James Boyko

PERSONAL DETAILS

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EDUCATION

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

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 - Jan. 2023
University of Tennessee, Knoxville, USA

PUBLICATIONS

1. Boyko JD and Vasconcelos T. Rates of biome shift predict diversification dynamics in flowering plants. bioRxiv 2024:2024–6.
2. Boyko J. Automatic Discovery of Optimal Discrete Character Models. bioRxiv 2024:2024–11.
3. Vasconcelos T and Boyko J. mvh: an R tool to assemble and organize virtual herbaria from openly available specimen images. bioRxiv 2024:2024–8.
4. Boyko J. SegColR: Deep Learning for Automated Segmentation and Color Extraction. bioRxiv 2024:2024–7.
5. Boyko J, Cohen J, Fox N, et al. An Interdisciplinary Outlook on Large Language Models for Scientific Research. 2023.

6. 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.
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, Hagen ER, Beaulieu JM, and Vasconcelos T. The evolutionary responses of life-history strategies to climatic variability in flowering plants. The New phytologist 2023.
9. Boyko JD, O'Meara BC, and Beaulieu JM. A novel method for jointly modeling the evolution of discrete and continuous traits. Evolution 2023.
10. Boyko JD and Beaulieu JM. Reducing the biases in false correlations between discrete characters. Systematic biology 2022.
11. 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.
12. 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.
13. Boyko JD and Beaulieu JM. Generalized hidden Markov models for phylogenetic comparative datasets. Methods in Ecology and Evolution 2021;12:468–78.
14. 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

UMPDA Professional Development Award 2023
$250 USD
Journal of Biogeography Innovation Award 2022
$750 USD
Outstanding Graduate Student Research Award 2021
$1000 USD
American Society of Naturalists Travel Grant 2019
$500 USD
Distinguished Doctoral Fellowship 2017 - 2021
$80,000 USD
SGS Conference Grant 2017
$750 USD
Phylogenetic Symposium Travel Grant 2016
$400 USD

PROFESSIONAL SERVICE

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

R Advanced
Python Advanced
Bash Proficient
High Performance Computing Proficient

SOFTWARE CONTRIBUTIONS

SegmentR	R package for image segmentation and color analysis using Grounded SAM (Segment Anything Model).
mvh	Assembling and organizing virtual herbaria
SegColR	Image segmentation and color analysis using Grounded SAM
corHMM	Correlated Hidden Markov Models for comparative biology
dentist	Computing uncertainty by sampling points around maximum likelihood estimates
hiSSE	Hidden State Dependent Speciation Extinction models
OUwie	Continuous character evolution under Ornstein-Uhlenbeck (OU) models

COMPETITIONS AND DATA CHALLENGES

Japan Aerospace Exploration Agency (JAXA) 2023
8th place

PEER REVIEW

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

TEACHING

Instructor (Fall 2025) University of Michigan
BIO202: Biological Data Analysis and Programming

Invited talk (2025) University of Michigan
Tools and Technology Seminar: Correlated character evolution with hidden Markov models and applications in antibiotic resistance evolution

Invited talk (2024) University of Bergen
Workshop Harmonizing Accumulation Modeling (WHAM)

Instructor (2024) University of Michigan
Stats Workshop: Phylogenetic Comparative Methods

Instructor (2024) University of Michigan
An Introduction to Generative AI Tools for Research

Instructor (2024) University of Michigan
Gans Foundation Student Workshop: Functional Morphology

Instructor (2024) Boston University
Phylogenetic Comparative Methods in R

Instructor (2024) University of Michigan
An Introduction to Generative AI Tools for Research

Instructor (2023) University of Michigan
Enhancing Professional Productivity with Generative AI

Teaching Assistant (2017-2022) University of Arkansas
Evolutionary Biology

Teaching Assistant (2016-2017) University of Toronto
Macroevolution

Teaching Assistant(2016-2017) University of Toronto
Biostatistics

Teaching Assistant (2015-2016 University of Toronto
From Genomes to Ecosystems in a Changing World

Teaching Assistant (2015-2016) University of Toronto
Adaptation and Biodiversity

PRESENTATIONS

1. 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)
2. 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)
3. 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)
4. 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)
5. Boyko, J.D., Beaulieu, J.M. (2022) Reducing the biases in false correlations between discrete characters. (Evolution: Poster presentation - International Conference)
6. Boyko, J.D., Beaulieu, J.M. (2019) Quantifying the limits of our knowledge in phylogenetic comparative studies. (Quantitative Genetics Workshop: Oral presentation - International Workshop)
7. 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)
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. (2018) Testing the signal of marine versus freshwater origins of photosynthetic eukaryotes. (Botany: Oral presentation – International Conference)
10. Boyko, J.D., Mahler, D. L. (2017) Testing for character displacement in Lesser Antillean anoles. (Atwood Colloquium: Oral presentation – Institutional Conference)
11. Boyko, J.D., Mahler, D. L. (2016) Character displacement in Lesser Antillean Anolis lizards. (Evolution: Oral presentation – International Conference)
12. Boyko, J.D., Mahler, D. L. (2016) Testing for repeated character displacement in Anolis lizards. (OE3C: Oral presentation – Provincial Conference)

REFERENCES

Dr. Jeremy Beaulieu
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Fayetteville AR
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Dr. Brian O'Meara
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