

AVA MACKAY-SMITH

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EDUCATION

Duke University Graduate School and Medical Center August 2022-present

Ph.D. Candidate in University Program in Genetics and Genomics

Certificate In College Teaching

Thesis Advisor: Dr. Greg Wray

Wellesley College

August 2016-May 2020

B.A. in Biological Sciences, magna cum laude

Thesis Advisor: Dr. Andrea Sequeira

RESEARCH EXPERIENCE

Duke University Graduate School, Department of Biology

April 2023 - present

Ph.D. Candidate, Wray Lab

- Project: Interplay of large-scale standing genetic variation and chromatin accessibility in the maintenance of a long-standing hybrid zone in *Heliconius* butterflies
- Project: Construction of long-read pangenome graphs to capture standing variation between and within subspecies of *Heliconius* butterflies

Yale School of Medicine, Department of Genetics

Sep 2021 - July 2022

Lab Operations Manager and Research Assistant, Dr. Steven Reilly

- Project: Establishing best practices for CRISPR-based functional perturbation screens in the ENCODE4 consortium
- Project: Functional effects of small sequence insertions and deletions in humans relative to chimpanzees

Broad Institute of MIT and Harvard

Jul 2020 - Sep 2021

Research Associate I, Dr. Pardis Sabeti

- Project: Developing protocols for quantitative measurement of regulatory element activity in highly multiplexed CRISPR interference screens with FACS, HCR, and FISH approaches

Wellesley College, Department of Biological Sciences

Sept 2017 - May 2020

Thesis Candidate and Student Researcher, Dr. Andrea Sequeira

- Project: Differential gene expression patterns in two species of polyphagous *Naupactus* weevils feeding on diverse host plants across the United States
- Project: Identifying haplotypes in the invasive parthenogenetic weevil *Naupactus cervinus* to trace introduction history in the United States

FELLOWSHIPS AND AWARDS

Duke Genomics Travel Award, Center for Advanced Genomic Technologies (CAGT) 2024

Bruce Weir Summer Institute in Statistical Genetics, full scholarship 2024

Duke University Department of Biology, Grant in Aid of Research 2024

Smithsonian Tropical Research Institute (STRI) Predoctoral Fellow 2023 - 2024

National Science Foundation Graduate Research Fellow	2022 - present
James B. Duke Fellowship, Duke University Graduate School	2022 - present
ENCODE4 Consortium Team Science Award: CRISPR Working Group	2022
Wellesley College Fiske Prize in Biology	2020
Wellesley College Camellia Student Leadership Nominee	2020

PUBLICATIONS

Mackay-Smith A, Wray GA. Genome mountaineering: expanding horizons of the three-dimensional genome for the intrepid evolutionary adventurer. *Genome Biol and Evol* 17(6): evaf113 (2025). <https://doi.org/10.1093/gbe/evaf113>

Yao D*, Tycko J*, Oh JW*, Bounds LR*, Gosai SJ*, **Mackay-Smith A**, Lataniotis L, Doughty BR, Gabdank I, Schmidt H, Guerrero-Altamirano T, Siklenka K, Guo K, White AD, Youngworth I, Andreeva K, Ren X, Barrera A, Luo Y, Yardımcı GG, Tewhey R, Kundaje A, Greenleaf WJ, Sabeti PC, Leslie C, Pritykin Y, Moore JE, Beer MA, Gersbach CA, Reddy TE, Shen Y, Engreitz JE, Bassik MC, Reilly SK. Multicenter integrated analysis of noncoding CRISPRi screens. *Nat Methods* 21, 723–734 (2024). <https://doi.org/10.1038/s41592-024-02216-7>

Xue JR, **Mackay-Smith A**, Mouri K, Fernandez-Garcia M, Dong MX, Akers JF, Noble M, Li X, Zoonomia Consortium, Lindblad-Toh K, Karlsson EK, Noonan JP, Capellini TD, Brennand KJ, Tewhey R, Sabeti PC, Reilly SK. The functional and evolutionary impacts of human-specific deletions in conserved elements. *Science* 380, eabn2253 (2023). <https://doi.org/10.1126/science.abn2253>

Rodriguero MS, Confalonieri VA, **Mackay-Smith A**, Dornon MK, Zagoren E, Palmer A, Sequeira AS. Genetically depauperate and still successful: few multilocus genotypes of the introduced parthenogenetic weevil *Naupactus cervinus* (Coleoptera: Curculionidae) prevail in the Continental United States. *Insects* 14(2):113 (2023). <https://doi.org/10.3390/insects14020113>

Reilly SK*, Gosai SJ*, Gutierrez A, **Mackay-Smith A**, Ulirsch JC, Kanai M, Mouri K, Berenzy D, Kales S, Butler GM, Gladden-Young A, Bhuiyan RM, Stitzel ML, Finucane HK, Sabeti PC, Tewhey R. Direct characterization of cis-regulatory elements and functional dissection of complex genetic associations using HCR–FlowFISH. *Nat Genet* 53, 1166–1176 (2021). <https://doi.org/10.1038/s41588-021-00900-4>

Mackay-Smith A, Dornon MK, Lucier R, Okimoto A, Mendonca de Sousa F, Rodriguero M, Confalonieri V, Lanteri AA, Sequeira AS. Host-specific gene expression as a tool for introduction success in *Naupactus* parthenogenetic weevils. *PLoS ONE* 16(7): e0248202 (2021). <https://doi.org/10.1371/journal.pone.0248202>

POSTER AND ORAL PRESENTATIONS

Biology of Genomes Meeting, Cold Spring Harbor 2025
Exploring hybridization persistence—Gene regulatory dynamics and sex-specific recombination landscapes in Lepidoptera

ASN, SSE, SSB Evolution National Meeting 2019
Host-specific gene expression and invasiveness in parthenogenetic weevils

Wellesley Ruhlman Conference 2019
*Colonization histories and epigenetic variation in the parthenogenetic, invasive weevil *Naupactus cervinus**

WORKSHOPS AND TRAINING

Wilderness Medical Associates Institute: Wilderness First Responder	June 2025
Communicating Science Convention (ComSciCon) - Triangle Area	January 2025
Johns Hopkins University Visualizing Science Workshop Series	Sept. - Dec. 2024
Duke Undergraduate Research Support Entering Mentoring Workshop	June 2024
Bruce Weir Summer Institute in Statistical Genetics	May - June 2024

PROFESSIONAL EXPERIENCE

Teaching Assistant - Data Visualization and Storytelling, IDS707 <i>Duke University Master's in Interdisciplinary Data Science</i>	August 2025 - Present
Teaching Assistant - General Microbiology, BIO212L <i>Duke University Department of Biology</i>	January - May 2025
Curations Assistant and Gardens Docent <i>Wellesley College Botanic Gardens</i>	February 2019 - May 2020
Fieldwork and Analysis Intern <i>Smithsonian Conservation Biology Institute</i>	Summer 2019
Field Research Assistant in the Gustafsson lab <i>Uppsala University</i>	Summer 2018
Field Research Assistant in the Barton lab <i>Institute of Science and Technology, Vienna</i>	Summer 2017

OUTREACH AND SERVICE

IDEA Committee and Faculty Meeting Student Representative <i>Duke University Program Department of Biology</i>	Fall 2025 - Present
Butterfly Monitor Volunteer <i>Carolinas Biodiversity Monitoring Program</i>	Fall 2024 - Present
Undergraduate honors thesis mentor <i>Duke University Program Department of Biology</i>	Winter 2023 - Spring 2025
Graduate Science Communication at Duke Video Workshop Co-Organizer <i>Duke University Graduate School & Department of Biology</i>	August 2023
K-12 Lesson Planning Volunteer <i>Science Research and Education Network (SciREN), Triangle chapter</i>	Sep 2022, 2023
Working Group for Sexual Harassment and Discrimination Member <i>Broad Institute of Harvard and MIT</i>	Jan 2021 - Aug 2021

PROFESSIONAL ASSOCIATIONS

Society for Molecular Biology and Evolution, 2025 -
Sigma Xi Scientific Research Honor Society, 2020 - 2024

American Society of Naturalists, 2019 -

REFEREES

Dr. Andrea Sequeira

Wellesley College, Department of Biological Sciences

Gordon P. Lang and Althea P. Lang '26 Professor of Biological Sciences

Undergraduate thesis advisor and mentor from 2017-2021

Email: asequeir@wellesley.edu

Dr. Steven K. Reilly

Yale School of Medicine, Department of Genetics

Assistant Professor of Genetics

Principal Investigator from 2020-2022

Email: steven.k.reilly@yale.edu