

Elizabeth Christina Santos

Assistant Professor & Director of Fishes
Evolution, Ecology and Organismal Biology
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PROFESSIONAL APPOINTMENTS

August 2025–	Assistant Professor & Director of Fishes Department of Evolution, Ecology and Organismal Biology Museum of Biological Diversity The Ohio State University
January 2024–July 2025	Postdoctoral Scholar Department of Ecology and Evolutionary Biology University of California, Irvine
April–December 2023	Postdoctoral Research Fellow Department of Biology Sam Noble Museum of Natural History University of Oklahoma
2020–2023	NSF Postdoctoral Research Fellow Interdisciplinary Research Using Biological Collections June 2021–April 2023: University of Oklahoma Jan. 2020–June 2021: University of Washington

EDUCATION

Ph.D. 2014–2019	University of Arizona Ecology and Evolutionary Biology
M.S. 2013–2014	University of California, San Diego Biology
B.S. 2008–2012	University of California, San Diego Ecology, Behavior, and Evolution; with minor in Marine Science Honors with Distinction in Biology; Phi Beta Kappa; <i>cum laude</i>

PUBLICATIONS

23 total, 1266 citations, h-index=14

Preprints:

Santos, E. C., J. Huie, A. Capobianco, R. Faucher, T. Clardy, W. B. Ludt, G. Carnevale, D. Arcila, and C. M. Martinez. 2026. Macroevolutionary consequences of twin neck innovations in deep-sea dragonfishes. *bioRxiv*. <https://doi.org/10.64898/2026.06.21.733442>

Santos, E. C., et al. [30 coauthors] 2026. Ecological axes of skull diversification in a massive vertebrate radiation. *bioRxiv*. <https://doi.org/10.64898/2026.06.19.733456>

1. Chan, H., **E. C. Santos**, and K. M. Evans. 2026. Integration promotes morphological innovation in deep-sea anglerfishes (Eupercaria: Lophiiformes). *Evolution*, in press.
2. MacFarland, E., A. Medeiros, C. Pedraza-Marrón, L. Hughes, S. Pirro, **E. Santos**, A. Santaquiteria, W. White, M. Miya, G. Ortí, T. Linley, C. Baldwin, J. Orr, D. Arcila, L. Tornabene, R. Betancur-R. 2026. The convergent evolution of the pelvic suction cup: a unique key innovation in spiny-finned fishes. *Science Advances*, in press.
3. **Santos, E. C.,** S. T. Friedman, and C. M. Martinez. 2026. Distinct evolutionary signatures underlie body shape diversity across deep sea habitats. *Evolution*, 80: 85–96.
Press: OSU News, Interview for CBC Radio Show Quirks and Quarks
4. Gallagher, B. K., **E. C. Santos**, M. Dumelle, P. R. Kaufmann, and J. L. Ebersole. 2025. Geologic history explains freshwater fish species richness across the conterminous USA. *Global Ecology and Biogeography*, 34: e70139.
5. Neves, M. P., H. Chan, **E. C. M. Santos**, and K. Evans. 2025. Cranial modularity drives phenotypic diversification and adaptive radiation of Antarctic icefishes. *Proceedings of the National Academy of Sciences*, 122: e2503283122.
6. **Miller, E. C.,** R. Faucher*, P. B Hart, M. Rincon-Sandoval, A. Santaquiteria, W. T. White, C. C. Baldwin, M. Miya, R. Betancur-R, L. Tornabene, K. Evans, and D. Arcila. 2025. Reduced evolutionary constraint accompanies ongoing radiation in deep-sea anglerfishes. *Nature Ecology and Evolution*, 9: 474–490.
* = undergraduate co-author
Press: NPR Shortwave Podcast episode “Think anglerfish are weird? Wait until you hear how they evolved!”
7. Santaquiteria, A., **E. C. Miller**, U. Rosas-Puchuri, C. R. Pedraza-Marrón, E. M. Troyer, M. W. Westneat, G. Carnevale, D. Arcila, and R. Betancur-R. 2025. Colonization dynamics explain the decoupling of species richness and morphological disparity in syngnatharian fishes across oceans. *The American Naturalist*, 205: 3.
8. **Miller, E. C.** 2023. Historical biogeography supports Point Conception as the site of turnover between temperate East Pacific ichthyofaunas. *PLoS ONE*, 18: e0291776.

9. Heiple*, Z., J. M. Huie, A. Medeiros, P. Hart, C. Goatley, D. Arcila, and **E.C. Miller**. 2023. Many ways to build an angler: An analysis of feeding morphologies in a deep-sea evolutionary radiation. *Biology Letters*, 19: 20230049.
*=undergraduate co-author
10. **Miller, E. C.**, C. M. Martinez, S. T. Friedman, P. C. Wainwright, S. A. Price, and L. Tornabene. 2022. Alternating regimes of shallow and deep-sea diversification explain a species richness paradox in marine fishes. *Proceedings of the National Academy of Sciences*, 119: e2123544119.
Press: *UW News: "Study reveals how ancient fish colonized the deep sea"*
11. **Miller, E. C.** 2021. Comparing diversification rates in lakes, rivers, and the sea. *Evolution*, 75: 2055–2073.
Press: *PNAS Inner Workings: "Reeling in answers to the 'freshwater fish paradox'"; Minute Earth YouTube channel episode "The Freshwater Paradox"*
12. **Miller, E. C.**, S. L. Mesnick, and J. J. Wiens. 2021. Sexual dichromatism is decoupled from diversification over deep time in fishes. *The American Naturalist*, 198: 232–252.
13. **Miller, E. C.*** and C. Román-Palacios*. 2021. Evolutionary time best explains the latitudinal diversity gradient of living freshwater fish diversity. *Global Ecology and Biogeography*, 30: 749–763.
*= authors contributed equally
14. Barrientos, L., J. Streicher, **E. C. Miller**, M. Pie, J. J. Wiens, and A. J. Crawford. 2021. Phylogeny of terraranan frogs based on 2,665 loci and impacts of missing data on phylogenomic analyses. *Systematics and Biodiversity*, 19: 818–833.
15. Hernandez-Hernandez*, T., **E. C. Miller**, C. Román-Palacios, and J. J. Wiens. 2021. Speciation across the Tree of Life. *Biological Reviews*, 96: 1205–1242.
*=all authors contributed equally.
16. Wiens, J. J., A. Camacho, A. Goldberg, T. Jezkova, M. Kaplan, S. Lambert, **E. C. Miller**, J. Streicher, and R. Walls. 2019. Climate change, extinction, and Sky Island biogeography in a montane lizard. *Molecular Ecology*, 28: 2610–2624.
17. **Miller, E. C.**, K. T. Hayashi*, D. Song*, and J. J. Wiens. 2018. Explaining the ocean's richest biodiversity hotspot and global patterns of fish diversity. *Proceedings of the Royal Society B*, 285: 20181314.
*=undergraduate co-author
Press: *New York Times Trilobites (print and online), UA News, KJZZ (NPR member station).*
18. Streicher, J. W., **E. C. Miller**, P. C. Guerrero, C. Correa, J. C. Ortiz, A. J. Crawford, M. R. Pie, and J. J. Wiens. 2018. Evaluating methods for phylogenomic analyses, and a new phylogeny for

a major frog clade (Hyoidea). *Molecular Phylogenetics and Evolution*, 119: 128–143.

19. **Miller, E. C.** and J. J. Wiens. 2017. Extinction and time help drive the marine-terrestrial biodiversity gradient: is the ocean a deathtrap? *Ecology Letters*, 20: 911–921.
20. Larsen, B. B.*, **E. C. Miller**, M. K. Rhodes, and J. J. Wiens. 2017. Inordinate fondness multiplied and redistributed: the number of species on Earth and the new Pie of Life. *Quarterly Review of Biology*, 92: 229–265.
*=all authors contributed equally
21. **Miller, E. C.**, H. C. Lin, and P. A. Hastings. 2016. Improved resolution and a novel phylogeny for the Neotropical triplefin blennies (Teleostei: Tripterygiidae). *Molecular Phylogenetics and Evolution*, 96: 70–78.
22. Rosenblatt, R. C., **E. C. Miller**, and P. A. Hastings. 2013. Three new species of triplefin blennies of the genus *Enneanectes* (Teleostei, Tripterygiidae) from the Tropical Eastern Pacific with a key to Pacific species of *Enneanectes*. *Zootaxa*, 3636: 361–373.
23. **Miller, E. C.**, A. B. Sellas, and R. C. Drewes. 2012. A new species of *Hemidactylus* (Squamata: Gekkonidae) from Príncipe Island, Gulf of Guinea, West Africa with comments on the African-Atlantic clade of *Hemidactylus* geckos. *African Journal of Herpetology*, 61: 40–57.

Notes and comments:

Miller, E. C. 2020. Digest: Hypothesis testing in biogeography using phylogenetic trees. *Evolution*, 74: 2741–2742.

Miller, E. C. and J. J. Wiens. 2018. Demystifying the marine-terrestrial biodiversity gradient: response to Vermeij et al. *Ecology Letters*, 21: 940–941.

TEACHING

- 2026: EEOB 3194: Undergraduate Group Studies, Introduction to Marine Biology
(**Instructor**), Ohio State University
- Developed new course for EEOB
- 2020 **Instructor**, University of Washington
- FISH 290: Scientific Writing and Communication
- 2014–2019: **Teaching Assistant**, University of Arizona (five semesters)
- *Wrote lecture and lab materials; †guest lecturer
 - Ichthyology (ECOL 482, Fall 2015, Fall 2019)* †
 - Evolution (ECOL 335, Spring 2016)* †

- Herpetology (ECOL 453, Spring 2015)*, sole lab instructor
- Mammalogy (ECOL 485, Fall 2014)* †

- 2017: **Undergraduate Scientific Writing Seminar**, University of Arizona, Tucson, AZ
- Developed and taught a 2-hour workshop for STEM undergraduates to read and synthesize scientific literature
- 2010–2014: **Teaching Assistant, UC San Diego** (10 quarters)
- Biodiversity (BIEB 140, Spring 2012, 2013, 2014)
 - Animal Behavior and Communication (BIEB 166, Winter 2012)
 - Introduction to Ecology (BIEB 102, Fall 2011)
 - Organismic and Evolutionary Biology (BILD 3; Sp. 2010, Fa. 2011, Wi. 2011, Su. 2013, Wi. 2014)

STUDENT MENTORSHIP

- 2026–Present: Abigail Huber, MS, Ohio State University
- 2022–Present: Rose Faucher, undergraduate, Rice University
- **Co-authored publication in *Nature Ecology and Evolution***
 - Presented poster at 2023 Evolution meeting
 - Now PhD student, University of Southern California
- 2021–2023: Zachary Heiple, undergraduate to graduate student, University of Oklahoma
- Pilot NSF Postdoc-REU Program
 - Morphometrics of deep-sea anglerfishes using CT-scans
 - Poster and oral presentations at SICB 2022, JMIH 2022
 - **First-author publication in *Biology Letters***
 - Now PhD student, Scripps Institution of Oceanography
- 2016: Kenji Hayashi, undergraduate, Brown University. Now Ph.D. student at UCLA
- Global fish biogeography and diversification
 - **Co-authored publication in *Proceedings of the Royal Society B***
- 2016: Dongyuan Song, undergraduate, Fudan University. Now Ph.D. student at Harvard
- Global fish biogeography and diversification
 - **Co-authored publication in *Proceedings of the Royal Society B***

GRADUATE STUDENT COMMITTEES

1. Brendan O’Loughlin, Ohio State EEOB Ph.D., 2026–
2. Ryan Hudson, Ohio State EEOB Ph.D., 2026–
3. Josie Nelson, Ohio State EEOB Ph.D., 2026–
4. Halle Summers, Ohio State EEOB Ph.D., 2026–
5. Isabel Basden, Ohio State Earth Sciences Ph.D., 2026–
6. Nick Wilson, Ohio State Earth Sciences Ph.D., 2026–

GRANTS AND FELLOWSHIPS

\$359,900 total awarded

- 2019: NSF Postdoctoral Research Fellowship in Biology: Interdisciplinary Research Using Biological Collections. [DBI 1906574] “Tempo and mode in the abyss: evolution following colonization of the deep sea”. \$207,000.
- 2015: NSF Graduate Research Fellowship [DGE 1143953]. \$138,000
- 2014–2019: Awards from the University of Arizona. \$5,900 total
Robert Hoshaw Memorial Award (2018); Galileo Scholarship (2015, 2018); Women in STEM Travel Award (2019); Graduate and Professional Student Council Travel Award (2018, 2019)
- 2012: A. Stanley Rand Internship in Herpetology, Smithsonian Tropical Research Institute. \$3,000
- 2011: NSF Research Experiences for Undergraduates, California Academy of Sciences. \$5,000
- 2011: Friends of the International Center Study Abroad Scholarship, UC San Diego. \$1,000

HONORS AND AWARDS

- 2019: Ernst Mayr Award Symposium Finalist, Society of Systematic Biologists
- 2018: Robert W. Hoshaw Memorial Award, University of Arizona. ***Highest honor given to a graduate student in the Department of Ecology and Evolutionary Biology***
- 2018: Frederick H. Stoye Award for best oral presentation in general ichthyology, American Society of Ichthyologists and Herpetologists
- 2018: Graduate Student Award given for Scholarship in Ecology and Evolutionary Biology, University of Arizona
- 2015: NSF Graduate Research Fellowship
- 2014: NSF Graduate Research Fellowship Honorable Mention

PRESENTATIONS

Invited presentations:

- 2026: University of Bern Aquatic Ecology and Evolution Seminar Series, October 2026.
Purdue University Ecology and Evolution Seminar. October 2026.
Ohio State University School of Earth Science. September 2026.
- 2025: University of Dayton Department of Biology. November 2025.
Michigan State University Integrative Biology. March 2025.
Ohio State University Evolution, Ecology and Organismal Biology. February 2025.
New York University Department of Biology. February 2025.
Rutgers-Camden Center for Computational and Integrative Biology. January 2025.
University of California, Riverside. January 2025.
- 2024: California Ichthyology Congress (invited panelist). June 2024.
California State University Los Angeles. May 2024
Harvard Department of Organismic and Evolutionary Biology. March 2024.
- 2023: Louisiana State University Museum of Natural Science. November 2023.

Southern Louisiana University Department of Biological Sciences. November 2023. *Voted best Southeastern Seminar for Fall 2023*
 NOAA Alaska Fisheries, Seattle WA. October 2023.
 San Jose State University Department of Biological Sciences. October 2023.
 UC Irvine Ecology and Evolutionary Biology. October 2023.
 California State University Long Beach Biology Seminar Series. April 2023.
 2022: Scripps Institution of Oceanography. April 2022.
 2021: North Carolina Museum of Natural Sciences. October 2021.
 University of Oklahoma, Department of Biology. October 2021.
 Joint Meeting of Ichthyologists and Herpetologists symposium. July 2021.
 2020: University of Birmingham, Palaeo Discussion Group. April 2020.
 2019: University of Arizona, Quantitative Biology Seminar Series. April 2019.

Select contributed presentations:

Miller, E.C., R. Faucher, P. Hart, M. Rincon-Sandoval, A. Santaquiteria, R. Betancur-R, L. Tornabene, K. Evans, and D. Arcila. “Phylogenomics reveals continuous innovation in a deep-sea radiation.” Oral presentation. Society for Integrative and Comparative Biology, Seattle, WA, January 2024.

Miller, E.C., J. West, R. Faucher, S. Alvarez-Carretero, G. Carnevale, A. Santaquiteria, E. Troyer, C. Baldwin, M. Westneat, G. Ortí, L. Hughes, K. Evans, R. Betancur-R, and D. Arcila. “A novel phylogenomic hypothesis of Eupercaria, the new bush at the top.” Oral presentation. Indo-Pacific Fish Conference, Auckland, New Zealand, November 2023.

Miller, E.C., C. Martinez, S. Friedman, P. Wainwright, S. Price, and L. Tornabene. “Alternating regimes of shallow and deep diversification in marine fishes.” Oral presentation. Joint Meeting of Ichthyologists and Herpetologists, Spokane, WA, July 2022.

Miller, E.C., C. Martinez, S. Friedman, P. Wainwright, S. Price, and L. Tornabene. “Alternating regimes of shallow and deep diversification in marine fishes.” Oral presentation. Evolution (virtual), June 2021.

Miller, E.C. and J.J. Wiens. “Sexual selection does not explain diversity disparities among clades.” Oral presentation. Evolution, Providence, RI, June 2019. ***Finalist for Ernst Mayr Award for best student talk***

Miller, E.C., K.T. Hayashi, D. Song, and J.J. Wiens. “Explaining the ocean’s dominant species richness gradient and global patterns of marine fish diversity.” Oral presentation. Joint Meeting of Ichthyologists and Herpetologists, Rochester, NY, July 2018. ***Won best student oral presentation in general ichthyology category***

PROFESSIONAL DEVELOPMENT

- 2021: Entering Mentorship Workshop (8-hour course on mentoring undergraduate students), University of Wisconsin-Madison.
- 2020: 3D Morphometrics and Image Analysis Intense Workshop, Friday Harbor Laboratories
- 2018: Analytical Paleobiology Workshop, University of Florida.

PROFESSIONAL SERVICE

Grant panels: NSF BIO, April 2026.

Peer reviews: regular *Proceedings of the Royal Society B*, *Global Ecology and Biogeography*, *PLoS ONE*, *Communications Biology*, *Frontiers of Biogeography*, *Scientific Reports*, *Diversity*

- 2022 Invited participant: ‘HaloDaSH: The deep and shallow history of aquatic life’s passages between marine and freshwater habitats.’ Workshop held at 2022 SICB meeting.

Society service:

- 2023–2027 Board of Governors, American Society of Ichthyologists and Herpetologists
- 2022 Judge for 2022 best student talk, Joint Meeting of Ichthyologists and Herpetologists
- 2021 **Symposium Chair:** “Why are there so many kinds of fishes? A showcase of early-career ichthyologists.” 2021 Joint Meeting of Ichthyologists and Herpetologists
- 2021 Judge for 2020 Best Paper in *Copeia* (now *Ichthyology and Herpetology*)
- 2021, 2023 Reviewer for Student Award Symposium Abstracts, Society of Systematic Biologists
- 2020 Reviewer for Graduate Student Research Awards, Society of Systematic Biologists

Service for Ohio State University:

- 2025–Present: Graduate Admissions Committee
- 2025–Present: Museum of Biological Diversity Open House Committee

Service for the University of Washington:

- 2020: Mentor for NSF Graduate Research Fellowship Workshop Series

Service for the University of Arizona:

- 2018–2019: Travel and research proposal judge: Graduate and Professional Student Council; Women in STEM Student Council
- 2015–2016: Graduate student representative for Ecology and Evolutionary Biology

PUBLIC OUTREACH

Public Presentations:

1. Miller, E.C. “The three most surprising things about anglerfishes (to me).” North Carolina Museum of Natural Sciences, October 2021.
2. Miller, E.C. “The secret behind the diversity of coral reefs.” Desert Dolphins Scuba Dive Club, Tucson, AZ, February 2019.
3. Miller, E.C. “Where does biodiversity come from? An example from the world’s coral reefs.” Borderlands Brewery, Tucson, AZ, January 2019.

Public Outreach:

2008–2020: Ronald Reagan Elementary School, Clara Barton Elementary School: Eastvale, CA

- Encourage students to pursue higher education and STEM
- Send videos to classrooms about research

2016, 2017: Tucson Festival of Books, Tucson, AZ

- Lead the first implementation of the EEB Department’s booth at a city-wide, two-day public outreach event.
- Designed hands-on outreach activities and trained volunteers
- Gave live reptile demonstrations to the general public

2017: Walker Elementary School, Tucson, AZ

- Organized one-day field trip for elementary school class to visit U. Arizona
- Coordinated graduate students to teach hands-on biology lessons

K-12 teaching:

2015: **Biosphere 2 Haury Outreach Scholar**, Biosphere2, Tucson, AZ

- Taught Summer Science Academy for middle and high school students

2013–2014: **4th/5th Grade Teaching Intern**, Old Town Academy Elementary School, San Diego:

- Developed science curriculum in physics, chemistry, biology, and earth sciences with a focus on hands-on projects and collaborative learning
- Taught 4 one-hour classes per week, assign projects and graded work
- Organized field trips to museums and state parks in San Diego