

# AVA MACKAY-SMITH

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## EDUCATION

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### **Duke University Graduate School and Medical Center**

*August 2022-present*

Ph.D. student, 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

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### **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****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
- Expanded the resource list for understanding and intervening in bystander situations
- 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
- Interfaced between clients and veterinary nurses/technicians/doctors for medical questions and visiting around procedure times
- Developed knowledge-related resources and event programming to improve the quality of the training experience and ensure multiple routes for volunteer growth & commitment
- 2020 MSPCA-Angell Volunteer Certificate of Achievement in Communications Planning

**PUBLICATIONS**

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. Manuscript under review (2022).

Xue JR, **Mackay-Smith A**, Mouri K, Zoonomia Consortium, Tewhey R, Sabeti PC, Reilly SK. The functional and evolutionary impacts of human-specific deletions in conserved elements. Manuscript under review (2022).

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).

**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).

## SKILLS AND TECHNIQUES

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<b>Cell Culture</b>	Adherent and suspension mammalian cell culture, lentiviral generation, titration, and large-scale infection, plasmid transfection and electroporation, FACS, FISH, Cas9/Cas12a homologous directed repair, CRISPRi screens
<b>Bench Protocols</b>	DNA isolation, RNA isolation, Gibson assembly, PCR, molecular cloning, plasmid isolation, magnetic separation of DNA fragments, HCR, luciferase reporter assays, Illumina TruSeq and custom index library preparation and sequencing, gel electrophoresis, ChIP-qPCR, amplified fragment length polymorphism, Sanger sequencing preparation
<b>Bioinformatics</b>	Unix/bash, Git, R/RStudio, Python/Jupyter notebooks, L <sup>A</sup> T <sub>E</sub> X, Anaconda, Adobe Illustrator, Prism, Seurat single-cell analysis, CASA peak calling, UCSC Genome Browser tools and track building, slurm and UGER HPC cluster computing, Canu genome assembly, ENCODE API
<b>Spoken Languages</b>	Working knowledge of Spanish

## POSTER AND ORAL PRESENTATIONS

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### 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

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Society of Duke Fellows, 2022 -

Sigma Xi Scientific Research Honor Society, 2020 -

American Society of Naturalists, 2019 -

## FELLOWSHIPS AND AWARDS

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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