

# MICAH G. FREEDMAN

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## EDUCATION AND TRAINING

**Postdoctoral Fellow**, Dept. of Botany, University of British Columbia 2022-Present

- **Advisor:** Dr. Amy Angert

**NSF Postdoctoral Fellow**, University of Chicago 2020-2022

- **Advisor:** Dr. Marcus Kronforst

**Ph.D.**, Population Biology, University of California, Davis 2014-2020

- **Dissertation Title:** *Contemporary Evolution During Global Range Expansion in the Monarch Butterfly.*
- **Advisors:** Dr. Sharon Strauss, Dr. Santiago Ramírez
- **Completion Date:** January 30, 2020

**B.S.**, Entomology & Plant Sciences, Cornell University 2009-2013

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## PEER-REVIEWED PUBLICATIONS

\*Authors contributed equally; †Undergraduate coauthor

### Submitted and in preparation

Robinson, M.L., Weber, M.G., Freedman, M.G., Jordan, E.†, Yonenaga, J. & S.Y. Strauss. Broadscale evolution of coloration in caterpillars reflects their interactions with plants and supports classic tenets of plant defense theory. **In revision.**

Freedman, M.G., Ramírez, S.R. & S.Y. Strauss. Plants from the California Channel Islands have reduced physical and chemical defenses against herbivores. **In preparation.**

### Preprints

**Freedman, M.G.**, Choquette, S.†, Hunter, M.D., Strauss, S.Y., Ramírez, S.R. & R.L. Vannette (2021). Population-specific patterns of cardenolide sequestration in monarch

butterflies from around the world. [biorxiv.org/content/10.1101/2021.10.15.464593v1](https://doi.org/10.1101/2021.10.15.464593v1).  
Journal submission currently **in revision**.

### **Published**

Hemstrom, W.B.\*, **Freedman, M.G.\***, Zalucki, M.P., Ramírez, S.R. & M.R. Miller (2022). Population genetics of a recent range expansion in monarch butterflies. **In press**, *Molecular Ecology*. <https://doi.org/10.1111/mec.16592>.

Pocius, V.M., Majewska, A.A. & **M.G. Freedman** (2022) The role of experiments in monarch butterfly conservation: a review of recent studies and approaches. *Annals of the Entomological Society of America* 115, 10-24. [doi.org/10.1093/aesa/saab036](https://doi.org/10.1093/aesa/saab036)

**Freedman, M.G.**, De Roode, J.C., Forsiter, M.L., Kronforst, M.R., Pierce, A.A., Schultz, C.B., Taylor, O.R. & E.E. Crone (2021). Are eastern and western monarch butterflies distinct populations? A review of evidence for ecological, phenotypic, and genetic differentiation and implications for conservation. *Conservation Science and Practice*, 3:e432. [doi.org/10.1111/csp2.432](https://doi.org/10.1111/csp2.432)

- Cover feature for the [July 2021 issue](#)

**Freedman, M.G.**, Dingle, H., Strauss, S.Y. & Ramírez, S.R. (2020). Two centuries of monarch butterfly collections reveal contrasting effects of range expansion and migration loss on wing traits. *Proceedings of the National Academy of Sciences, USA* 117, 28887-28893. [doi.org/10.1073/pnas.2001283117](https://doi.org/10.1073/pnas.2001283117).

- Featured by [UC Davis](#), [San Jose Mercury News](#), [Santa Cruz Sentinel](#), [East Bay Times](#), [Davis Enterprise](#)

**Freedman, M.G.**, Jason, C.<sup>†</sup>, Ramirez, S.R. & S.Y. Strauss (2020). Host plant adaptation during contemporary range expansion in the monarch butterfly. *Evolution* 74, 377-391. [doi.org/10.1111/evo.13914](https://doi.org/10.1111/evo.13914).

**Freedman, M.G.** & H. Dingle. (2018). Wing morphology in migratory North American monarchs: characterizing sources of variation and understanding changes through time. *Animal Migration* 5, 61-73. [doi.org/10.1515/ami-2018-0003](https://doi.org/10.1515/ami-2018-0003)

- Featured by [National Geographic](#) and as part of a television production by the Japanese National Broadcasting Corporation (NHK)

**Freedman, M.G.**, Miller, R.H. & H.S. Rogers. (2018). Landscape-level bird loss increases the prevalence of honeydew-producing insects and invasive ants. *Oecologia* 188, 1263-1272. [doi.org/10.1007/s00442-018-4273-5](https://doi.org/10.1007/s00442-018-4273-5).

**Freedman, M.G.**, Dingle, H., Chiu, J.C., Tabuloc, C. Yang, L.H. & M.P. Zalucki. (2018). Non-migratory monarch butterflies retain developmental and transcriptional mechanisms associated with migration. *Biological Journal of the Linnean Society* 123, 265-278. doi.org/10.1093/biolinnean/blx148.

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### **FELLOWSHIPS AND AWARDS**

U.S. Fish and Wildlife Service Research Award (co-PI) - <b>\$19,520</b>	<b>2022-2023</b>
NSF Postdoctoral Research Fellowship in Biology - <b>\$138,000</b>	<b>2020-2022</b>
Center for Population Biology Summer Research Award - <b>\$1,693</b>	<b>2019-2020</b>
Center for Population Biology Summer Research Award - <b>\$1,700</b>	<b>2018-2019</b>
Center for Population Biology Summer Research Award - <b>\$1,800</b>	<b>2017-2018</b>
National Geographic Society Exploration Grant - <b>\$4,750</b>	<b>2017-2018</b>
NSF EAPSI Australia Fellowship - <b>\$5,400</b>	<b>2016</b>
SSE Rosemary Grant Award - <b>\$2,250</b>	<b>2016-2017</b>
Mildred E. Mathias Research Award - <b>\$2,752</b>	<b>2016-2017</b>
Center for Population Biology Summer Research Award - <b>\$1,800</b>	<b>2015-2016</b>
National Science Foundation Graduate Research Fellowship	<b>2015-2019</b>
Davis Botanical Society Award - <b>\$1,690</b>	<b>2015-2016</b>
Hunter Rawlings Cornell Presidential Research Scholarship - <b>\$32,000</b>	<b>2009-2013</b>
Garden Club of America Summer Environmental Scholarship - <b>\$2,000</b>	<b>2011</b>

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### **INVITED TALKS**

“Global range expansion in the monarch butterfly: ecological and evolutionary implications.” Departmental Seminar, University of Illinois at Chicago Department of Biological Sciences, October 26, 2021.

“Contemporary evolution during global range expansion in the monarch butterfly.” Eco-Evo Lunch Seminar, Stanford University, March 3, 2020.

“Contemporary evolution of monarch butterflies in North America and abroad.” Departmental Seminar, Iowa State University Department of Ecology, Evolution, and Biodiversity, December 12, 2019.

“The ecology and evolution of monarch butterflies on Pacific islands.” POETS seminar series, University of Guam, June 1, 2018.

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### **CONFERENCE PRESENTATIONS**

**Freedman, M.G.**, Agrawal, A.A., Hastings, A.P., Papa, R. & M.R. Kronforst. Functional genomics of cardenolide sequestration in monarch butterflies (*Danaus plexippus*). Oral presentation at the 2022 Entomological Society of America Meeting, Vancouver, BC.

**Freedman, M.G.**, Choquette, S., Hunter, M.D., Strauss, S.Y., Ramírez, S.R. & R.L. Vannette. Population-specific patterns of cardenolide sequestration in monarch butterflies from around the world. Oral presentation at the 2022 Evolution Meeting, Cleveland, OH.

**Freedman, M.G.**, Hemstrom, W.B., Miller, M.R., Zalucki, M.P., Ramírez, S.R. & S.Y. Strauss. Standing genetic variation in monarch butterflies and its conservation implications. Invited oral presentation at the 2019 Entomological Society of America Meeting, Saint Louis, MO.

**Freedman, M.G.**, Jason, C., Ramirez, S.R. & S.Y. Strauss. Host plant adaptation during global range expansion in the monarch butterfly. Oral presentation at the 2019 Evolution Meeting, Providence, RI.

**Freedman, M.G.**, Jason, C., Ramirez, S.R. & S.Y. Strauss. Host plant adaptation during global range expansion in the monarch butterfly. Poster presented at the 2019 Gordon Conference on Plant-Herbivore Interactions, Ventura, CA.

**Freedman, M.G.** Parallel loss of defenses against ungulate herbivores in chaparral shrubs from the Channel Islands, California, USA. Oral presentation at the 2017 Ecological Society of America Meeting, Portland, OR.

**Freedman, M.G.** Contemporary evolution of monarch butterflies in their introduced range. Oral presentation at the 2017 Evolution Meeting, Portland, OR.

**Freedman, M.G.**, Miller, R.H. & H.S. Rogers. Assessing the importance of “unwanted” mutualisms between invasive ants and honeydew-producing insects in native forests of the Northern Mariana Islands. Poster presented at the 2014 Ecological Society of America Conference, Sacramento, CA.

**Freedman, M.G.**, Campbell, S.A., Halitschke, R. & A. Kessler. Evolution of reduced floral scent emission under multiple independent transitions from outcrossing to selfing in the wild nightshades (Solanaceae). Poster presented at the 2014 Gordon Conference on Plant Volatiles, Ventura, CA.

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### **NON-PEER-REVIEWED PUBLICATIONS**

Freedman, M.G. (2018). Restoration of the Colorado River Delta: Assessing the impacts of the Minute 319 environmental pulse flow. Available at:

### **TEACHING EXPERIENCE**

Teaching Assistant: EVE 100 – Introduction to Evolution	Fall 2019
Reader: EVE 181 – Plant-Animal Interactions	Fall 2016
Reader: EVE 101 – Introduction to Ecology	Spring 2016
Teaching assistant: EVE 100 - Introduction to Evolution	Fall 2015

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### **SERVICE ACTIVITIES**

**Manuscript reviews:** *PNAS, Cell, Journal of Biogeography, Frontiers in Ecology and Evolution, Biological Invasions, Journal of Tropical Ecology, Ecology and Evolution, Scientific Reports, Journal of Thermal Biology, Journal of Tropical Biology and Conservation*

**Graduate Student Mentor:** UC Davis EEGAP (Evolution and Ecology Graduate Admissions Pathways) partnership with Howard University

**Graduate Student Mentor:** UC Davis SEEDS (Strategies for Ecology Education, Diversity, and Sustainability) undergraduate club

**Assistant instructor:** R Bootcamp – 2017

**Outreach activities:** Invited guest scientist for CIM<sup>2</sup>AS student interns at University of Illinois, Chicago (2022), panel participant on how to find a postdoc (2021 Evolution meeting), Volunteer at UC Davis Picnic Day (2015, 2018, 2019), UC Davis Biodiversity Museum Day (2019), UC Davis BioBlitz (2016), Science Exploration Day at the Chabot Space and Science Center in Oakland, CA (2017)

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### **PROFESSIONAL MEMBERSHIPS**

Entomological Society of America	October 2019 - Present
Society for the Study of Evolution	March 2015 - Present
Ecological Society of America	August 2014 – Present