Michelle Jonika

Bioinformatician · Computational Biologist · Molecular Geneticist

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Summary

As a computational biologist, I enjoy the puzzle-like nature of coding genetics and genomics problems, specifically bringing this approach to the evolution of genomic content and sex chromosomes. Detail-oriented planning, project management, experimental design, and clear communication are important to my critical thinking and problem solving strategies for research. I am pursuing a Ph.D. in Genetics and Genomics at Texas A&M University, and I defended my dissertation in January 2023 with a graduation date of May 2023. I am interested in career paths in industry intersecting bioinformatics, computational biology, genetics, genomics, and molecular biology.

Expertise

Genomics:	NGS Analysis and Pipeline Development (SRA, Trimmomatic, bwa, samtools, GATK), Genome Assembly (HiFiasm, QUAST, BUSCO, BlobToolKit), RNASeq (FastQC, bowtie2, DESeq2), GWAS (PLINK, GEMMA), Genomic Prediction (rrBLUP)
Genetics:	Evolutionary Biology (Genome structure evolution, Mammalian Sex chromosome evolution, Morphometrics), Veterinary Medicine (Clinical Data Evaluation, Cancer Prediction), Crop Science (Epistasis, Introgression)
Molecular Biology:	Primer optimization, gDNA/DNA extraction, RNA extraction, PCR, qPCR, Gel visualization/imaging, Flow Cytometry
Chemistry:	GC-MS, DART-MS, Drug Database Design, LC-MS
Programming:	R, Linux/Unix, tidyverse, Python, LaTeX, HTML/CSS, R Shiny
Code Management:	Git/GitHub, VSCode, BitBucket, Docker, JIRA, conda
Data Science:	Large dataset management (>20Gb), Machine Learning, Bayesian statistics, Phylogenetics, Simulations, Data Visualization, Software Development, Amazon Web Services (AWS)/Cloud Computing, HPC Cluster Computing
Soft Skills:	Project management, Public Speaking and Communication, Leadership, Multi-disciplinary Collaboration, Adaptive problem solving, Multi-tasking, Self-Motivated, Time Management, Strategic Planning

Education

Ph.D. in Genetics and Genomics (Graduate Business Certificate)

College Station, Texas

Texas A&M University | Advisor: Heath Blackmon — Aug. 2018 - May 2023

- Dissertation: Patterns and Processes in the Evolution of Sequence Classes and Genomic Compartments

B.S. in Forensic and Investigative Science (Minor: Genetics)

College Station, Texas

Texas A&M University | Advisor: Aaron M. Tarone — Aug. 2014 - May 2018

- Thesis: Genes as Markers of Sex for Forensic Entomology

Experience

PetDx

San Diego, California

Bioinformatics Intern | Bioinformatics and Data Science Team — June 2022 - Aug. 2022

- Leveraged high-complexity data set to predict canine cancer types
- Used machine learning (Random Forest) approaches to train and evaluate different models
- Performed extensive data evaluation to curate sample metrics, obtain balanced training and testing sets and identify meaningful model parameters

Bayer Crop Science

St. Louis, Missouri

Data Science Intern | Genomics Discovery and Application Team — May 2021 - Aug. 2021

- Identifying historic data to test for epistasis and designing a follow-up experiment to test for epistasis
- Developing a statistical testing framework to identify interactions between introgressed loci
- Three-month, full-time position exposure in an industry setting
- Establishing multi-disciplinary connections with teams with expertise in data science, genomics, and precision breeding

Ph.D. Research | Advisor: Dr. Heath Blackmon

College Station, Texas

Texas A&M Interdisciplinary Program in Genetics and Genomics | Texas A&M Department of Biology — Aug. 2018 - May 2023

- Developing an R package **(Lo et al. 2019)** to characterize microsatellite evolution and applying this package to characterize microsatellite evolution across 300 million years of insect evolution **(Jonika et al. 2020)**
- Elucidating the role of centromere type in insect chromosome evolution **(Ruckman et al. 2020)**
- Designing an automated genomic pipeline and TensorFlow based machine learning application to categorize genomic characteristics for 100s of mammalian species totaling 1000s of TB of genomic data

Post-baccalaureate Research Technician | Advisor: Dr. Aaron M. Tarone College Station, Texas

Texas A&M Department of Entomology May 2018 - Aug. 2018

- Completed additional experimentation and formal writing from undergraduate thesis project **(Jonika et al. 2020)**
- Applied new sex determination methodology and primer optimization to additional applications in forensic entomology **(Pimsler et al. 2021)** and stem cell research **(Pitonak et al. 2022)**

Teaching & Mentorship

Teaching Assistant

Department of Biology | Department of Genetics

- Python for Biologists | Spring 2023 | Texas A&M
- Anatomy and Physiology | Spring 2022 | Texas A&M
- Critical Writing in Biology | Fall 2020, Spring 2021 |Texas A&M
- Introduction to Genetics Laboratory | Spring 2019, Spring 2023 | Texas A&M
- Guest Lecture - Forensic Genetics | Topic: Genetic Testing | Sep. 2022 | Texas A&M
- Guest Lecture - Bioinformatics | Topic: Genetic Privacy | Nov. 2021 | Utah Valley University

Graduate Student Mentor

Undergraduate Research Assistants

- Mentee: Johnathan Lo | Topic: Microsatellite Characterization and Evolution
- Mentee: Abhi Arekere | Topic: Carnivore Chromosome Number Evolution
- Mentee: Ragan Miller, Joseph Ward, Leen Fardoun | Topic: Chrysina Morphometrics

Leadership & Outreach

Genetics Graduate Student Association

President | Vice President | Graduate Student Representative | Seminar Committee May 2019 - Current

- Facilitate monthly graduate student association meetings
- Oversee communication between current graduate students, genetics faculty, and the program executive committee

Texas A&M College of Science

Outreach Committee | Women in Science and Engineering Jan. 2019 - Current

- Participated in various outreach activities important to the mission of the College of Science and Women in Science and Engineering
- Served on the Women in Science and Engineering outreach committee and organized school STEM nights

Genetics Society of America

Early Career Leadership Program - Career Development Subcommittee Jan. 2020 - Dec. 2022

- Contribute career development blog pieces for Genes to Genomes blog
- Curate resources contributing to a career development toolkit and early career researcher newsletters
- Organize career development workshops for bimonthly workshop series and TAGC conference

Awards & Grants

2022 **Texas A&M Data Science Ambassador,** Texas A&M University

2022 **Research Excellence,** Interdisciplinary Genetics and Genomics Program

2021 **Outstanding PhD Student Poster Presentation,** Texas Genetics Society

2020 **Outstanding PhD Student Oral Presentation,** North America Forensic Entomology Association

2019 **Genetics Graduate Student Association Travel Grant,** Interdisciplinary Genetics and Genomics Program

Selected Publications

*Please see Google Scholar for a full publications list

M. Pitonak, M. Aceves, P.A. Kumar, G. Dampf, P. Green, A. Tucker, V. Dietz, D. Miranda, S. Letchuman, **M.M. Jonika**, D. Bautista, H. Blackmon, J.N. Dulin. 2022. Effects of Biological Sex Mismatch on Neural ProgenitorCell Transplantation for Spinal Cord Injury in Mice. Nature Communications. 13(1):1-12.

M.M. Jonika, J.M. Alfieri, T. Sylvester, A.R. Buhrow, H. Blackmon. 2022. Why Not Y Naught. Heredity. 129. 75-78.

S. Ruckman*(Co-first author), **M.M. Jonika*(Co-first author)**, C. Casola, H. Blackmon. 2020. Chromosome Number Evolves at Equal Rates in Holocentric and Monocentric Clades. PLOS Genetics 16(10):e1009076.

M.M. Jonika, C.E. Hjelmen, A.M. Faris, A.S. McGuane A.M. Tarone. 2020. An Evaluation of Differentially Spliced Genes as Markers of Sex for Forensic Entomology. J. of Forensic Science 65(5): 1579-1587

J. Lo, **M.M. Jonika**, H. Blackmon. 2019. micRocounter: Microsatellite Characterization in Genome Assemblies. G3 9(10): 3101-3104

J.M. Alfieri, G. Wang, **M.M. Jonika**, C.A. Gill, G.N. Athrey, H. Blackmon. 2022. A Primer for Single-Cell Sequencing in Non-Model Organisms. Genes 13(2).