



# 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 2025

New College of Florida

August 2014–May 2018

## Publications

Double dagger (‡) indicates co-first authors.

### Published:

- 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 press:

- Barkdull, M.**‡, C. R. Miller‡, M. A. Pipkin, & C. S. Moreau. 2023. Natural history collections: What are they and why do we need them?. In press at *Frontiers for Young Minds*.

### Scientific outreach:

- 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/3ph21sm>

## Talks

Dagger (†) indicates presenter.

### Oral presentations:

- 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.**†, 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.
- 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.

### Lightning talks:

- Barkdull, M.**† and Moreau, C. (2020). Formicidae caste determination: single cell and functional genomic techniques. Social Insects in the Northeast Region meeting, Brooklyn, NY. \*\*Postponed due to COVID19.

### Posters:

- Barkdull, M.**† and Moreau, C. (2022). Social traits modulate genome evolution in ants. Biology of Genomes meeting, Cold Spring Harbor Laboratory, NY.
- 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.
- 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

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### Research grants (Total amount: \$13,000)

- 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

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### Post-baccalaureate Intern

ZAMUDIO LAB

Cornell University

September 2018–August 2019

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

### Hawkmoth Sensory Behavior Volunteer

RAGUSO LAB

Cornell University

September 2018–December 2018

- 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.

### Birdsong Evolution, Research Assistant

DRS. ARAYA-SALAS AND ODOM

Cornell Lab of Ornithology

May 2018–May 2019

- Assisted in coding birdsong spectrograms for downstream data analysis.
- Created analysis protocol and generate graphics for future researchers on the project.

### Florida Duskywing Genetics Project, Research Assistant

HEFFERNAN LAB

New College of Florida

August 2017–May 2018

- 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
- Results in prep for publication.

### NSF Research Experiences for Undergraduates Intern

DEPARTMENT OF INVERTEBRATE ZOOLOGY

American Museum of Natural History

May 2017–August 2017

- 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

New College of Florida

January 2017–May 2017

- 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.

## Curatorial Skills & Experiences

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

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.
- Oversaw 237% Instagram follower increase since the beginning of 2022.

## Collection Databasing, Graduate Worker

CORNELL UNIVERSITY INSECT COLLECTION

August 2020–Present

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

## Teaching

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### 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–May 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

Cornell University

August 2019–December 2020

- 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.

### Foundations of Biology Teaching Assistant

BIOL2100

New College of Florida

August 2017–December 2017

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

### Cellular Biology Teaching Assistant

BIOL3500

New College of Florida

August 2016–December 2016

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

## Mentoring Experiences

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### Mahalia Donaldson

PAID RESEARCH INTERN

Cornell University

August 2022–Present

- 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

### Seyde Delgado

PAID RESEARCH INTERN; BIOLOGY 2990 INDEPENDENT RESEARCH EXPERIENCE STUDENT

Cornell University

May 2022–Present

- 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

## Service

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### Graduate Student Association Treasurer

DEPT. OF ECOLOGY & EVOLUTIONARY BIOLOGY

Cornell University

August 2022–August 2023

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

### Graduate Student Association Co-President

DEPT. OF ECOLOGY & EVOLUTIONARY BIOLOGY

Cornell University

July 2020–August 2022

- 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 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:

- Insectes Sociaux

## 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)

# Outreach

## 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

## “Meet an Entomologist” volunteer

EVENT VOLUNTEER

- Answered questions from visitors to the Museum 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–NA

