

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. 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*. Unweighted GPA: 3.8

Thesis Advisor: Dr. Andrea Sequeira

Thesis: Host-specific gene expression as a tool to facilitate establishment of introduced weevil populations in the United States

RESEARCH EXPERIENCE

Duke University Graduate School, Department of Biology April 2023 - present

Ph.D. Candidate, Wray Lab

- Developing wetlab and computational approaches to characterize gene regulatory divergence in *Heliconius* butterfly development at the genetic and epigenetic levels
- 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

- Oversaw the management of lab setup, the development of lab workflows, standards of operation, training of undergraduate students, and shaping lab culture for Dr. Steven Reilly, postdoctoral mentor from the Sabeti lab
- 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

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

FELLOWSHIPS AND AWARDS

Smithsonian Tropical Research Institute (STRI) Predoctoral Fellow	2023 - present
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 Camellia Student Leadership Nominee	2020
Wellesley Summer Research Grant recipient	2020
Wellesley College Research Grant recipient	2019

WORKSHOPS AND TRAINING

Bruce Weir Summer Institute in Statistical Genetics May - June 2024

- Received a BWSISG scholarship to attend modules on Probability & Statistics, Quantitative Genetics, and Statistical Genetics alongside an international group of academics, professionals, and graduate students.

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

- 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**

PROFESSIONAL EXPERIENCE

Wellesley College Botanic Gardens February 2019 - May 2020
Curations Assistant and Gardens Docent

- Collaborated with horticultural personnel to index existing and new collections, handling multi-platform data input and purchasing records over multiple data collection years
- Researched and protected IUCN-listed rare specimens and other plants of special interest

Smithsonian Conservation Biology Institute Summer 2019
Fieldwork and Analysis Volunteer

- Completed native orchid and forest health surveys on private and public properties around the Shenandoah National Park as a part of the Changing Landscapes Initiative (CLI) under Dr. Iara Lacher.
- Assisted with GIS analysis and data management of survey information in the lab across the study area

Bili Nursery September 2018 - December 2018
Horticultural Volunteer

- Assisted with the management of native plant orders for local enterprises, wholesale landscapers, and Parks Victoria.
- Repotted growing seedlings in varying life stages and of various species, and prepared pots for more than 200 seedlings and cuttings daily

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 and maintained 450 nest boxes for cavity-nesting bird species in a 10-person field team

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
- Logged detailed, custom GIS data using Trimble 3000 GPS systems for *in situ* samples, and collected over 1000 biological samples of plant tissue

MENTORING AND OUTREACH

Duke University Program Department of Biology Spring 2024 - present
Undergraduate mentor

- Mentoring a current Duke Biology undergraduate in wetlab-based research, construction of an honors thesis proposal, and graduate school applications.

Duke University Program in Genetics and Genomics

Fall 2022 - Spring 2024

Recruitment Committee

- Assisted with UPGG recruitment weekend scheduling logistics, including faculty meetings, panel organization, catering, and student events.

SciREN Triangle

Sep 2022, 2023

Lesson Planning Participant

- Constructed a lesson plan on biological mimicry with interactive digital and in-person components for middle-school students, 2023
- 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, 2022

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

MSPCA-Angell West Medical Center

December 2019 - Aug 2021

Trainer and Volunteer Advisory Council Member

- Co-ordinated new volunteer shadowing and training to prepare for solo shifts and developed knowledge-related resources and event programming to improve the quality of the training experience and ensure multiple routes for volunteer growth & commitment

RESEARCH INTERESTS

Patterns of gene expression in adaptation and phenotypic plasticity; functional molecular and genomic analysis in evolutionary ecology and speciation; evolution of epigenetic regulation and structure; applications to conservation biology