AARON M OLSEN

NSF Postdoctoral Fellow

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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 W 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 and Research Postdoctoral Fellow, Brown University (Advisor: Elizabeth Brainerd)
2016-2018	NSF Postdoctoral Fellow, Brown University (Advisor: Elizabeth Brainerd)
2009-2016	Ph.D. student, University of Chicago (Advisor: Mark Westneat)
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*. *Early view*. DOI: 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.

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.*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.

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.

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.

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.

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.

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.

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.

Teaching Experience

Total student contact hours: 463

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. *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, 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.

Olsen AM & Westneat MW. *Dabbling, grazing and diving: Skull shape is related to beak foraging behaviors in the avian order Anseriformes*. Paper presented at: Society for Integrative and Comparative Biology Annual Meeting; 2013 Jan 3-7; San Francisco, California.

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 (2,0)
Frontiers in Zoology (1,1)
Integrative and Comparative Biology (2,0)
Journal of Morphology (2,2)
Methods in Ecology & Evolution (2,1)
North American Bird Bander (1,0)
PNAS (1,0)
Systematic Biology (1,1)
Total (14,6)

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

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, Brothers for Science After School Program. 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)