

Sarah T. Friedman

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Professional Positions

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| 2021 – present | Research Fish Biologist NOAA: National Oceanic & Atmospheric Administration Alaska Fisheries Science Center, Seattle, WA |
| 2020 – 2021 | Hutchinson Environmental Postdoctoral Fellow Department of Ecology and Evolutionary Biology Yale University |

Education

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| 2015 – 2020 | Ph.D. in Ecology University of California, Davis Thesis: The Evolution of Morphological Diversity in Teleost Fishes Advisor: Dr. Peter C. Wainwright |
| 2010 – 2014 | B.S. in Aquatic and Fishery Sciences Minor in Marine Biology University of Washington Advisor: Dr. Ted W. Pietsch |

Publications

- 12) **Friedman, S.T.**, Collyer, M.L., Price, S.A., and Wainwright, P.C. (2021). Divergent processes drive parallel evolution in marine and freshwater fishes. *Systematic Biology*. doi:10.1093/sysbio/syab080.
- 11) **Friedman, S.T.**, Price, S.A., and Wainwright, P.C. (2021). The effect of locomotion mode on body shape evolution in teleost fishes. *Integrative Organismal Biology*. doi:10.1093/iob/obab016.
- 10) Martinez, C.M., **Friedman, S.T.**, Corn, K.A., Larouche, O., Price, S.A., and Wainwright, P.C. (2021). The deep sea is a hot spot of fish body shape evolution. *Ecology Letters*. doi:10.1111/ele.13785.
- 9) Larouche, O., Adams, D.S., Alencar, L.R.V., Camper, B., Hodge, J.R., Zapfe, K., **Friedman, S.T.**, Wainwright, P.C., and Price, S.A., (2020). Do key innovations unlock diversification? A case-study on the morphological and ecological impact of pharyngognathy in acanthomorph fishes. *Current Zoology*. doi:10.1093/cz/zoaa048.

- 8) Larouche, O., Benton, B., Corn, K.A., **Friedman, S.T.**, Gross, D., Iwan, M., Kessler, B., Martinez, C.M., Rodriguez, S., Whelpley, H., Wainwright, P.C., and Price, S. A. (2020). Reef-associated fishes have more maneuverable body shapes at a macroevolutionary scale. *Coral Reefs*. doi:10.1007/s00338-020-01976-w.
- 7) **Friedman S.T.**, Price S.A., Corn, K.A., Larouche O., Martinez C.M., Wainwright P.C. (2020). Body shape diversification along the benthic–pelagic axis in marine fishes. *Proc. R. Soc. B* 287: 20201053. doi:10.1098/rspb.2020.1053.
- 6) Price, S.A., Larouche, O., **Friedman, S.T.**, Corn, K.A., Wainwright, P.C. and Martinez, C.M. (2020). A CURE for a major challenge in phenomics: a practical guide to implementing a quantitative specimen-based undergraduate research experience. *Integrative Organismal Biology*. doi:10.1093/iob/obaa004
- 5) Price, S.A., **Friedman, S.T.**, Corn, K.A., Martinez, C.M., Larouche, O., and Wainwright, P.C. (2019). Building a body shape morphospace of teleostean fishes. *Integrative and Comparative Biology*. doi:10.1093/icb/icz115/5523207.
- 4) **Friedman, S.T.**, Martinez, C.M., Price, S.A., and Wainwright, P.C. (2019) The influence of size on body shape diversification across Indo-Pacific shore fishes. *Evolution*. doi:10.1111/evo.13755.
- 3) Minicozzi, M., Kimball, D., Finden, A., **Friedman, S.**, and Gibb, A.C. (2019). Are extreme anatomical modifications required for fish to move effectively on land? Comparative anatomy of the posterior axial skeleton in the Cyprinodontiformes. *The Anatomical Record*. <https://doi.org/10.1002/ar.24117>.
- 2) **Friedman, S.T.**, Price, S.A., Hoey, A.S., and Wainwright, P.C. (2016). Ecomorphological convergence in planktivorous surgeonfishes. *Journal of Evolutionary Biology*. doi: 10.1111/jeb.12837.
- 1) Price, S.A., **Friedman, S.T.**, and Wainwright, P.C. (2015). How predation shaped fish: the impact of fin spines on body form evolution across teleosts. *Proceedings of the Royal Society of London B: Biological Sciences*. 282:20151428.

Manuscripts in Progress

Friedman, S.T. and Muñoz, M.M. (In Review). A latitudinal gradient of deep-sea invasions for marine fishes. *Nat. Comm.*

Alencar, L.R.V., Hodge, J.R., **Friedman, S.T.**, Wainwright, P.C. and Price, S.A. (In Review). Size as a complex trait and the scaling relationships of its components across teleosts. *Evolutionary Ecology*.

Ghezelayagh, A., Harrington, R.C.,.... **Friedman, S.T.**, Near, T.J. (In Review). Prolonged morphological expansion of the hyperdiverse spiny-rayed fishes following the end-Cretaceous. *Nature Eco. Evol.*

Corn, K.A, **Friedman, S.T.**, Burress, E., Martinez, C.M., Larouche, O., Price, S.A., and Wainwright, P.C. (In Revision). Biting elevates morphological diversification of reef fishes following the end-Cretaceous mass extinction. PNAS.

Price, S.A., **Friedman, S.T.**, et al. (In Review). FishShapes v1: functionally relevant measurements of teleost shape and size on three dimensions. Ecology.

Miller, E.C., Martinez, C.M., **Friedman, S.T.**, Wainwright, P.C., Price, S.A., and Tornabene, L. (In Review). Alternating regimes of shallow and deep diversification in marine fishes. PNAS.

Friedman, S.T., and Muñoz, M.M. (In Review). Thermally robust ballistic mechanisms do not expand the climatic niche of salamanders. Integ. Org. Bio.

Book Chapters

Vaz, D., Martinez, C., **Friedman, S.T.**, and Rizzato, P. (In Press). Taxonomy and Morphology. Chapter 6 in Methods for Fish Biology. American Fisheries Society, Bethesda, Maryland.

Awards & Fellowships

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| 2020 | NSF Postdoctoral Research Fellowship in Biology (\$138,000; declined) |
| 2020 | Hutchinson Postdoctoral Fellowship, Yale University |
| 2020 | Wake Award for Best Student Presentation, SICB Conference |
| 2019 | W.D. Hamilton Award finalist, awarded Honorable Mention (\$500) |
| 2019 | UC Davis Outstanding Graduate Student Teaching Award (\$500) |
| 2019 | UC Davis Center for Population Biology Travel Award (\$1,500) |
| 2017 | Ecology Student Endowment (\$2,475) |
| 2017 | Elizabeth P. Wood Fellowship (\$2,072) |
| 2017 | Graduate Group in Ecology Fellowship (\$11,864) |
| 2016 | Center for Population Biology Research Award (\$1,385) |
| 2016 | Ecology Student Endowment (\$2,310) |
| 2016 | Stephen and Ruth Wainwright Endowed Fellowship (\$2,500) |
| 2016 | Ted and Silvia Hillyer Fellowship (\$1,000) |
| 2016 | James P. Michelleti Research Fellowship (\$7,319) |
| 2016 | Graduate Group in Ecology Fellowship (\$18,876) |
| 2014 | Wake Award for Best Student Poster, SICB Conference |

Teaching Experience

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| 2018 – 2020 | Lab Instructor, Evolution and Ecology (BIS 2B), UC Davis |
| 2019 | Teaching Assistant, Life in the Sea (EVE 12), UC Davis |
| 2019 | Teaching Assistant, Data Carpentry in R, UC Davis |

2015 – 2018 Instructor, Biodiversity of Fishes I - IV, UC Davis
2013 – 2014 Teaching Assistant, Biology of Fishes (FISH 311), Univ. of Washington

Invited Seminars

2021 Yale University, Yale Institute of Biospheric Sciences
2020 University of Minnesota, Mankato, Ecology and Evolutionary Biology

Recent Conference Presentations

Friedman, S. Collyer, M., Price, S., and P. Wainwright. Divergent processes drive parallel evolution in marine and freshwater fishes. Oral presentation delivered virtually at Evolution. June 2020.

Friedman, S. Collyer, M., Price, S., and P. Wainwright. Divergent processes drive parallel evolution in marine and freshwater fishes. Oral presentation delivered at SICB, Austin, TX. Jan 2020.

Friedman, S., Price, S., and P. Wainwright. Morphological diversification along the benthic-pelagic axis in marine teleosts. Oral presentation delivered at Gilbert Ichthyological Society, Eatonville, WA. Sept 2019.

Friedman, S., Price, S., and P. Wainwright. Getting to the bottom of it: Morphological diversification in benthic teleosts. Oral presentation delivered at Evolution, Providence, RI. June 2019.

Friedman, S., Price, S., and P. Wainwright. Getting to the bottom of it: Morphological diversification in benthic teleosts. Oral presentation delivered at the Society for Integrative and Comparative Biology, Tampa, FL. January 2019.

Friedman, S., Price, S., and P. Wainwright. The influence of body size on morphological diversification across fishes. Oral presentation delivered at the Society for Integrative and Comparative Biology, San Francisco, CA. January 2018.

Friedman, S., Price, S., Hoey, A. and P. Wainwright. Ecomorphological convergence in planktivorous surgeonfishes. Oral presentation delivered at the Society for Integrative and Comparative Biology, New Orleans, LA. January 2017.

Professional Societies

Evolution
Gilbert Ichthyological Society
Society for Integrative and Comparative Biology (SICB)
American Society of Ichthyologists and Herpetologists (ASIH)

Professional Training

- 2017 Geometric Morphometrics Workshop – UC Berkeley
Instructors: Dr. Miriam Zelditch & Dr. Don Swiderski
- 2017 Workshop in Applied Phylogenetics – Bodega Marine Labs
Instructors: Dr. Brian Moore
- 2016 Functional Morphology & Ecology of Fishes – Friday Harbor Labs
Instructors: Dr. Adam Summers & Dr. Alice Gibb
- 2015 Analysis of Organismal Form – University of Manchester
Instructor: Dr. Chris Klingenberg

Service & Outreach

Reviewer

Integrative and Comparative Biology, Systematic Biology, Journal of Anatomy, Journal of Fish Biology, The American Naturalist, Proceeding of the Royal Society B: Biological Science, Evolution, BMC Evolutionary Biology, Copeia, Scientific Reports, Nature Climate Change, Ecology and Evolution, Integrative Organismal Biology

Academic Service

- 2019 Advisor, Ask-An-Expert Booth, Division of Phylogenetics and Comparative Biology at annual SICB meeting
- 2016 Organizer & co-founder, Graduate Group in Ecology Open Lab Meetings
- 2016 Reviewer, UC Davis Graduate Group in Ecology Admissions Committee

Recent Community Outreach

- 2021 Presenter, STEM Career Workshop for Girl Scouts
- 2021 Scientist, Sci.CORPS Program, Yale Peabody Museum, New Haven, CT
- 2019 - 2020 Scientist Educator, Skype A Scientist program
- 2016 - 2020 Presenter, Biodiversity Day, Bohart Museum, Davis, CA
- 2016 - 2018 Exhibitor, Picnic Day, University of California, Davis, CA