

Ian N. Cost

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Albright College
Department of Biological Sciences
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Current Position

Assistant Professor, Department of Biological Sciences, Albright College, Reading, PA. 2019 – Present

Education

University of Missouri, Columbia, MO. 2019
Ph.D., 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

As faculty at Albright College I have taught the following courses:

Medical Terminology (BIO207; Cotaught with Hartman – WLC)	2022 – Present
Tropical Ecology (BIO113/313; cotaught with Mech – BIO)	2022 – Present
General Biology II (BIO152; Lecture and Lab)	2021 – Present
Comparative Vertebrate Anatomy (BIO331; Lecture and Lab)	2021 – Present
Behavior and Morphology (BIO485; Senior Seminar)	2020 – Present
Human Anatomy and Physiology II (BIO235 Lecture and Lab)	2020 – Present
Human Anatomy and Physiology I (BIO234 Lecture and Lab)	2019 – Present
General Biology I Lab (BIO151)	2019 – 2020

Graduate Teaching Assistant Experience:

University of Missouri	2014 – 2019
Fort Hays State University	2012 – 2014

Public Schools

Special Education Instructor , Gosnell Public Schools.	2007 – 2012
Special Education Assistant , Weymouth Public Schools	2005 – 2007

Invited Presentations and Lectures

Skype-A-Scientist and informal virtual 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
Human Biology Lecture: Evolution, Fort Hays State University, BIOL 100
Ornithology Field Trip Leader, Fort Hays State University, BIOL 650L

Spring 2017
Spring 2014
2012 – 2014

Publications

- Cost, I. N.**, Sellers, K. C., Rozin, R. E., Spates, A. T., Middleton, K. M. and Holliday, C. M. 2022. 2D and 3D visualizations of archosaur jaw muscle mechanics, ontogeny and phylogeny using ternary diagrams and 3D modeling. *J. Exp. Biol.* **225**, doi: [10.1242/jeb.243216](https://doi.org/10.1242/jeb.243216).
- Wilken A. T., Sellers K. C., **Cost I. N.**, Rozin R. E., Middleton K. M., Holliday C. M. 2020. Connecting the chondrocranium: Biomechanics of the suspensorium in reptiles. *Vertebrate Zoology* 70:275–90. doi: [10.26049/VZ70-3-2020-02](https://doi.org/10.26049/VZ70-3-2020-02)
- Cost, I. N.**, Sellers, K. C., Middleton, K. M., Echols, M. S., Witmer, L. M., Davis, J. L., and Holliday, C. M. 2020. Palatal biomechanics and its significance for cranial kinesis in *Tyrannosaurus rex*. *Anat Rec.* doi: [10.1002/ar.24219](https://doi.org/10.1002/ar.24219).
- Wilken A. T., Middleton K. M., Sellers K. C., **Cost I. N.**, Holliday C. M. 2019. The roles of joint tissues and jaw muscles in palatal biomechanics of the Savannah monitor (*Varanus exanthematicus*) and their significance for cranial kinesis. *J Exp Biol.* doi: [10.1242/jeb.201459](https://doi.org/10.1242/jeb.201459).
- 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. *J Anat.* doi: [10.1111/joa.12449](https://doi.org/10.1111/joa.12449).

Undergraduate Research Mentoring

Albright College

Samantha Seador, leg muscle physiology	Spring 2022 – Present
Kamaryn Koch, cardiovascular comparative anatomy	Spring 2022 – Present
Brigitte Amendano, comparative anatomy of trigeminal nerve in raptorial birds	Fall 2021 – Present
Phuong Chau, comparative anatomy of head and neck joints	Spring 2021 – Present
Suzanne Spriggs, comparative anatomy of bill tip organs in shorebirds	Summer 2020 – 2021
Robert Schwartz (Currently: Trinity School of medicine), comparative anatomy of avian perching	Fall 2019 – 2021

University of Missouri

London Bales, dissection methods in avian specimens	2018 – 2019
Conner Verhulst, contrast-enhanced muscle imaging in Grey Parrot	2018 – 2019
Anmol Sethi, contrast-enhanced muscle imaging in Tokay Gecko	2017 – 2019
Alec Wilken (Currently: Univ. of Chicago PhD program), feeding biomechanics in <i>Varanus</i>	2016 – 2019
Caitlyn Smith (Currently: Univ. of Missouri School of Medicine), Mallard duck jugal material properties	2016 – 2018
Rachel Rozin, (Currently: Florida Aquarium) feeding biomechanics in gallanseriform birds	2015 – 2018
Jake Cooper, <i>T. rex</i> biomechanics	Summer 2016
Eva Herbst (Currently: Post-Doc, Universitat Zurich), <i>Desmotosuchus</i> modelling and biomechanics	Summer 2016
Anthony Spates (Currently: Aspen Dental, St. Joseph, MO), 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

Outreach

Baird Ornithological Club Nature Interpretation and Walk Leader	2022 – Present
13 th Street Educational Partnership	2021 – Present
Letters to A Pre-Scientist	2019 – Present
Skype-A-Scientist	2019 – Present
North American Migratory Bird Count (Audubon Society)	2015 – Present
Christmas Bird Count (Audubon Society)	2012 – Present
Author of Extinct Animal of the Week (previously Dinosaur of the Week) blog	2010 – Present
Scrub into A Health Career Presenter	2015 – 2018
CALEB Science Club Anatomy Educator	2015 – 2018
Dinosaurs and Cavemen Science Expo Educator	2015 – 2018
Missouri Department of Conservation Wetlands Bird Survey	2015 – 2018
High School Outreach Presenter, Gross Anatomy Lab	2014 – 2018
Soaring into Science, Mizzou ReSTEM Institute Presenter	2014 – 2018
Mizzou IGNITES High School Camp	Summer 2018
University of Missouri Adventure Club afterschool program	2018
Benton STEM Elementary School Science Showcase	2014 – 2017
St. Louis Science Center Rock, Fossil, Quake	2017
Museum at Prairie Fire, Kansas City, KS	2015
Exhibit Presenter, National Fossil Day at the Sternberg Museum of Natural History, Hays, KS	2013

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

2022	
Albright Creative Research Experience, Summer Term (Koch)	\$2,800
Albright Creative Research Experience, January Interim (Amendano and Chau, Hearst Research Fellows)	\$1,200
2020	
Albright Creative Research Experience, Summer Term (Spriggs, Hearst Research Fellow)	\$2,800
Albright Creative Research Experience, January Interim (Schwartz)	\$600
2019	
Integrative Anatomy Student Association Travel Grant Spring 2018	\$220
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 Spring 2019)	\$24,000
2013	Biology Student Travel Honorarium, Fort Hays State University October 2013	\$300

Peer Reviewed Abstracts

*Undergraduate author

30 Total Abstracts

30. Amendano, B.*, Spriggs, S. N., **Cost I. N.**, 2022. A Comparative Analysis of the Trigeminal Nerve in the Orbits of Predatory Birds. Pennsylvania Academy of Sciences, DeSales University, Center Valley, PA.
29. Chau, P.*, **Cost I. N.**, 2022. Comparing Dental Measurement in North American Bats with Corresponding Diets. Pennsylvania Academy of Sciences, DeSales University, Center Valley, PA.
28. Holliday, C. M., Wilken, A. T., Sellers, K. C., **Cost, I. N.**, Middleton, K. M., 2022. Flat or flexible? Evolutionary cranial biomechanics and the origins of modern archosaur skulls. *The FASEB Journal*, 36. 134th Annual Meeting of the American Association of Anatomists, Experimental Biology Conference, Philadelphia, PA.
27. Fortner, J. D., Wilken, A. T., Sellers, K. C., **Cost, I. N.**, Middleton, K. M., Holliday, C. M. 2021. The Role of the Intramandibular Joint, Symphyseal Tissues, and Wrapping Muscles on Theropod Dinosaur Mandibular Function. *The FASEB Journal*, 35. 133rd Annual Meeting of the American Association of Anatomists, Experimental Biology Conference (virtual).
26. Schwartz, R. M.*, **Cost, I. N.**, 2021. Getting a Grip on the Avian Tendon Locking Mechanism. Annual Meeting of the Society for Integrative and Comparative Biology, Washington D. C. (virtual).
25. Spriggs, S. N.*, **Cost, I. N.**, 2021. A Comparative Analysis of the Remote Touch Mechanism in Birds. Annual Meeting of the Society for Integrative and Comparative Biology, Washington D. C. (virtual).
24. Fortner, J. D., Wilken, A. T., Sellers, K. C., **Cost, I. N.**, Holliday, C. M. 2021. Finite element modeling the effect of symphyseal tissue properties and the intramandibular joint on *Tyrannosaurus rex* mandibular biomechanics. Annual Meeting of the Society for Integrative and Comparative Biology, Washington D. C. (virtual).
23. Holliday C. M., Wilken A. T., Sullivan, S. P., Sellers K. C., **Cost I. N.**, Middleton K. M. 2021. Myology of the Reptilia. Annual Meeting of the Society for Integrative and Comparative Biology, Washington D. C. (virtual).
22. Wilken, A. T.*, Sellers, K. C., **Cost, I. N.**, Middleton, K. M., Witmer, L. M., Holliday, C. M. 2021. Bird brains, jaw muscles, and the origin of avian cranial kinesis. Annual Meeting of the Society for Integrative and Comparative Biology, Washington D. C. (virtual).
21. Holliday C. M., Wilken A. T., Bailleul A. M., Sellers K. C., **Cost I. N.**, Rozin R. E., Middleton K. M. 2019. Connecting the Chondrocranium: Biomechanics of the Palatocranial Joints of Sauropsids. *The 12th International Congress of Vertebrate Morphology Meeting*.
20. Middleton K. M., Sellers K. C., **Cost I. N.**, Spates A. T., Holliday C. M. 2019. Methods for Visualizing and Comparing Force Vectors in Two- and Three-Dimensions, with Applications for Vertebrate Feeding and Locomotion. *The 12th International Congress of Vertebrate Morphology Meeting*.
19. Wilken A. T.*, Middleton K. M., Sellers K. C., **Cost I. N.**, Holliday C. M. 2019. Functional Morphology of the Palate in *Varanus exanthematicus* (Squamata: Varanidae) and Its Significance for the Evolution of Cranial Kinesis. *The 12th International Congress of Vertebrate Morphology Meeting*.
18. **Cost, I. N.**, Echols, M. S., Middleton, K. M., Holliday, C. M. 2019. Assessing the Biomechanical Environment of an Extinct Parrot (Psittaciformes) Using Extant Parrot Models. Annual Meeting of the Society for Integrative and Comparative Biology, Tampa, FL.

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.**, McGechie, 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). *The FASEB Journal*, 31. 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. 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.
8. **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.
7. 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.
6. 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.
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

14 Total Abstracts

14. Schwartz, R. M.*, **Cost, I. N.** 2020. Getting a Grip on the Avian Tendon Locking Mechanism (TLM). 21st Annual Berks County Undergraduate Research and Creativity Conference, Reading, PA.

13. Sethi, A.*, McGechie, F., Sullivan, S. O., Sellers, K. C., **Cost, I. N.**, Holliday, C. M. 2019. 3-D Reconstruction of the Muscle Architecture of Jaw muscles in *Gekko gekko*. Life Sciences Week, University of Missouri, Columbia, MO.
12. Wilken, A. T.*, Middleton, K. M., Sellers, K. C., **Cost, I. N.**, Holliday, C. M. 2019. Functional Morphology of the Palate of *Varanus exanthematicus* and its Significance for Lepidosaur Cranial Kinesis. Life Sciences Week, University of Missouri, Columbia, MO.
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.*, McGechie, 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.

Service

Albright College

Educational Policy Council	2021 – Present
Teacher Education Committee	2020 – Present
Health Sciences Advisory Committee	2020 – Present
Curriculum Subcommittee, Task Force on Race Relations at Albright College; Co-leader	2020 – Present
Curriculum Development Committee	2020 – 2021

Graduate Student

Integrative Anatomy Student Association, Website Administrator	2017 – 2019
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
Wilson Ornithological Society	2015 – Present
Society for Integrative and Comparative Biology	2014 – Present
American Audubon Society	2013 – Present
Society of Vertebrate Paleontology	2011 – Present
Columbia Audubon Society	2015 – 2019
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

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