Hannah Weller

Research interests: biomechanical constraints in life history evolution; development of new computational methods for analysing organism color and pattern; broadly, paths of least resistance in the evolution of new traits.

Education

2019 – Present **PhD candidate, Ecology and Evolutionary Biology**
Brown University (Providence, RI)
Thesis: How much does functional morphology matter to the evolution of mouthbrooding?

2017 – 2019 **Transitional M.Sc., Ecology and Evolutionary Biology**
Brown University (Providence, RI)
Thesis: How do feeding adaptations influence the convergent evolution of mouthbrooding?

2012 – 2016 **Honors B.Sc., Biology**
University of Chicago (Chicago, IL)
Thesis: Winnowing in the eartheater cichlids

Peer-reviewed publications

Cohen, K.E., **Weller, H.I.**, Westneat, M.W., and Summers, A.P (2020). The Evolutionary Continuum of Functional Homodonty to Heterodonty in the Dentition of *Halichoeres* Wrasses. Integrative and Comparative Biology (in revision).

Weller, H.I.*, Hooper, S.E.*, and Amelon, S.K (2020). Countcolors, an R package for quantification of the fluorescence emitted by Pseudogymnoascus destructans lesions on the wing membranes of hibernating bats. Journal of Wildlife Diseases. https://doi.org/10.7589/2019-09-231

*These authors contributed equally to this work.

Cohen, K.E., **Weller, H.I.**, and Summers, A.P. (2020). Not your father's homodonty—stress, tooth shape, and the functional homodont. Journal of Anatomy. https://doi.org/10.1111/joa.13248

Weller, H.I., Olsen, A., Camp, A.L., Hernandez, L.P., Manafzadeh, A.R., and Brainerd, E.L. (2020). An XROMM study of intra-oral transport and swallowing in catfish. Integrative Organismal Biology. https://doi.org/10.1093/iob/obaa018.

van Meer, N.M., **Weller, H.I.**, Manafzadeh, A.R., Kaczmarek, E.B., Scott, B., Gussekloo, S.W.S, Wilga, C.D., Brainerd, E.B., and Camp, A.L. (2019). Intra-oropharyngeal food transport and swallowing in white-spotted bamboo sharks. Journal of Experimental Biology. 10.1242/jeb.201426

Weller, H.I., and Westneat, M.W. (2019). Quantitative color profiling of digital images with earth mover's distance using the R package colordistance. PeerJ. 10.7717/peerj.6398

Weller, H.I., McMahan, C.D., and Westneat, M.W. (2016). Dirt-sifting Devilfish: Winnowing in the geophagine cichlid *Satanoperca daemon* and evolutionary implications. Zoomorphology. 10.1007/s00435-016-0335-6

Publications in preparation

Capano, J. G., Cieri, R. L., **Weller, H.I.**, and Brainerd, E. L. (2020). Ribs All the Way Down: 3D-Rib Kinematics during Lung Ventilation in Boa constrictor (Reptilia: Serpentes), Comparison with Three Non-Serpentine Squamates, and Implications for Evolutionary Convergence (in prep).

Software

Weller, H.I. (2020). recolorize: Simplify and Remap Image Colors for Biological Analysis (ver. 0.9.0). Compiled and installable; CRAN release planned. https://github.com/hiweller/recolorize

Weller, H.I. (2019). colordistance: Distance Metrics for Image Color Similarity (ver. 1.1.0). CRAN repository. https://CRAN.R-project.org/package=colordistance

Weller, H.I. (2018). countcolors: Locates and Counts Pixels Within Color Range(s) in Images (ver. 0.9.1). CRAN Repository. https://CRAN.R-project.org/package=countcolors

Presentations

Weller, H.I., López-Fernández, H., McMahan, C.D., and Brainerd, E.L. (Jan. 2020). Talk: The spandrels of Satan's perches: evidence for the co-optation of feeding traits in the convergent evolution of mouthbrooding in Neotropical cichlids. *Society for Integrative and Comparative Biology, Austin, TX.*

Weller, H.I., López-Fernández, H., McMahan, C.D., and Brainerd, E.L. (Oct. 2019). Talk: Does mouthbrooding constrain or complement feeding morphology? *Regional Division of Vertebrate Morphology (Northeast), Newton, MA.*

Weller, H.I., Olsen, A., Camp, A.L., Hernandez, L.P., Manafzadeh, A.R., and Brainerd, E.L. (Jan. 2019). Talk: 3D-Intra-oral Prey Trajectories Indicate Distinct Phases in how Channel Catfish (Ictalurus punctatus, Siluriformes: Ictaluridae) Swallow Food. *International Congress of Vertebrate Morphology, Prague, CZ.*

Weller, H.I., Cohen, K.E., Gibb, A., and Brainerd, E.L. (Jan. 2019). Poster: Using tethers to measure food transport in a flatfish. *Society for Integrative and Comparative Biology, Tampa, FL.*

Weller, H.I., Olsen, A., Camp, A.L., Hernandez, L.P., Manafzadeh, A.R., and Brainerd, E.L.(Jan. 2019). Talk: An XROMM study of intra-oral transport and swallowing in catfish. *Society for Integrative and Comparative Biology, Tampa, FL.*

Weller, H.I. and Brainerd, E.L. (Oct. 2017). Talk: How do fish swallow food? *Regional Division of Vertebrate Morphology (Northeast), Lowell, MA.*

Weller, H.I., McMahan, C.D., and Westneat, M.W. (July 2016). Poster: Dirt-sifting devilfish: winnowing in eartheater cichlids. *American Society of Ichthyologists and Herpetologists, New Orleans, LA.*

Awards and Fellowships

April 2019 — **Graduate Research Fellowship**
$138,000, National Science Foundation

December 2018 — **Field Museum Visiting Scientist Scholarship**
$1,500, Field Museum of Natural History

May 2017 — **Presidential Fellowship**
$108,000, Brown University

June 2015 — **Jeff Metcalf Undergraduate Research Fellowship**
$5,000, Marine Biological Laboratory

March 2015 — **Elected to Phi Beta Kappa Society**

September 2014 — **Best Presentation, Undergraduate Research Symposium**
$150, University of Chicago

June 2014 — **Elliott and Eileen Hinkes Research Fellowship**
$4,000, University of Chicago

Invited talks, lectures, & workshops

July 2020 — **Workshop: Phylogenetic Comparative Methods in R**
University of Washington, Friday Harbor Laboratories (Friday Harbor, WA)
R workshop focusing on phylogenetic and comparative methods. Instructors: Matthew Kolmann and Cassandra Donatelli.

July 2020 — **A field guide to statistics in organismal biology**
University of Washington, Friday Harbor Laboratories (Friday Harbor, WA)
Guest lecture. Instructors: Matthew Kolmann and Cassandra Donatelli.

July 2020 — **Mouthbrooding morphologies in Neotropical cichlids**
University of California Davis, Dept. of Ecology and Evolutionary Biology (Davis, CA)
Virtual seminar. Host: Peter Wainwright.

April 2020 — **Special Topics: Light, Color, and Vision in Biology (BIOL 7901/ENTM 7008)**
Louisiana State University, Dept. of Entomology and Dept. of Biology (Baton Rouge, LA)
Guest lecturer (3 classes). Instructors: Nathan Lord (ENTM) & Brant Faircloth (BIOL).

December 2019 — **Workshop: R for Biologists**
Louisiana State University, Dept. of Entomology (Baton Rouge, LA)
Organizer. Day-long workshop on data analysis and visualization in R.

Research experience

2017 – Present — **Graduate student, Brainerd Lab**; advisor: Elizabeth Brainerd
Brown University, Dept. of Ecology & Evolutionary Biology
Comparative morphology, kinematics, and biomechanics of mouthbrooding fishes; XROMM fish feeding and transport.

September 2013 – July 2017 — **Research assistant**; advisor: Mark Westneat
University of Chicago, Dept. of Organismal Biology & Anatomy
Quantitative color analysis; geometric morphometrics; high-speed video kinematics.

June 2015 – September 2015
Jeff Metcalf Summer Research Fellow; advisor: Roger Hanlon
Brown University, Dept. of Ecology & Evolutionary Biology
Hyperspectral imaging; image analysis pipelines; camouflage analyses.

June 2014 – September 2014
Summer Research Fellow, Westneat Lab; advisor: Mark Westneat
University of Chicago, Dept. of Organismal Biology & Anatomy
Ontogenetic scaling; biomechanical modeling; geometric morphometrics.

Teaching and outreach

August 2020 – Present
Teaching assistant, *Brown University, Alpert Medical School* (Providence, RI)
COVID-modified Human Anatomy (lecture and lab)
Restructuring the traditional gross anatomy curriculum, including remote/small group work and prosection-based staggered labs.

September 2019 – Present
R User Group, *Brown University, Dept. of Ecology and Evolutionary Biology* (Providence, RI)
Organizing and running monthly R workshops for graduate and undergraduate students, focusing on techniques for biological analysis (e.g., data organization, statistics, and visualization).

August 2019 – April 2020
Teaching assistant, *Brown University, Alpert Medical School* (Providence, RI)
Human Anatomy (lecture and lab)
Guiding medical students through cadaver-based human anatomy labs.

September 2018 – Present
Marine Science Club, *Paul Cuffee High School* (Providence, RI)
Collaborating with high school teachers for weekly science activities with high school students.

September 2017 – Dec. 2017
Teaching assistant, *Brown University, Dept. of Ecology & Evolutionary Biology* (Providence, RI)
Diversity of Life (lecture)

January 2015 – April 2017
Teaching assistant, *University of Chicago, Dept. of Biological Sciences* (Chicago, IL)
Presenting and supervising lab experiments; writing and grading assignments; lecturing; leading paper discussions and review sessions; guiding dissection-based anatomy labs.

Genetic and Developmental Biology (lab & lecture)
Multiscale Modeling of Biological Systems (lecture)
Molecular Biology of the Cell (lab)
Comparative Vertebrate Anatomy (lab & lecture)

June 2013 – September 2013
Animal care intern, *New England Aquarium* (Boston, MA)
Daily animal care and maintenance; visitor outreach; collection trips.

Skills

Coding R, Python (OpenCV, Scrapy, & BioPython libraries), MATLAB, UNIX, MEL

Software Latex, Maya, FIJI/ImageJ, Horos, 3DSlicer, XMALab, Mesquite, Pandoc, Microsoft Office

Languages English (native), French (intermediate)

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