

Ian N. Cost

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Medical Sciences Building, M263

Integrative Anatomy Program

Department of Pathology and Anatomical Sciences

Columbia, Missouri 65212

Education

University of Missouri, Columbia, MO.	2014 – Present
PhD anticipated May 2019, Integrative Anatomy	
Fort Hays State University, Hays, KS.	2014
M.S. , Biological Sciences	
Lesley University, Cambridge, MA.	2007
M.Ed. , Elementary and Special Education in Moderate Disabilities	
Bridgewater State University, Bridgewater, MA.	2004
B.A. , Asian History	

Research Interests

I am a broadly trained vertebrate functional anatomist and paleontologist. My research is interested in: 1) Functional cranial biomechanics in suboscine birds; 2) Cranial kinesis in avians and non-avian theropod dinosaurs; 3) Ecology of birds; and 4) Statistical analyses of large finite element data sets.

Teaching Experience

Teaching has always been important to me and my passion for sharing my knowledge in science through teaching and mentoring has increased as I continue my career. I was a Graduate Teaching Assistant for the following courses:

University of Missouri

Undergraduate Human Anatomy, PTH_AS 2203	2014 – Present
Undergraduate Human Anatomy, PTH_AS 2201	2016 – 2017
Human Anatomy, University of Missouri Medical School	2016 – 2017
Athletic Training Anatomy, ATHTRN 2500	Summer 2015

Fort Hays State University

Lab Experiences in Biology, BIOL 102L	2012 – 2014
Introductory Biology, BIOL 180L	2012 – 2014
Anatomy and Physiology, BIOL 230L	2012 – 2014

Special Education Instructor, Gosnell Public Schools; I was the lead educator and developed curriculum and individual education plans for grade 5 – 12 students, interacting with students with various learning hardships. 2007 – 2012

Special Education Assistant, Weymouth Public Schools; I worked with students on the Autism spectrum and assisted in developing curriculum as an assistant educator. 2005 – 2007

Coursework Relevant to Teaching

University of Missouri

Fundamentals of Evolutionary Biology
Fundamentals of Evolutionary Morphology
Statistics
Anatomy Teaching Practicum

Fort Hays State University

Ornithology
Paleontology of the Lower Vertebrates
Comparative Anatomy
Paleobiology

Invited Presentations and Lectures

Skype/distance High School Presentations in Biology, Paleontology, and Ornithology	2013 – Present
Ornithology: Taxonomy and Systematics, University of Missouri, FW 2600	26 February 2019
Ornithology: Skeleton and Digestion, University of Missouri, FW 2600	31 January 2019
Science on Tap, Outreach Lectures for Public Audiences (Presentation available online)	27 January 2019
Biological Sciences EcoLunch, Biology Dept. University of Missouri	Spring 2017
Human Biology Lecture: Evolution, Fort Hays State University, BIOL 100	Spring 2014
Ornithology Field Trip Leader, Fort Hays State University, BIOL 650L	2012 – 2014

Publications

Gignac, P. M., Kley N. J., Clarke J. A., (and 20 others including **Cost I. N.**) 2016. Diffusible iodine-based contrast-enhanced computed tomography (diceCT): an emerging tool for rapid, high-resolution, 3-D imaging of metazoan soft tissues. *Journal of Anatomy*. [doi: 10.1111/joa.12449](https://doi.org/10.1111/joa.12449).

In Review

Cost, I. N., Sellers, K. C., Middleton, K. M., Echols, M. S., Witmer, L. M., Davis, J. L., and Holliday, C. M. 2019. *In review*. Palatal biomechanics and its significance for cranial kinesis in *Tyrannosaurus rex*. *Anatomical Record*.

Wilken, A. T., Middleton, K. M., Sellers, K. C., **Cost, I. N.**, and Holliday, C. M. 2019. *In review*. Postural Protractors: The Biomechanical Role of Protractor Musculature in *Varanus exanthematicus*. *Journal of Experimental Biology*.

In Preparation

Cost, I. N., Sellers, K. C., Middleton, K. M., and Holliday, C. M. *In preparation*. Three dimensional morphospace visualization of cranial musculature using ternary diagrams. **To be submitted to Integrative Organismal Biology**

Rozin, R. E., **Cost, I. N.**, and Holliday, C. M. *In preparation*. Scaling and Biomechanical Behavior in Gallanseriformes.

External Grants and Awards Received

2019		
	Charlotte Mangum Program for Student Support (Society for Integrative and Comparative Biology), 2019	\$160
2017		
	American Association of Anatomists Student Travel Grant 2017	\$250
2016		
	Jackson Student Travel Grant (Society of Vertebrate Paleontology) 2016	\$400
	Carl Gans Collections and Charitable Fund 2016	\$150
2002		
	National Conference on Undergraduate Research and Lancy Foundation 2002	\$3,000

Internal Grants and Awards Received

2018		
	Graduate Student Association Travel Award, University of Missouri April 2018	\$100
	Integrative Anatomy Student Association Travel Grant Spring 2018	\$220
2017		
	Best Oral Presentation – Missouri Life Sciences Week 2017	\$100
2016		
	Graduate Professional Council Travel Award, University of Missouri 2016	\$300

2015	Graduate Student Association Travel Award, University of Missouri April 2015	\$100
2014	Integrative Anatomy Program Anatomy Teaching Fellowship (renewed annually through 2018)	\$24,000
2013	Biology Student Travel Honorarium, Fort Hays State University October 2013	\$300

Outreach

Scrub into A Health Career Presenter	2015 – Present
I designed Powerpoint and hands-on anatomy presentations for high schoolers.	
CALEB Science Club Anatomy Educator	2015 – Present
I designed Powerpoint and hands-on anatomy presentations for middle and high schoolers.	
Dinosaurs and Cavemen Science Expo Educator	2015 – Present
I designed hands-on activities in evolution, ornithology, anthropology, and paleontology for general audiences of all ages in a public setting.	
North American Migratory Bird Count (Audubon Society)	2015 – Present
I conducted migratory bird surveys with members of the general public on public lands during the spring migration period.	
Missouri Department of Conservation Wetlands Bird Survey	2015 – Present
I conducted wetlands breeding bird surveys for the state of Missouri with members of the general public on state-owned conservation land. This work informed conservation policies in a high-use public recreation area.	
High School Outreach Presenter, Gross Anatomy Lab	2014 – Present
I presented short anatomy based presentations for upper class high school students and college level students.	
Benton STEM Elementary School Science Showcase	2014 – Present
I designed and presented paleontology and anatomy outreach at a K – 5 STEM centered school.	
Soaring into Science, Mizzou ReSTEM Institute Presenter	2014 – Present
I designed hands-on activities in evolution and anatomy for general audiences of all ages in a public setting.	
Christmas Bird Count (Audubon Society)	2012 – Present
I conducted over-wintering bird surveys for the National Audubon Society with members of the general public on public lands.	
Author of Extinct Animal of the Week (previously Dinosaur of the Week) blog	2010 – Present
I wrote educational material for audiences of all ages concerning paleontology and paleobiology.	
Mizzou IGNITES High School Camp	Summer 2018
I hosted a group of underrepresented high school students and presented how our lab runs and answered questions about research opportunities for undergraduate students in the science disciplines.	
University of Missouri Adventure Club afterschool program	2018
I delivered an anatomy presentation to students in grades 1–3 in a public school setting.	
St. Louis Science Center Rock, Fossil, Quake	2017
I designed and presented avian evolution displays for the general public in a St. Louis museum.	
Museum at Prairie Fire, Kansas City, KS	2015
I designed a travelling “Pop-up Museum” within a science museum that presented specific material on evolution and dinosaur feeding.	
Exhibit Presenter, National Fossil Day at the Sternberg Museum of Natural History, Hays, KS	2013
I presented information on the evolution of birds from dinosaur ancestors at a natural history museum in western Kansas.	

Undergraduate Mentoring

University of Missouri

London Bales, dissection methods in avian specimens	2018 – Present
Conner Verhulst, contrast-enhanced muscle imaging in Grey Parrot	2018 – Present
Amol Sethi, contrast-enhanced muscle imaging in Tokay Gecko	2017 – Present
Alec Wilken, feeding biomechanics in <i>Varanus</i>	2016 – Present
Caitlyn Smith (currently Mercy Hospital St. Louis), Mallard duck jugal material properties	2016 – 2018
Rachel Rozin (currently Georgia Aquarium), feeding biomechanics in gallanseriform birds	2015 – 2018
Jake Cooper (currently University of Southern Indiana), <i>T. rex</i> biomechanics	Summer 2016
Eva Herbst (currently Royal Veterinary College), <i>Desmotosuchus</i> modelling and biomechanics	Summer 2016
Anthony Spates (currently UMKC School of Dentistry), cranial biomechanics in Red-tailed Hawk	2014 – 2016

Fort Hays State University

Nathan Honas, Teaching in Biology	Spring 2014
Garrit Flax, Teaching in Biology	Spring 2014
David Adams, Teaching in Biology	Spring 2013

Peer Reviewed Abstracts

*Undergraduate author

17 Total Abstracts

17. **Cost, I. N.**, Sellers, K. C., Middleton, K. M., Davis, J. L., Witmer, L. M., Holliday, C. M. 2018. Cranial Kinesis in *Tyrannosaurus rex*: Interpreting the Biomechanical Environment of Skulls. *Journal of Vertebrate Paleontology Supplement – Meeting Program and Abstracts*: 110.
16. **Cost, I. N.**, Middleton, K. M., Holliday, C. M. 2018. Mechanical Performance in the Skulls of Parrots (Aves: Psittaciformes). Annual Meeting of the Society for Integrative and Comparative Biology, San Francisco, CA.
15. Holliday, C. M., **Cost, I. N.**, Sellers, K. C., Middleton, K. M. 2018. Using Ternary Plots to Convey 3D Jaw Muscle Orientation in Space and Time. Annual Meeting of the Society for Integrative and Comparative Biology, San Francisco, CA.
14. Rozin, R. E.*, **Cost, I. N.**, Holliday, C. M. 2018. Feeding Biomechanics in Gallinaceous Birds and its Significance for Avian Cranial Evolution. Annual Meeting of the Society for Integrative and Comparative Biology, San Francisco, CA.
13. Sethi, A.*, Sellers, K. C., **Cost, I. N.**, McGeachie, F., Middleton, K. M., Holliday, C. M. 2018. 3D Fiber Tracking of Jaw Muscles Reveals a Diversity of Muscle Architectures in the Heads of Reptiles. Annual Meeting of the Society for Integrative and Comparative Biology, San Francisco, CA.
12. Wilken, A. T.*, Middleton, K. M., Sellers, K. C., **Cost, I. N.**, Holliday, C. M. 2018. Finite Element Analysis of the Savannah Monitor, *Varanus exanthematicus*, and its Implications for Lepidosaur Cranial Kinesis. Annual Meeting of the Society for Integrative and Comparative Biology, San Francisco, CA.
11. **Cost, I. N.**, Middleton, K. M., Witmer, L. M., Echols, M. S., Holliday, C. M. 2017. Comparative Anatomy and Biomechanics of the Feeding Apparatus of Parrots (Aves: Psittaciformes). 129th Annual Meeting of the American Association of Anatomists, Experimental Biology Conference, Chicago, IL.
10. **Cost, I. N.**, Sellers, K. C., Davis, J. L., Middleton, K. M., Witmer, L. M., Holliday, C. M. 2016. Postural changes and kinetic competency in the palates of birds and other diapsids. *Journal of Vertebrate Paleontology Supplement – Meeting Program and Abstracts*: 120.
9. **Cost, I. N.**, Spates, A, Sellers, K. C., Davis, J. L., Middleton, K. M., Witmer, L. M., Holliday, C. M.; 2016. Relative Kinetic Competency in the Palatal Complexes of Birds and Other Diapsids. *The 11th International Congress of Vertebrate Morphology Meeting*: 144.
8. Holliday C. M., Bailleul, A. M., **Cost I. N.**, Sellers K. C., Witmer L. M., Vickaryous, M. K. 2016. The significance of novel palatal joints in the adaptive radiations of archosaurs. *The 11th International Congress of Vertebrate Morphology Meeting*: 145.
7. Holliday C. M., Tsai H. P., **Cost I. N.**, Sellers K. C., Lautenschlager S., Witmer L. M. 2016. DiceCT and its applications for understanding the reptile musculoskeletal system. *The 11th International Congress of Vertebrate Morphology Meeting*: 202.
6. Rozin, R. E.*, **Cost, I. N.**, Holliday, C. M. 2016. Feeding biomechanics in galliform birds and its significance for avian cranial evolution. Society of Vertebrate Paleontology, Salt Lake City.

5. Spates, A.*, **Cost, I. N.**, Sellers, K. C., and Holliday, C. M. 2016. Using Novel Methods to Visualize Jaw Muscle Biomechanics and its Significance for the Evolution of the Avian Feeding Apparatus. 128th Annual Meeting of the American Association of Anatomists, Experimental Biology Conference, San Diego, CA.
4. **Cost, I. N.**, Spates, A., Sellers, K. C., Davis, J. L., Middleton, K. M., Witmer, L. M., Holliday, C. M. 2015. Biomechanics of the Avian Feeding Apparatus. 75th Annual Meeting of the Society of Vertebrate Paleontology, Dallas, TX. *Journal of Vertebrate Paleontology Supplement—Meeting Program and Abstracts*: 110.
3. **Cost I. N.** 2013. An Unusual Cervical Vertebral Column of a Plesiosaur from the Kiowa Shale Described With a Note on Preservation. Geological Society of America *Abstracts with Programs*: 326.
2. **Cost, I. N.**, Deramos-King, C. 2003. Stormwater Runoff Levels of Inorganic Anions in the Town River and South Brook of Bridgewater, Massachusetts. National Conference on Undergraduate Research, Salt Lake City, UT.
1. **Cost, I. N.**, Deramos-King, C. 2002. Stormwater Runoff Levels of Inorganic Anions in the Town River and South Brook of Bridgewater, Massachusetts. American Chemical Society, Boston, MA.

Other Presentations

*Undergraduate author

11 Total Abstracts

11. **Cost, I. N.**, Sellers, K. C., Middleton, K. M., Echols, M. S., Davis, J. L., Witmer, L. M., Holliday, C. M. 2018. Cranial Kinesis in Extant and Fossil Animals. Society for Integrative and Comparative Biology Regional Meeting, University of Missouri.
10. **Cost, I. N.**, Middleton, K. M., Witmer, L. M., Echols, M. S., Holliday, C. M. 2017. Comparative Anatomy and Biomechanics of the Feeding Apparatus of Parrots (Aves: Psittaciformes). Life Sciences Week, University of Missouri, Columbia, MO.
9. Wilken, A. T.*, Middleton, K. M., Sellers, K. C., **Cost, I. N.**, Davis, J. L., Holliday, C. M. 2017. Modeling Complex Cranial Joints in *Varanus exanthematicus*. Life Sciences Week, University of Missouri, Columbia, MO.
8. Sethi, A.*, McGeachie, F., Sellers, K. C., **Cost, I. N.**, Holliday, C. M. 2017. 3-D Reconstruction of the Muscle Architecture of Pterygoideus Ventralis in *Gekko gekko*. Life Sciences Week, University of Missouri, Columbia, MO.
7. Cooper, J.*, Herbst, E., Sellers, K. C., **Cost, I. N.**, Middleton, K. M., Holliday, C. M. 2016. The Impact of Muscle Anatomy on Skull Loading in Hard-Biting Animals. University of Missouri Summer REU Forum.
6. Herbst, E.*, Cooper, J., **Cost, I. N.**, Sellers, K. C., Middleton, K. M., Holliday, C. M. 2016. 3D Reconstruction of the Feeding Biomechanics of the North American Aetosaur *Desmotosuchus*. University of Missouri Summer REU Forum.
5. **Cost, I. N.** 2016. Biomechanics of Feeding and Cranial Kinesis in Parrots (Aves: Psittaciformes) and Other Dinosaurs. Research Proposal Defense, University of Missouri.
4. Rozin R. E.*, **Cost, I. N.**, and Holliday, C. M. 2015. Feeding biomechanics in the wild turkey, *Meleagris gallopavo*, and its significance for avian cranial evolution. Summer Research REU Forum
3. Spates, A.*, **Cost, I. N.**, Sellers, K. C., and Holliday, C. M. 2015. A Tale of Two Birds: Biomechanics of the Avian Feeding Apparatus. Life Sciences Week, University of Missouri, Columbia, MO.
2. **Cost, I. N.**, Sellers, K. C., and Holliday, C. M. 2015. Diffusible-Iodine Contrast-Enhanced CT and 3D Visualization of Cranial Muscles. Life Sciences Week, University of Missouri, Columbia, MO.
1. **Cost, I. N.** 2014. Description of An Unusual Cervical Vertebral Column of a Plesiosaur from The Kiowa Shale. Master's Thesis presentation.

Fieldwork

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| Audubon Raptor Survey Assistant and Photographer | 2013 – 2014 |
| Photographer for Jessica Casey: “Timing and intensity of steer use on old world bluestem (<i>Bothriocola ischaemum</i>) and blue grama (<i>Bouteloua gracilis</i>) in southern mixed-grass prairie.” | 2013 |
| Small mammal trapping Assistant and Photographer for Nina Luna: “Possible effects of black-tailed prairie dogs on abundance and diversity of raptors and small mammals in mixed and shortgrass prairie of western Kansas” | 2013 |

Service

Integrative Anatomy Student Association, Website Administrator	2017 – Present
University of Missouri Library Services Committee	Spring 2017
Graduate Professional Council Finance Committee	2016 – 2017
University of Missouri IT Committee	Fall 2016
Integrative Anatomy Student Association Vice President	2015 – 2017
Photography for Fort Hays State University Department of Biological Sciences Newsletter, <i>Natural Inquirer</i>	2013 – 2014
Bird Banding Site volunteer, Fort Hays State University Campus	2013

Professional Societies

American Ornithological Society	2016 – Present
Columbia Audubon Society	2015 – Present
Wilson Ornithological Society	2015 – Present
Society for Integrative and Comparative Biology	2014 – Present
American Audubon Society	2013 – Present
Society of Vertebrate Paleontology	2011 – Present
American Association of Anatomists	2016 – 2018
American Ornithologists' Union	2015 – 2016
Cooper Ornithological Society	2015 – 2016
Kansas Academy of Science	2012 – 2014
Massachusetts Teachers Association	2005 – 2007

Software Proficiencies

ImageJ, Avizo, Amira, Geomagic, Strand7, R, BoneLoad, MatLab, Corel

Reference Contact Information

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