**Pamela Beth Hart**

Curriculum Vitae

National Science Foundation Postdoctoral Research Fellow in Biology

Sam Noble Oklahoma Museum of Natural History | Department of Biology

The University of Oklahoma

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**EDUCATION**

Ph.D. Biology (Systematics, Ecology, and Evolution), Museum of Natural Sciences, Louisiana State University, Baton Rouge, LA. 2021.

**Dissertation**: Evolution of Extreme Habitat Specialists in the Dark: Cavefishes and Anglerfishes

Major Advisor: Dr. Prosanta Chakrabarty

M.S. Biology (Ecology, Evolution, and Systematics), Museum of Natural History, Auburn University, Auburn, AL. 2016.

**Thesis**: Diversity and Conservation of the Southern Cavefish

Major Advisor: Dr. Jonathan W. Armbruster

B.S. Marine Biology, Auburn University, AL. 2013. Institutional Honors: Cum Laude.

**PUBLICATIONS**

(10) **Hart, P.B.,** M.L. Niemiller, J.W. Armbruster, and P. Chakrabarty. Conservation Implications for the World’s Most Widely Distributed Cavefish, *Typhlichthys subterraneus*, Based on Population Genomics. In review at *Evolution*.

(9) **Hart, P.B.**, R.J. Arnold, F. Alda, C.P. Kenaley, T.W. Pietsch, D. Hutchinson\*, and P. Chakrabarty. (2022) Evolutionary Relationships of Anglerfishes (Lophiiformes) Reconstructed using Ultraconserved Elements. *Molecular Phylogenetics and Evolution* 10.1016/j.ympev.2022.107459

\*Undergraduate Mentee

(8) **Hart, P.B.** Review of: Fishes of the Genus *Sinocyclocheilus* (Cypriniformes: Cyprinidae) in China: Systematics, Biology, Biogeography and Cave Adaptation. In review at *Ichthyology & Herpetology*.

(7) Crawford, C. H., A. Webber-Schultz, **P. B. Hart**, Z. S. Randall, C. Cerrato-Morales, A. B.

Kellogg, H. E. Amplo, A. Suvarnaraksha, L. M. Page, P. Chakrabarty, and B. E. Flammang. (2022) They Like to Move it (Move it): Walking Kinematics of Balitorid Loaches of Western Thailand. *Journal of Evolutionary Biology* https://doi.org/10.1242/jeb.242906

(6) Santiago-Rosario, L.Y., B.D. Elderd, K. Harms, **P.B. Hart**, and M. Dassanayake. (2021) No escape: The influence of Sodium Substrate on Plant Growth and Tissue Sodium Responses. *Ecology and Evolution*. DOI: 10.1002/ece3.8138

(5) **Hart, P.B.,** M.L. Niemiller, E.D. Burress, W.B. Ludt, J.W. Armbruster, and P. Chakrabarty.

(2020) Cave-adapted evolution in the North American amblyopsid fishes inferred using

phylogenomics and geometric morphometrics. *Evolution*. doi:10.1111/evo.13958

(4) Crawford, C.H., Z.S. Randall, **P.B. Hart**, L.M. Page, P. Chakrabarty, and B.E. Flammang. (2020) Skeletal and muscular pelvic morphology of hillstream loaches (Cypriniformes: Balitoridae). *Journal of Morphology*. DOI: 10.1002/jmor.21247

(3) **Burress, P.B.H**., E.D. Burress, J.W. Armbruster (2017) Body shape variation within the Southern Cavefish, Typhlichthys subterraneus (Percopsiformes: Amblyopsidae). 2017. *Zoomorphology*. DOI: 10.1007/s00435-017-0360-0

(2) Armbruster, J.W., M.L. Niemiller, and **P.B. Hart** (2016) Morphological evolution of the Cave-, Spring- and Swampfishes of the Amblyopsidae (Percopsiformes).*Copeia*. 104: 763-777. DOI: 10.1643/CI-15-339

(1) Niemiller, M.L., K.S. Zigler, **P.B. Hart**, B.R. Kuhajda, J.W. Armbruster, B.N. Ayala, and A.S. Engel (2016) First record of a stygobiotic fish (Percopsiformes: Amblyopsidae: Typhlichthys) from the Appalachians karst region in the eastern United States. Subterranean Biology. *Subterranean Biology* 20: 39-50. DOI: 10.3897/subtbiol.20.9693

**RESEARCH INTERESTS**

*Genotype to phenotype interface in extremophiles*— I am interested in organismal adaptations to harsh environments with a current focus on cavefishes and anglerfishes. I use comparative genomics, phylogenomics, morphology, and physiology to better understand organismal adaptations in extreme environments and how they are maintained both genetically and phenotypically.

*Conservation of unique and at-risk animals*— My research is driven by a passion for maintaining biodiversity of organisms that are adapted to environments at-risk for anthropogenic disturbance like groundwater aquifers.

**FELLOWSHIPS AND AWARDS**

|  |  |  |
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| 2021 |  | **National Science Foundation Post-Doctoral Research Fellowship in Biology**, Research Area 2 Integrative Research Investigating the Rules of Life Governing Interactions Between Genomes, Environment and Phenotypes. Title: Navigating the Dark: Extremophile Sensory Convergence in Caves. **$138,000** |
| 2019 |  | American Society for Ichthyologists and Herpetologists Tracy I. Storer Award for Best Student Poster Presentation in General Ichthyology at the Joint Meeting for Ichthyologists and Herpetologists. |
| 2019 |  | Cave Research Foundation Philip M. Smith Graduate Research Grant for Cave and Karst Research. **$2,000** |
| 2019 |  | Sigma Xi Grants in Aid of Research for Graduate Students. **$500** |
| 2019 |  | Systematics Research Fund from the Linnean Society and the Systematics Association. **$1,388.88** |
| 2019 |  | National Speleological Society Ralph Stone Fellowship. **$2,000** |
| 2019 |  | North American Native Fishes Association Conservation Research Grant. **$1,000** |
| 2019 |  | BioGrads Symposium Best Student Oral Presentation Winner, Department of Biological Sciences, LSU |
| 2018 |  | BioGrads Research and Travel Award, Department of Biological Sciences, LSU. **$200** |
| 2018 |  | Society of Systematic Biologists Graduate Student Research Award. **$2,000** |
| 2018 |  | American Society for Ichthyologists and Herpetologists Frederick H. Stoye Award for Best Student Oral Presentation in Genetics, Development, and Morphology at the Joint Meeting for Ichthyologists and Herpetologists. |
| 2018 |  | American Society for Ichthyologists and Herpetologists Clark Hubbs Travel Award |
| 2015 |  | American Museum of Natural History Theodore Roosevelt Research Grant. **$2,700** |
| 2015 |  | Birmingham Audubon Society’s Walter F. Coxe Research Scholarship. **$2,500** |
| 2015 |  | Graduate Research Assistantship, Cell and Molecular Biosciences Peaks of Excellence Research Fellowship, Auburn University |
| 2014 |  | Best Student Poster Presentation Winner- 2nd place, Southeastern Fishes Council Conference |
| 2014 |  | Graduate Research Assistantship, Cell and Molecular Biosciences Peaks of Excellence Research Fellowship, Auburn University |
| 2012 |  | Undergraduate Competitive Research Fellowship, College of Sciences and Mathematics, Auburn University |
| 2012 |  | Funds for Excellence Grant, Department of Biological Science, Auburn University. **$1,000** |

**INVITED PRESENTATIONS**

|  |  |  |
| --- | --- | --- |
| 2021 |  | **Hart, P.B.**, R. J. Arnold, F. Alda, and P. Chakrabarty. ASIH Symposium: Why Are There So Many Kinds of Fish? A Showcase of Early-Career Ichthyologists. Evolutionary Relationships of Anglerfishes (Lophiiformes) Reconstructed using Ultraconserved Elements. |
| 2020 |  | **Hart, P.B.** California Academy of Sciences, California, Genomics Series: Evolution in the Dark. Cave-adaptive evolution in North American Fishes (Percopsiformes: Amblyopsidae). |
| 2020 |  | **Hart, P.B.** University of Tennessee, Chattanooga, Bridges Beyond the Classroom Seminar.Cave-adaptive evolution in North American Fishes. |
| 2018 |  | **Hart-Burress, P.B.,** M.L. Niemiller, and P. Chakrabarty. Geological Society of America. Population genomics of the Southern Cavefish (*Typhlichthys subterraneus*) |

**PRESENTATIONS**

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| 2021 |  | D. Elías, C.D. MacMahan, F. Alda, C. García-Alzate, **P.B. Hart**, P. Chakrabarty. Joint Meeting of Ichthyologists and Herpetologists, “Phylogenomics and Biogeographic History of Trans-Andean Tetras in the Genus Hyphessobrycon Durbin 1908”. Paper. ASIH Symposium: Why Are There So Many Kinds of Fish? A Showcase of Early-Career Ichthyologists. |
| 2019 |  | **Hart, P.B.,** M.L. Niemiller, J.W. Armbruster, P. Chakrabarty. Joint Meeting of Ichthyologists and Herpetologists, “Population Genomics of a Cavefish Species Complex: Implications for Conservation and Aquifer Connectivity”. Poster, Storer Ichthyology Best Student Competition Award Winner. |
| 2019 |  | **Hart, P.B,** M.L. Niemiller, E.D. Burress, J.W. Armbruster, P. Chakrabarty. BioGrads Student Organization, LSU Department of Biological Sciences Symposium, “Cave-Adaptive Evolution: Phylogenomics of Amblyopsid Fishes”. Paper. Best Student Oral Presentation Competition Winner. |
| 2019 |  | **Hart, P.B.,** M.L. Niemiller, E.D. Burress, J.W. Armbruster, P. Chakrabarty. Society for Integrative and Comparative Biology, “Phylogenomics and Shape Variation  Among Amblyopsid Fishes”. Paper, Department of Phylogenetics and Comparative Biology Wake Award Student Competition. |
| 2019 |  | Crawford, C. H., Z. S. Randall, **P. B. Hart**, L. M. Page, P. Chakrabarty, B. E. Flammang. Society for Integrative and Comparative Biology, “The Muscles That Move The Fish That Walk”. Paper. |
| 2018 |  | **Hart, P.B.**, M.L. Niemiller, E.D. Burress, J.W. Armbruster, P. Chakrabarty. Joint Meeting of Ichthyologists and Herpetologists, “Phylogenomics and Shape Variation  Among Amblyopsid Fishes”. Paper, Stoye Ichthyology Best Student Competition Award Winner. |
| 2018 |  | **Burress, P.B.H.,** M.L. Niemiller, and P. Chakrabarty. Society for Integrative and Comparative Biology, “Phylogenomics of the Cave-, Spring-, and Swampfishes of North America (Percopsiformes: Amblyopsidae)”. Paper. |
| 2016 |  | **Hart, P.B.** and J.W. Armbruster. Southeastern Fishes Council Conference, “Molecular diversity of the Southern Cavefish, *Typhlichthys subterraneus*, and conservation implications”. Paper. |
| 2014 |  | **Hart, P.B.** and J.W. Armbruster. Joint Meeting of Ichthyologists and Herpetologists, “Morphological variation among Southern cavefish (*Typhlichthys subterraneus*) lineages in Alabama”. Poster. |
| 2013 |  | **Hart, P.B**., C.K. Ray, and J.W. Armbruster. Alabama Academy of Sciences, “A look at the genetic structure of the *Macrhypobsis aestivalis* species complex in Alabama”. Paper. |

**REVIEWER CONTRIBUTIONS**

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| 2021 |  | *Molecular Ecology* |
| 2021 |  | *Ichthyology & Herpetology* |
| 2020 |  | *Proceedings of the Royal Society B* |
| 2019 |  | *Biochemical Genetics* |
| 2019 |  | *Journal of Cave and Karst Studies* |
| 2018 |  | *Zootaxa* |
| 2018 |  | *Environmental Biology of Fishes* |

**RESEARCH EXPERIENCE**

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| 2021- present |  | National Science Foundation Post-Doctoral Research Fellow in Biology, The University of Oklahoma. |
| 2016- 2021 |  | Graduate Research Assistant, Museum of Natural Sciences, Louisiana State `University. |
| 2013- 2016 |  | Graduate Research Assistant, Biodiversity Learning Center, Auburn University. |
| 2014, 2015 |  | Graduate Research Assistant, Cell and Molecular Biology Peaks of Excellence Assistantship, Auburn University. |
| 2012-2013 |  | Undergraduate Research Assistant, Marine Biology Laboratory, Advisor: Dr. Nanette Chadwick. Auburn University. |
| 2011- 2013 |  | Undergraduate Research Fellow, Fish Systematics Laboratory, Advisor: Dr. Jonathan Armbruster. Auburn University. |

**TEACHING EXPERIENCE AND EMPLOYMENT**

*Graduate Teaching Assistant*

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| 2020 |  | Introduction to Biology II (BIOL 1209) |
| 2019 |  | Ichthyology (BIOL 4145) |
| 2018 |  | Genetics (BIOL 2153) |
| 2017 |  | Course-based Undergraduate Research Experience: Honors Introductory Biology for Majors (BIOL 1503) |
| 2016 |  | Introduction to Biology (BIOL 1208) |
| 2013- 2016 |  | Biomedical Physiology (BIOL 5600/6600) |
| 2013- 2016 |  | Animal Physiology (BIOL 5240/6240) |

*Collections Assistant*

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| 2018-2019, 2020- 2021 |  | Louisiana State University, Ichthyological Collection, Graduate |
| 2012 |  | Auburn University Museum of Natural History Ichthyological Collection, Undergraduate |

**FIELD EXPERIENCE**

*Biological Field Technician*

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| 2020 |  | Cave and karst systems in Thailand- Sampling cave-obligate biodiversity in Northern Thailand |
| 2020 |  | Freshwater systems in Thailand- Sample freshwater biodiversity in Northern and Southern Thailand, including Bangkok and Chiang Mai. |
| 2012- present |  | Cave and karst systems in the Eastern US- Sampling terrestrial and aquatic cave biodiversity in the Interior Low Plateau and the Appalachian Ridge and Valley karst regions. |
| 2011- present |  | Freshwater systems in the Eastern US- Sampling freshwater biodiversity in the Southeastern U.S. including drainages in Kentucky, Tennessee, Alabama, and Georgia via electrofishing and seining. |

**TECHNICAL SKILLS AND ABILITIES**

Molecular Laboratory Techniques

* Ultraconserved Elements Library Preparation and Hybrid Enrichment with KAPA HyperPrep and MyBaits MYcroarray
* DNA extraction: Qiagen DNeasy Blood and Tissue Kit, CTAB, EZNA Kit, Chelex
* Polymerase Chain Reaction (PCR)
* Quantitative Real Time Polymerase Chain Reaction (qRT-PCR)

Bioinformatics Skills

* Experience using High Performance Computing Clusters including Louisiana State University SuperMike2 and the University of Oklahoma OU Supercomputing Center for Education and Research (OSCER)
* Experience with Python, Linux, and R programming languages

Specimen Preparation

* Formalin fixation for aqueous museum storage
* EtOH tissue storage
* Cryogenic (liquid nitrogen-LN2) tissue storage

Vertical Caving Certified by the Huntsville Cave Rescue Unit

CPR and First Aid Certified

NAUI/SSI Open Water Dive Certified

**OUTREACH AND LEADERSHIP**

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| 2021 |  | Virtual Girl’s Day at the Museum, LSU Museum of Natural Science. Featured Scientist. Virtual event that focused on women in STEM including discussions with scientists and at-home activities. Focus/Age: Girls 4th-6th grade. |
| 2020 |  | Ocean Commotion, collaboration with Louisiana Sea Grant and the LSU Museum of Natural Science. Special Scientist Guest. Virtual event focused on the conservation and importance of the Louisiana coast. Focus/Age: K-8th students. |
| 2020 |  | Virtual Girls Day Road Trip, collaboration among Louisiana Public Broadcasting, LSU Outreach, and the LSU Museum of Natural Science. Call Monitor. Virtual event that focused on women in STEM including discussions with scientists and at-home activities. Call Monitors controlled conversations with scientists in Zoom Breakout Rooms. Focus/Age: Girls 4th-6th grade. |
| 2017-2019 |  | Women in Science at LSU, Vice President. Women in Science at LSU is a group focused on the well-being of professional women scientists and allies. Meetings included workshops for professional improvement, academic meeting conduct, and teambuilding. Vice-Presidential duties include account management and meeting planning. |
| 2017, 2019 |  | Master Naturalist Workshop. An event by the Louisiana Mater Naturalists of Greater Baton Rouge in conjunction with the Louisiana State University Museum of Natural Science where citizen volunteers complete a training program to better understand local ecosystems and conservation of these areas. Ran behind the scenes tour of the Fish Collection at the LSU Museum of Natural Science. Age/Focus: Adults. |
| 2019 |  | Halloween Art & Nature Festival. Art and science event open to the general public where event goers can experience the synthesis of art and nature. Set-up and presentation of museum specimens. Focus/Age: General public. |
| 2019 |  | Girls Day at the Museum, Group Leader. Science focused day at the museum with multiple stations and activities ranging in scientific disciplines. Group Leaders brought groups of girls from one activity to another and assisted in the activities. Focus/Age: Girls 4th-6th grade. |
| 2019 |  | Baton Rouge Recreational Center Nature Explorer’s Summer Camp, Fantastic Beasts and Where to Find Them. Presentation on museums and museum specimens with special focus on fishes in harsh environments. Focus/Age: Children ages 7-10. |
| 2019 |  | Special Saturdays, Fishes in Extreme Darkness with Pam Hart. Museum centric event teaching elementary and middle school students about fishes with extreme adaptations for living in dark environments. Focus/Age: Children ages 5-12. |
| 2017 |  | Special Saturdays, Into the Dark with Pam Hart. Museum centric event teaching elementary and middle school students about caves, cave animals, and cave adaptations. Focus/Age: Children ages 5-12. |
| 2017-2018 |  | LSU BioGrads*,* Social Coordinator. Biological Sciences Graduate Student Association. |
| 2016-2020 |  | Night at the Museum, Louisiana State University Museum of Natural Science. Museum centric event teaching elementary and middle school students about fishes and the Ichthyological Collection at the LSU Museum of Natural Science. |
| 2012- 2014 |  | AU Explore, Auburn University Museum of Natural History, College of Sciences and Mathematics. |
| 2012, 2013 |  | Marine Biology Club Outreach, Smith Station High School, Smith Station, AL. |
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**UNDERGRADUATE MENTEES**

\* Denotes that student co-authored a publication; § denotes that student presented at a scientific conference

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| Ashleigh Dyess Roques | |  | LSU Museum of Natural Science. Molecular laboratory techniques including DNA extraction, Polymerase Chain Reaction. 2016-2017 | |
| §Valencia Henderson |  | | LSU Museum of Natural Science. Analysis of molecular sequence data including assembly of contiguous sequences, multiple sequence alignment, BLAST, and mitogenome construction. Phylogenomic analysis of mitogenomic sequences using Maximum Likelihood and Bayesian analysis. Participated as a field technician in freshwater fieldwork in Thailand. 2017-2019 |
| \*Destinee Hutchinson |  | | Northwest Indian College, Native Environmental Science, Genomics Department. Molecular laboratory techniques including quantification, library preparation, hybrid enrichment, gel electrophoresis, PCR. 2018 |

**PROFESSIONAL SOCIETIES AND ASSOCIATIONS**

American Society for Ichthyologists and Herpetologists

National Speleological Society #65592

North American Native Fish Association

Sigma Xi Honors Society

Society for Systematic Biologists

Southeastern Cave Conservancy, Inc.

Systematic Research Foundation

Southeastern Fishes Council

Geological Society of America

**REFERENCES**

|  |  |  |
| --- | --- | --- |
| Dr. Dahiana Arcila |  | Assistant Professor, Curator of Ichthyology, Sam Noble Museum of Natural History, The University of Oklahoma  Dahiana.arcila@ou.edu |
| Dr. Prosanta Chakrabarty |  | Professor, Curator of Ichthyology, LSU Museum of Natural Science, Louisiana State University  Prosanta@lsu.edu |
| Dr. Jonathan W. Armbruster |  | Associate Professor, Curator of Fishes, Auburn University Museum of Natural History, Auburn University  armbrjw@auburn.edu |