

# AVA MACKAY-SMITH

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## EDUCATION

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**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

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**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

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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

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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

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**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

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**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**

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## WORKSHOPS AND TRAINING

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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

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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

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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 &amp; 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

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Society for Molecular Biology and Evolution, 2025 -  
 Sigma Xi Scientific Research Honor Society, 2020 - 2024  
 American Society of Naturalists, 2019 -