Leah Darwin

PhD Candidate
Center for Computational Molecular Biology
Brown University

leah_darwin@brown.edu

Education

Brown University

Computational Molecular Biology, PhD — Expected 2026
Computational Molecular Biology, MSc — May 2025
GPA: 3.93/4.0

- Advisor: David M. Rand
- National Science Foundation Research Fellow

Arizona State University

Computer Science, BS — May 2021
Applied Mathematics, BS — May 2021
GPA: 3.87/4.0
Summa cum laude

- Minor in Biological Sciences

Research Interests

Genetic and environmental interactions; complex traits; molecular evolution and adaptation; population genetics

Awards & Fellowships

- National Science Foundation Research Fellow (NSF GRFP), 8/2023 -7/2026, $147,000. “Mitonuclear coadaptation in *Drosophila* and humans.”
- National Institutes of Health Predoctoral Training Program (T32) Fellow, 8/2022-7/2023
- Boston University Martin Luther King Jr. Fellow, $20,000, *declined*
- School of Human Evolution and Social Change (SHESC) Undergraduate Research Award, 2020, $1,000
- Western Alliance to Expand Student Opportunities (WAESO): Undergraduate Research Fellow, 8/2019-5/2020
- Arizona State University President’s Award (merit scholarship), 8/2017-5/2021

Journal Publications

Darwin, L. J., Lemieux, F. A., Bachtel, R. Z., Blocker, J. H., Brown, C. P., Lerman, J. D., Maule, O. C., Raynes, Y., & Rand, D. M. (2025). Genetic and environmental interactions outweigh mitonuclear coevolution for complex traits in Drosophila. *Nature Communications,* in revision.

Rand, D. M., Lemieux, F. A., Bradley, K. M., Marmor, L., **Darwin, L. J.**, & Raynes, Y. (2025). Absence of Mother's Curse for performance traits among divergent mtDNAs in heterozygous nuclear backgrounds in Drosophila. *Evolution*, in revision.

Raynes, Y., Santiago, J. C., Lemieux, F. A., **Darwin, L.**, & Rand, D. M. (2024). Sex, tissue, and mitochondrial interactions modify the transcriptional response to rapamycin in Drosophila. *BMC Genomics*, *25*(1), 766.

Patel, L. A., Chau, P., Debesai, S., **Darwin, L.**, & Neale, C. (2022). Drug Discovery by Automated Adaptation of Chemical Structure and Identity. *Journal of Chemical Theory and Computation*, *18*(8), 5006–5024.

Garzón, D. N., Castillo, Y., Navas-Zuloaga, M. G., **Darwin, L.**, Hardin, A., Culik, N., Yang, A., Castillo-Garsow, C., Ríos-Soto, K., Arriola, L., & Ghosh, A. (2021). Dynamics of prion proliferation under combined treatment of pharmacological chaperones and interferons. *Journal of Theoretical Biology*, *527*, 110797.

Works in progress

- Experimental evolution of replicate populations of *Drosophila* under targeted selection of mitochondrial complex I inhibitor, rotenone. *Manuscript in preparation.*
- Experimental evolution of replicate populations of *Drosophila* with the mitochondrial genome as the "selective" environment for the nuclear genome.

Contributed Conference Talks

Annual *Drosophila* Research Conference (DROS)
Evolution Session, "Selective response of mitochondrial and nuclear genomes to an OXPHOS inhibitor in experimental populations of *Drosophila*", San Diego, California, 3/21/2025

Annual Meeting of the Society for Molecular Biology & Evolution (SMBE)
Mitochondria: from powerhouse to processor and from marker to meaning symposium, "The contribution of within- and between-species mitochondrial variation to adaptation in experimental Drosophila populations", Puerto Vallarta, Mexico, 7/10/2024

Annual Symposium on Biomathematics and Ecology: Education and Research (BEER)
Technical Session, "The Effects of Antibody and Interferon Treatment on Prion Proliferation in the Brain", Madison, Wisconsin, 5/10/2019

Presented Abstracts

Boston Evolutionary Genomics Supergroup
Annual retreat, "Experimental analysis of mitonuclear epistasis, GxE, and coevolution in Drosophila", Boston, Massachusetts, 9/5/2025

Annual Meeting of the Society for Molecular Biology & Evolution (SMBE)
Poster session, “Using replicate experimental Drosophila populations to test for mitonuclear co-adaptation”, Ferrara, Italy, 7/23/2023

Annual *Drosophila* Research Conference (DROS)
Poster session, “Using hybrid swarms to test for co-adaptation of mitochondrial and nuclear genes”, Chicago, Illinois, 3/2/2023

Los Alamos National Laboratory Theoretical Biology and Biophysics
Seminar series, “Computational Search for Cancer Treatments”, Remote, 5/18/2021

International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems (ICMA)
Poster session, “Genetic variability of the Fcγ receptor in the population and its role in disease dynamics and pathogenesis”, Tempe, Arizona, 8/12/2019

Professional Experience

Graduate teaching assistant
Department of Ecology, Evolution and Organismal Biology, Brown University, Evolutionary Biology (BIOL 0480), Fall 2023

Online Course Author
Ira A. Fulton Schools of Engineering, Arizona State University, Bio-Inspired Computing (CSE/IEE 598), Coauthor: Dr. Stephanie Forrest, 1/2021-7/2021

Undergraduate research assistant
School of Computing, Informatics, and Decision Systems, Arizona State University, Mentor: Dr. Violet R. Syrotiuk, 1/2020-8/2021

- Development of tools for large-scale network testbed experimentation. Focused on algorithms for term selection in high-dimensional systems.

Undergraduate summer research intern
Center for Nonlinear Studies, Los Alamos National Laboratory, Mentor: Chris Neale

- Development of testing framework for classical molecular dynamics simulations coupled with Monte Carlo moves.

Undergraduate teaching assistant
Ira A. Fulton Schools of Engineering, Arizona State University, Probability and Statistics for Engineers (IEE380), Fall 2019 and Spring 2020

Subject Area Tutor
Arizona State University, various subjects in biology, mathematics, statistics, and computer science, 2/2018-2/2019

Mathematics Tutor
Primavera Online High School and Middle School, Summer 2018

Service to the University and Community

- Member, Graduate Admissions Committee, Center for Computational Molecular Biology, Brown University, 2024-2025
- Mentor, Summer REU Program, Department of Ecology, Evolution, and Organismal Biology, Brown University, 2024-2z0
- Organizer, Journal Club, Center for Computational Molecular Biology, Brown University, 2023-2024
- Founder, Science on the Hill: Educational outreach for local elementary students, 2022-2024
- Panelist, SACNAS GRFP Best Practices Webinar, 4/19/2024
- Panelist, Brown College Loop Girls Who Code Research@Brown panel, 4/26/2024
- Judge, SOLS Undergraduate Research Symposium, Arizona State University, 2024-2025
- Judge, VEX Robotics: Educational robotics for local elementary students, 2016-2019
- Workshop leader, Girl Powered: Educational robotics aimed at involving elementary aged girls in STEM, 2018-2019