

AARON M OLSEN

Anatomy Teaching & Research Postdoctoral Fellow

E-mail: aaron_olsen@brown.eduWebsite: aaronolsen.github.io**Research Interests**

Evolution of musculoskeletal systems, skeletal biomechanics, motion analysis, shape analysis

Education**University of Chicago**

Ph.D. Integrative Biology, 2016, Dept of Organismal Biology & Anatomy

"Patterns of Morphological and Functional Evolution in the Feeding System of Waterfowl (Anseriformes): Insights from Diet, Beak Shape, and Cranial Mechanics"

Advisor: [Mark Westneat](#)

S.M. Integrative Biology, 2011, Dept of Organismal Biology & Anatomy

University of Kansas

B.S. Biochemistry with university honors, 2009

B.A. Languages for Humanitarian Aid (special major), 2009

University of Murcia, Spain

Study abroad, 2006-2007 academic year

Academic Appointments

- 2018-pres. Anatomy Teaching & Research Postdoc, Brown University ([Brainerd lab](#))
- 2016-2018 NSF Postdoctoral Fellow, Brown University (Brainerd lab)
- 2009-2016 Ph.D. student, University of Chicago ([Westneat lab](#))
- 2010-2016 Resident Graduate Student, Field Museum of Natural History
- 2012-2013 NSF Moto-IGERT Fellow, University of Chicago
- 2009 Research assistant, [Hauck lab](#), University of Konstanz, Germany
- 2006-2008 Undergraduate research assistant, [Ward lab](#), University of Kansas

Grants, awards and fellowships

- 2017 Best Dissertation Award, Biological Sciences, University of Chicago
- 2016-2018 [NSF Postdoctoral Research Fellowship in Biology](#) (\$138,000)
- 2016 Smithsonian Predoctoral Fellowship (declined)
- 2011-2015 NSF Graduate Research Fellowship
- 2012-2013 NSF Moto-IGERT Research Award (\$2000)
- 2011-2012 University of Chicago Hinds Research Award (\$1459)
- 2009 DAAD Undergraduate Scholarship (4,485€)
- 2007 K-INBRE Undergraduate Research Scholarship (\$5,700)

Peer-reviewed publications

- Aiello BR, Hardy AR, Cherian C, **Olsen AM**, Orsbon CP, Hale ME & Westneat MW (2018). A comparison of pectoral fin ray morphology and its impact on fin ray flexural stiffness in labriform swimmers. *Journal of Morphology*. 279(8):1031-1044. DOI: [10.1002/jmor.20830](https://doi.org/10.1002/jmor.20830).

- Aiello BR, Hardy AR, Cherian C, **Olsen AM**, Ahn S, Hale ME & Westneat MW (2018). The relationship between pectoral fin stiffness and swimming behavior in Labridae: insights into design, performance, and ecology. *Journal of Experimental Biology*. 221(1). DOI: [10.1242/jeb.163360](https://doi.org/10.1242/jeb.163360).
- Olsen AM***, Camp AL* & Brainerd EL (2017). The opercular mouth-opening mechanism of largemouth bass functions as a 3D four-bar linkage with three degrees of freedom. *Journal of Experimental Biology*. 220:4612-4623. DOI: [10.1242/jeb.159079](https://doi.org/10.1242/jeb.159079). *Equal author contributions
- Westneat MW, Aiello BR, **Olsen AM** & Hale ME (2017). Bioinspiration From Flexible Propulsors: Organismal Design, Mechanical Properties, Kinematics and Neurobiology of Pectoral Fins in Labrid Fishes. *Marine Technology Society Journal*. 51(5):23-34. DOI: [10.4031/MTSJ.51.5.3](https://doi.org/10.4031/MTSJ.51.5.3).
- Olsen AM** (2017). Feeding ecology is the primary driver of beak shape diversification in waterfowl. *Functional Ecology*. 31(10):1985-1995. DOI: [10.1111/1365-2435.12890](https://doi.org/10.1111/1365-2435.12890).
- Delacy CR, **Olsen AM**, Chapman DD, Brooks EJ & Bond ME (2017). Affordable and accurate stereo-video system for measuring dimensions underwater- a case study using Oceanic Whitetip sharks (*Carcharhinus longimanus*). *Marine Ecology Progress Series*. 574:75-84. DOI: [10.3354/meps12190](https://doi.org/10.3354/meps12190).
- Olsen AM** & Westneat MW (2016). Linkage mechanisms in the vertebrate skull: Structure and function of three-dimensional, parallel transmission systems. *Journal of Morphology*. 277:1570-1583. DOI: [10.1002/jmor.20596](https://doi.org/10.1002/jmor.20596).
- Olsen AM** (2015). Exceptional avian herbivores: multiple transitions toward herbivory in the bird order Anseriformes and its correlation with body mass. *Ecology and Evolution*. 5(21):5016-5032. DOI: [10.1002/ece3.1787](https://doi.org/10.1002/ece3.1787).
- Olsen AM** & Westneat MW (2015). StereoMorph: an R package for the collection of 3D landmarks and curves using a stereo camera setup. *Methods in Ecology and Evolution*. 6:351-356. DOI: [10.1111/2041-210X.12326](https://doi.org/10.1111/2041-210X.12326).

Published Software

- Olsen AM** & Haber A (2017). [StereoMorph](#): Stereo Camera Calibration and Reconstruction. R package version 1.5.1. CRAN.R-project.org/package=StereoMorph.
- Olsen AM** (2016). [linkR](#): 3D Lever and Linkage Mechanism Modeling. R package version 1.0.0. CRAN.R-project.org/package=linkR.
- Olsen AM** (2015). [svgViewR](#): 3D Animated Interactive Visualizations using SVG. R package version 1.0.0. CRAN.R-project.org/package=svgViewR.

Press coverage of research

- Gorman, J (2017). 'How It Works: The Large Mouth of the Largemouth Bass'. [New York Times, ScienceTake](#). 26 Dec, D6. (Coverage of [Olsen et al. 2017](#))

Teaching Experience

Total student contact hours: 463

Gross Anatomy, Warren Alpert Medical School, Brown University. Academic year 2018.

Gross Anatomy and histology (pelvis; 24 hrs), Pritzker School of Medicine, University of Chicago. Teaching assistant for Dr. Callum Ross. Fall 2015. [Student evaluations not collected]

Gross Anatomy and histology (human development, thorax, abdomen, pelvis; 86 hrs), Pritzker School of Medicine, University of Chicago. Teaching assistant for Dr. Callum Ross. Fall 2014. [Student evaluations not collected]

Gross Anatomy (thorax, abdomen, pelvis, head & neck; 107 hrs), Pritzker School of Medicine, University of Chicago. Teaching assistant for Dr. Callum Ross. Fall 2013. [Student evaluations]

Gross Anatomy (human development, abdomen, pelvis, limbs; 96 hrs), Pritzker School of Medicine, University of Chicago. Teaching assistant for Dr. Callum Ross. Fall 2012. [Student evaluations]

Comparative Vertebrate Anatomy (50 hrs), Organismal Biology and Anatomy, University of Chicago. Teaching assistant for Dr. Mark Westneat. Spring 2012. [Student evaluations not collected]

Computational Neuroscience II (50 hrs), Graduate Program in Computational Neuroscience, University of Chicago. Teaching assistant for Dr. Sliman Bensmaia. Winter 2011. [Student evaluations]

Chordate Evolutionary Biology (50 hrs), Organismal Biology and Anatomy, University of Chicago. Teaching assistant for Dr. Michael Coates. Spring 2011. [Student evaluations]

Invited Oral Presentations

Olsen AM. *What's going on (biomechanically) in a catfish head?* Departmental seminar at University of Massachusetts Lowell; 2018 Sep 12; Lowell, MA.

Olsen AM. *Animals with highly mobile heads and what they can tell us about the evolution of motor systems.* Departmental seminar at Clemson University; 2017 Sep 29; Clemson, SC.

Olsen AM & Brainerd EL. *Uncovering mechanisms of mouth expansion in catfish using X-Ray Reconstruction of Moving Morphology.* Paper presented in the Insights from Animal Biomechanics Symposium at the American Society of Biomechanics Annual Meeting; 2017 Aug 8-11; Boulder, CO.

Olsen AM, Hernandez LP, Camp AL & Brainerd EL. *Linking morphology and motion: Testing multibody simulations against in vivo cranial kinematics in suction feeding fishes using XROMM.* Paper presented in the Cranial Biomechanics and Evolution Symposium at the American Association of Anatomists Annual Meeting; 2017 Apr 22-26; Chicago, IL.

Oral Presentations (10 most recent)

Olsen AM & Brainerd EL. *An Ancient Throat Expansion Mechanism Functions as an 11-Bar Linkage in Channel Catfish.* Paper presented at: Joint Meeting of Ichthyologists and Herpetologists; 2018 Jul 12-15; Rochester, New York.

- Olsen AM**, Hernandez LP, Camp AL & Brainerd EL. *Closed loops of joints, rather than the joints themselves, impose the primary motion constraint in the catfish mouth expansion mechanism*. Paper presented at: Society for Integrative and Comparative Biology Annual Meeting; 2018 Jan 3-7; San Francisco, California.
- Olsen AM**, Camp AL & Brainerd EL. *Balancing complexity and error in kinematic models: fitting 2D and 3D four-bar linkage models to the opercular mechanism of largemouth bass (*Micropterus salmoides*)*. Paper presented at: Society for Integrative and Comparative Biology Annual Meeting; 2017 Jan 4-8; New Orleans, Louisiana.
- Olsen AM** & Westneat MW. *Two levers and a linkage: patterns of morphological and functional diversity in the upper beak, lower beak and cranial linkages of birds*. Paper presented at: Society for Integrative and Comparative Biology Annual Meeting; 2016 Jan 3-7; Portland, Oregon.
- Olsen AM** & Westneat MW. *Biological linkage mechanisms as networks*. Paper presented at: 6th International Meeting on Cranio-cervical Systems in Vertebrates; 2015 Jul 7-10; Ghent, Belgium.
- Olsen AM** & Westneat MW. *When linkages deviate from planarity: A new 3D computational linkage model applied to the cranial linkages of birds and fishes*. Paper presented at: Society for Integrative and Comparative Biology Annual Meeting; 2015 Jan 3-7; West Palm Beach, Florida.
- Olsen AM**. *Unlocking the diet data of the past: A new R package for compiling and querying diet datasets*. Paper presented at: 131st American Ornithologists' Union Meeting; 2014 Sept 23-28; Estes Park, Colorado.
- Olsen AM**. *Exceptional avian herbivores: Multiple origins of herbivory in the bird order Anseriformes and its correlation with beak shape and body mass*. Paper presented at: Society for the Study of Evolution Annual Meeting; 2014 Jun 20-24; Raleigh, North Carolina.
- Olsen AM** & Westneat MW. *Variation on an Old Articulation: Diverse material properties of a key joint underlying avian cranial kinesis*. Paper presented at: Society for Integrative and Comparative Biology Annual Meeting; 2014 Jan 3-7; Austin, Texas.
- Olsen AM** & Westneat MW. *Duck, duck, goose: multiple origins of geese from a duck-like ancestor*. Paper presented at: 131st American Ornithologists' Union Meeting; 2013 Aug 13-17; Chicago, Illinois.

Mentoring

Undergraduates supervised

Alejandro Romero, Brown University, 2018
 Chahat Rana, Brown University, 2018
 Connor Johnson, Brown University, 2018
 Shahn Thaliffdeen, Brown University, 2017-2018
 Mariah Nuzzo, Brown University, 2017
 Bianca Obiakor, Brown University, 2017
 Tara Bozzini, Brown University, 2017
 Jenna Hewitt-Kenda, Brown University, 2017

Trevor Thompson, University of Chicago, 2012

Travel Awards

- 2017 Brown University BioMed Postdoc travel award (\$650)
- 2015 University of Chicago BSD travel award (\$500)
- 2015 University of Chicago GRAD travel award (\$750)

Refereed manuscripts (initial submissions, revised submissions)

- American Naturalist (1,1)
- Biology Letters (1,0)
- Evolution (3,0)
- Evolutionary Ecology (1,0)
- Frontiers in Zoology (1,1)
- Integrative and Comparative Biology (2,0)
- Journal of Morphology (2,2)
- Journal of Zoology (1,1)
- Methods in Ecology & Evolution (2,1)
- North American Bird Bander (1,0)
- PNAS (1,0)
- Royal Society Open Science (1,0)
- Systematic Biology (1,1)
- Zoology (1,0)
- Total:** 19,7

Invited Lectures

- Biology design: Structural Architecture of Organisms*, Ecology and Evolutionary Biology, Brown University. Course director: Dr. Sharon Swartz. 2017 Oct 20.
- Biomechanics of Vertebrate Feeding Systems*, Organismal Biology and Anatomy, University of Chicago. Course director: Dr. Callum Ross. 2013 Feb 8.
- Development and Evolution of Neuromechanical Systems*, Organismal Biology and Anatomy, University of Chicago. Course director: Drs. Melina Hale and Callum Ross. 2013 Apr 26.

Science Outreach

- Marine Science Club*. After-school club at the [Paul Cuffee School](#) (grades 9-12) in Providence, RI. Fall 2018.
- Biomechanics Design*. Summer camp for teens at the Field Museum of Natural History. July 14-25, 2014.
- Vital Organs: Dissecting the Heart and Brain*. Project Exploration after-school Program at Ariel Community Academy (Chicago, IL). March 7, 2012.

Societies and Committees

- 2011-pres. Society for Comparative and Integrative Biology (SICB), member
- 2014-2016 Society for the Study of Evolution (SSE), member
- 2013-2014 Field Museum Women in Science, Monthly seminar series committee
- 2013-2014 Field Museum Women in Science, Summer internship committee

Volunteer Service

- 2010-2015 Bird Division Volunteer, Field Museum of Natural History, Chicago, IL
- 2005-2008 Spanish-English Medical Interpreter, Kansas City, Kansas
- 2005-2006 Director and founder of KU Campus Garden Project, University of Kansas
- 2006-2007 Youth Mentor (*Refuerzo escolar*), Murcia city government, Murcia, Spain

Undergraduate academic awards and honors

- 2009 Graduation with university honors
- 2009 Graduation Global Awareness Certification (GAP)
- 2008 National IDeA Symposium Travel Stipend (\$600)
- 2007 Member KU Alpha chapter of Phi Beta Kappa
- 2006 Andrew P. Debicki ISEP Scholarship (\$2000)
- 2005 CE Spahr Fund (\$480)
- 2004 KU Summerfield Scholarship (\$12,000)
- 2004 Thrivent College Scholarship (\$4,000)

Languages coded

R, HTML, JavaScript, C++, Matlab, PHP

Languages spoken

English (native), Spanish (non-native fluent), French (intermediate), German (intermediate)