



# Megan Barkdull

PH.D CANDIDATE, NSF GRADUATE RESEARCH FELLOW

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## Education

### Ph.D Candidate, Department of Ecology and Evolutionary Biology

ADVISOR: DR. CORRIE MOREAU

### Bachelor of Arts in Biology

ADVISOR: DR. EMILY HEFFERNAN

- Honors Thesis: Population Genetics of the Threatened Florida Duskywing Skipper

Cornell University

August 2019–expected May 2024

New College of Florida

August 2014–May 2018

## Publications

Double dagger (‡) indicates co-first authors.

### Published:

- Barkdull, M.‡**, C. R. Miller‡, M. A. Pipkin, & C. S. Moreau. 2023. Natural history collections: What are they and why do we need them?. *Frontiers for Young Minds*. <https://kids.frontiersin.org/articles/10.3389/frym.2023.1048608>
- Barkdull, M.**, & C. S. Moreau. 2023. Worker reproduction and caste polymorphism impact genome evolution and social genes across the ants. *Genome Biology and Evolution*. <https://doi.org/10.1093/gbe/evad095>
- Heffernan, E., A. Markee., M. R. Truglio, **M. Barkdull**, S. Steele Cabrera, J. Daniels. 2023. Population Genetic Structure of a Rare Butterfly in a Fragmented South Florida Ecosystem. *Insects* <https://doi.org/10.3390/insects14040321>
- Williams, K.M., **M. Barkdull**, M. Fahmy, E. Hekkala, M. E. Siddall, S. Kvist. 2020. Caught red handed: iDNA points to wild source for CITES-protected contraband leeches. *Eur J Wildl Res*. <https://doi.org/10.1007/s10344-020-01419-5>
- Siddall, M. E., **M. Barkdull**, M. Tessler, M. R. Brugler, E. Borda., & E. Hekkala. 2019. Ideating iDNA: Lessons and limitations from leeches in legacy collections. *PloS one* <https://doi.org/10.1371/journal.pone.0212226>

### In review:

Manuscripts available upon request.

- Barkdull, M.**, N. K. Brady, & E. V. Heffernan. 2023. Microsatellites for Lepidopteran conservation: utility, considerations, and outlook. *In review at Frontier in Ecology and Evolution*.

### Submitted for presubmission inquiry:

Manuscripts available upon request.

- Barkdull, M.**, & C. S. Moreau. 2023. Comparative genomics reveals protein-coding and regulatory loci underlie the evolution of caste polymorphism in turtle ants. Submitted for presubmission inquiry to *Nature Ecology & Evolution*.

## Talks

Dagger (†) indicates presenter.

### Invited seminars:

- Barkdull, M.†** and Moreau, C. (scheduled for November 2023). Genomic causes and consequences of worker caste polymorphism in the ants. Essig Brunch Seminar Series, University of Berkeley, Berkeley, CA.

### Oral presentations:

- Barkdull, M.†** and Moreau, C. (2023). Social traits modulate genome evolution in ants. *Evolution*, Albuquerque, NM.
- Barkdull, M.†** and Moreau, C. (2022). Social traits shape genome evolution in ants. Cornell Department of Ecology and Evolutionary Biology Winter Symposium, Ithaca, NY.
- Barkdull, M.†** and Moreau, C. (2020). Formicidae caste determination: single cell and functional genomic techniques. Social Insects in the Northeast Region meeting, Brooklyn, NY. \*\*Cancelled due to COVID19.
- Barkdull, M.†**, Williams, K.M., Tessler, M., Siddall, M.E. (2019). What's in a leech? A diversity of potential for leech-derived iDNA. Cornell Department of Ecology and Evolutionary Biology Winter Symposium, Ithaca, NY.

5. **Barkdull, M†.**, Tessler, M., and Siddall, M.E. (2017). What's in a leech? A haemadispid by any other name would reveal as much. AMNH REU Summer Symposium, Manhattan, NY.

## Posters:

1. **Barkdull, M†.** and Moreau, C. (2022). Social traits modulate genome evolution in ants. Biology of Genomes meeting, Cold Spring Harbor Laboratory, NY.
2. E.V Heffernan†, **M. Barkdull**, and A. Markee (2019). The role of gene flow in connecting populations of endangered skipper butterflies in the United States: using genetic data to inform management strategies. International Symposium on Molecular Insect Science, Barcelona, Spain.
3. Markee, A.N†., Saarinen, E. V., **Barkdull, M.** (2019). Conservation genetics of the Florida duskywing skipper (*Ephyriades brunnea*): a multi-population assessment of a rare South Florida butterfly. Entomological Society of America meeting, St. Louis, MO.
4. Ash, M†., **Barkdull, M†.**, Elmir, G.† (2017). Are endangered Dakota Skipper populations infected with Wolbachia? Imperiled Butterflies Working Group meeting, Miami, FL.

## Grants, Fellowships & Awards

### Research grants (Total amount: \$14,000)

- Andrew W. Mellon Student Research Grant, Cornell University (\$1,000)
- Research Grant, Sigma Xi, Cornell Chapter (\$1,000)
- Student Research Award, American Society of Naturalists (\$2,000)
- Grant-in-aid of research, Society for Integrative and Comparative Biology (\$1,000)
- Research Travel Grant, Cornell University Graduate School (\$2,000)
- Graduate Student Research Fund, Cornell University (\$4,000)
- Richard G. Harrison Fund, Cornell University (\$3,000)

### Conference travel grants (Total amount: \$1,250)

- Conference Travel Grant, Graduate School, Cornell University (\$500)
- Orenstein Fund, Cornell University (\$750)

### Fellowships (Total amount: \$233,655)

- National Science Foundation Graduate Research Fellowship (\$138,000)
- Cornell Fellowship (\$33,241)
- National Merit Scholar (\$62,414)

## Awards

- Book Award for Best First-Year Symposium Presentation (\$50)

## Research Positions

### Ph.D. researcher

MOREAU LAB

- Investigated the genetic basis and consequences of worker caste polymorphisms using genome sequencing, comparative genomic methods, and transcriptomics.
- Conducted multiple field excursions to collect ant specimens to support research program.

*Cornell University*

*August 2018–ongoing*

### Post-baccalaureate intern

ZAMUDIO LAB

- Conducted conservation genetics research on a number of reptile and amphibian species.
- Responsible for assisting all lab members with wet lab work, including DNA extractions, microsatellite sequencing, Sanger sequencing, and library prep for MiSeq.
- Collaborated with Dr. Fábio de Sá to describe the genetic mating system of the saxicolous Brazilian frog \**Cycloramphus boraceiensis*.\*

*Cornell University*

*September 2018–August 2019*

### Hawkmoth Sensory Behavior volunteer

RAGUSO LAB

- Participated in weekly hawkmoth colony care tasks (feeding, plant care, pupae counts etc.).
- Ran experiments testing the role of floral humidity in hawkmoth feeding choice.

*Cornell University*

*September 2018–December 2018*

### Birdsong Evolution, research assistant

DRS. ARAYA-SALAS AND ODOM

- Coded individual song elements in birdsong spectrograms for downstream data analysis.
- Created analysis protocol and generate graphics for future researchers on the project.

*Cornell Lab of Ornithology*

*May 2018–May 2019*

### Florida Duskywing Genetics Project, research assistant

HEFFERNAN LAB

- Carried out a population genetics analysis of the threatened Florida Duskywing skipper butterfly to inform conservation policy.
- Performed next-generation sequencing in order to develop novel microsatellite markers
- Project published in \*Insects\*.

*New College of Florida*

*August 2017–May 2018*

## NSF Research Experiences for Undergraduates Intern

DEPARTMENT OF INVERTEBRATE ZOOLOGY

- Used genetic techniques (Sanger sequencing etc.) to identify the hosts of terrestrial bloodfeeding leeches.
- Presented results at 2017 AMNH REU Symposium; manuscript published in \*PLOS One\*.
- Conducted fieldwork to collect invertebrate (leeches, crayfish) for related lab projects.

### Dakota Skipper Wolbachia Status, research assistant

HEFFERNAN LAB

- Conducted DNA extractions and PCR amplifications of Wolbachia pathogen genes from the endangered Dakota Skipper butterfly to identify pathogen strains.
- Performed significant PCR troubleshooting of genes which repeatedly failed to amplify.
- Prepared a poster on the findings of the project; presented at a meeting of the Imperiled Butterfly Working Group.

American Museum of Natural  
History

May 2017–August 2017

New College of Florida

January 2017–May 2017

## Curatorial Skills & Experiences

### Nabokov's Butterflies exhibit contributor

CORNELL UNIVERSITY INSECT COLLECTION AND MANN LIBRARY

September 2023–March 2024

- Collaborated with CUIC and Mann library staff to design an exhibit featuring the butterfly specimens collected by Vladimir Nabokov during his time at Cornell.
- Designed visuals and wrote content for exhibit component focused on butterfly conservation and the role of natural history collections in conservation research.

### Six-Legged Science: Unlocking the Secrets of the Insect World exhibit contributor

CORNELL UNIVERSITY INSECT COLLECTION AND MUSEUM OF THE EARTH

January 2022–March 2022

- Helped design components of public-facing museum exhibit, including pulling specimens, databasing, and design work
- This exhibit reached 18,592 in-person visitors.

### Social Media co-manager

CORNELL UNIVERSITY INSECT COLLECTION

January 2022–Present

- Co-managed the CUIC's Instagram and Twitter pages, designing and posting content to engage the broader community with the work of the CUIC.

### Collections Management Workshop, participant

CORNELL UNIVERSITY INSECT COLLECTION

January 2021–May 2021

- Participant in a semester-long workshop series, led by Drs. Jason Dombroskie and Corrie Moreau, which focused on practical discussion of topics related to the care and management of natural history collections.
- Topics included museum mission statements, managing loans, collecting and export permits, managing volunteers and students, databasing, extension, and outreach.

### Collection Databasing, graduate supervisor

CORNELL UNIVERSITY INSECT COLLECTION

August 2020–Present

- Responsible for databasing specimens in the CUIC's Formicidae collection, from data entry to interfacing with Specify.
- Supervised and trained undergraduate and graduate students on how to conduct databasing in the the collection.
- Designed training materials for other databasing workers.

### Entomological Collections Network annual meeting, attendee

November 2020–NA

- Virtually attended conferences sessions on a wide range of entomological collections management topics.

## Teaching

### Introduction to Evolution and Diversity Writing in the Major guest lecturer

BIOEE 1780

Cornell University

October 2023–NA

- Invited to give a guest lecture on my dissertation research and path to graduate school in Jasmine Peters' Writing in the Majors course.

### Conservation Biology guest lecturer

BISC 4575

Forham University

April 2023–NA

- Invited to give a guest lecture on conservation genetics and my research to Dr. Evon Hekkala's conservation biology seminar course.

### Introduction to Evolution and Diversity grader

BIOEE 1781

Cornell University

August 2022–December 2023

- Responsible for grading weekly assignments for online evolution and diversity course.

### Introduction to Evolution and Diversity teaching assistant

BIOEE1780

Cornell University

January 2020–May 2020

- Taught three weekly discussion/lab sections.
- Assisted with course transition to an online format due to COVID-19.

## Comparative Physiology teaching assistant

BIOG1440

- Taught three weekly discussion/lab sections, leading hands-on investigations of physiological concepts covered in lectures.
- Created extensive, novel course review materials; available on my GitHub.

Cornell University

August 2019–December 2020

## Foundations of Biology teaching assistant

BIOL2100

- Led review sessions prior to tests and quizzes.
- Met individually with students to address performance questions.

New College of Florida

August 2017–December 2017

## Cellular Biology teaching assistant

BIOL3500

- Led content-delivery and problem-solving review sessions once per week.
- Assisted in exam grading and clerical tasks.

New College of Florida

August 2016–December 2016

# Mentoring Experiences

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## Mahalia Donaldson

PAID RESEARCH INTERN

- Conducted a research project to the evolution of genes related to aggression in ants spanning a range of aggression phenotypes.
- Learning scientific programming skills including Bash and R scripting, Git and Github version control
- Results of this project are in prep for an invited submission to Annals of the Entomological Society of America.

Cornell University

August 2022–Present

## Seyde Delgado

PAID RESEARCH INTERN; BIOLOGY 2990 INDEPENDENT RESEARCH EXPERIENCE STUDENT

- Conducted a research project to understand the relationship between herbivory and molecular evolution in ants.
- Learning scientific programming skills including Bash and R scripting, Git and Github version control

Cornell University

May 2022–Present

# Service

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## Graduate Student Association treasurer

DEPT. OF ECOLOGY & EVOLUTIONARY BIOLOGY

- Manage funding from the university for graduate student and some department events.

Cornell University

August 2022–August 2023

## Graduate Student Association co-president

DEPT. OF ECOLOGY & EVOLUTIONARY BIOLOGY

- Liase between graduate student body and faculty leadership to communicate and address graduate student concerns
- Participated in the formation of working groups focused on assessing and improving diversity, equity and inclusion in the department.

Cornell University

July 2020–August 2022

## Cornell Diversity Preview Weekend volunteer

DEPT. OF ECOLOGY & EVOLUTIONARY BIOLOGY

- Volunteered for the workshops “Crafting a CV” and “Fellowships and Personal Statements” providing peer review to participants for the 2020 DPW event.
- Served as a peer mentor to a DPW participant during the Fall 2020 semester.
- Answered participant questions as a panelist for the workshop “Crafting a CV” for the 2021 DPW event.

Cornell University

September 2020 and summer 2021–NA

## EvoDay Planning Committee

\* POSTPONED TO SPRING 2022 DUE TO COVID19

- Identify and invite speakers for a day-long symposium on the theme of “Evolution in Deep Time”.

Cornell University

Spring 2020–NA

## Department Seminar Series Committee

DEPT. OF ECOLOGY & EVOLUTIONARY BIOLOGY

- This committee plans and coordinates the department’s weekly seminar series
- Responsible for soliciting speaker nominations, constructing schedule of speakers, and assisting host labs with managing their speaker visits.
- While on this committee, I initiated a push to increase the diversity of our invited speakers, based on the best practices identified by Hagan et al. (2020).

Cornell University

August 2019–August 2020

## Journal referee:

- Integrative and Comparative Biology, editorial reviewer
- Evolution, ad hoc reviewer
- Insectes Sociaux, ad hoc reviewer

## Society membership:

- Society for the Study of Evolution (SSE)
- Society for Open, Reliable, and Transparent Ecology and Evolutionary Biology (SORTEE)
- Society for Integrative and Comparative Biology (SICB)
- Society for Molecular Biology and Evolution (SMBE)

## Volunteer instructor for Ithaca Children's Garden summer camp

EVENT VOLUNTEER

- Led 6-10 year old campers through hands-on activity focused on the ant life cycle and on insect collecting.

*Ithaca Children's Garden*

*July 2023–NA*

## Panelist for “Women in Entomology: Meet the Superheroes of Insect Science”

PUBLIC TALK

- Discussed research and insect conservation.
- Panel can be viewed at <https://www.youtube.com/watch?v=HZ0WdZk84wM>

*WSKG/PBS*

*October 2022–NA*

## Guest blogger for the Paleontological Research Institute/Museum of the Earth

GUEST BLOGGER

- Guest blogged for the Paleontological Research Institute and Museum of the Earth. \*\*Barkdull, M.\*\* (2022). Insects under threat: the role of natural history collections in biodiversity conservation. <https://bit.ly/3ph2lsm>

*Paleontological Research*

*Institute/Museum of the Earth*

*July 2022–NA*

## “Meet an Entomologist” volunteer

EVENT VOLUNTEER

- Answered questions from visitors to the Musuem of the Earth's Six-legged Science exhibit.

*Six-legged Science Exhibit, Museum*

*of the Earth*

*July 2022–NA*

## Panelist for “Exploring Insect Evolution: A Panel on New Research”

PUBLIC TALK

- Gave a research talk for the event \*Exploring Insect Evolution: A Panel on New Research\* as part of the Museum of the Earth's Darwin Days events.
- Talk can be viewed at <https://bit.ly/3s4jOGB>

*Darwin Days Week, Museum of the*

*Earth*

*February 2022–NA*

## Cornell Insectapalooza volunteer

EVENT VOLUNTEER

- Manned a table on ant diversity and discussed all things ant with members of the public, including young children, teens and adults.

*Dept. of Entomology, Cornell*

*University*

*October 2019, 2022, 2023–NA*

