

# 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](https://doi.org/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](https://doi.org/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](https://doi.org/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

<b>April 2019</b>	<b>Graduate Research Fellowship</b> \$138,000, National Science Foundation
<b>December 2018</b>	<b>Field Museum Visiting Scientist Scholarship</b> \$1,500, Field Museum of Natural History
<b>May 2017</b>	<b>Presidential Fellowship</b> \$108,000, Brown University
<b>June 2015</b>	<b>Jeff Metcalf Undergraduate Research Fellowship</b> \$5,000, Marine Biological Laboratory
<b>March 2015</b>	<b>Elected to Phi Beta Kappa Society</b>
<b>September 2014</b>	<b>Best Presentation, Undergraduate Research Symposium</b> \$150, University of Chicago
<b>June 2014</b>	<b>Elliott and Eileen Hinkes Research Fellowship</b> \$4,000, University of Chicago

---

## Invited talks, lectures, & workshops

<b>July 2020</b>	<b>Workshop: Phylogenetic Comparative Methods in R</b> <i>University of Washington, Friday Harbor Laboratories</i> (Friday Harbor, WA) R workshop focusing on phylogenetic and comparative methods. Instructors: Matthew Kolmann and Cassandra Donatelli.
<b>July 2020</b>	<b>A field guide to statistics in organismal biology</b> <i>University of Washington, Friday Harbor Laboratories</i> (Friday Harbor, WA) Guest lecture. Instructors: Matthew Kolmann and Cassandra Donatelli.
<b>July 2020</b>	<b>Mouthbrooding morphologies in Neotropical cichlids</b> <i>University of California Davis, Dept. of Ecology and Evolutionary Biology</i> (Davis, CA) Virtual seminar. Host: Peter Wainwright.
<b>April 2020</b>	<b>Special Topics: Light, Color, and Vision in Biology (BIOL 7901/ENTM 7008)</b> <i>Louisiana State University, Dept. of Entomology and Dept. of Biology</i> (Baton Rouge, LA) Guest lecturer (3 classes). Instructors: Nathan Lord (ENTM) & Brant Faircloth (BIOL).
<b>December 2019</b>	<b>Workshop: R for Biologists</b> <i>Louisiana State University, Dept. of Entomology</i> (Baton Rouge, LA) Organizer. Day-long workshop on data analysis and visualization in R.

---

## Research experience

<b>2017 – Present</b>	<b>Graduate student, Brainerd Lab</b> ; advisor: Elizabeth Brainerd <i>Brown University, Dept. of Ecology &amp; Evolutionary Biology</i> <i>Comparative morphology, kinematics, and biomechanics of mouthbrooding fishes; XROMM fish feeding and transport.</i>
<b>September 2013 – July 2017</b>	<b>Research assistant</b> ; advisor: Mark Westneat <i>University of Chicago, Dept. of Organismal Biology &amp; Anatomy</i> <i>Quantitative color analysis; geometric morphometrics; high-speed video kinematics.</i>

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)

---

*Lab:* Biomedical Center 426, 171 Meeting St., Providence, RI 02906

*Email:* [hannahiweiler@gmail.com](mailto:hannahiweiler@gmail.com)

*Website:* [hiweiler.github.io](https://hiweiler.github.io)