

# Curriculum Vitae

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Department of Basic Sciences

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## Education

- 2015** PhD, Ecology and Evolutionary Biology (Functional Morphology), Ohio University, Athens, Ohio. Dissertation: Implications of Airflow Dynamics and Soft-Tissue Reconstructions for the Heat Exchange Potential of Dinosaur Nasal Passages
- 2006** BS, Biology, University of New Mexico, Albuquerque, New Mexico.

## Professional Experience

- 2017–Present** Assistant Professor of Anatomy in the Department of Basic Sciences at the New York Institute of Technology College of Osteopathic Medicine in Jonesboro, AR
- 2016–2017** Postdoctoral researcher working on dinosaur aeroacoustics. NC State and the Paleontology Research Lab at the North Carolina Museum of Natural Sciences, Raleigh, NC
- 2015–2016** Postdoctoral researcher working on the “Student’s Discover: Digital Dinosaurs” project, Paleontology Research Lab, North Carolina Museum of Natural Sciences, Raleigh, NC
- 2009–2014** Gross Anatomy teacher’s aide, Heritage College of Osteopathic Medicine, Ohio University, Athens, Ohio

## Teaching Experience

- 2017–Present** Assistant professor for medical gross anatomy & neuroanatomy courses
- 2010–2014** Teaching assistant for medical gross anatomy series
- 2010** Teaching assistant for Neuromorphology
- 2013** Teaching assistant for Microanatomy (histology and biochemistry)

## **Grants, Awards, and Scholarships**

- 2013** Recipient of NSF travel grant for the ICVM Nose Symposium in Barcelona, Spain
- 2012** Recipient of Biological Sciences travel grant  
Recipient of Jurassic Foundation Grant-in-Aid-of-Research  
Recipient of the Doris O. and Samuel P. Welles Research Fund
- 2011** Recipient of Graduate Student Senate and Biological Sciences travel grants
- 2010** Recipient of the National Science Foundation's Graduate Research Fellowship Award  
Recipient of Dept. Biological Sciences Travel Grant

## **Publications**

1. Bourke, J.M., Porter, W.R., Witmer, L.M. 2018. Convoluted nasal passages function as efficient heat exchangers in ankylosaurs (Dinosauria: Ornithischia: Thyreophora). PLoS ONE 13(12):e0507381.
2. Wroe, S., Parr, W.C.H., Ledogar, J.A., Bourke, J., Evans, S.P., Fiorenza, L., Benazzi, S., Hublin, J.-J., Stringer, C., Kullmer, O., Curry, M., Rae, T.C., Yokley, T.R. 2018. Computer simulations show that Neanderthal facial morphology represents adaptation to cold and high energy demands, but not heavy biting. Proc. R. Soc. B. 285: 20180085.
3. Bourke, J.M., Witmer, L.M. 2016. Nasal conchae function as aerodynamic baffles: Experimental computational fluid dynamic analysis in a turkey nose (Aves: Galliformes). Resp. Physiol. Neurobiol. 234:32–46.
4. O'Brien, H.D., Bourke, J.M. 2015. Physical and computational fluid dynamics models for the hemodynamics of the artiodactyl carotid rete. J. Theor. Biol. 386:122–131.
5. Bourke, J.M., Porter, Wm. R., Ridgely, R.C., Lyson, T.R., Schachner, E.R., Bell, P.R., Witmer, L.M. 2014. Breathing life into dinosaurs: Tackling challenges of soft-tissue restoration and nasal airflow in extinct species. Anat. Rec. 297:2148–2186.
6. Bourke, J., Wroe, S., Moreno, K., McHenry, C., Clausen, P. 2008. Effects of gape and tooth position on bite force and skull stress in the dingo (*Canis lupus dingo*) using a 3-dimensional finite element approach. PLOS ONE. Vol.3(5):e2200.
7. Clausen, P., Wroe, S., McHenry, C., Moreno, K., Bourke, J. 2008. The vector of jaw muscle force as determined by computer-generated three-dimensional simulation: A test of Greaves' model. J. Biomech. 41: 3184–3188.

## **In Review**

1. Bourke, J.M., Witmer, L.M. The impact of soft tissues on nasal airflow in diapsids: Implications for dinosaurs. J. Morph.
2. Fontenot, N., Kouts, J., Bourke, J.M. Case of the missing head: A case report on a cadaveric discovery of a unilaterally absent medial head of the gastrocnemius. Eur. J. Anat.

## Conference Presentations

1. Bourke, J., Gates, T.A., Zanno, L.E. 2019. Nasal passage growth through ontogeny in the lambeosaurine *Parasaurolophus* (Ornithopoda: Dinosauria). 79<sup>th</sup> Annual Meeting of the Society of Vertebrate Paleontology. Brisbane, Queensland, Australia
2. Bourke, J., Gates, T., Birthisel, T.A., Evans, D.C., Witmer, L., Ridgely R.C., Ditto, W., Zanno, L.E. 2018. Airway variation and acoustic signaling in the crest of *Parasaurolophus* (Dinosauria: Ornithopoda) based on specimens from Southern Utah. 78<sup>th</sup> Annual Meeting of the Society of Vertebrate Paleontology. Albuquerque, NM
3. Bourke, J., Witmer, L., Ridgely, R., Porter, W.R., Zanno, L.E. 2016. Airflow simulations in the antorbital sinus of *Acrocanthosaurus*: Testing the potential for theropod paranasal sinuses to function as accessory cooling structures. 76<sup>th</sup> Annual Meeting of the Society of Vertebrate Paleontology. Salt Lake City, UT
4. Bourke, J. 2015. Reconstructing the diversity of nasal anatomy and airflow in dinosaurs with implications for physiology and ecology. 75<sup>th</sup> Annual Meeting of the Society of Vertebrate Paleontology. Dallas, TX
5. Bourke, J., Porter, R., Ridgely, R.C., Witmer, L.M. 2015. Using airflow patterns to aid inferences of nasal soft-tissue reconstructions in dinosaurs. Meeting of the American Association of Anatomists. Boston, MA
6. Bourke, J.M., Porter, Wm. R., Ridgely, R.C., Witmer, L.M. 2014. Airflow reconstruction and heat-transfer potential in the elongate nasal passages of the ankylosaurs *Panoplosaurus mirus* and *Euoplocephalus tutus*. 74<sup>th</sup> Annual Meeting of the Society of Vertebrate Paleontology, Berlin, Germany
7. Bourke, J.M., Porter, Wm. R., Ridgely, R.C., Lyson, T.R., Schachner, E.R., Bell, P.R., Witmer, L.M. 2014. Nasal turbinates in pachycephalosaurids (Dinosauria: Ornithischia): Reconstructing nasal anatomy and airflow, with implications for physiology. 10<sup>th</sup> International Congress on Vertebrate Morphology. Barcelona, Spain.
8. Bourke, J.M., Witmer, L.M. 2012 Dorsal or rostral nostrils? Testing fleshy nostril position and airflow in sauropods using computational fluid dynamics. 72<sup>nd</sup> Annual Meeting of the Society of Vertebrate Paleontology, Raleigh, SC.
9. Bourke, J.M., Witmer, L.M. 2012. Baffling bird noses: Modeling the effects of turbinate structure on airflow dynamics in ostriches and turkeys. Poster presentation at Annual Meeting of the Society of Integrative and Comparative Biology, Charleston, South Carolina.
10. Bourke, J. M., Witmer, L.M. 2011. Computer modeling of nasal airflow in two extant avian dinosaurs (turkey and ostrich), with implications for modeling airflow in extinct theropods. Platform presentation at 71<sup>st</sup> Annual Meeting of the Society of Vertebrate Paleontology, Las Vegas, NV. *Society of Vertebrate Paleontology—Program and Abstracts: 75*.
11. Bourke, J. M., Witmer, L.M. 2011. Breathing life back into dinosaurs: computer modeling of nasal airflow in dinosaurs and their extant relatives. Platform presentation at Geological Society of America Northeastern and North-Central Joint Meeting, Pittsburgh, Pennsylvania.
12. Bourke, J. M., Witmer, L.M. 2011. The nose knows: modeling airflow in alligators and dinosaurs. Poster presentation at Annual Meeting of the Society of Integrative and Comparative Biology, Salt Lake City, Utah.
13. Bourke, J. M., Witmer, L.M. 2010. The nose knows: the effects of nasal cavity anatomy on airflow in alligators. Poster presentation at 70<sup>th</sup> Annual Meeting of the Society of Vertebrate

Paleontology, Pittsburgh, PA. *Society of Vertebrate Paleontology —Program and Abstracts*: 63A.

14. Martiny, A. R., Ridgely, R.C., Dufeu, D.L., Porter, W.R., Bourke, J.M., Morhardt, A.C., Snively, E.D., Witmer, L.M. 2010. Poster presentation at Promoting a culture of outreach within an active university research lab setting: WitmerLab at Ohio University. 70<sup>th</sup> Annual Meeting of the Society of Vertebrate Paleontology, Pittsburgh, PA.
15. Witmer, L. M., Ridgely, R.C., Snively, E.D., Holliday, C.M., Hieronymus, T.L., Dufeu, D.L., Porter, W.P., Bourke, J.M., Martiny, A.R. 2010. Toward the visible dinosaur: integrating anatomical systems to test inferences of function, physiology and behavior. 9th International Congress of Vertebrate Morphology, Punta del Este, Uruguay.

## **Research Experience**

**2017–Present:** Run a research lab on Arkansas State campus where students and I use 3D models and computational fluid dynamics to answer questions about nasal passage and blood vessel elaboration with size in dinosaurs and other extinct animals.

**Summer 2015 – 2017:** Postdoctoral work in Lindsay Zanno’s Paleontology Research Lab at the North Carolina Museum of Natural Science. Worked on digitizing the skull of *Acrocanthosaurus* and soft-tissue reconstruction. Collected fossils with the lab at various locations in Utah.

**Fall 2009 – Summer 2015:** PhD student at Ohio University. Trained to use Ohio University’s  $\mu$ CT scanner; the 3D reconstruction tool Amira/Avizo; the computational fluid dynamics software Fluent, and comparative vertebrate anatomy at the Heritage College of Osteopathic Medicine

**Fall 2008 – Summer 2009:** Volunteer work in the Witmer Lab at Ohio University. Trained on the 3D segmentation tool Amira. Created 3D endocasts of brains using CT scan data.

**2007 – 2008:** Independent study with Dr. Stephen Wroe and colleagues at the University of New South Wales in Sydney, Australia. Trained in the Finite Element Analysis program Strand7. Worked on model creation. Performed experiments and analyzed their results.

**2006:** Senior herpetology project measuring horn variation among species of horned lizard – *Phrynosoma* at the University of New Mexico. Respiration rate study at the University of New Mexico on bees, crickets and crayfish to determine metabolic differences associated with different lifestyles. Taught a class to middle school children (7<sup>th</sup> grade) on the effects of scaling in biological systems.

**1997 – 1998:** Paleontological field work with Dr. Jim Martin of the South Dakota School of Mines and Technology and Dr. David Parris of the Trenton State Museum (NJ) on their annual dig along the Missouri river in South Dakota. Learned fossil hunting practices, excavation techniques, and preparation procedures.

## Outreach Experience

- 2019:** Worked with local high schoolers in the Northeast Arkansas region on a project to make a constructible skull of an iguana using 3D-Prints of a CT-scanned iguana skull. This was part of a newly created program by NYITCOM at A-State called SHARE (Summer Health Academy for Research Exploration).
- 2018:** Invited to speak on heat transfer in the noses of dinosaurs at the St. Louis Science Center in St. Louis, MO as part of their annual SciFest event. | Produced and helped disseminate material related to the publication of [Bourke et al. 2018](#). Material was made freely available to the public in the form of images, movies and 3D PDFs of the data.
- 2017:** Visited middle school classrooms in North Carolina to discuss how to become a paleontologist. | Presented on turtle evolution at the North Carolina Museum of Natural Sciences Reptile and Amphibian Day.
- 2016:** Worked with middle school teachers around North Carolina, on producing citizen science content for 6–8<sup>th</sup> graders in math and science. This was part of an NSF-funded project known as Students Discover.
- 2015:** Gave a general public presentation on how paleontologists use digital models to learn more about dinosaur, at the annual Paleopalooza event at the North Carolina Museum of Natural Sciences. | Gave multiple public tours of the Paleontology lab. | Ran Citizen Science booths at the North Carolina State science fair and Paleopalooza.
- 2014:** Produced and helped disseminate material related to the publication of [Bourke et al. 2014](#). Material was made freely available to the public in the form of images, movies and 3D PDFs of the data.
- 2013:** Participated in the [Young Scholars Ohio Program](#). | Helped setup and participated in the PBS series: Innovation Cafes, which featured a presentation on dinosaurs from the WitmerLab.
- 2012:** Worked closely with a lab student in creating the movies for the [Visible Interactive Iguana project](#). | Helped give public presentation on dinosaurs at the [Ohio Valley Museum of Discovery](#).
- 2011:** Worked closely with a lab student in the creation of the [Visible Interactive Ostrich project](#). | Worked with the [Young Scholars Ohio Program](#).
- 2010:** Worked on the [Visible Interactive Alligator project](#), making alligator bone data available to the public via 3D PDFs, models, and movies. | Worked with the [Young Scholars Ohio Program](#).

## **Professional Affiliations**

Society of Vertebrate Paleontology  
International Society of Vertebrate Morphology  
Society of Integrative and Comparative Biology  
American Association of Anatomists