James G. DuBose

Graduate Student, Bioinformatics
Department of Biology
Georgia Institute of Technology

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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

Research

Georgia Institute of Technology — January 2022 – Present
Principle Investigator: Dr. William Ratcliff
Synopsis: In the Ratcliff lab, I am focusing 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 to develop accompanying bioinformatic tools that allow others to implement these approaches as well. My work in the Ratcliff lab has primairly focused on using yeasts (*S. 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
Principle 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 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 — 2019 – 2021
Principle Investigator: Dr.Tammy Haselkorn
Thesis: *The Ecological and Evolutionary Dynamics of Social Amoeba Microbiomes and Key Symbionts*
Synopsis: As an undergaduate student I studied the symbiotic interaction between soil dwelling amoebae and their bacterial symbioints. Specifically, I investigated the key ecological drivers of these symbiotic interactions, including how the symbioints are transmitted, their relevance to the host, and how abiotic soil factors influence the stability of the interactions. I have continued with Dr.Haselkorn to study how abiotic and biotic soil factors influence amoeba diversity.

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

Jennifer T. Pentz, Kathryn MacGillivray, **J.G. DuBose**, Peter L. Conlin, Emma Reinhardt, Eric Libby, William C. Ratcliff. 2021. Clonal development, not aggregation, drives the transition to multicellularity in an isogenic model system. *bioRxiv*. doi: 10.1101/2022.07.21.500805 - In review at *eLife*

J.G. DuBose., Y. Li, G.O. Bozdag, W.C. Ratcliff. 2022. Varanus: A Simple and Scalable Python-Based Variant Annotation Program. GitHub Repository. - Manuscript in Preparation

Talks and Presentations

Evolution 2021, Talk 06/23/2021
Virtual
James 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 01/08/2021
Virtual
James 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 11/06/2020
Virtual
James 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 07/2020
Virtual
James 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 11/01/2019
University of Mississippi, Oxford, MS
James 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 bateria*
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*

Student Undergraduate Research Fellowship (SURF) 2019 – 2021
Award amount: $4,000 over two semesters
Proposal: *The effects of the Burkholderia bacterial symbiont on its social amoeba host's fitness and microbiome formation*

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 retreiving and organizing information from online locations, a process known as webscraping. 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 webscraping 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 08/2022 – Present
Graduate Teaching Assistant

Georgia Institute of Technology, School of Biological Sciences 01/2022 – 05/2022
Graduate Research Assistant

Arkansas Department of Health, Public Health Laboratories 03/2021 – 07/2021
Laboratory Technician, Molecular Biology Unit, COVID-19 Unit

University of Central Arkansas Tutoring Center 08/2019 – 05/2021
Biology, Chemistry, and Mathematics Tutor

University of Central Arkansas, Biology Department 06/2020 – 08/2020
Research Assistant

References

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

Dr. Tammy Haselkorn
Assistant 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