BIOGRAPHICAL SKETCH

NAME: Forbes, Kwame

eRA COMMONS USER NAME: kwameforbes

POSITION TITLE: Graduate Student Research Assistant

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	END DATE	FIELD OF STUDY
University of the Virgin Islands, Charlotte Amalie, VI	BS	12/2019	Biology conc. Computation Biology
University of North Carolina Chapel Hill, Chapel Hill, NC	NIH training grant	06/2021	Postbaccalaureate Research Education Program

A. Personal Statement

My interest in biomedical research began in college when I became part of the NIH-funded Research Initiative for Scientific Enhancement (RISE) program. This opportunity was vital because I got to work closely with my mentor during the academic year. In parallel, I attended workshops about potential careers in biomedicine. My first ascent into biomedical research was identifying age, sex, and tissue effects on gene expression variability in Parkinson's disease via a meta-analysis approach using the National Center for Biotechnology Information. Presenting my findings at the Annual Biomedical Research Conference for Minority Students (ABRCMS) was a significant accomplishment. After graduating, realizing some of my shortcomings, I applied and was accepted in UNC's Postbaccalaureate Research Education Program (PREP) program. Under the guidance of Dr. Micheal Love, a renowned figure in bioinformatics, I have worked extensively with programming, biological databases, and data visualization. Sharpened my scientific communication skills by presenting my research in lab meetings, and at conferences. Currently working under the mentorship of Maria Aleman and Daniel Dominguez, a project we are excited about involves discerning the impact of Iron Deficiency on the transcriptome landscape in various tissues, ranging in their utilization of iron. This project serves as a great gateway into Hematology. I look forward to working towards completing a meaningful publication in the coming months. My passion for informatics, biology, and biomedical research has been the driving force in my pursuit of a PhD in Bioinformatics and Computational Biology. In an era where the frontiers of science continue to expand, it has become increasingly vital for scientists to employ computational strategies to tackle the growing complexity of problems. I am committed to helping advance our understanding of complex biological systems and contribute to the forefront of scientific knowledge. With Dr. Aleman's hematology expertise, and my growing computational skills, I am in the ideal environment to conduct impactful research. Beyond obtaining my doctoral degree, I would then like to pursue an industry. I aspire to provide research and guidance opportunities to students, particularly those from underrepresented communities.

B. Positions, Scientific Appointments and Honors

Positions and Scientific Appointments

2021 - Graduate Student Research Assistant, University of North Carolina Chapel Hill Biology and Biomedical Student Program, Chapel Hill, NC
2021 - Member, Society of Black Biomedical Students, Chapel Hill, NC
2020 Chemistry lab Instructor, University of the Virgin Islands, Charlotte Amalie, VI
2019 Genetics Teaching Assistant, University of the Virgin Islands, Charlotte Amalie, VI
2018 Computer Science lab Instructor, University of the Virgin Islands, Charlotte Amalie, VI

Honors

2021 - 23	Bioinformatics and Computational Biology T32 Grant, University of North Carolina Chapel Hill
2021 - 22	Inclusive Excellence Top-Up Fellowship award from, University of North Carolina Chapel Hill
2020	Biological Data Science 2020 Scholarship, JTech Cold Springs Harbor Laboratory (CSHL)
2020	Outstanding Poster Presentation Award, Annual Biomedical Research Conference for Minority Students (ABRCMS)
2019	Dick Smith Scholarship, Omega Psi Phi Fraternity Inc.

C. Contribution to Science

1. **Undergraduate Research:** In the summer of 2019, I engaged in impactful research at the University of Tennessee at Chattanooga under the guidance of Dr. David Giles, a distinguished researcher specializing in Vibrio cholerae. Dr. Giles' lab was actively investigating the acquisition and utilization of exogenous long-chain fatty acids (LCFA) by bacteria, emphasizing their role as crucial niche-specific molecules with functions ranging from nutrient sources to membrane modifiers and signaling agents. My specific project aimed to identify homologs of Vibrio cholerae proteins involved in LCFA assimilation across various bacterial species for subsequent phylogenetic analyses. Leveraging the Integrated Microbial Genomes database, we successfully located homologs of key membrane proteins responsible for cholera toxicity in bacteria spanning diverse families.
    a. Saksena S, **Forbes K**, Rajan N, Giles D. Phylogenetic investigation of Gammaproteobacteria proteins involved in exogenous long-chain fatty acid acquisition and assimilation. Biochem Biophys Rep. 2023 Sep; 35:101504. PubMed Central PMCID: PMC10439403.

2. **Postbaccalaureate Research:** After undergraduate, I worked with Dr. Michael Love at the University of North Carolina at Chapel Hill to develop new functions within the DESeq2 software for analyzing RNA datasets. The new functions we developed helped biologists analyze and interpret their "bulk" dataset by integrating it with a "single cell" dataset. Our overall goal was to allow biologists to know which cells in their dataset may be important when they see expression differences in RNA in their samples. My contributions to this led to the development of software, VizwithSCE, that provided visualizations of the output of DESeq2 to help further analyze the datasets. The software's development was especially memorable as it provided the opportunity to engage with numerous researchers and graduate students, gaining valuable insights into my project and the intricacies of graduate school.
    a. **Forbes, K.** and Love, M. (2021) Visualization of bulk differential analysis results for deseq2 with single-cell datasets, Visualization of Bulk Differential Analysis Results for DESeq2 with Single-Cell Datasets •
    b. **Forbes, K.** and Love, M, Integration of SC Datasets with Bulk Differential Analysis Results for DESeq2. Annual Biomedical Research Conference for Minority Students; 2020 November; Virtual.

3. **Graduate Research:** One of my ongoing research projects focuses on transcription factors (TFs) and RNA binding proteins (RBPs), two dynamic groups of proteins that regulate gene expression that often undergo molecular evolution events. One such event, gene duplication or the creation of paralogs, is a key driver of metazoan complexity that gives rise to hundreds of multigene families. Whether paralogs have unique or redundant functions remains unclear. TFs and RBPs have undergone large-scale duplications yielding hundreds of gene families. We hypothesized that paralogous genes within RBP and TF families may exhibit tissue or cell-type specific gene expression. I contributed to exploring this hypothesis by examining paralog expression patterns across tissues and cell types using both bulk and single-cell RNA sequencing.
    a. **Forbes, K**, Aleman, M, Dominguez, D. Transcription Factors & RNA Binding Proteins: Regulatory Loops and Gene Paralogs. University of North Carolina at Chapel Hill Pharmacology Retreat 2023

D. Scholastic Performance

YEAR	COURSE TITLE	GRADE
	University of the Virgin Islands	
2014	Interpersonal Comm. Leadership Skills	A-
2014	Intro Algebra Concept Skill II	P
2014	Natural World: The Caribbean	A
2014	Freshman Development Seminar	A-
2014	Criminology	B+
2014	Precalculus Algebra	A
2014	Intro to Sociology	A
2014	General Biology I	A-
2014	General Chemistry I	B+
2014	General Chemistry I Lab	A
2014	Voice & Diction	B+
2014	College Trigonometry	B+
2015	General Biology II	B
2015	Responsible Conduct of Research	B+
2015	General Chemistry II	B
2015	General Chemistry II Lab	B+
2015	Intro Calculus & Anal Geometry I	B-
2015	An Intro Soc. Sci. Caribbean Focus	A
2015	Intro Calculus & Anal Geometry II	A
2015	Principles of Genetics	B-
2015	Ethnobotany	A
2015	Organic Chemistry I	B-
2015	Organic Chemistry I Lab	B
2015	English Composition	B+
2015	Cardio & Muscular Conditioning	B
2016	Research Methods	A
2016	Modern Concepts of Ecology	C
2016	Organic Chemistry II Lab	B
2016	Public Speaking	A-
2016	Tennis	C
2016	Vertebrate Structure	B-
2016	Cell & Molecular Bio I	B
2016	Jr. Science Seminar	A
2016	Open Water Scientific Diving	A-
2016	Introduction to Physics I	B
2017	Research Methods II	B
2017	Biology of Microorganisms I	B
2017	Jr. Science Seminar II	B-
2017	Functional Elem French I	B-
2017	Introduction to Physics II	B+
2017	Evolution	B+
2017	Senior Science Seminar I	B-
2017	Broadcast Communication I	B+
2017	Intro to Programming I	B
2018	Bioinformatics	A-
2018	Intro to Programming II	B
2018	Research and Applied Writing	B
2018	Self-Management: Wellness & Risk	B+
2018	Senior Science Seminar I	D

2018	Intro Comp Architect & Dig System	C-
2018	Data Structures	B-
2018	Discrete Mathematics	C+
2018	Linear Algebra	A
2019	Digital Communication and Networks	A
2019	Databases and Info Retrieval	A-
2019	Programming Languages	B-
2019	Intro to the Data Science Workflow	A-
2019	Basic Design	A
2019	Directed Independent Research	A
2019	Internship/Field Studies	A
2019	Mathematical Modeling	B+
	University of North Carolina Chapel Hill	
2020	Bioinformatics/Seq Analysis	P
2021	Research in BBSP	P
2021	Seminar in BBSP	P
2021	Research in BBSP – Part I	P
2021	Bioinformatics Colloquium	P
2021	Bioinformatics Math Modeling	P
2021	Intro to Statistical Modeling	H
2021	Topics in Pop Genetics	P
2022	Research in BBSP	P
2022	Seminar in BBSP	P
2022	Research in BBSP – Part II	P
2022	Bioinformatics Colloquium	P
2022	Structural Bioinformatics	P
2022	Computational Modeling Lab	P
2022	Topics in Statistical Genetics	H
2022	Bioinformatics Colloquium	P
2022	Writing Fellowship Proposal	P
2022	Special Topics	H
2022	Doctoral Research and Dissertation	P
2022	Intro to Computational Biology	P
2023	Bioinformatics Colloquium	P
2023	BCB Teaching	P
2023	Special Topics	P
2023	Doctoral Research and Dissertation	P
2023	Advance Molecule Biology II	P
2023	Practical RNA-Seq	P