

Nathan Craig Bird, Ph.D.

Associate Professor
Department of Biology
107 McCollum Science Hall
University of Northern Iowa
Cedar Falls, IA 50614-0421

Office: (319) 273-2454
Lab: (319) 273-7125
E-mail: nathan.bird@uni.edu

Research Interests

Origin and evolution of novelty; Comparative morphology and the evolution of regionalization in the axial skeleton in fishes; Developmental regulation of skeletal development.

Education, Post-Doctoral Fellowships, and Faculty Appointments

- 2021-Present *Associate Professor*. Department of Biology, University of Northern Iowa, Cedar Falls, Iowa.
- 2014-2021 *Assistant Professor*. Department of Biology, University of Northern Iowa, Cedar Falls, Iowa.
- 2012-2014 *Postdoctoral Research Associate*. Department of Biological Sciences, University of Rhode Island, Kingston, RI. Evolution and Development of Sensory Systems in Fishes.
- 2009-2012 *Postdoctoral Research Associate*. Department of Biology, Wesleyan University, Middletown, CT. Molecular and Developmental Biology of Muscle Development in Zebrafish.
- 2009 *PhD in Biological Sciences*. Department of Biological Sciences, The George Washington University, Washington, DC. Dissertation title: Development, Growth, and Evolution of the Cypriniform Weberian Apparatus. Mentor, L. Patricia Hernandez.
- 2003 *MS in Biology*. Department of Biology, University of South Dakota, Vermillion, SD. Thesis title: Developmental Morphology of the Axial Skeleton in the Zebrafish, *Danio rerio*. Mentor, Paula M. Mabee.
- 1999 *BS in Biology*. Department of Biology, University of South Dakota, Vermillion, SD.

Grants, Awards, and Fellowships

- 2020 UNI Student Admission Ambassador (SAA) Apple Polisher Award. Nominated by Jacob Horn (Student in Spring 2020 BIOL 3106 Vertebrate Anatomy)
- 2018 Teaching Grant: "Storage and Upgrade of Synthetic Cadavers Intended for the Human Anatomy and Physiology I Laboratory". \$52,365.64. Roy J. Carver Charitable Trust, awarded October 2018 to update the housing of syndavers used in Anatomy and Physiology 1 labs. Authors: Nathan Bird, Sheree Harper (lead), Jill Maroo, Mary McDade, and Theresa Spradling.

- 2017 Teaching Grant: “Using Micro-CT and 3-D Printing to Create 21st Century Experiential Learning in Anatomy & Biological Sciences”. \$303,634. Roy J. Carver Charitable Trust, awarded October 2017 for purchase of a Micro CT and 3D printer to update the curriculum of Vertebrate Anatomy and other courses, as well as for undergraduate and graduate student research projects. Authors: Peter Berendzen, Nathan Bird (lead), David Saunders.
- 2016 UNI Faculty 2016 Summer Fellowship (internal competitive). “Analysis of growth and evolution of the Weberian apparatus in cypriniform fishes.” May-June, 2016.
- 2016 Pre-Tenure grant (UNI Provost, internal competitive). “Evolution of the Weberian apparatus in cypriniform fishes” (\$1478).
- 2014 Teaching Grant: “Inclusion of Synthetic Cadavers into the Human Anatomy and Physiology I Laboratory”. \$150,000.00. Roy J. Carver Charitable Trust, awarded October 2014 to Anatomy and Physiology 1 labs. Authors: Nathan Bird, Mary McDade, John Ophus, David Saunders, and Darrell Wiens.
- 2008-2009 Isabella Osborn King Research Fellowship, Department of Biological Sciences, George Washington University.
- 2008 Best Poster Award, Division of Evolutionary and Developmental Biology, Society for Integrative and Comparative Biology.
- 2007 Best Poster Award, Division of Vertebrate Morphology, Society for Integrative and Comparative Biology.
- 2005-2009 Weintraub Fellowship in Systematics and Evolution, Department of Biological Sciences, George Washington University.
- 2003-2009 Research Fellow, Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, DC.
- 2002 SICB Grant in Aid of Research. Innervation Patterns in the Median Fins of Fishes (\$800).
- 2001 USD CoBRE NIH Pilot Grant (PI Mabee, Co-PI’s: Crotwell and **Bird**) Innervation Patterns and Fin Positioning Mechanisms. (NIH P20 RR15567; \$7500).

TEACHING

Professional Teaching

- 2014-Present Department of Biology, University of Northern Iowa.
- Developmental Biology of Animals (BIOL 4146/5146, 4 CR)
 - Vertebrate Anatomy (BIOL 3106, 4 CR)
 - Anatomy and Physiology II Lecture for Majors (BIOL 3102)
 - Anatomy and Physiology I Laboratory (BIOL 3101)
 - Anatomy and Physiology II Laboratory (BIOL 3102)
 - Anatomy and Physiology II Laboratory for Pre-Nursing (BIOL 3102)

- 2014-Present *Guest Lecturer*, University of Northern Iowa.
- SCIED 1200, Inquiry into Life Science (Dr. Jill Maroo). Fish care in the classroom. University of Northern Iowa. Fall 2019.
 - BIOL 4193, Methods in Teaching Life Science (Dr. Alison Beharka). Fish care in the classroom. University of Northern Iowa. Spring 2019.
 - CHEM 1011, Molecules and Life (Dr. Brittany Flokstra). Evolution: What is it and how does it work?. University of Northern Iowa. 10 November, 2017.
 - CHEM 1011, Molecules and Life (Dr. Brittany Flokstra). Evolution: What is it and how does it work?. University of Northern Iowa. 17 April, 2017.
 - BIOL 2052, Cell Structure and Function (Dr. Julie Kang). Examining Anatomy, Development, and Evolution in Vertebrates. University of Northern Iowa. 10 April 2017.
 - CHEM 1011, Molecules and Life (Dr. Brittany Flokstra). Evolution and Superpowers: Where are all the X-Men? University of Northern Iowa. 3 April, 2017.
 - CHEM 1011, Molecules and Life (Dr. Brittany Flokstra). Evolution: What is it and how does it work?. University of Northern Iowa. 7 November, 2016.
 - BIOL 2052, Cell Structure and Function (Dr. Julie Kang). Examining Anatomy, Development, and Evolution in Vertebrates. University of Northern Iowa. 18 April, 2016
- 2003-2009 *Graduate Teaching Assistant*, Department of Biological Sciences, George Washington University
- Comparative Vertebrate Anatomy Lab
 - Biology of Proteins Lab
 - Biology of Organisms Lab
- 2005, 2006 *Guest Lecturer*, Comparative Vertebrate Anatomy, George Washington University
- 2001-2002 *Graduate Teaching Assistant*, University of South Dakota State-Wide Educational Services
- Survey of Biology Lab
- 2000-2003 *Graduate Teaching Assistant*, Department of Biology, University of South Dakota
- Principles of Organismal Diversity and Ecology Lab
 - Principles of Cellular and Molecular Biology Lab
 - Survey of Biology Lab

Faculty Development

Teaching

- UNI CETL Spring 2024 “Open By Design” Professional Development Workshop
- UNI Division of Continuing Education and Special Programs Professional Development Courses for Online Course Design and Teaching
 - o Quality Matters Course Design Essentials Tutorial. Completed July 2020.
 - o Quality Matters Teaching Online Essentials Tutorial. Completed July 2020.
 - o Quality Matters Course Design Essentials Workshop. Attended July 31, 2020.
 - o Quality Matters Teaching Online Essentials Workshop. Attended July 31, 2020.
- UNI CETL Summer 2020 “Remote Possibilities” Professional Development Workshop Series

- **"MAKING LEMONADE"** (discovering and leveraging unexpected benefits in remote learning; going deeper with Blackboard; exploring & exploding assumptions; lessons to take back to f2f learning). Attended June 3, 2020
 - **SYNCHRONOUS? ASYNCHRONOUS? HYBRID? HYFLEX?** (considering limits to "bandwidth," both for telecommunication and cognition). Attended June 10, 2020.
 - **COMMUNICATION** (including class announcements & individual correspondence; discussions & collaboration; feedback & grading; captioning). Attended June 16, 2020.
 - **GROUP WORK** (including peer review, forums, collaborations). Attended June 24, 2020.
 - What happens when **LABS, STUDIOS, & FIELD EXPERIENCES** become virtual spaces? Panelist on June 30, 2020.
 - **ACTIVE LEARNING STRATEGIES FOR ALL SEASONS** (f2f, hybrid, HyFlex, online) Pragmatic approaches in support of student-centered learning, universal design for learning (UDL), metacognition, micro-learning, and transparency in learning and teaching (TILT). Attended July 24, 2020.
 - **LEARNING FROM SURVEYS STUDENT EXPERIENCE** (How did our students experience emergency remote learning and a summer marked by pandemic and civil unrest? What do they bring to F'20?). Attended July 27, 2020.
 - **PREPARING FOR THE PHYSICALLY DISTANCED CLASSROOM** (Protocols, safety, logistics, etiquette, enforcement?). Attended August 6, 2020
- Completed the teaching certification program (*teachUNI*) through Center for Excellence in Teaching and Learning at UNI, April 2016.
 - The program required participation several pedagogy-related events, including two panel discussions, three faculty observations, four book discussion groups, six seminars, and a week-long workshop.

SCHOLARSHIP

Research Mentoring

2014-Present University of Northern Iowa

Undergraduate Students

- Nick Duncan, Annalise Zeinemann, Max Whipple, Srijaa Kadiyala (Undergraduate Research). Fall 2023-Spring 2024. Project: Evolution of the loach Weberian apparatus.
- Derek Blackburn (University Honors Thesis). Starting Fall 2023.
- Carly J. Baker (University Honors Thesis). Graduated December, 2022. Project: Analysis of phylogenetic variation in enamel thickness across vertebrate teeth.
- Spenser J. R. Larson (University Honors Thesis). Graduated May, 2022. Project: Optimization of micro-CT protocols for non-destructive identification of ligament ultrastructure in the zebrafish, *Danio rerio*.
- Luke Butikofer (University Honors Thesis). Graduated December, 2020. Project: Examining Variation in Tooth Morphology Across Dietary Types in Mammals.
- Jeremy Abels (Undergraduate Research/University Honors Thesis/Summer Undergraduate Research Program). Spring 2018-Spring 2020. Project: Histological Anatomy and Structural Integration in Four Distinct Cypriniform Weberian Apparatus Morphologies.
- Casey Brown (Undergraduate Research). Fall 2018-Spring 2019. Project: Optimizing Micro-CT scanning for analysis of hard and soft tissue morphology in cypriniform fishes.

- Selena Richardson (Undergraduate Research/Summer Undergraduate Research Program). Spring 2018-Fall 2018. Project: Histological Development and Ontogeny of the Weberian Apparatus in the Zebrafish, *Danio rerio*.
 - Tyler Aten (Undergraduate Research). Fall 2017/Spring 2018. Project: “Effect of Exogenous thyroid hormone (T3/T4) on larval survival and bone growth in the Weberian apparatus.”
 - Bailey Wetherell (University Honors Thesis). Spring/Fall 2016. Project/Thesis: “Developmental Immunity of the Skeletal Elements of the Weberian Apparatus to the Effects of Exogenous Estrogen (17-β Estradiol), a Known Disruptor of Cartilage Development.”
 - Gavin McGivney (Summer Undergraduate Research Program 2016). Project: Testing the immunity of the Weberian apparatus to developmental modulators.
 - Joseph Campbell (Summer Undergraduate Research Program 2016). Project: The relationship among environment, body shape, and Weberian apparatus morphology in Danionin fishes.
 - Emily Meier (Summer Undergraduate Research Program 2015, University and Biology Department Honors Thesis). Project: Testing the modular hypothesis in the development of the Weberian apparatus. May 29, 2015-Spring 2016. Thesis: “Testing for Modularity in the Axial Skeleton of Fishes”.
 - Sarah Freeland (Summer Undergraduate Research Program 2015, University and Biology Department Honors Thesis). Project: Testing for developmental buffering in the development of the Weberian apparatus. May 29, 2015-Spring 2016. Thesis: “The Role of Rearing Temperature on Somitogenesis and Skeletal Development”.
- 2012-2014 University of Rhode Island – projects ranged from fluorescent analysis of lateral line patterning to histological and whole-mount analysis of lateral line development.
- 2009-2012 Wesleyan University - projects ranged from analyzing skeletal defects in transgenic and mutant zebrafish to immunohistochemical or in situ analysis of zebrafish muscle development.
- As a post-doctoral fellow, I mentored and trained four graduate students
 - As a post-doctoral fellow, I mentored and trained six undergraduates and one doctoral student
- 2003-2009 George Washington University - projects ranged from immunohistochemical and histological analysis of skeletal development to whole-mount analysis of comparative morphology.
- As a graduate student, I mentored and trained seven undergraduates and two junior graduate students
- 2000-2003 University of South Dakota - histological and whole-mount analysis of zebrafish skeletal development.
- As a graduate student, I mentored and trained one undergraduate

Peer Reviewed Publications

1. Leyhr, J, Haitina, T, **Bird, NC**. In Secondary Review. The overlooked first intercostal ligament: Does it help to stabilize the Weberian apparatus? *Journal of Anatomy*
2. **Bird, NC**, Richardson, SS, Abels, JR. 2020. Histological development and integration of the zebrafish Weberian apparatus. *Developmental Dynamics* 249 (8): 998-1017. DOI: 10.1002/dvdy.172
3. **Bird, NC**, Abels, JR, Richardson, SS. 2020. Histology and structural integration of the major morphologies of the cypriniform Weberian apparatus. *Journal of Morphology* 281(2): 273-293.
4. Becker, E, **Bird, NC**, and Webb, JF. 2016. Post-embryonic development of canal and superficial neuromasts and the generation of two cranial lateral line phenotypes. *Journal of Morphology* 277 (10):1273–1291. First published online 13 August 2016.

5. **Bird, NC** and Webb, JF. 2014. Heterochrony, Modularity, and the Functional Evolution of the Mechanosensory Lateral Line Canal System of Fishes. *EvoDevo* 2014 5:21.
6. Webb, JF, **Bird, NC**, Carter, L, and Dickson, J. (2014) Comparative development and evolution of two lateral line phenotypes in Lake Malawi cichlids. *Journal of Morphology*.
7. Windner, SE, **Bird, NC**, Patterson, SE, Doris, RA, and Devoto, SH. (2012). Fss/Tbx6 is required for central dermomyotome cell fate in zebrafish. *Biology Open* 1: 806-814. doi: 10.1242/bio20121958
8. Patterson, SE, **Bird, NC**, and Devoto, SH. (2010). BMP regulation of myogenesis in zebrafish. *Developmental Dynamics*, 239:806-817. *Cover illustration*.
9. **Bird, NC** and Hernandez, LP. (2008). Building an evolutionary innovation: differential growth in the modified vertebral elements of the zebrafish Weberian apparatus. *Zoology*, 112:97-112.
10. **Bird, NC** and Hernandez, LP. (2007). Morphological variation in the Weberian apparatus of Cypriniformes. *Journal of Morphology*, 268:739–757. *Cover illustration*.
11. Hernandez, LP, **Bird, NC** and Staab, KL. (2007). Using zebrafish to investigate cypriniform evolutionary novelties: functional development and evolutionary diversification of the kinethmoid. *Journal of Experimental Zoology (Molecular Developmental Evolution)*, 308(5):625-641.
12. **Bird, NC** and Mabee, PM. (2003). Developmental morphology of the axial skeleton of the zebrafish, *Danio rerio* (Ostariophysi: Cyprinidae). *Developmental Dynamics* 228, 337-357.
13. Mabee, PM, Crotwell, PL, **Bird, NC** and Burke, AC. (2002). Evolution of median fin modules in the axial skeleton of fishes. *Journal of Experimental Zoology (Molecular Developmental Evolution)* 294:77-90. *Cover illustration*.

Book Chapters and Other Publications

1. **Bird, NC**, Windner, SE, and Devoto, SH. (2011). Immunocytochemistry to study myogenesis in zebrafish. in *Myogenesis. Methods in Molecular Biology*, Vol. 798. DiMario, J.X., ed.
2. Mabee, PM and **Bird, NC**. (2001). A preliminary description of the anatomy and development of the zebrafish axial skeleton. ZFIN Direct Data Submission. (http://zfin.org/cgi-bin/ZFIN_jump?record=ZDB-PUB-011008-1).

Invited Seminars and Symposium Presentations

1. **Bird, NC**. (2021). *The cypriniform Weberian apparatus as a model for examining developmental integration and environmental-based morphological variation in a complex sensory system*. Invited seminar, University of California, Berkeley, Department of Integrative Biology. April 15, 2021.
2. **Bird, NC**. (2018). *Using X-men and comic book characters to discuss concepts of genetics, evolution, and functional anatomy*. UNI Science Education Update Conference. April 6, 2018.
3. **Bird, NC**. (2017). *Deconstructing the Cypriniform Weberian Apparatus*. Pre-Tenure Seminar, University of Northern Iowa Department of Biology Graduate Colloquium. October 9, 2017.
4. **Bird, NC**. (2017). *Evolution and Superpowers: Where are all the X-Men?* Invited seminar, ROD-CON. April 1, 2017.
5. **Bird, NC**. (2016). *Evolution and Superpowers: Where are all the X-Men?* Invited seminar, University of Northern Iowa Darwin Week (UNIFI). February 10, 2016.
6. **Bird, NC**. (2015). *Evolution, Development, and Novelty in the Vertebrate Axial Skeleton: Exploring the Weberian Apparatus of Cypriniform Fishes*. Invited seminar, University of Dubuque, Department Natural and Applied Sciences Seminar Series. September 4, 2015.
7. **Bird, NC**. (2014). *Evolution of the mechanosensory lateral line system: insights from development, functional morphology, and behavior in zebrafish and cichlids*. Invited seminar, University of South Dakota, Department of Biology Seminar Series. November 3, 2014.
8. **Bird, NC**. (2012). *Control of migration of the posterior lateral line primordium and lateral stripe melanophores in zebrafish by derivatives of the somites*. Invited seminar, University of Rhode Island Biological & Environmental Sciences Colloquium Series. December 3, 2012.

9. **Bird, NC** and Hernandez, LP. (2008). *Skeletal development of the Weberian apparatus in cypriniform fishes*. Invited symposium talk for the Comparative Morphology and Development Third Inaugural Symposium, Student Satellite Symposium: ‘Skeletal Differentiation Across the Vertebrates’ at the annual meeting of the Canadian Society of Zoologists in Halifax, Nova Scotia, Canada. May 19-23, 2008.

Presentations at National and International Conferences

1. Leyhr, J, Leflaëc, E, Debais-Thibaud, M, **Bird, NC**, Dollman, K, Tafforeau, P, Sanchez, S, and Haitina, T. (2023). DICE-PPC-SR μ CT for describing anatomy, mutant phenotypes, and tissue organisation in three dimensions at near-histological resolution. To be presented at the Society for Developmental Biology annual meeting in Chicago, IL, July 2023.
2. **Bird, NC** (2019). TAL-X Workshop (panelist and presenter): Workshop Title: “Identifying the core concepts of vertebrate morphology teaching: a means to enhance active learning and retention in the classroom.” Presentation: “Using Flexible Pedagogy to Break Down Barriers to Student Success in Comparative Vertebrate Anatomy.” Annual Meeting of the Society for Integrative and Comparative Biology in Tampa, FL. January 3-7, 2019.
3. **Bird, NC** (2019). The Ever-Evolving Comparative Vertebrate Anatomy Final Project: An Alternative to Comprehensive Lecture Finals. Presented at the Annual Meeting of the Society for Integrative and Comparative Biology in Tampa, FL. January 3-7, 2019.
4. Abels, JR*, Richardson, SS*, and **Bird, NC** (2019). Histological Anatomy and Structural Integration in Four Distinct Cypriniform Weberian Apparatus Morphologies. Presented at the Annual Meeting of the Society for Integrative and Comparative Biology in Tampa, FL. January 3-7, 2019.
5. **Bird, NC** (2016). Histological analysis of morphological integration and development in the Weberian apparatus of the zebrafish. Presented at the 11th International Congress of Vertebrate Morphology in Washington, DC. June 29-July 3, 2016.
6. **Bird, NC** and Webb JF. (2014). Modularity and heterochrony in the adaptive evolution of the lateral line system of fishes. Presented at the SICB annual conference in Austin, TX.
7. **Bird, NC** and Webb JF. (2013). Evolution of the lateral line system of fishes via dissociated heterochrony. Presented at the 2013 joint DVM/DCB Northeast Regional SICB meeting, held at Yale University, New Haven, CT.
8. **Bird, NC**. (2012). The central dermomyotome as an organizer of ectodermal tissues. Presented at the Connecticut Valley Zebrafish Meeting, held at the University of Massachusetts, Amherst.
9. **Bird, NC**, Stellabotte, F, and Devoto, SH. (2010). *Tbx24* is required for proper dermomyotome formation in the posterior trunk of zebrafish. Presented at the Society for Developmental Biology annual meeting in Albuquerque, NM.
10. **Bird, NC**. (2009). Development and growth of the cypriniform Weberian apparatus: lessons from the zebrafish. Presented at the Connecticut Valley Zebrafish Meeting, held at the University of Massachusetts, Amherst.
11. **Bird, NC** and Hernandez LP. (2009). Constructing a complex morphological novelty: Insights from growth, development, and genetics of the cypriniform Weberian apparatus. Presented at the SICB annual conference in Boston, MA.
12. **Bird, NC** and Hernandez LP. (2009). Is the Weberian apparatus a key innovation: causal versus permissive evolutionary factors? Presented at the SICB annual conference in Boston, MA.
13. **Bird, NC** and Hernandez, LP. (2008). Differential growth and the evolution of novel vertebral morphology: lessons from the cypriniform Weberian apparatus. Presented at the SICB annual conference in San Antonio, TX.
14. **Bird, NC** and Hernandez LP. (2007). Growth of discrete processes within the Weberian apparatus: the role of positive and negative allometry in the origin of this evolutionary novelty. Presented at the 8th International Congress of Vertebrate Morphology in Paris, France.

15. Hernandez LP, **Bird, NC**, Staab, KL, and O'Quin, CT. (2007). Using zebrafish to investigate the origin and evolution of morphological novelty. Presented at the 8th International Congress of Vertebrate Morphology in Paris, France.
16. **Bird, NC** and Hernandez, LP. (2007). Morphological variation of the Weberian apparatus in cypriniform Fishes. Presented at the SICB annual conference in Phoenix, AZ.
17. **Bird, NC** and Hernandez LP. (2006). Origin of complex structures: zebrafish as the new model organism for investigating morphological innovation. Presented at the SICB annual conference in Orlando, FL.
18. **Bird, NC** and Hernandez LP. (2005). Development of the Weberian apparatus. Presented at the SICB annual conference in San Diego, CA.
19. **Bird, NC** and Hernandez LP. (2004). Is the Weberian apparatus a key innovation? Presented at the 7th International Congress of Vertebrate Morphology in Boca Raton, FL.
20. **Bird, NC** and Hernandez, LP. (2004). The Weberian apparatus: development and evolution of a morphological novelty. Presented at the SICB annual conference in New Orleans, LA.
21. **Bird, NC** and Mabee, PM. (2003). Homology, individuality, and developmental morphology of the axial skeleton of the zebrafish. Presented at the SICB annual conference in Toronto, Canada.
22. **Bird, NC** and Mabee, PM. (2002). Development of the axial skeleton in the zebrafish, *Danio rerio*. Presented at the 2002 University of South Dakota Sigma Xi Annual Graduate Sciences Research Forum.
23. **Bird, NC** and Mabee, PM. (2002). Development of the axial skeleton in the zebrafish, *Danio rerio*. Presented at the Society for Integrative and Comparative Biology (SICB) annual conference in Anaheim, CA.
24. **Bird, NC** and Mabee, PM. (2001). Morphological development of the zebrafish axial skeleton. Presented at the 2nd Midwest Zebrafish Meeting in St. Paul, MN.
25. **Bird, NC** and Mabee, PM. (2001). Morphological development of the zebrafish axial skeleton. Presented at the 2001 North Dakota/South Dakota EPSCoR biennial meeting in Brookings, SD.
26. **Bird, NC** and Mabee, PM. (2000). Morphological development of the zebrafish axial skeleton. Presented at the 2000 South Dakota EPSCoR annual meeting in Rapid City, SD.

*Undergraduate Student

Published Abstracts

1. Abels, JR*, Richardson, SS*, and **Bird, NC** (2019). Histological Anatomy and Structural Integration in Four Distinct Cypriniform Weberian Apparatus Morphologies. *Integrative and Comparative Biology*, 59 (suppl 1): e261. <https://doi.org/10.1093/icb/icz004>.
2. **Bird, NC** (2019). The Ever-Evolving Comparative Vertebrate Anatomy Final Project: An Alternative to Comprehensive Lecture Finals. *Integrative and Comparative Biology*, 59 (suppl 1): e274. <https://doi.org/10.1093/icb/icz004>.
3. **Bird, NC** (2016). Histological analysis of morphological integration and development in the Weberian apparatus of the zebrafish. ICVM11-2016 Abstracts. *The Anatomical Record*.
4. **Bird, NC** and Webb JF. (2014). Modularity and heterochrony in the adaptive evolution of the lateral line system of fishes. *Integrative and Comparative Biology*, 54 (suppl 1): e1-e234 doi:10.1093/icb/icu008.
5. **Bird, NC**, Stellabotte, F, and Devoto, SH. (2010). *Tbx24* is required for proper dermomyotome formation in the posterior trunk of zebrafish. *Developmental Biology*, 344:461.
6. **Bird, NC** and Hernandez LP. (2009). Constructing a complex morphological novelty: Insights from growth, development, and genetics of the cypriniform Weberian apparatus. *Integrative and Comparative Biology*, 49:e16.
7. **Bird, NC** and Hernandez LP. (2009). Is the Weberian apparatus a key innovation: causal versus permissive evolutionary factors? *Integrative and Comparative Biology*, 49:e201.

8. **Bird, NC** and Hernandez, LP. (2007). Differential growth and the evolution of novel vertebral morphology: lessons from the cypriniform Weberian apparatus. *Integrative and Comparative Biology*, 47:e160.
9. **Bird, NC** and Hernandez LP. (2007). Growth of discrete processes within the Weberian apparatus: the role of positive and negative allometry in the origin of this evolutionary novelty. *Journal of Morphology*, 268:1050.
10. Hernandez LP, **Bird, NC**, Staab, KL, and O'Quin, CT. (2007). Using zebrafish to investigate the origin and evolution of morphological novelty. *Journal of Morphology*, 268:1082.
11. **Bird, NC** and Hernandez, LP. (2006). Morphological variation of the Weberian apparatus in cypriniform Fishes. *Integrative and Comparative Biology*, 46:e170.
12. **Bird, NC** and Hernandez LP. (2005). Origin of complex structures: zebrafish as the new model organism for investigating morphological innovation. *Integrative and Comparative Biology*, 45:966.
13. **Bird, NC** and Hernandez LP. (2004). Development of the Weberian apparatus. *Integrative and Comparative Biology*, 44:525.
14. **Bird, NC** and Hernandez LP. (2004). Is the Weberian apparatus a key innovation? *Journal of Morphology*, 260:278.
15. **Bird, NC** and Hernandez, LP. (2003). The Weberian apparatus: development and evolution of a morphological novelty. *Integrative and Comparative Biology*, 43(6):941.
16. Uraiqat, CA, **Bird, NC**, and Hernandez, LP. Pharyngeal arch development in midline and hedgehog signaling mutants: implications for morphogenesis of the visceral skeleton. *Integrative and Comparative Biology*, 43:942.
17. **Bird, NC** and Mabee, PM. (2002). Homology, individuality, and developmental morphology of the axial skeleton of the zebrafish. *Integrative and Comparative Biology*, 42: 1197.
18. **Bird, NC** and Mabee, PM. (2002). Development of the axial skeleton in the zebrafish, *Danio rerio*. *American Zoologist*, 41:1393.
19. Mabee, PM, **Bird, NC**, and Crotwell, PL. (2000). Models to explain directions of development and evolution of fin skeletons. *American Zoologist*, 40:1112.

*Undergraduate Student

Ongoing Projects

1. Three-Dimensional analysis of ligament growth and structure in the zebrafish Weberian apparatus (collaboration with Dr. Tatjana Haitina, University of Uppsala, Uppsala, Sweden).
2. Analysis of ontogenetic defects in hatchery-reared walleye (collaboration with Dr. Peter Berendzen, UNI, and Iowa Department of Natural Resources).
3. Relationship of growth, function, and environment in the loach Weberian apparatus.
4. Variation in ligament structure, function, and composition in cypriniform fishes: a case study using the Weberian apparatus and Kinethmoid-mediated premaxillary protrusion apparatus (collaboration with Dr. Katie Staab, McDaniel College, MD).
5. Cell death and regeneration in cobalt-treated cichlid neuromasts (collaboration with Dr. Margot Schwalbe, Lake Forest College, IL, and Dr. Jacqueline Webb, University of Rhode Island, RI).

SERVICE

Service to the University of Northern Iowa

1. Service to the University
 - University Committee on Curricula, Member. August 2022-present.
 - Graduate College Committee on Curricula, Member. August 2023-present.

- Phase Two Academic Positioning Steering Committee, Member, December 2021-present
 - Phase Two Academic Positioning Steering Committee Liaison to Health Sciences Focused Working Group, December 2021-June 2022.
 - Led two groups during UNI Up Close days in a biological lab exercise and Q&A session. February 16th and 23rd, 2018
 - Pre-Tenure Research Grant Committee (2017). Internal review of 12 pre-tenure research grant applications for university funding, followed by committee discussion, review, and voting on funding. Final meeting October 24, 2017.
2. College Committees
 - Alternate for CHAS Senate (Biology Seat), January 2022-present
 3. Service to Department
 - Admissions Parent Visit Day, April 7, 2023
 - Admissions Parent Visit Day, October 29, 2022.
 4. Departmental Committees
 - Biology PAC Subcommittee 2022-2024
 - Biology Recruitment and Outreach (Ad Hoc) 2021-current
 - Biology-Nursing Curriculum Committee (Ad Hoc) Spring 2023-current
 - Promotion and Standards Committee (Ad Hoc), February 2023
 - Undergraduate SOA Committee (Ad Hoc), Fall 2020-current
 - Biology Safety Committee (Standing), January 2022-current
 - Biology Math Requirement Assessment Committee (Ad Hoc), Fall 2021
 - Biology BA-Biomedical Curriculum Committee (Ad Hoc), Fall 2019
 - Outcomes Committee (Standing; Fall 2014-2018)
 5. Advising
 - Presented talk to joint meeting of Pre-Dental and Pre-Medicine Clubs: “Letters of Recommendation and Personal Statements”. February 1, 2023.
 - Faculty advisor to the Pre-Dental Club (Fall 2014 – Present)
 - Faculty advisor to the Pre-Medical Club (December 2018-Present)
 - Attended Pre-Dental Advisors Biennial Workshop at the University of Iowa (May 12, 2017) to better understand the needs of Pre-Dental students in order to serve them better as faculty advisor
 - Attended Pre-Dental Advisors Workshop at the University of Iowa (May 4, 2015) to better understand the needs of Pre-Dental students in order to serve them better as faculty advisor
 6. Other
 - LGBT* Ally Training (online and in-person workshop on 10/28/14, facilitated by UNI LGBT* Center). Certified Safe Zone.
 - Marshal, Winter 2014 Commencement ceremony
 - Violent Incident Defense Strategy (VIDS) Training. Facilitated by UNI Police. March 1, 2016

Service to the Community/Recruitment/Media

1. Interview regarding syndavers for Iowa Public Radio (River to River program). March 30, 2023.
2. Iowa Public Radio Pre-Interview for Syndaver story. March 17, 2023.
3. Experiential Anatomical Learning Experience for Area High School Students. Hosted high school students associated with Northeast Iowa Community College (NICC) for a hands-on anatomy laboratory experience (dissection demos and syndaver demo) and medical career-based questions. March 23, 2023.
4. Syndaver Media Visit, Waterloo-Cedar Falls Courier. February 16, 2023.
5. Syndaver demo and discussion for Dr. Nancy Kertz (CANAs, UNI Nursing Program). January 25, 2023.

6. Organized syndaver/student A&P photoshoot for UNI University Relations (scouting January 12, 2023). January 19, 2023.
7. Experiential Anatomical Learning Experience for Area High School Students. Hosted high school students from the Cedar Falls Center for Advanced Professional Studies (CAPS) program for a hands-on anatomy laboratory experience (dissection demos and syndaver demo) and medical career-based questions. January 5, 2023.
8. Interviewed by UNI University Relations regarding syndavers. December 19, 2022.
9. Provided statement to UNI University Relations regarding syndavers. November 30, 2022.
10. Experiential Anatomical Learning Experience for Muscatine Community College Administrators. Highlighted our use of syndavers in our AP laboratories. November 28, 2022.
11. Experiential Anatomical Learning Experience for Area High School Students. Hosted high school students from the Cedar Falls Center for Advanced Professional Studies (CAPS) program for a hands-on anatomy laboratory experience (dissection demos and syndaver demo) and medical career-based questions. April 14, 2022.
12. Experiential Anatomical Learning Experience for Area High School Students. Hosted high school students associated with Northeast Iowa Community College (NICC) for a hands-on anatomy laboratory experience (dissection demos and syndaver demo) and medical career-based questions. April 7, 2022.
13. Event Supervisor for Iowa Science Olympiad 2023. Created, Supervised, and Scored Anatomy and Physiology Event for both B (Middle School) and C (High School) participants. April 1, 2023
14. Secretary, Iowa Science Olympiad Board of Directors. Four-year position starting July 28, 2020
15. Iowa Science Olympiad Board of Directors. Member starting Fall 2019.
16. Event Supervisor for Iowa Science Olympiad 2022. Created, Supervised, and Scored Anatomy and Physiology Event for both B (Middle School) and C (High School) participants. March 26, 2022
17. Event Supervisor for Iowa Science Olympiad 2021. Created, Supervised, and Scored Anatomy and Physiology Event for both B (Middle School) and C (High School) participants. March 23, 2021
18. Event Supervisor for Iowa Science Olympiad 2020. Created, Supervised, and Scored Anatomy and Physiology Event for both B (Middle School) and C (High School) participants. March 7, 2020
19. Experiential Learning Experience for UNI Admissions Staff. Hosted 10-15 admission staff members for interactive experience with Micro-CT and 3D-Printing. January 24, 2019 and July 30, 2019.
20. Experiential Anatomical Learning Experience for Area High School Students. Hosted 19 high school students from the Cedar Falls Center for Advanced Professional Studies (CAPS) program for a hands-on anatomy laboratory experience (dissection demos and syndaver demo) and medical career-based questions. April 11, 2019.
21. Event Supervisor for Iowa Science Olympiad 2019. Created, Supervised, and Scored Anatomy and Physiology Event for both B (Middle School) and C (High School) participants. March 30, 2019
22. Experiential Anatomical Learning Experience for Area High School Students. Hosted 15 high school students from Turkey Valley, New Hampton, West Delaware, Waukon, and Western Dubuque high schools associated with Northeast Iowa Community College (NICC) students for a hands-on anatomy laboratory experience (dissection demos and syndaver demo). February 21 2019 (scheduled).
23. Experiential Anatomical Learning Experience for Area High School Students. Hosted 12 high school students from the Cedar Falls Center for Advanced Professional Studies (CAPS)

- program for a hands-on anatomy laboratory experience (dissection demos and syndaver demo) and medical career-based questions. October 1, 2018.
24. Event Supervisor for Iowa Science Olympiad 2018. Created, Supervised, and Scored Anatomy and Physiology Event for both B (Middle School) and C (High School) participants. April 7, 2018
 25. Experiential Anatomical Learning Experience for Area High School Students. Hosted 24 high school students from Northern Iowa area high schools associated with Northeast Iowa Community College (NICC) students for a hands-on anatomy laboratory experience (dissection demos and syndaver demo). February 8, 2018.
 26. Experiential Anatomical Learning Experience for Faculty of the Communications Sciences and Disorders Department. Hosted ~10 faculty and staff (primarily from Communications Sciences and Disorders Department) for a hands-on anatomy laboratory experience (syndaver demo). November 16, 2017.
 27. Created and organized a syndaver experience for 12 high school FIRST Robotics Competition (FRC) Iowa Regional participants. March 23, 2017
 28. Hosted 24 high school and community college (NICC) students for a hands-on anatomy laboratory experience (dissection demos and syndaver demo). January 19, 2017
 29. Hosted 5 female 7th graders from Waterloo (Iowa) TAG program with interests in careers in anatomy. Toured facilities, hands-on laboratory experience, and hands-on anatomy class experience (dissection demos and syndaver demo). April 21, 2016
 30. Job Shadow Mentor for Narragansett Pier Middle School (Grade 8), Narragansett, Rhode Island (2014). PRE-UNI

Service to the Profession

1. Ad Hoc reviewer for Peer-Reviewed Scientific Journals:
 - *PLOS One*
 - *Zoological Letters*
 - *Zoology*
 - *Integrative and Comparative Biology*
 - *Biological Journal of the Linnean Society*
 - *Journal of Anatomy*
 - *Developmental Dynamics*
 - *Evolutionary Biology*
2. Ad Hoc reviewer for German Research Foundation (DFG)
3. Ad Hoc reviewer for National Science Foundation (NSF)
4. Society for Integrative & Comparative Biology Annual Meeting Best Poster Judge
 - Division of Evolutionary Developmental Biology, 2011, 2013
 - Division of Vertebrate Morphology, 2013
5. Society for Integrative & Comparative Biology Annual Meeting Best Paper Judge
 - Division of Evolutionary Developmental Biology, 2013
 - Division of Vertebrate Morphology, 2013
6. Society for Integrative & Comparative Biology Graduate Student/Post-Doc representative (Division of Evolutionary Developmental Biology), 2005-2008.

Current Society Memberships

- Society for Integrative and Comparative Biology (SICB): 2001-Present