

AVA MACKAY-SMITH

(+1)540-336-7948 ◊ apm58@duke.edu

LinkedIn: [ava-mackay-smith](#) ◊ [a-mackaysmith.com](#)

EDUCATION

Duke University Graduate School and Medical Center

August 2022-present

Ph.D. student, Wray lab, University Program in Genetics and Genomics.

Wellesley College

August 2016-May 2020

Bachelor of Arts, Biological Sciences, *magna cum laude*.

Unweighted GPA: 3.8

RESEARCH EXPERIENCE

Duke University Graduate School, Department of Biology

April 2023 - present

Graduate Student, Wray Lab

- Currently developing wetlab and computational approaches to dissecting out the landscape of gene regulatory divergence in *Heliconius* butterflies, at the genetic and epigenetic levels and through developmental time
- Active collaborations with Arnaud Martin's lab at George Washington University and Owen McMillan's group at the Smithsonian Tropical Research Institute in Panama

Yale School of Medicine, Department of Genetics

Sep 2021 - July 2022

Lab Operations Manager and Research Assistant, Reilly Lab

- Managed the lab opening of Dr. Steven Reilly, my postdoctoral mentor from the Sabeti lab
- Oversaw the management of lab setup, the development of lab workflows, standards of operation, training of undergraduate students, and shaping lab culture
- Active contributor to the ENCODE4 Consortium CRISPR screen working group as part of the Sabeti Functional Characterization Center

Broad Institute of MIT and Harvard

Jul 2020 - Sep 2021

Research Associate I, Sabeti Lab

- Contributed to a project in the Sabeti lab focusing on the functional characterization of positively selected human variants, specifically those within genetic regulatory elements or linked to disease traits, including the protocol development for HCR-FlowFISH
- Assisted with graduate student work on human-specific conserved deletions and variants in noncoding regions
- Responsible for data management for the Sabeti lab in its capacity as a Functional Characterization Center for the ENCODE Consortium

Wellesley College Department of Biological Sciences

Sept 2017 - May 2020

Thesis Candidate and Student Researcher in the Sequeira lab

- Completed an honors thesis on species introduction and differential gene expression of *Naupactus* polyphagous parthenogenetic weevils with Dr. Andrea Sequeira, addressing broader evolutionary questions regarding epigenetics and gene expression using molecular methods.
- Maintained short-term live adult and juvenile insect specimens and preserved specimens in long-term storage

Uppsala University

Summer 2018

Field Research Assistant in the Gustafsson lab

- Banded adult birds with Dr. Lars Gustafsson's group, alongside regularly handling and banding young chicks and fledglings from Collared Flycatcher nests on the island of Gotland
- Worked 12-hour days in the field in unmarked forests using GPS and compass coordinates for navigation
- Maintained 450 nest boxes for cavity-nesting bird species in a 10-person field team
- Learned standardized data measurement techniques to contribute to a 39-year dataset

Institute of Science and Technology, Vienna

Summer 2017

Field Research Assistant in the Barton lab

- Spent 10- to 14-hour days in field teams collecting plant samples from mountainous slopes, accessed via abseiling and rock-climbing
- Collected over 1000 biological samples of plant tissue, and processed samples to prepare for further lab work
- Logged detailed, custom GIS data using Trimble 3000 GPS systems for *in situ* samples

VOLUNTEER AND LEADERSHIP EXPERIENCE**SciREN Triangle**

Sep 2022

Lesson Planning Participant

- Collaborated on the structure, writing, and dissemination of an evolutionary biology-focused lesson plan for elementary and middle school educators that meets North Carolina state educational standards

FEMMES

March 2023

Capstone Day Lesson Plan Leader

- Taught a one-day workshop to elementary and middle school students on climate change and evolutionary biology

Project SHORT

Sep 2022 - present

Volunteer Graduate Mentor

- Volunteering in an international peer network designed to reduce cost and knowledge barriers in the graduate school application process
- Mentoring domestic and international STEM Ph.D. applicants in genetics, evolution, and ecology

Broad Institute of Harvard and MIT

Jan 2021 - Aug 2021

BroadRATS Working Group for Sexual Harassment and Discrimination Member

- Collaborated with other Research Associates and Technicians to develop better reporting procedure for workplace sexual harassment and discrimination
- Worked with external Ombuds office to improve resources available to all Broad employees for a safe and equitable workplace

PUBLICATIONS

Yao D*, Tycko J*, Oh JW*, Bounds LR*, Gosai SJ*, Lataniotis L, **Mackay-Smith A**, Doughty BR, Gabdank I, Schmidt H, Youngworth I, Andreeva K, Ren X, Barrera A, Luo Y, Siklenka K, Yardımcı GG, The ENCODE4 Consortium, 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. Multi-center integrated analysis of non-coding CRISPR screens. Preprint: *BioRxiv* (2022). <https://doi.org/10.1101/2022.12.21.520137>

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, **Ava Mackay-Smith**, 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

Host-specific gene expression and invasiveness in parthenogenetic weevils

ASN, SSE, SSB Evolution National Meeting 2019

Colonization histories and epigenetic variation in the parthenogenetic, invasive weevil *Naupactus cervinus*

Wellesley Ruhlman Conference 2019

PROFESSIONAL ASSOCIATIONS

Society of Duke Fellows, 2022 -

Sigma Xi Scientific Research Honor Society, 2020 -

American Society of Naturalists, 2019 -

FELLOWSHIPS AND AWARDS

2022 - present James B. Duke Fellowship, Duke University Graduate School

2022 - present National Science Foundation Graduate Research Fellow

2022 ENCODE4 Consortium Team Science Award: CRISPR Working Group

2020 Wellesley College Fiske Prize in Biology

2020 Wellesley Camellia Student Leadership Nominee

2020 Wellesley Summer Research Grant recipient

2019 Wellesley College Research Grant recipient