

Danielle H. Drabeck

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EDUCATION

2019-2024	University of Minnesota, Twin Cities, MN Advisor: Suzanne McGaugh	Postdoctoral Fellow, Ecology, Evolution and Behavior
2012-2019	University of Minnesota, Twin Cities, MN Advisors: Sharon A. Jansa/ Antony M. Dean	Ph.D. Ecology, Evolution and Behavior- 2019
2009-2010	Tulane University, New Orleans, LA Adviser: Michael J. Blum	M.Sc. Environmental Biology
2004-2008	Tulane University, New Orleans, LA (Transfer from University of Aberdeen, Scotland)	B.S. Environmental Biology and Anthropology

PUBLICATIONS

In Prep/Review

- (1) Melendez-Vazquez F., Lucaci A., Selberg A., Clavel J., **Drabeck D.H.**, Carnavalle G., Pond S., Rincon M., Santaquiteria A., Betancur R., Arcila A. 2023. Ecological interactions and genomic innovations fueled evolution of fish endothermy. *Science Advances* (*In Review*)
- (2) **Drabeck, D.H.**, Anderson, M., Luszczek, E., Roback, E., Lassen, J. F., Kowalczyk, A., McGaugh, S.E., and T. Isles (2024). Integrating Metabolic and Comparative Genomics Reveals Genes Underlying Adaptive Metabolic Shifts in the Carnitine Pathway among Hibernating Mammals. *Nature Ecology and Evolution*. (*In Prep*)
- (3) **Drabeck, D.H.**, Holding, M. Haynes, L., Disharoon, D., and A. Sen_Gupta. (2024) Venom resistance in the short-tailed opossum (*Monodelphis domestica*). *Journal of Mammalogy* (*In Prep*)
- (4) **Drabeck, D.H.**, Alter, L., Arcila, D., Arroyave, J.A., Hendrickson, D., Borowski, R., and Suzanne McGaugh. Novel genomes of phylogenetically dispersed cavefish reveal convergent selection in the evolution of troglomorphy. (2024) *Current Biology*. *In Prep*

In Press

- (5) **Drabeck, D.H.**, Wiese*, J., Gilbertson*, E., Arroyave, J., Stiasny, M.L.J., Alter, S.E., Borowsky, R., Hendrickson, D.A., Arcila, D., and S.E. McGaugh. Gene loss and relaxed selection of *plaat1* in vertebrates adapted to low-light environments. (2024). *Proceedings of the Royal Society B*, 291:20232847.
- (6) **Drabeck, D.H.**, Holt, J. and McGaugh, S.E., 2022. Widespread convergent evolution of alpha-neurotoxin resistance in African mammals. *Biology letters*, 18(11), p.20220361.

- (7) **Drabeck, D.H.**, Rucavado, A., Hingst-Zaher, E., Cruz, Y.P., Dean, A.M., and S.A. Jansa. Ancestrally Reconstructed von Willebrand Factor Reveals Evidence for Trench Warfare Coevolution between Opossums and Vipers. (2022a). *Molecular Biology and Evolution*. 3
- (8) **Drabeck, D.H.**, Rucavado, A., Hingst-Zaher, E., Cruz, Y.P., Dean, A.M., and S.A. Jansa. (2020) Resistance of South American opossums to vWF-binding venom C-type lectins. *Toxicon* 178: 92-99
- (9) **Drabeck, D.H.** (2021) Resistance of Native Species to Reptile Venoms. In *Handbook of Venoms and Toxins of Reptiles*, ed. S. P. Mackessy. Boca Raton, FL: CRC Press.
- (10) Holding M.L.†, **Drabeck D.H.†** , Jansa S.A, Gibbs, H.L Venom resistance as a model for understanding the molecular basis of complex coevolutionary adaptations. (2016) *Integr. Comp. Biol.* 56(5):1032-1043 **†- Joint lead authors- Both authors contributed equally to this publication**
- (11) **Drabeck, D.**, and Jansa, S. Why the honey badger don't care: Convergent evolution of venom-targeted nicotinic acetylcholine receptors in mammals that survive venomous snake bites. (2015) *Toxicon* 99: 68-72
- (12) **Drabeck, D.**, Chattfield, M., Omalley, B., Richard-Zawacki, C. 2014. The status of Louisiana's diamondback terrapin (*Malaclemys terrapin*) populations in the wake of the Deepwater Horizon oil spill: Insights from population genetic and contaminant analyses. *Journal of Herpetology* 48:125-136.
- (13) Hekkala, E., Saumure, R., Jeager, J., Werner, H., Sredl, M., Culver, M., Bradford, D., **Drabeck, D.**, Blum, M.J. 2011. Resurrecting an extinct species: Archival DNA, taxonomy, and conservation of the Vegas Valley leopard frog. *Conservation Genetics* 12: 1379-1385.

*Authors who are current or former undergraduate mentees

2024	National Institute of Health Loan Repayment Program Award
2024	National Science Foundation Access for Persons with Disabilities Award
2020	National Institute of Health TREM Fellow (2019-2022)
2019	College of Biological Sciences Pletcher Award (UMN) (<u>\$5000</u>)
2018	American Society of Mammalogist Travel Award (Competitive)
2018/2019	Microbial and Plant Genomics Institute Travel Award (Competitive)
2018	Council of Graduate Students (COGS) Conference Travel Grant
2017	Interdisciplinary Doctoral Fellowship (<u>\$25000+14 credits</u>)
2017	American Society of Mammalogists Grant in Aid (\$1500)
2016	JMIH Student Travel Award (\$600)
2015	Dayton Bell Museum Fellowship
2015	Minnesota Herpetological Society Grant in Conservation and Research (\$21,500)
2014	UMN Grant in Aid of Research, co-written with Dr Sharon Jansa and Dr Antony Dean. Awarded a year- long research assistantship as well as research funds to support dissertation work. (<u>\$47,000</u>)
2014	Minnesota Herpetological Society Award for Conservation Research (\$750)
2014	Frederick and Helen Gauge Fund Award, American Society of Ichthyologist and Herpetologists (\$500)
2014	Counsel of Graduate Students Travel Award (\$150)
2014	Ray C. Anderson Zoology and Genetics Fellowship (\$7,000)
2014	American Society of Mammalogists Grant in Aid (\$1,500)
2014	Elmer C. and Marcia F. Birney Fellowship (\$5,843)
2014-2018	University of Minnesota EEB Research Award (\$1,500-2,000)
2014-2018	University of Minnesota EEB Travel Award (\$800-1200)
2014-2017	Dayton Bell Museum Fund Fellowship (\$1,200-1,500)
2013	Rosemary Grant Award, Society for the Study of Evolution (\$2,209)
2013	University of Minnesota EEB Travel Award (\$800-1200)
2013	UMN, College of Biological Sciences Summer Fellowship (<u>\$5,843</u>)
2013	NSF Graduate Research Fellowship Program-Honorable Mention
2007	Saunders-Maridel Scholarship
2004	Presidents Volunteer Service Award

FUNDING, HONORS, AND AWARDS

INVITED ORAL PRESENTATIONS

- (1) **Drabeck, D.H.** Lessons from repeated evolution of venom resistance. Gordon Research Conference Venom Evolution, Function and Biomedical Applications. Speaker Invitation August 2024

- (2) **Drabeck, D.H.** Trench warfare coevolution of venom resistance. EUVEN. (virtual) 2022. Available [here](#)
- (3) **Drabeck, D.H.** Gordon Conference *Bridging Gaps in Venom Research: From Ecology and Evolution to Socio-Economic Impacts*. Invited, declined (2020, 2022).
- (4) **Drabeck, DH.** Trench warfare coevolution in venom and venom resistance. 2020. (Oct 29, 2021). International Toxin Talks (e-seminar).
- (5) **Drabeck, DH,** Dean AM, and Jansa SA Opossums vs. vipers: Molecular and functional characterization of a coevolving trait. 2019 *Macalester College Biology department seminar series*
- (6) Drabeck, DH, **Drabeck, DH,** Dean AM, and Jansa SA Opossums vs. vipers: Molecular and functional characterization of a coevolving trait. 2019 *Augustana University Biology Department Seminar Series*.
- (7) **Drabeck, DH,** Dean AM, and Jansa SA Opossums vs. vipers: Molecular and functional characterization of a coevolutionary arms race. 2018 *North American Society of Toxinology, Keynote talk Kingsville, TX*.
- (8) **Drabeck, DH,** Dean AM, and Jansa SA Molecular and functional characterization of a coevolutionary trait. 2018 *Visiting Researcher Seminar Instituto Butantan, Brazil*
- (9) **Drabeck, DH,** Dean AM, and Jansa SA. Natural Toxins: Why we can and the honey badger don't. 2015 *Ohio State University Undergraduate Ecology and Evolution Club seminar, Columbus, OH*.
- (10) **Drabeck, DH,** Dean AM, and Jansa SA Opossums vs. vipers: Molecular and functional characterization of a coevolutionary arms race. 2018 *Instituto Butantan Invited Seminar*
- (11) ***Invited speaker to Gordon Conference (Venom Evolution, Function and Biomedical Applications) 2020 interrupted by COVID19**

CONTRIBUTED ORAL PRESENTATIONS

- (1) **Drabeck, DH,** Wiese, J., Gilbertson, E., Arcila,D., Arroyave, J., Alter, L., Hendrickson, D., Borowski, D., Stassiny, M., and Suzanne Mcgaugh. Convergent selection, relaxed selection, and gene loss in PLAAT1 related to loss of visual acuity across vertebrates. Evolution (Virtual) 2023.
- (2) **Drabeck, DH,** Holt J, and SE McGaugh. Convergent Evolution of alpha-neurotoxin resistance in African Mammals. *American Society of Mammalogists, Tuscon, AZ 2022*.
- (3) **Drabeck, DH,** Dean AM, and Jansa SA Opossums vs. vipers: Molecular and functional characterization of a coevolving trait. 2019 *Evolution, Providence RI*. & 2019 *American Society of Mammalogists Meeting Washington DC*.
- (4) **Drabeck, DH,** Dean AM, and Jansa SA Molecular and functional characterization of a coevolutionary trait. 2018 *Poster given at Gordon Conference: Evolution and Function of Venom Arsenal West Dover, VT*
- (5) **Drabeck, DH,** Dean AM, and Jansa SA. Convergent evolution of venom targeted nicotinic acetylcholine receptors in mammals that survive venomous snake bites. 2016 *Joint Meeting of Ichthyologists and Herpetologist New Orleans, LA., and the 2016 American Society of Mammalogists Meeting in Minneapolis, MN*

- (6) **Drabeck, DH**, Dean AM, and Jansa SA. The Molecular and Functional Characterization of a Coevolutionary Arms Race: South American vipers and Didelphid marsupials. *2015 Joint Meeting of Ichthyologists and Herpetologist Reno, NV*
- (7) **Drabeck, DH** and Jansa SA. (2014) Resistance to Venom-Induced Platelet Aggregation in Didelphid Marsupials: Functional Characterization of a Coevolutionary Arms Race. *2014 Poster given at Evolution Raleigh, NC.*

CURATORIAL EXPERIENCE

2012-2014	Curatorial Assistant, mammal collections, mentor: Sharon Jansa	Bell Museum of Natural History
2015-2016	Curatorial Assistant, tissues and genetic resources, mentor: Keith Barker	Bell Museum of Natural History

TEACHING EXPERIENCE

2010	EBIO 111: The Diversity of Life lab (Tulane) taught 6 sections of lab including writing of a 45 minute introductory lecture. Wrote and graded weekly quizzes.	Visiting Instructor
2010	EBIO 111: The Diversity of Life lab (Tulane)	Graduate Teaching Assistant
2017	EEB 3409: Evolution lab Taught weekly lab sessions in a interactive environment, including learning R, discussions, and jigsaw readings	Graduate Teaching Assistant
2018	EEB 4129 Mammalogy lab Lecture+lab, developed new curricula and materials to improve inclusivity in teaching and active learning.	Graduate Teaching Assistant/ Guest Lecturer
2019	EEB 1961 Foundations of Biology Lab 1 Implemented several new experimental active learning techniques introducing basic statistical analyses and data exploration to first year students	Graduate Teaching Assistant
2020-2021	BIOL 1102 Mastering Biology co-taught Designed and adapted evolution curriculum to an online environment during the COVID19 pandemic. Introduced active learning and changed curriculum to highlight scientists	Postdoctoral Teaching Fellow

PEDAGOGICAL TRAINING

- 2019- Year long preparing future faculty course with extensive review and preparation of teaching materials for active-learning environments
- 2019-2024- TREM NIH training fellowship including 25% appointment for partnered teaching and undergraduate mentorship

MENTORSHIP

- 2010- Mentored a team of undergraduates in fieldwork during my master’s work—aided in their applications to professional schooling (vet and med school)
- 2013-2018- Mentored two undergraduates in my PhD work and aided in their professional goals including successful matriculation into a PhD program.
- 2019-2024- I have mentored two students from Macalester College, and two UMN UROP students. See publications list for undergraduate mentee authors. As a postdoctoral fellow I regularly mentor undergraduate and graduate student research.

RESEARCH EXPERIENCE

2019-2024	National Institutes of Health TREM Fellow (University of Minnesota). Examining genetic basis of convergent evolution in cavefish	Postdoctoral Fellow, UMN
2012-2019	Doctoral Dissertation “Characterizing the Roles of Coevolution and Convergence in the Evolution of Venom Resistance in Mammals”	Graduate Researcher, UMN
2012	Pioneer-Hi-bred (Kelly Scientific) – research and greenhouse work on GMO crops.	Research Associate, Kelly Scientific/Pioneer Hi-Bred

2011	Pacific Ecorisk: toxicity testing	Aquatic Toxicologist, Pacific Ecorisk, Susiun, CA
2011	Shorebird capture, migration and oil spill research, blood and tissue sampling, banding, morphometrics.	Field Technician, Tulane University
2010	Research on the population level effects of the Deepwater Horizon oil spill on marsh reptiles. (Lab: Dr. Corinne Richards-Zawacki)	Research Associate, Tulane University
2009-2010	M.S. research population genetics work on a marsh grass (<i>Spartina spp</i>) and conservation genetics several species of frog (Lab: Dr. Michael J. Blum)	Graduate Research, Tulane University
2006	Fish ecology dissections, ovary/egg enumeration, and parasite identification in Threespine Sticklebacks (lab: Dr. David Heins)	Lab Technician, Tulane University

SERVICE

2021- PhD defense committee member (University of Queensland, Australia)

2016-2022- Peer Review: Molecular Ecology, Zoological Research, Chelonian Conservation and Biology, Molecular Biology and Evolution(2), Conservation Biology, Molecular Ecology, Toxicon, Journal of Molecular Evolution, Toxicon X, Zoo Keys.

2016- American Society of Mammalogy meeting, technology, registration, organization assistant, ASM 2016, Minneapolis, MN

2013-2014 EEB Graduate Student President, University of Minnesota, Twin Cities, MN

2013 EEB graduate student ethics council- organize/lead talks for ethics requirements (Fall 2013), University of Minnesota, Twin Cities, MN

2012- Counsel of Graduate Students (COGs) EEB department representative, University of Minnesota, Twin Cities, MN

OUTREACH

Outreach/Education Module design: Designed 3 venom and coevolution education outreach modules for all ages (participants age 3-90) to communicate results of my research. Modules were presented by self, local teachers, and undergraduate volunteers at several outreach venues (Market Science, Bell Museum- several (5+) events).

Public Speaker: Adapted a research talk communicating the results of my PhD to a public audience. "Natural Toxins: Why We Care and The Honey Badger Don't." Given at Café Scientifique (Bell Museum of Natural History) and the American Association of University Women. All ages.

Panelist on Diversity in STEM: Invited panelist on Sci-Spark and Grad-Challenges panels encouraging frank discussion on the struggles and solutions of broadening representation in academic science.

Community Volunteer: Volunteer regularly at district science fairs as a judge and consult elementary science teachers on curriculum development improving the teaching of concepts in evolution.

Scientific mentor: Recruited students from diverse backgrounds utilizing university resources such as the UMN North Start Alliance. Mentored several undergraduate students in research relating to both M.Sc. and PhD work. All mentees were successful in pursuing the career goals they identified.

Departmental Activities: EEB graduate student president (203-2014), EEB graduate student ethics council, organize and lead talks for ethic requirements (2013), Council of graduate students department representative (2012).

PRESS

2022- Interview by the [Outside/In podcast](#) – topic opossum biology

2022- Interviewed by Elaine Godfrey, "The Honey Badger don't care but I do" [The Atlantic](#)

2021- [Work Covered](#) by Ali Ward's Ologies podcast episode "O/POSSUMOLOGY"

2016- [The Atlantic Interview](#) "The Very Long War Between Snakes and Newts" Ed Yong [Theatlantic.com](#)
June 9, 2016

2016- [Smithsonian Magazine Interview](#) "The Animals That Venom Can't Touch" Jason Bittel
[Smithsonian.com](#), Sept 30, 2016

2015- [NPR Interview](#) "A biologist explains why the Honey Badger don't care" Take Two, June 17 2015

2015- [Slate Magazine Interview](#) "Biology finally explains why Honey Badger don't care" Megan
Cartwright, [Slate Magazine](#), June 16, 2015

2015- [Bell Museum Imprint Magazine Interview](#) "Resistance to Snake Venoms in the Honey Badger"
Greg Brenning, [Bell Museum Imprint Magazine](#). Spring 2015 Issue.

2011- [Work Covered](#), [New York Times](#), "A frog endangered but extinct no more." Bhanoo, S. N., June 17,
2011. Accessed June 17 2011

2011- [Field Work Covered](#), [Associated Press](#), "Scientists: Gulf Health nearly at pre-spill level." Burdeau,
Cain and Seth Borenstein. April 18 2011

CURRENT AND PENDING SUPPORT

In Prep:

- 1) "Investigation of association-causation in biosynthetic pathways to evaluate adaptations of the black bear to maintain blood chemistry and minimize muscle catabolism during hibernation." NIH R01 Senior Personnel. Resubmission Spring 2024.
- 2) "Repeated Evolution in the Genomics Era: Utilizing new bioinformatic insights and high-quality genome sequencing to reveal the genetic basis, evolutionary history, and selective pressure underlying convergent adaptations in vertebrates." K99, NIH. Submission Feb 12, 2024