeba Microbiome*

ASM Microbe, Poster July 2020
James G. DuBose, Hunter Olsen, Tamara S. Haselkorn. *Prevalence and Genetic Diversity of the Burkholderia Bacterial Farming Symbionts in Dictyostelium Discoideum Social Amoeba Populations and their Effect on the Amoeba Microbiome*

ASM South Central Branch, Poster November 01, 2019
James G. DuBose, Hunter Olsen, Tamara S. Haselkorn. *Long-term Prevalence Patterns of the Burkholderia Farming Symbiont in Dictyostelium discoideum Social Amoeba Populations*

Grants and Funding Awards

Computational Biology Graduate Research Assistantship 2022
Proposal: *A multi-omics approach for comparing the physiological differences between slow and fast-growing bacteria*
Award Amount: $4,200 over one semester

UCA College of Natural Sciences and Mathematics Student Research Funding 2021
Award amount: $1,000 over one semester
Proposal: *The horizontal transmission of the Paraburkholderia bacterial farming symbiont and its effects on the microbiome of the social amoeba D. discoideum*

Advancement of Undergraduate Research in the Sciences (AURS) 2019
Award amount: $5,000 over one semester
Proposal: *Ecological relevance of the amoeba farming symbiosis: the prevalence of the Burkholderia bacterial symbiont in natural populations, and its effect on the amoeba microbiome*

Outreach and Volunteering

Development of Programming Education Resources for Historically Minoritized Groups in Computing
Project Advisor: Dr. Benjamin Rydal Shapiro
Synopsis: DataWorks is a data services provider that employs people from communities that have historically had little access to computational resources and education. By hiring and educating people from these groups, DataWorks hopes to broaden access to computing and foster equitable labor practices. One of the main tasks performed by DataWorks employees is retrieving and organizing information from online locations, a process known as web scraping. I have been working with DataWorks on building educational resources that will teach the employees to how to automate these tasks using Python, as opposed to manual copying and pasting. The primary resource is a comprehensive introductory Python course that is specifically designed for people with no computational experience. Since web scraping is the major task performed at DataWorks, this course teaches Python through the lens of parsing webpages into tabular data.

Employment

Georgia Institute of Technology, School of Biological Sciences August 2022 – December 2022
Graduate Teaching Assistant

Georgia Institute of Technology, School of Biological Sciences January 2022 – May 2022
Graduate Research Assistant

Arkansas Department of Health, Public Health Laboratories March 2021 – July 2021
Laboratory Technician, Molecular Biology Unit, COVID-19 Unit

University of Central Arkansas Tutoring Center August 2019 – May 2021
Biology, Chemistry, and Mathematics Tutor

University of Central Arkansas, Biology Department June 2020 – August 2020
Research Assistant

References

Dr. William Ratcliff
Associate Professor, Department of Biology
Georgia Institute of Technology
Email: william.ratcliff@biology.gatech.edu

Dr. Tammy Haselkorn
Associate Professor, Department of Biology
University of Central Arkansas
Email: thasekorn@uca.edu

Dr. Benjamin Rydal Shapiro
Assistant Professor, Department of Learning Sciences
Georgia State University
Email: bshapiro@gsu.edu