

# Dr. Jessica H. Arbour

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Citizenship: Canadian

## EDUCATION AND RESEARCH POSITIONS

- 2017-present **NSERC Postdoctoral Research Fellow, Biology, University of Washington**  
Project: Adaptation, convergence and constraint in the diversification of feeding morphology and biomechanics across bats (Chiroptera: Mammalia)  
Supervisor: Dr. Sharlene Santana
- 2016-2017 **Postdoctoral Research Associate, Biology, University of Washington**  
Project: NSF IOS Grant - Macroevolutionary analyses of cranial morphology and function in mammals  
Supervisor: Dr. Sharlene Santana
- 2009-2015 **Ph.D., Ecology and Evolutionary Biology, University of Toronto**  
Thesis: Trends in the evolution and ecology of functional morphology in Neotropical cichlids  
Supervisor: Dr. Hernán López-Fernández  
Conferred: June 10, 2015  
GPA: 4.0 on 4.0 scale
- 2005-2009 **B.Sc., First Class Honours, Marine Biology and Oceanography, Dalhousie University**  
Thesis: A morphometric analysis of two sympatric morphs of Arctic char (*Salvelinus alpinus*) from Lake Hazen, Ellesmere Island  
Supervisor: Dr. Jeffrey Hutchings  
GPA: 4.25 on 4.30 scale

## PEER REVIEWED PUBLICATIONS

Number of Published Articles	First Authorships	h-index	i10-index	Total Citations	Median Citations per Article
15	11	8	8	287	12

15. Arbour, J.H. & López-Fernández, H. 2018. Intrinsic constraints on the diversification of Neotropical cichlid adductor mandibulae size. *The Anatomical Record* 301(2):216-226 [Invited, Special Issue]
14. Lee, W., B. Falk, C. Chiu, A. Krishnan, J.H. Arbour, & C.F. Moss. 2017. Tongue-driven sonar beam steering by a lingual-echolocating fruit bat. *PLoS Biology* 15(12): e2003148

13. **Arbour, J.H.** & S.E. Santana. 2017. A major shift in diversification rate helps explain macroevolutionary patterns in primate species diversity. *Evolution* 71(6):1600-1613.
12. **Arbour, J.H.**, and López-Fernández, H. 2016. Continental cichlid radiations: functional diversity reveals the role of changing ecological opportunity in the Neotropics. *Proceedings of the Royal Society B* 238: 20160556.
11. Astudillo-Clavijo, V., **Arbour, J.H.** and López-Fernández, H. 2015. Selection towards different adaptive optima drove the early diversification of locomotor phenotypes in the radiation of Neotropical geophagine cichlids. *BMC Evolutionary Biology* 15:77 [Highly Accessed]
10. **Arbour, J.H.**, & López-Fernández, H. 2014. Adaptive landscape and functional diversity of Neotropical cichlids: implications for the ecology and evolution of Cichlinae (Cichlidae; Cichliformes). *Journal of Evolutionary Biology* 27(11):2431-42.
9. López-Fernández\*, H., **Arbour\***, J.H., Willis, S., Watkins, C., Honeycutt, R., and Winemiller, K. 2014. Morphology and efficiency of a specialized foraging behavior, substrate sifting, in Neotropical cichlid fishes. *PLoS ONE* 9(3): e89832 [\*joint first authors]
8. **Arbour, J.H.**, Barriga Salazar, R.E., López-Fernández, H. 2014. A new species of *Bujurquina* (Teleostei: Cichlidae) from the Río Danta, Ecuador, with a key to all species in genus. *Copeia* 2014(1):79-86.
7. **Arbour, J.H.**, C.M. Brown. 2014. Incomplete specimens in geometric morphometric analyses. *Methods in Ecology and Evolution* 5(1):16-26.
6. **Arbour, J.H.**, & López-Fernández, H. 2013. Ecological variation in South American geophagine cichlids arose during an early burst of adaptive morphological and functional evolution. *Proceedings of the Royal Society B* 280: 20130849.
5. López-Fernández, H., **Arbour, J.H.**, Winemiller, K. O. & Honeycutt, R. L. 2013. Testing for ancient adaptive radiations in Neotropical cichlid fishes. *Evolution* 67:1321-37. [cover feature]
4. Brown, C. M., **Arbour, J.H.** & Jackson, D. 2012. Testing of the effect of missing data estimation and distribution in morphometric multivariate data analyses. *Systematic Biology* 61: 941-954.
3. **Arbour, J.H.**, Hardie, D. C. & Hutchings, J. A. 2011 Morphometric and genetic analyses of two sympatric morphs of Arctic char (*Salvelinus alpinus*) in the Canadian High Arctic. *Canadian Journal of Zoology* 89: 19–30.
2. **Arbour, J.H.** & López-Fernández, H. 2011. *Guianacara dacrya*, a new species from the rio Branco and Essequibo River drainages of the Guiana Shield (Perciformes: Cichlidae). *Neotropical Ichthyology* 9: 87–96.
1. **Arbour, J.H.**, Avendaño, P. & Hutchings, J. A. 2010. Aspects of the ecology and life history of Alligatorfish *Aspidophoroides monopterygius*. *Environmental Biology of Fishes* 87: 353–362.

## PUBLICATIONS IN REVIEW OR IN PREPARATION

**Arbour, J.H., A.A. Curtis and S.E. Santana.** Adaptive shifts in skull shape evolution in bats: signatures of echolocation and dietary ecology. *Nature Communications (In Revision)*

A.A. Curtis, **J.H. Arbour** and S.E. Santana. Mind the gap: Naturally occurring orofacial clefts reduce biting performance in bats. *Journal of Experimental Biology (In Prep)*

**Arbour, J.H., C.G. Montaña, K. Winemiller, A.A. Pease, M. Soria-Barreto, J. Cochran-Biederman and H. López-Fernández.** Feeding ecology and functional diversification in Neotropical cichlids. *Journal of Evolutionary Biology (In Prep)*

## RESEARCH EXPERIENCE

*Postdoctoral Research*, University of Washington, Biology, 2016-present (Advisor: Dr. Sharlene Santana)

- Mammal cranial morphology and trophic diversification
- Micro-CT and diceCT, segmentation and 3D modelling of mammalian skulls and muscles
- lineage diversification of mammalian orders

*Doctoral Research*, University of Toronto, Ecology and Evolutionary Biology, 2009-2015 (Advisor: Dr. Hernán López-Fernández)

- Analysis of rates and patterns of morphological evolution in cichlids, using phylogenetic comparative methods
- Multivariate relationships between diet, morphology and ecological performance
- Morphological diversity and evolution of extinct cichlids
- Histological preparation and dissection of whole specimens

*Undergraduate Honours Research*, Dalhousie University, Marine Biology, 2008-2009 (Advisor Dr. Jeffrey Hutchings)

- Resource polymorphisms in post-glacial lake Arctic Char morphotypes
- Body shape analysis using geometric morphometrics
- Genetic divergence analysis using microsatellite loci

*NSERC Undergraduate Research Assistant*, Dalhousie University, Marine Biology, 2008 (Advisor Dr. Jeffrey Hutchings)

- Life histories and aging of Atlantic non-commercial marine fish

*NSERC Undergraduate Research Assistant*, Dalhousie University, Oceanography, 2007 (Advisor: Dr. Anna Metaxas)

- Analysis of invertebrate species distributions from submersible video footage of the Discovery Corridor
- Time series analysis of bryozoan colony growth rates on kelp

*NSERC Undergraduate Research Assistant*, Dalhousie University, Biology, 2006 (Advisor: Dr. Brian Hall)

- Histological whole mount staining and serial sectioning of alligator embryos for osteoderm development

## SCHOLARSHIPS, FELLOWSHIPS AND AWARDS\*

SICB 2019 Broadening Participation Travel Award (awarded 11/18) – \$500 (USD)  
NSERC postdoctoral fellowship (2017-2019) – \$45 000/year  
E.M. Walker Graduate Award in Ecology and Evolutionary Biology (2014-2015) – \$800  
University of Toronto Doctoral Completion Grant (2014-2015) - \$1380  
University of Toronto School of Graduate Studies Conference Grant (2013) – \$330  
Alexander Graham Bell Canada Graduate Scholarship, Ph.D. Level (2011-2014) – \$35 000/year  
E.M. Walker Graduate Award in Biodiversity, University of Toronto (2010) – \$3 250  
Ontario Graduate Scholarship (2010-2011) – \$15 000  
Helen Sawyer Hogg Graduate Admission Award, University of Toronto Faculty of Arts and Sciences (2009) – \$4 035  
Alexander Graham Bell Canada Graduate Scholarship, Masters Level (2009-2010) – \$17 500  
Dalhousie University Convocation, Avery Prize (2009) – \$250  
Dalhousie Hugh P. Bell Scholarship (2008) – \$706  
Dalhousie David Durward Memorial Prize (2008) – \$1 441  
Dalhousie Shao Hua and Wen Hsiang Yoh Award (2007) – \$225  
Dalhousie Laing Undergraduate Summer Research Award (2007) – \$6 250  
NSERC Undergraduate Student Research Award (2006, 2008) – \$5 600/year  
Dalhousie University Dean's List 2005-2009  
Dalhousie Fredrick S. Fountain Undergraduate Entrance Scholarship (2005-2009) - \$8 000/year

\* CAD unless otherwise specified

## CONFERENCE PRESENTATIONS

**J.H. Arbour**, A. Curtis and S. Santana. 2019 (Accepted). Macroevolutionary dynamics of cranial and mandible shape in bats. Symposium: Multifunctional structures and multistructural functions: Functional coupling and integration in the evolution of biomechanical systems. The Society for Integrative and Comparative Biology Annual Meeting. January 2019, Tampa, Florida, USA. (Pending Oral Presentation) [*Invited Talk*]

**J.H. Arbour**, A. Curtis, S. Santana. 2018. Adaptive shifts in the evolution of skull shape in bats (Chiroptera): signatures of dietary ecology and echolocation. Symposium: The macroevolutionary dynamics of form-function relationships. Evolution 2018: II Joint Congress on Evolutionary Biology. August 19<sup>th</sup>, Montpellier, France. (Oral Presentation).

S. Santana and **J.H. Arbour**. 2017. The role of morphology, performance, and behavior in the ecological diversification of bats. Canadian Society of Zoologists. IEE/CMD Joint Symposium. May 17<sup>th</sup>, Winnipeg, Manitoba, Canada (Oral Presentation) [*Invited Talk*]

**Arbour, J.H.** and S. Santana. 2017. Does evolutionary rate heterogeneity explain the uneven distribution of species diversity within Primates? Society for Integrative and Comparative Biology Annual Meeting, Jan 5<sup>th</sup>, New Orleans, USA (Oral Presentation)

**Arbour, J.H.** and H. López-Fernández. 2013. Patterns of morphological evolution support an ancient adaptive radiation in cichlids. Joint Meeting of Ichthyologists and Herpetologists, July 15, Albuquerque, New Mexico, USA (Oral Presentation)

**Arbour, J.H.** and H. López-Fernández. 2012. Evolutionary trends in the functional morphology of Neotropical geophagine cichlids. First Joint Congress on Evolutionary Biology, July 9, Ottawa, Ontario (Oral Presentation)

**Arbour, J.H.** and H. Lopez-Fernandez. 2010. Comparative functional morphology of Geophagine Cichlids. Joint Meeting of Ichthyologists and Herpetologists, Providence, Rhode Island, USA. July 10, 2010. (Oral Presentation)

**Arbour, J.H.** and H. Lopez-Fernandez 2010. Comparative functional morphology of Neotropical Geophagine cichlids. Atwood Colloquium in Ecology and Evolutionary Biology, University of Toronto. April 10, 2010, (Oral Presentation)

**Arbour, J.H.** and J. Hutchings. 2009. A Morphometric Analysis of Two Sympatric Morphs of Arctic Char (*Salvelinus alpinus*) from Lake Hazen, Ellesmere Island. Canadian Society for Ecology and Evolution, Halifax, Nova Scotia, Canada, May 15, 2009 (Poster Presentation)

#### MEDIA ARTICLES

**Arbour, J.** and F. Hauser. Does something seem fishy about your sushi? ROM project finds mislabelled fish in Toronto restaurants and markets. *ROM Magazine*, Fall 2017: 14-15.

Curtis, A. and **Arbour J.** A pocket full of bats. Burke Museum Blog. January 30, 2018.

[http://www.burkemuseum.org/blog/pocket-full-bats?utm\\_source=twitter&utm\\_medium=social&utm\\_campaign=pocket-bats](http://www.burkemuseum.org/blog/pocket-full-bats?utm_source=twitter&utm_medium=social&utm_campaign=pocket-bats)

#### SOFTWARE

**Arbour J. H.** and C. M. Brown. 2013. LOST: missing morphometric data simulation and estimation. V1.3. R statistical software package. CRAN: <http://cran.r-project.org/web/packages/LOST/index.html>

#### TEACHING

2017	Guest Lecturer, Functional Morphology (BIOL 439) University of Washington, Department of Biology
2016	Guest Lecturer, Biology of Fishes (FHL 305) Friday Harbour Laboratories, University of Washington
2011-2014	Teaching Assistant, Diversity of Fishes (EEB 382) University of Toronto, Ecology and Evolutionary Biology
2011	Course/Lab Material Development, Diversity of Fishes (EEB 382)

University of Toronto, Ecology and Evolutionary Biology

2009-2010 Teaching Assistant, Adaptation and Biodiversity (BIOL 120/BIOL 150)  
University of Toronto, Ecology and Evolutionary Biology

## PROFESSIONAL ACTIVITIES AND SERVICE

2018 UAW 4121 Working Groups on International Postdoctoral Scholars and Healthcare Access

2011 Bodega Applied Phylogenetics Workshop, March 5-11<sup>th</sup>, UC Davis/Bodega Bay Marine Lab

Peer Review Evolution (4), Biological Journal of the Linnean Society (2), Proceedings of the Royal Society B (2), Methods in Ecology and Evolution (1), Environmental Biology of Fishes (2), Copeia (1), Journal of Fish Biology (2), Neotropical Ichthyology (1), The Anatomical Record (2), Zookeys (1) - [publons.com/a/1356959/](https://publons.com/a/1356959/) for reviews in 2017 to present

## FIELD EXPERIENCE

2012 Sampling of Andean fishes from western Ecuador using seines, gill nets and electrofishers.  
**Supervisors:** Dr. Nathan Lujan and Dr. Hernán López-Fernández

## PUBLIC OUTREACH

2017 “Pocket Bats!” project. Developed and implemented augmented reality materials (cards linked to “Augment”) for patrons to visualize and interact with 3d bat skulls. Showcased at the Burke Museum “Testing 1,2,3” Temporary Exhibit. Free to download for teachers.  
*Burke Museum, Seattle, Washington*

2016 Volunteer, hands-on micro-CT, 3D modelling and bat cranial diversity. Behind the Scenes Night  
*Burke Museum, Seattle, Washington*

2013 Volunteer, hands-on ichthyology displays. March Break biodiversity week activities  
*Royal Ontario Museum, Toronto, Ontario*

2013 Designed fish diversity activities for children and adults, for “Curator’s Corner” Temporary Exhibit  
*Royal Ontario Museum, Toronto, Ontario*

2011 Assisted in Neotropical biodiversity exhibit planning and maintenance for “Water” Travelling Exhibit  
*Royal Ontario Museum, Toronto, Ontario*

2008-2009 Volunteer, fish conservation activities. Talk Fish Symposium  
*East Coast Aquarium Society/Bedford Institute of Oceanography, Halifax, Nova Scotia*