

# Ian N. Cost

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Integrative Anatomy Program  
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## Curriculum Vitae

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### Education

University of Missouri, Columbia, MO.	2014 – Present
<b>PhD</b> anticipated May 2019, Integrative Anatomy	
Fort Hays State University, Hays, KS.	2014
<b>M.S.</b> , Biological Sciences	
Lesley University, Cambridge, MA.	2007
<b>M.Ed.</b> , Elementary and Special Education in Moderate Disabilities	
Bridgewater State University, Bridgewater, MA.	2004
<b>B.A.</b> , 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 dinosaurs; 3) Ecology of birds; and 4) Statistical analyses of large finite element data sets.



### 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		

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Jackson Student Travel Grant (Society of Vertebrate Paleontology) 2016	\$400
Carl Gans Collections and Charitable Fund 2016	\$150
<b>2002</b>	
National Conference on Undergraduate Research and Lancy Foundation 2002	\$3,000

## Internal Grants and Awards Received

<b>2018</b>	
Graduate Student Association Travel Award, University of Missouri April 2018	\$100
Integrative Anatomy Student Association Travel Grant Spring 2018	\$220
<b>2017</b>	
Best Oral Presentation – Missouri Life Sciences Week 2017	\$100
<b>2016</b>	
Graduate Professional Council Travel Award, University of Missouri 2016	\$300
<b>2015</b>	
Graduate Student Association Travel Award, University of Missouri April 2015	\$100
<b>2013</b>	
Biology Student Travel Honorarium, Fort Hays State University October 2013	\$300

## Coursework Relevant to Teaching

### University of Missouri

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

### Fort Hays State University

Biostatistics  
Ornithology  
Paleontology of the Lower Vertebrates  
Comparative Anatomy  
Paleobiology

## 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). 129<sup>th</sup> 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 11<sup>th</sup> 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 11<sup>th</sup> 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 11<sup>th</sup> 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

10 Total Abstracts

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.

## 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 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

## 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
Anmol Sethi, contrast-enhanced muscle imaging in Tokay Gecko	2017 – Present
Alec Wilken, feeding biomechanics in <i>Varanus</i>	2016 – Present
Caitlyn Smith (currently UM School of Medicine), 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

## 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 ( <a href="#">Presentation available online</a> )	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

## Outreach

Scrub into A Health Career Presenter	2015 – Present
CALEB Science Club Anatomy Educator	2015 – Present

Dinosaurs and Cavemen Science Expo Educator	2015 – Present
North American Migratory Bird Count (Audubon Society)	2015 – Present
Missouri Department of Conservation Wetlands Bird Survey	2015 – Present
High School Outreach Presenter, Gross Anatomy Lab	2014 – Present
Benton STEM Elementary School Science Showcase	2014 – Present
Soaring into Science, Mizzou ReSTEM Institute Presenter	2014 – Present
Christmas Bird Count (Audubon Society)	2012 – Present
Author of <a href="#">Extinct Animal of the Week</a> (previously Dinosaur of the Week) blog	2010 – Present
Mizzou IGNITES High School Camp	Summer 2018
University of Missouri Adventure Club afterschool program	2018
St. Louis Science Center Rock, Fossil, Quake	2017
Museum at Prairie Fire, Kansas City, KS (Pop-up Museum)	2015
Exhibit Presenter, National Fossil Day at the Sternberg Museum of Natural History, Hays, KS	2013

## Fieldwork

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