

# Emily M. Troyer

Postdoctoral Researcher  
University of Michigan  
Ann Arbor, MI 48109-1079

Website: fishdiversitylab.weebly.com  
Email: emtroyer@umich.edu

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## EDUCATION

- Aug 2019- May 2024 **Ph.D. Biology**  
University of Oklahoma, Department of Biology
- Aug 2016- May 2018 **M.S. Marine Science**  
King Abdullah University of Science and Technology, Saudi Arabia
- May 2013- Dec 2015 **B.S. Zoology**  
The Ohio State University
- Sept 2008- June 2012 **B.S. Criminology, Arabic minor**  
The Ohio State University

## PROFESSIONAL APPOINTMENTS

- August 2024- Present **Postdoctoral Researcher**  
University of Michigan, Museum of Paleontology

## PUBLICATIONS

- (10) Berv JS, Fox N, Thorstensen MJ, Lloyd-Laney H, **Troyer EM**, Rivero-Vega RA, Smith SA, Friedman M, Fouhey DF, Weeks BC. bifrost: an R package for scalable inference of phylogenetic shifts in multivariate evolutionary dynamics. bioRxiv preprint: <https://doi.org/10.64898/2026.04.12.718036>
- (9) **Troyer EM**, White W, Betancur-R R, Arcila D. 2025. Parallel shifts in differential gene expression reveal convergent miniaturization in fishes. *Proceedings of the National Academy of Sciences*. 122 (43) e2512299122. DOI: 10.1073/pnas.2512299122
- (8) **Troyer EM**, Rivero-Vega RA, Cui X, Zhu M, Qiao T, Saad HH, Figueroa RT, Andrews JV, Clement AM, Lebedev OA, Higgins R, Igielman B, Pierce SE, Giles S, Friedman M. 2025. Macroevolutionary role reversals in the earliest radiation of bony fishes. *Current Biology*. 35(19) 4631-4641.e3. DOI: 10.1016/j.cub.2025.08.008
- (7) Igielman B, Figueroa RT, Higgins RR, Pierce SE, Coates MI, **Troyer EM**, Fernandez V, Dollman K, Lu J, Zhu M, Friedman M, Giles S. 2025. The lower jaw of Devonian ray-finned fishes (Actinopterygii): anatomy, relationships, and functional morphology. *The Anatomical Record*. DOI: 10.1002/ar.70005
- (6) Hart PB, Rincon-Sandoval M, Melendez-Vazquez F, Armbruster JW, **Troyer EM**, Bierstein OM, Gough BJ, Betancur-R R, Niemiller ML, Arcila D. 2025. Ancient climate changes and relaxed selection shape cave colonization in North American cavefishes. *Proceedings of the Royal Society B*. 292(2051) DOI: 10.1098/rspb.2024.2516
- (5) Santaquiteria A, Miller E, Rosas-Puchuri U, Pedraza-Marrón C, **Troyer EM**, Westneat M, Carnevale G, Arcila D, Betancur-R R. 2025. Colonization dynamics explain the high species richness of syngnatharian fishes (seahorses and allies) in the Indo-Pacific. *The American Naturalist*. 205(3) DOI:10.1086/733931
- (4) **Troyer EM**, Evans KM, Goatley CHR, Friedman M, Carnevale G, Nicholas B, Kolmann M, Bemis KE, Arcila D. 2024. Evolutionary innovation accelerates morphological diversification in pufferfishes and their relatives. *Evolution*. 78(11) 1869-1882. DOI:10.1093/evolut/qpae127

- (3) **Troyer EM**, Betancur-R R, Hughes LC, Westneat M, Carnevale G, White WT, Pogonoski JJ, Tyler JC, Baldwin CC, Ortí G, Brinkworth A, Clavel J, Arcila D. 2022. The impact of paleoclimatic changes on body size evolution in marine fishes. *Proceedings of the National Academy of Sciences*. 119(29) e2122486119. DOI: 10.1073/pnas.2122486119
- (2) Kovačić M, Bogorodsky SV, **Troyer EM**, Tornabene L. 2019. *Cerogobius petrophilus* (Perciformes: Gobiidae), a new gobiid genus and species from the Red Sea. *Zootaxa*. DOI: 10.11646/zootaxa.4565.2.2
- (1) **Troyer EM**, Coker DJ, Berumen ML. 2018. Comparison of cryptobenthic reef fish communities among microhabitats in the Red Sea. *PeerJ*. DOI: 10.7717/peerj.5014

### **PUBLICATIONS IN PREP**

- (1) Miller EC, Faucher R, Santaquiteria A, West J, Armbruster JW, Baldwin C, Buser TJ, Carpenter K, Diaz de Astarloa JM, Gartner S, Huang S, Kim J, López-Fernández H, Lujan N, Mandrak N, Miya M, Neves M, Paquin M, Pogonoski J, **Troyer EM**, Westneat M, White W, Wiley EO, Carnevale G, Ortí G, Martinez CM, Hughes LC, Betancur-R R, Evans K, Arcila D. Marine and freshwater habitats differentially shape skull evolution in a massive fish radiation.

### **PRESENTATIONS**

- 2026 **Troyer EM**, Lyons-Weiler Z, Figueroa RT, Higgins R, Igielman B, Dearden R, Caron A, Coates M, Pierce S, Giles S, Friedman M. “Radiation in jaw morphology of early ray-finned fishes after the Late Devonian extinction”. Oral presentation. Society for Integrative and Comparative Biology Annual Meeting, Portland OR.
- 2025 **Troyer EM**. “Shedding light on the unseen: Evolutionary insights from the fish fossil record.” Smith Lecture, University of Michigan.
- 2025 **Troyer EM**, Rivero-Vega R, Cui X, Zhu M, Qiao T, Saad HH, Figueroa RT, Andrews JV, Clement A, Lebedev O, Higgins R, Igielman B, Pierce S, Giles S, Friedman M. “Macroevolutionary role reversals in the earliest radiation of bony fishes.” Oral presentation. International Congress of Vertebrate Morphology Virtual Meeting.
- 2025 **Troyer EM**, Rivero-Vega R, Cui X, Zhu M, Qiao T, Saad HH, Figueroa RT, Andrews JV, Clement A, Lebedev O, Higgins R, Igielman B, Pierce S, Giles S, Friedman M. “Macroevolutionary role reversals in the earliest radiation of bony fishes.” Oral presentation. Evolution, Athens, GA.
- 2025 **Troyer EM**, Rivero-Vega R, Cui X, Zhu M, Clement A, Lebedev O, Higgins R, Igielman B, Pierce S, Giles S, Friedman M. “Patterns of jaw diversification in early bony fishes.” Oral presentation. Society for Integrative and Comparative Biology Annual Meeting, Atlanta, GA.
- 2024 **Troyer EM**. “Integrating genomic, morphological, and paleontological data to unravel macroevolutionary drivers of morphological diversity in fishes.” Oral presentation. EEB Tuesday Seminar Series, University of Michigan.
- 2024 **Troyer EM**, Evans KM, Goatley CHR, Friedman M, Carnevale G, Nicholas B, Kolmann M, Bemis KE, Arcila D. “Evolutionary innovation accelerates morphological diversification in pufferfishes and their relatives.” Oral presentation. 3<sup>rd</sup> Joint Congress on Evolutionary Biology (virtual portion).
- 2024 **Troyer EM**, Arcila D. “They might not be giants: Genetic convergence on miniaturization in goby fishes.” Oral presentation. 3<sup>rd</sup> Joint Congress on Evolutionary Biology, Montreal, Canada.

- 2023 **Troyer EM**, Evans K, Goatley C, Friedman M, Carnevale G, Nicholas B, Kolmann M, Bemis K, Arcila D. "Kind of a beak deal: Mouth type, not reef association, promotes rapid diversification in marine fishes." Oral presentation. Indo-Pacific Fish Conference, Auckland, New Zealand.
- 2023 **Troyer EM**, Evans K, Goatley C, Arcila D. "Kind of a Beak Deal: Patterns of Skull Evolution in Fossil and Extant Tetraodontiform Fishes." Invited oral presentation. International Congress of Vertebrate Morphology. Cairns, Australia.
- 2022 **Troyer EM**, Betancur-R R, Hughes LC, Westneat M, Carnevale G, White WT, Pogonoski JJ, Tyler JC, Baldwin CC, Ortí G, Brinkworth A, Clavel J, Arcila D. "The impact of paleoclimatic changes on body size evolution in marine fishes". Oral presentation. Evolution. Cleveland, OH.
- 2021 **Troyer EM**, Betancur-R R, Arcila D. "Role of Paleoclimatic Events on the Evolution of Body Size in Tetraodontiform Fishes." Oral presentation. Stoye Award Best Student Oral Presentation Winner, Joint Meeting of Ichthyologists and Herpetologists. Phoenix, AZ.
- 2018 **Troyer EM**. "Microhabitat association of cryptobenthic fishes in the central Red Sea." Oral presentation. Visiting Scholar Seminar, King Fahd University of Petroleum and Minerals. Dhahran, Saudi Arabia.
- 2017 **Troyer EM**, Coker DJ, Berumen ML. "Microhabitat association of cryptobenthic reef fish (Family: Gobiidae) in the central Red Sea." Oral presentation. 10<sup>th</sup> Indo-Pacific Fish Conference. Tahiti, French Polynesia.
- 2016 **Troyer EM**, Hoskins EA, Hamilton IM. "Schooling individuals discover a novel food source via social learning faster than non-schooling individuals." Poster. The Ohio State University Spring Undergraduate Research Student Poster Forum. Columbus, OH.
- 2015 **Troyer EM**, Hoskins EA, Hamilton IM. "How individual variation in activity influences the transmission of novel information." Poster. The Ohio State University Fall Undergraduate Research Student Poster Forum. Columbus, OH.

### **STUDENT RESEARCH MENTORSHIP**

- 2025-present Jerónimo Morales Toledo, graduate student, University of Michigan
- Phylogenetic comparative methods and Bayesian inference to explore the evolution and ecology of aroid plants
- 2022-2024 Maddie McClurg, undergraduate student, University of Oklahoma
- Phylogenetics of tetraodontiform fishes

### **TEACHING EXPERIENCE**

#### *Short Seminars*

- 2026 Introduction to Geometric Morphometrics in *R*, University of Michigan

#### *Graduate Teaching Assistant*, University of Oklahoma (six semesters)

- 2019-2023 Introduction to Biology Lab (BIOL 1124)  
 2020-2021 Ichthyology (BIOL 4493) \*created lab course materials

#### *Guest Lecturer*

- 2025 Analytical Paleobiology (EARTH 444), University of Michigan

2023 Ichthyology (BIOL 4493), University of Oklahoma

### **FELLOWSHIPS AND AWARDS** (total ~\$57,000)

2024 Society for the Study of Evolution W. D. Hamilton Award Finalist **\$500**

2024 University of Oklahoma Three Minute Thesis Competition Runner Up and People's Choice Award **\$2,500**

2023 University of Oklahoma College of Arts & Sciences Finishing Fellowship **\$10,500**

2023 University of Oklahoma Biology Department Travel Fund **\$1,000**

2023 University of Oklahoma Bullard Dissertation Completion Fellowship **\$10,500**

2023 International Congress of Vertebrate Morphology Travel Award **\$620**

2022 University of Oklahoma Graduate College Design a Shelf Contest **\$500**

2021-2024 University of Oklahoma Graduate Student Senate Grant **\$2,585**

2021 University of Oklahoma L.G. Hill Biology Excellence Fund Award **\$1,500**

2021 American Society for Ichthyologists and Herpetologists Frederick H. Stoye Award for Best Student In-Person Oral Presentation **\$300**

2020-2022 University of Oklahoma L.G. Hill Biology Excellence Fund Award **\$1,500**

2020-2023 University of Oklahoma Department of Biology Adams Summer Research Scholarship **\$14,000**

2020-2022 University of Oklahoma Graduate College Robberson Research Grant **\$2,500**

2020 University of Oklahoma College of Arts and Sciences Leota McGuire Graduate Fellowship **\$8,500**

### **PROFESSIONAL SERVICE**

**Peer reviews:** *PNAS, PLoS ONE, Ecology and Evolution, Systematic Biology, PeerJ, Journal of Vertebrate Paleontology, Journal of Heredity, Journal of Fish Biology*

#### **Society Service:**

2025-2026 Judge for the Society for the Study of Evolution W.D. Hamilton Award for Outstanding Graduate Student Presentation at Evolution

2025 Judge for Division of Vertebrate Morphology Best Student Poster competition at Society for Integrative and Comparative Biology

#### **Service for University of Oklahoma:**

2023-2024 Diversity, Equity, and Inclusion Committee. Promote a more diverse department, and consult on matters of diversity and inclusion.

2022-2023 Undergraduate Studies Committee. Assist in reviewing new course syllabi and curriculum change requests.

2022 Graduate Selections Committee. Assist in evaluating and ranking MS and Ph.D. candidates for the Biology program.

### **VOLUNTEER EXPERIENCE**

2018-2019 The Ohio State University Museum of Biological Diversity Fish Collection,  
Supervisor: Marc Kibbey

### **PROFESSIONAL DEVELOPMENT**

2025 Science Communication Fellows Program (15-hour course on public science communication), University of Michigan Museum of Natural History  
2023 RNA-seq for analyses for non-model organisms (5-day bioinformatics workshop), Physalia Courses  
2019 Software and Data Carpentry (2-day coding workshop), University of Oklahoma

### **PUBLIC OUTREACH**

2025-2026 Scientist Spotlight at the University of Michigan Museum of Natural History. Created hands-on activities to showcase my research to the general public.  
2025 University of Michigan Museum of Natural History ID Day. Showcased specimens in the Ichthyology collection and helped visitors identify their own specimens.  
2021-2024 University of Oklahoma Sam Noble Museum Ichthyology Collections Tour. Provided tours of the collection to local schools and answered questions about museum curation and natural history.  
2022-2024 University of Oklahoma Sam Noble Museum Curiosidays. Developed and led a hands-on activity where visitors could experiment with gyotaku and create fish prints from museum specimens in the Ichthyology Collection.

### **PROFESSIONAL SOCIETIES AND ASSOCIATIONS**

Society for Integrative and Comparative Biology  
International Society for Vertebrate Morphology  
Society for the Study of Evolution