

# James Boyko

## PERSONAL DETAILS

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*Address* Biological Sciences Building, 5034  
University of Michigan  
1105 N University Ave  
Ann Arbor, MI 48109  
*Mobile* (479) 871-8704  
*E-Mail* [jboyko@umich.edu](mailto:jboyko@umich.edu)  
*Website* <https://jamesboyko.com/>  
*Github* [jboyko](https://github.com/jboyko)

## EDUCATION

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**Ph.D. Biological Sciences** Aug. 2017 - Aug. 2022

*University of Arkansas, USA*

Supervisor: Dr. Jeremy M. Beaulieu

Thesis Title: Hiding in plain sight: accounting for rate heterogeneity in trait evolution models

**M.Sc. Evolutionary Biology and Ecology** Aug. 2015 - Jul. 2017

*University of Toronto, Canada*

Supervisor: Dr. D. Luke Mahler

Thesis Title: The Effect of Congeners on Trait Evolution and Sexual Dimorphism in Lesser Antillean Anolis Lizards

**B.Sc Biology and History** Sept. 2010 - Jun. 2015

*University of Toronto, Canada*

## PROFESSIONAL EXPERIENCE

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**Assistant Professor, Michigan Society of Fellows** Aug. 2024 - present

*University of Michigan, USA*

**Post-doctoral researcher, Schmidt Futures post-doctoral fellow** Jan. 2023 - Dec. 2024

*University of Michigan, USA*

**Post-doctoral researcher, Post-doctoral research associate** Oct. 2022 - Dec. 2022

*University of Tennessee, Knoxville, USA*

## PUBLICATIONS

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1. Stepanova N, Boyko JD, Lin J, Davis Rabosky AR, and Rabosky DL. Punctuated Versus Gradual Shifts in the Multivariate Evolutionary Process: A Test With Paired Radiations of Scincid Lizards. *Systematic Biology* 2025;74:483–98.
2. Vasconcelos T, Weaver WN, Baumgartner A, Bugnaski Z, and Boyko JD. Automated extraction of leaf mass per area from digitized herbarium specimens. *New Phytologist* 2025.
3. Vasconcelos T and Boyko JD. mvh: An R tool to assemble and organize virtual herbaria from openly available specimen images. *Applications in Plant Sciences* 2025;13:e11631.
4. Boyko JD. SegmentR: Deep learning for automated segmentation with an R interface. *Ecological Informatics* 2025:103259.

5. Boyko JD. Automatic Discovery of Optimal Discrete Character Models. *bioRxiv* 2024;2024–11.
6. Boyko JD and Vasconcelos T. Rates of biome shift predict diversification dynamics in flowering plants. *bioRxiv* 2024;2024–6.
7. Boyko JD and O'Meara BC. dentist: Quantifying uncertainty by sampling points around maximum likelihood estimates. *Methods in Ecology and Evolution* 2024;15:628–38.
8. Boyko JD, Cohen J, Fox N, et al. An Interdisciplinary Outlook on Large Language Models for Scientific Research. 2023.
9. Hagen ER, Vasconcelos T, Boyko JD, and Beaulieu JM. Investigating historical drivers of latitudinal gradients in polyploid plant biogeography: A multiclade perspective. *American Journal of Botany* 2024:e16356.
10. Boyko JD, Hagen ER, Beaulieu JM, and Vasconcelos T. The evolutionary responses of life-history strategies to climatic variability in flowering plants. *The New phytologist* 2023.
11. Boyko JD, O'Meara BC, and Beaulieu JM. A novel method for jointly modeling the evolution of discrete and continuous traits. *Evolution* 2023.
12. Boyko JD and Beaulieu JM. Reducing the biases in false correlations between discrete characters. *Systematic biology* 2022.
13. Mortimer SME, Boyko JD, Beaulieu JM, and Tank DC. Synthesizing Existing Phylogenetic Data to Advance Phylogenetic Research in Orobanchaceae. *Systematic Botany* 2022;47:533–44.
14. Vasconcelos T, Boyko JD, and Beaulieu JM. Linking mode of seed dispersal and climatic niche evolution in flowering plants. *Journal of Biogeography* 2021;50:43–56.
15. Boyko JD and Beaulieu JM. Generalized hidden Markov models for phylogenetic comparative datasets. *Methods in Ecology and Evolution* 2021;12:468–78.
16. Nakov T, Boyko JD, Alverson AJ, and Beaulieu JM. Models with unequal transition rates favor marine origins of Cyanobacteria and photosynthetic eukaryotes. *Proceedings of the National Academy of Sciences* 2017;114:E10606–E10607.

## **AWARDS AND GRANTS**

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<b>UM/OpenAI Collaboration Grant (Co-I)</b>	2025
<i>\$50,000 USD</i>	
<b>UMPDA Professional Development Award</b>	2023
<i>\$250 USD</i>	
<b>Journal of Biogeography Innovation Award</b>	2022
<i>\$750 USD</i>	
<b>Outstanding Graduate Student Research Award</b>	2021
<i>\$1000 USD</i>	
<b>American Society of Naturalists Travel Grant</b>	2019
<i>\$500 USD</i>	
<b>Distinguished Doctoral Fellowship</b>	2017 - 2021
<i>\$80,000 USD</i>	
<b>SGS Conference Grant</b>	2017
<i>\$750 USD</i>	
<b>Phylogenetic Symposium Travel Grant</b>	2016
<i>\$400 USD</i>	

## **PROFESSIONAL SERVICE**

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<b>SSE Symposium - AI in Evolutionary Biology (organizer)</b>	2025
<b>Virtual Workshop - The Future of AI for Freshwater Biodiversity Conservation (invited participant)</b>	2025

BioBlend Workshop: Integrating Multimodal and Crowd-sourced Data for AI-Driven Biodiversity Monitoring and Conservation (organizer)	2024
MIDAS and Schmidt Futures AI in Science Colloquium (organizer)	2023

## CODING AND HIGH PERFORMANCE COMPUTING

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R	Advanced
Python	Advanced
Bash	Proficient
High Performance Computing	Proficient

## SOFTWARE CONTRIBUTIONS

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<i>SegmentR</i>	R package for image segmentation.
<i>mvh</i>	Assembling and organizing virtual herbaria
<i>corHMM</i>	Correlated Hidden Markov Models for comparative biology
<i>dentist</i>	Computing uncertainty by sampling points around maximum likelihood estimates
<i>hiSSE</i>	Hidden State Dependent Speciation Extinction models
<i>OUwie</i>	Continuous character evolution under Ornstein-Uhlenbeck (OU) models

## COMPETITIONS AND DATA CHALLENGES

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Japan Aerospace Exploration Agency (JAXA)	2023
<i>8th place</i>	

## PEER REVIEW

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Nature Communications, Systematic Biology, Evolution, Journal of Biogeography, Methods in Ecology and Evolution, New Phytologist, PNAS, PLOS Biology, PLOS computational biology, ProceedingsB

## TEACHING

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<b>Instructor (Fall 2025)</b> <i>BIO202: Biological Data Analysis and Programming</i>	University of Michigan
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<b>Invited talk (2025)</b> <i>AI for Scientists and Engineers summer academy: Foundation Models</i>	University of Michigan
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<b>Invited talk (2025)</b> <i>Tools and Technology Seminar: HMs and antibiotic resistance evolution</i>	University of Michigan
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<b>Invited talk (2024)</b> <i>Workshop Harmonizing Accumulation Modeling (WHAM)</i>	University of Bergen
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<b>Instructor (2024)</b> <i>Stats Workshop: Phylogenetic Comparative Methods</i>	University of Michigan
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<b>Instructor (2024)</b> <i>An Introduction to Generative AI Tools for Research</i>	University of Michigan
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<b>Instructor (2024)</b> <i>Gans Foundation Student Workshop: Functional Morphology</i>	University of Michigan
<b>Instructor (2024)</b> <i>Phylogenetic Comparative Methods in R</i>	Boston University
<b>Instructor (2024)</b> <i>An Introduction to Generative AI Tools for Research</i>	University of Michigan
<b>Instructor (2023)</b> <i>Enhancing Professional Productivity with Generative AI</i>	University of Michigan
<b>Teaching Assistant (2017-2022)</b> <i>Evolutionary Biology</i>	University of Arkansas
<b>Teaching Assistant (2016-2017)</b> <i>Macroevolution</i>	University of Toronto
<b>Teaching Assistant(2016-2017)</b> <i>Biostatistics</i>	University of Toronto
<b>Teaching Assistant (2015-2016)</b> <i>From Genomes to Ecosystems in a Changing World</i>	University of Toronto
<b>Teaching Assistant (2015-2016)</b> <i>Adaptation and Biodiversity</i>	University of Toronto

## PRESENTATIONS

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1. Boyko, J.D., (2025) Automatic discovery of optimal discrete character models (Evolution: Oral presentation - International conference)
2. Boyko, J.D., Vasconcelos, T.N.C. (2024) Rates of biome shift predict diversification dynamics in flowering plants (International Botanical Congress: Oral presentation - International conference)
3. Cohen, Y., Rauch, A., Li, J., Modenesi, B., Boyko, J.D., Wang, Y., Byon, E., and Huan, X. (2023) Sparse Modeling of Wavelet Features for Fault Classification and Regression in Spacecraft Propulsion Systems (PHMAP: Poster - International conference)
4. Boyko, J.D., Hagen. E.R., Beaulieu, J.M., Vasconcelos, T.N.C. (2023) The evolutionary responses of life-history strategies to climatic variability in flowering plants (Botany: Oral presentation - International conference)
5. Boyko, J.D., O'Meara B.C., Beaulieu, J.M. (2023) A Novel Method for Jointly Modeling the Evolution of Discrete and Continuous Traits (Evolution: Oral presentation - International conference)
6. Boyko, J.D., Beaulieu, J.M. (2022) Reducing the biases in false correlations between discrete characters. (Evolution: Poster presentation - International Conference)
7. Boyko, J.D., Beaulieu, J.M. (2019) Quantifying the limits of our knowledge in phylogenetic comparative studies. (Quantitative Genetics Workshop: Oral presentation - International Workshop)
8. Boyko, J.D., Nakov, T., Alverson, A.J. and Beaulieu, J.M. (2019) Quantifying the limits of our knowledge in phylogenetic comparative studies. (Botany: Oral presentation – International Conference)

9. Boyko, J.D., Nakov, T., Alverson, A.J. and Beaulieu, J.M. (2019) Quantifying the limits of our knowledge in phylogenetic comparative studies. (Botany: Oral presentation – International Conference)
10. Boyko, J.D., Nakov, T., Alverson, A.J. and Beaulieu, J.M. (2018) Testing the signal of marine versus freshwater origins of photosynthetic eukaryotes. (Botany: Oral presentation – International Conference)
11. Boyko, J.D., Mahler, D. L. (2017) Testing for character displacement in Lesser Antillean anoles. (Atwood Colloquium: Oral presentation – Institutional Conference)
12. Boyko, J.D., Mahler, D. L. (2016) Character displacement in Lesser Antillean Anolis lizards. (Evolution: Oral presentation – International Conference)
13. Boyko, J.D., Mahler, D. L. (2016) Testing for repeated character displacement in Anolis lizards. (OE3C: Oral presentation – Provincial Conference)

## **REFERENCES**

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**Dr. Jeremy Beaulieu**

*University of Arkansas*

*Department of Biological Sciences*

*Science-Engineering Building*

*Fayetteville AR*

*jmbeauli@uark.edu*

*(479) 575-2618*

**Dr. Brian O'Meara**

*University of Tennessee, Knoxville*

*Department of Evolutionary biology and Ecology*

*Dabney Hall*

*Knoxville, TN*

*bomeara@utk.edu*

*(865) 974-2804*

**Dr. Dan Rabosky**

*University of Michigan*

*Ecology and Evolutionary Biology Department*

*Biological Sciences Building*

*Ann Arbor, MI*

*drabosky@umich.edu*

*(510) 610-9082*

**Dr. Stephen Smith**

*University of Michigan*

*Ecology and Evolutionary Biology Department*

*Biological Sciences Building*

*Ann Arbor, MI*

*eebsmith@umich.edu*

*(734) 764-7923*