Zachary Tatom

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Education

PhD **Virginia Commonwealth University** 2024
Human Genetics, conc. Quantitative Genetics

B.S. **Auburn University Montgomery** 2014
Biology, conc. Microbiology and Public Health

Honors and Awards

Student Merit Award 2024
Research Society on Alcohol

Ruth L. Kirschstein Predoctoral Individual National Research Service Award (F31AA031189) 2023
National Institute of Alcohol Abuse and Alcoholism

Roscoe D. Hughes Fellowship 2023
Dept. of Human and Molecular Genetics, Virginia Commonwealth University

Student Merit Award 2023
Research Society on Alcohol

Travel Award 2023
Graduate School, Virginia Commonwealth University

Travel Award 2023
School of Medicine, Virginia Commonwealth University

Young Investigator Travel Award 2023
International Behavioural and Neural Genetics Society

Travel Award 2022
Graduate School, Virginia Commonwealth University

Travel Award 2022
School of Medicine, Virginia Commonwealth University

Student Merit Award 2022
Research Society on Alcohol

Student Merit Award 2021
Research Society on Alcohol

Dean's List 2012 - 2013
Auburn University Montgomery

Positions and Scientific Appointments

Postdoctoral Scholar 2024 - *ongoing*
Department of Psychiatry, Palmer Lab
University of California San Diego

Student Representative 2020 - 2024

Department of Human and Molecular Genetics
Virginia Commonwealth University

Graduate Research Assistant 2019 - 2024
Department of Human and Molecular Genetics, Miles Lab
Virginia Commonwealth University

Data Science Ambassador 2020 - 2021
Data Science Lab
Virginia Commonwealth University

Researcher II 2015 - 2017
Division of Infectious Diseases, Research and Informatics Services Center
University of Alabama Birmingham

Research Experience

Postdoctoral Research 2024 - *ongoing*
Department of Psychiatry, Palmer Lab
University of California, San Diego
Advisor: Dr. Abraham Palmer

- Identification of novel genetic loci, candidate genes, and variants associated with cocaine aversion behaviors, punishment- and reward-based learning, and locomotor behavior using genome-wide association study (GWAS) in Heterogeneous Stock (HS) Rats (in collaboration with Dr. Thomas C. Jhou, University of Maryland)
- Analysis and modification of GWAS phenotype data pre-processing and normalization pipelines
- Cross-species analysis of complex behaviors related to addiction biology using network biology approaches to identify biological processes and pathways underlying genetic associations with alcohol consumption in rats and humans

Dissertation, *Genetic and Transcriptomic Mechanisms of Progressive Ethanol Consumption in the Diversity Outbred Mouse* 2020 - 2024
Department of Human and Molecular Genetics, Miles Lab
Virginia Commonwealth University
Advisor: Dr. Michael Miles

- Using a novel genetic model (the Diversity Outbred Mouse from Jackson Labs) to map high-resolution behavioral quantitative trait loci (bQTL) related to observed variance in voluntary ethanol consumption and preference for ethanol compared to water
- Identification of genes (via expression QTLs) and gene expression networks (weighted gene correlation network analysis or WGCNA) involved in modulation of voluntary alcohol drinking
- Structural equation modeling to estimate direct genetic and mediation effects of gene transcription in multiple brain regions (prefrontal cortex, nucleus accumbens) on observed ethanol-related phenotypes
- Causal modeling of relationships between observed bulk brain-tissue gene expression and phenotype in both prefrontal cortex and nucleus accumbens
- Genetic modulation to knockout candidate gene *Car8* in mouse prefrontal cortex and observe changes in voluntary ethanol consumption behaviors and biological responses to ethanol
- Rodent behavioral and biological assays including light-dark box for anxiety-like behavior, three- and two-bottle intermittent ethanol access paradigms, loss of righting reflex, Rotarod for neuromuscular coordination, novel object recognition, and blood ethanol curves

Graduate Rotation Research 2019 - 2020

Virginia Commonwealth University

- Voluntary consumption of ethanol in mouse models following administration of *Gsk3b* inhibitor tideglusib, including mouse handling experience and intermittent ethanol access (IEA) voluntary consumption procedure
- CRISPR primer design to edit alleles in ethanol candidate genes in *Caenorhabditis elegans* prior to locomotor-based ethanol response assays
- R Shiny app development to compare candidate gene lists and visualize overlaps in data

Professional Research 2015 – 2017
Division of Infectious Diseases
University of Alabama at Birmingham

- Behavioral health research in people living with HIV and people living with Hepatitis C
- Recruitment, informed consenting, and data collection for large-scale studies targeted at improving health outcomes
- Interfacing between patients directly and primary investigators
- Application of validated instruments for data collection of alcohol use (AUDIT), anxiety and depression (PHQ-9), substance use, sexual health practices, and quality of life
- Quality control of data collected in clinical settings

Undergraduate Research 2014 - 2014
Department of Microbiology
Auburn University Montgomery

- Independent directed research in microbial genetics using a candidate gene with potential anticancer applications
- Culture, growth assay, and gene expression studies comparing wild-type *Serratia marcescens* and *pig* operon knockout strains to characterize prodigiosin pigment production effects on cell cycle

Teaching and Mentorship Experience

Teaching Assistant, Data Science I 2020
Virginia Commonwealth University

- Assisted with designing and grading assessments and monitoring progress on student learning objectives
- Maintained office hours and provided additional tutoring and support for students
- Provided hands-on training in R and Open Science Framework
- Prepared and delivered a lecture on development of R Shiny applications and dashboards

Preparing Future Faculty Program *ongoing*
Virginia Commonwealth University

- Completed coursework in a program aimed at VCU graduate and postgraduate trainees interested in pursuing careers in higher education
- Courses included GRAD 601 The Academic Profession; GRAD 602 Teaching and Learning in Higher Education; GRAD 604 Teaching, Learning, Technology, and the Future of Higher Education

Mentored Students
Virginia Commonwealth University

- Walker Rogers, *PhD Candidate in Human Genetics*
  Provided guidance during a PhD laboratory rotation, showing Walker the basics of R and QTL

analysis used in the Miles Lab for genetic mapping. Walker went on to join the Miles Lab at VCU and is finishing his PhD in genetic mapping of alcohol analgesia phenotypes in BXD mice.

- Julia Altmann, *PhD Candidate in Human Genetics*
  Provided mentorship during a PhD laboratory rotation, working on R coding and bioinformatics skills using RNA-seq data. Julia went on to join the lab of Dr. Chuck Harrel at VCU, working in comparative transcriptomics of human and mouse cancer cell lines.
- Marie Michenkova, *MD/PhD Student*
  Worked closely during a PhD laboratory rotation to more robustly characterize ethanol drinking behaviors in Diversity Outbred mice via principal component analysis, hierarchical clustering, and data imputation. Marie is anticipating joining the Miles Lab and continuing the Diversity Outbred mouse project.
- Angel Nguyen, *M.S. Bioinformatics*
  Worked together for the duration of Angel's M.S. degree to conduct bioinformatics analyses of candidate genes for ethanol consumption identified in QTL mapping from Diversity Outbred mice. Angel has since graduated.
- Gillian Fanning, *M.S. in Human Genetics*
  Provided mentorship and guidance during a M.S. laboratory rotation, demonstrating genomic mapping techniques and downstream bioinformatics analyses used in the Miles Lab. Gillian is finishing her PhD under the guidance of Dr. Timothy York at VCU.

Publications

Tatom, Z., K.M. Mignogna, L. Macleod, Z. Sergi, and M.F. Miles. (2025) Genetic mapping in Diversity Outbred mice identifies novel loci and candidate genes for anxiety-like behavior and genetic subgroups predictive of ethanol consumption. BioRxiv **[Preprint]**. May 28, 2025. Available from: https://doi.org/10.1101/2025.05.27.656445

Tatom, Z., K.M. Mignogna, Z. Sergi, J. Nguyen, M. Michenkova, M.L. Smith, and M.F. Miles. (2024) Identification of novel genetic loci and candidate genes for progressive ethanol consumption in diversity outbred mice. Neuropsychopharmacology. June 5, 2024. Available from: https://doi.org/10.1038/s41386-024-01902-6

Smith, M.L., Z. Sergi, K.M. Mignogna, N.E. Rodriguez, Z. Tatom, L. MacLeod, K.B. Choi, V. Philip, and M.F. Miles. (2023) Identification of genetic and genomic influences on progressive ethanol consumption in Diversity Outbred mice. BioRxiv **[Preprint]**. September 16, 2023. Available from: https://doi.org/10.1101/2023.09.15.554349

Presentations

Symposia and Conference Talks

Tatom, Z. M. Eid, T. Missfeldt-Sanches, A.S. Chitre, D. Chen, B.B. Johnson, E. Keung, O. Polesskaya, T.C. Jhou, and A.A. Palmer (2025). Phenome-wide association study identifies pleiotropic SNPs affecting cocaine avoidance, nicotine self-administration, and other addiction-related behaviors in Heterogeneous Stock Rats. Meeting of the Complex Trait Community - Rodent Genomics. Barcelona, Spain.

Tatom, Z. and M.F. Miles (2025). Anxiety phenotype components predict ethanol consumption magnitude and progression in a genetic analysis with Diversity Outbred mice. 48th Annual Research Society on Alcohol Scientific Meeting. Research Society on Alcohol. New Orleans, LA.

Poster Presentations

Tatom, Z., D. Bledsoe, S. Gottlieb, and M.F. Miles (2024) Car8 knockout in medial prefrontal cortex neurons increases voluntary ethanol consumption in male mice. 47th Annual Research Society on Alcohol Scientific Meeting. Research Society on Alcohol. Minneapolis, MN.

Tatom, Z., D. Bledsoe, and M.F. Miles (2024) *Car8* knockout in medial prefrontal cortex neurons increases voluntary ethanol consumption in male mice. NIDA Genetics and Epigenetics Cross-Cutting Research Team Meeting. National Institute on Drug Abuse. Bethesda, MD.

Tatom, Z. and M.F. Miles (2023) Likelihood-based causal modeling identifies gene transcripts driving ethanol consumption in Diversity Outbred mice. 46th Annual Research Society on Alcohol Scientific Meeting. Research Society on Alcohol. Bellevue, WA.

Tatom, Z. and M.F. Miles (2023) Identification of *Car8* as a novel candidate gene influencing ethanol consumption in Diversity Outbred mice through transcription in prefrontal cortex. Genes, Brain and Behavior Annual Meeting. International Behavioural and Neural Genetics Society. Galway, Ireland.

Tatom, Z. and M.F. Miles. (2022) Genetic and transcriptomic analyses in the Diversity Outbred mouse identify *Car8* as a candidate gene for ethanol consumption. 45th Annual Research Society on Alcohol Scientific Meeting. Research Society on Alcohol. Orlando, FL.

Tatom, Z. and M.F. Miles. (2022) *Car8* expression in prefrontal cortex significantly correlates with decreased voluntary ethanol consumption in Diversity Outbred mice. Virginia Commonwealth University Graduate Research Symposium. Virginia Commonwealth University. Richmond, VA.

Tatom, Z. and M.F. Miles. (2022) *Car8* identified as candidate gene for voluntary ethanol consumption from transcriptomics analysis of prefrontal cortex in Diversity Outbred mice. Central Virginia Society for Neuroscience Symposium. University of Virginia. Charlottesville, VA.

Tatom, Z., K. Mignogna, L. McLeod, and M.F. Miles. (2021) Correlations and SNP-based heritability estimates of ethanol-drinking and anxiety-like behavioral phenotypes in the diversity outbred mouse. Central Virginia Society for Neuroscience Virtual Symposium. Virginia Commonwealth University. Richmond, VA.

Tatom, Z., K. Mignogna, and M.F. Miles. (2021) Correlations and SNP-based heritability estimates of ethanol-drinking and anxiety-like behavioral phenotypes in the diversity outbred mouse. 44th Annual Research Society on Alcohol Scientific Meeting. Research Society on Alcohol. Austin, TX.

Seminar Presentations

Tatom, Z. and M.F. Miles (2023) Candidate gene identification and validation for ethanol-drinking behaviors in the Diversity Outbred mouse. Department of Human and Molecular Genetics. Virginia Commonwealth University. Richmond, VA

Tatom, Z. and M.F. Miles (2022) Genetic and transcriptomic investigations of progressive ethanol consumption in the Diversity Outbred mouse. Department of Human and Molecular Genetics. Virginia Commonwealth University. Richmond, VA.

Tatom, Z. and M.F. Miles (2021) Genomics of ethanol-related behaviors in the Diversity Outbred mouse. Department of Human and Molecular Genetics. Virginia Commonwealth University. Richmond, VA.

Tatom, Z. and M.F. Miles (2020) QTL analysis in the Diversity Outbred mouse. Department of Human and Molecular Genetics. Virginia Commonwealth University. Richmond, VA.