Curriculum Vitae
Henry Charles Astley

Biomimicry Research & Innovation Center
Depts. of Biology & Polymer Science
University of Akron
Office: ASEC C308, Phone # 330-972-8192
hastley@uakron.edu

Education:

- PhD in Biology, Brown University, 2013
  Topic: Performance, Mechanics, and Diversity of Anuran Jumping
- M.S. in Biology, University of Cincinnati, 2008.
  Topic: Habitat structure affects arboreal locomotion of snakes
- B.S. in Biology, University of Cincinnati, 2005. Minor: Mathematics
- B.S. in Aerospace Engineering, Florida Institute of Technology, 2001

Positions

- 8/2023 – current: Associate Professor, University of Akron, Biomimicry Research & Innovation Center. Primary Dept.: Biology, Secondary Dept.: Polymer Science & Engineering
- 8/2016 – 8/2023: Assistant Professor, University of Akron, Biomimicry Research & Innovation Center. Primary Dept.: Biology, Secondary Dept.: Polymer Science.
- 8/2013 – 7/2016: Physics of Living Systems Post-doctoral fellow, Georgia Institute of Technology, Goldman Lab

Publications

Astley, H.C. (2026) Skin Deep: a novel biomimetic control strategy for rectilinear locomotion in snake robots. Bioinspiration & Biomimetics https://doi.org/10.1088/1748-3190/ae73d6

Shriver, C., Davidson, A., Astley, H.C., Bhamla, S., Yung, K.L., Adams, D.S., Munteanu, V.D., Blob, R.W., Hammer, C., Taylor, S., Chang, Y., Hu, D.L., Kolar, M., Wiech, S., Mendelson, J.R., Schulz,A.K. (2026) Bridging Science Across Species: A Biomechanics Outreach Event at the Zoo, Integrative Organismal Biology https://doi.org/10.1093/iob/obag022

Gurung, B., Vega, C.M., & Astley, H.C. (2026). Backing out: dead-end tunnels reveal capacity for reverse concertina movement in Cornsnakes, *Pantherophis guttatus* (Linnaeus, 1766). Herpetology Notes 19, PDF

Patterson, Z. J., Astley, H. C., & Majidi, C. (2005). Soft robotic brittle star shows the influence of mass distribution on underwater walking. Bioinspiration & Biomimetics 20 036003. https://doi.org/10.1088/1748-3190/adbecb

Tingle, J. L., Garner, K. L., & Astley, H.C. (2025). Fluoromicrometry reveals minimal influence of tendon elasticity during snake locomotion. Journal of Experimental Biology 228 (5). https://doi.org/10.1242/jeb.249259

Bartlett, D.T., Raffle, K.O., Pettit, H.N., Brainard, M.K., Houglan, P.M., Gamel, K., Nopper, Z.O., Harden, R.K., Garner, A.M., Londraville, R.L. and Astley, H.C. (2025). Navigating Nature's Terrain: Jumping Performance Robust to Substrate Moisture and Roughness by Blackspotted Rockskippers (*Entomacrodus striatus*). Journal of Experimental Zoology Part A: Ecological and Integrative Physiology. https://doi.org/10.1002/jez.2903

Gamel, K. M., Pinti, S., and Astley, H.C. (2024) Ground Reaction Forces and Energy Exchange During Underwater Walking. Integrative Organismal Biology, Volume 6, Issue 1, 2024, obae013, https://doi.org/10.1093/iob/obae013

Gamel, K. M., Pinti, S., and Astley, H.C. (2024) Design of A Highly Sensitive, Low-cost Underwater Force Plate to Record Substrate Reaction Forces. Integrative Organismal Biology, Volume 6, Issue 1, obae008, https://doi.org/10.1093/iob/obae008

Rieser, J. M., Chong, B., Gong, C., Astley, H.C., Schiebel, P.E., Diaz, K., Pierce, C.J., Lu, H., Hatton, R. L., Choset, H., & Goldman, D. I. (2024). Geometric phase predicts locomotion performance in undulating living systems across scales. Proceedings of the National Academy of Sciences, 121(24), e2320517121. https:/doi.org/10.1073/pnas.2320517121

Tingle, J. L., Garner, K. L., & Astley, H. C. (2024). Functional diversity of snake locomotor behaviors: A review of the biological literature for bioinspiration. Ann NY Acad Sci, 1–22. https://doi.org/10.1111/nyas.15109

Tingle, J. L., Jurestovsky, D. J., & Astley, H. C. (2023). The relative contributions of multiarticular snake muscles to movement in different planes. Journal of Morphology, 284, e21591. https://doi.org/10.1002/jmor.21591

Jurestovsky, D. J., Joy, S., and Astley, H.C. (2023). Blood python (Python brongersmai) strike kinematics and forces are robust to variations in substrate geometry. Journal of Experimental Biology 226 (2). https://doi.org/10.1242/jeb.244456

Jurestovsky, D. J., Tingle, J. L., and Astley, H. C. (2022). Corn Snakes Show Consistent Sarcomere Length Ranges Across Muscle Groups and Ontogeny. Integrative Organismal Biology. https://doi.org/10.1093/iob/obac040

Fu, Q., Astley, H.C., Li, C. (2022). Snakes combine vertical and lateral bending to traverse uneven terrain. Bioinspiration & Biomimetics. https://doi.org/10.1088/1748-3190/ac59c5

Howe, S., Bryant, K., Duff, A., Astley, H.C. (2021). Testing the effects of body depth on fish maneuverability via robophysical models. Bioinspiration & Biomimetics. https://doi.org/10.1088/1748-3190/ac33c1

Jurestovsky, D. J., Usher, L. R., Astley, H. C. (2021). Generation of propulsive force via vertical undulations in snakes. J Exp Biol 224 (13): jeb239020. https://doi.org/10.1242/jeb.239020

Howe, S., Duff, A., & Astley, H. (2021). Comparing the turn performance of different motor control schemes in multilink fish-inspired robots. Bioinspiration & Biomimetics. https://doi.org/10.1088/1748-3190/abe7cc

Herndon, C., Astley, H. C., Owerkowicz, T., & Fenton, F. H. (2021). Defibrillate you later, alligator; Q10 scaling and refractoriness keeps alligators from fibrillation. Integrative Organismal Biology. https://doi.org/10.1093/iob/obaa047

Astley, H., Rieser, J., Kaba, A., Paez, V. M., Tomkinson, I. K., Mendelson, J., and Goldman, D. I. (2020). Side-impact collision: Mechanics of obstacle negotiation in sidewinding snakes. Bioinspiration & Biomimetics, v 16, n 6. https://doi.org/10.1088/1748-3190/ABB415

Howe, S. P., and Astley, H. C. (2020). The control of routine fish maneuvers: Connecting midline kinematics to turn outcomes. Journal of Experimental Zoology Part A: Ecological and Integrative Physiology, jez.2398. https://doi.org/10.1002/jez.2398

Astley, H.C. (2020) The Biomechanics of Multi-articular Muscle–Tendon Systems in Snakes. Integr Comp Biol. 2020;60(1):140–155. https://doi.org/10.1093/icb/icaa012

Astley, H.C. (2020) Long Limbless Locomotors Over Land: The Mechanics and Biology of Elongate, Limbless Vertebrate Locomotion. Integr Comp Biol. 2020;60(1):134–139. https://doi.org/10.1093/icb/icaa034

Schiebel, P. E.,Astley, H.C., Rieser, J.M., Agarwal, S., Hubicki, C., Hubbard, A.M., Diaz, K., Mendelson III, J. R., Kamrin, K., and Goldman, D.I. (2020) Mitigating memory effects during undulatory locomotion on hysteretic materials. eLife 2020;9:e51412 https://doi: 10.7554/eLife.51412

Jurestovsky, D. J., Jayne, B. C., and Astley, H. C. (2020) Experimental modification of morphology reveals the effects of the zygosphene–zygantrum joint on the range of motion of snake vertebrae. J Exp Biol 223:jeb216531 https://doi:10.1242/jeb.216531

Astley H.C., Mendelson J.R., Dai J., Gong C., Chong B., Rieser J.M., Schiebel P.E., Sharpe S.S., Hatton R.L., Choset H., Goldman D.I. (2020) Surprising simplicities and syntheses in limbless self-propulsion in sand. J Exp Biol 223:jeb103564. https://doi: 10.1242/jeb.103564

Langowski, J.K.A.. Singla, S., Nyarko, A., Schipper, H. van den Berg, F. T., Kaur, S., Astley, H. C., Gussekloo, S. W. S., Dhinojwala, A., and van Leeuwen, J. L. (2019) Comparative and functional analysis of the digital mucus glands and secretions of tree frogs. Frontiers in Zoology, 16:19. https://doi.org/10.1186/s12983-019-0315-z

Han, S. I., Astley, H. C., Maksuta, D. D., and Blackledge, T. A. (2019) External power amplification drives prey capture in a spider web. Proceedings of the National Academy of Sciences, 116(24), 12060-12065. https://doi.org/10.1073/pnas.1821419116

Reynaga, C. M., Astley, H. C., and Azizi, E. (2018) Morphological and kinematic specializations of walking frogs. *Journal of Experimental Zoology A*, 329:87–98; doi: 10.1002/jez.2182

Astley, H.C., Astley, V.E., Brothers, D., and Mendelson, J.R. (2017) Digital Analysis of Photographs for Snake Length Measurement. *Herpetological Review*, 48(1), 39–43.

Astley, H.C. (2016) The diversity and evolution of locomotor muscle properties in anurans. *Journal of Experimental Biology*, 219, 3163-3173; doi: 10.1242/jeb.142315

Camp, A. L., Astley, H.C., Horner, A.M., Roberts, T.J., and Brainerd, E.L. (2016) Fluoromicrometry: A Method for Measuring Muscle Length Dynamics with Biplanar Videofluoroscopy. *Journal of Experimental Zoology A*, Vol. 325 no 7 pp 399–408; doi: 10.1002/jez.2031

McInroe, B.*, Astley, H.C.*, Gong, C., Kawano, S., Schiebel, P.E., Rieser, J.M., Choset, H., Blob, R.W., and Goldman, D.I. (2016) Tail use improves performance on soft substrates in models of early vertebrate land locomotors. *Science*, Vol. 353 no 6295 pp 154-158; doi: 10.1126/science.aaf0984 *Co-First-Authors

Gong, C., Travers, M., Astley, H. C., Li, L., Mendelson, J., Goldman D. I., and Choset, H. (2016) Kinematic gait synthesis for snake robots. *The International Journal of Robotics Research*, Vol. 35 Issue 1-3, pp 100-113; doi:10.1177/0278364915593793

Astley, H.C., A. Haruta, and Roberts, T.J. (2015) Robust Jumping Performance and Elastic Energy Recovery from Compliant Perches in Tree Frogs. *Journal of Experimental Biology*, 218, 3360-3363; doi:10.1242/jeb.121715

Astley, H. C., Gong, C., Dai, J., Travers, M., Serrano, M. M., Vela, P. A., Choset, H., Mendelson, J. R., Hu, D., and Goldman, D. I. (2015) Modulation of orthogonal body waves enables high maneuverability in sidewinding locomotion. *Proceedings of the National Academy of Sciences*, vol. 112 no. 19, pp. 6200–6205 doi: 10.1073/pnas.1418965112

Astley, H. C., and Roberts, T. J. (2014) The mechanics of elastic loading and recoil in anuran jumping. *Journal of Experimental Biology*, 217, 4372-4378 doi:10.1242/jeb.110296

Marvi, H., Gong, C., Gravish, N., Astley, H. C., Travers, M., Hatton, R. L., Mendelson III, J. R., Choset, H., Hu, D. L., and Goldman, D. I. (2014) Sidewinding with minimal slip: snake and robot ascent of sandy slopes. *Science,* Vol. 346 no. 6206 pp. 224-229; doi: 10.1126/science.1255718

Astley, H. C., Abbot, E. M., Azizi, E., Marsh, R. L., and Roberts, T. J. (2013) Chasing maximal performance: A cautionary tale from the celebrated jumping frogs of Calaveras County. *Journal of Experimental Biology,* 216, 3947-3953. doi:10.1242/jeb.090357

Astley, H. C. (2012) Getting around when you're round: quanitative analysis of the locomotion of the blunt-spined brittle star *Ophiocoma echinata*. *Journal of Experimental Biology*, 215, 1923-1929. doi: 10.1242/jeb.068460

Astley, H. C. and Roberts, T.J. (2012) Evidence for a vertebrate catapult: elastic energy storage in the plantaris tendon during frog jumping. *Biology Letters*, vol. 8 no. 3 386-389 doi: 10.1098/rsbl.2011.0982

Astley, H. C. and Jayne, B.C. (2009) Arboreal habitat structure affects the performance and modes of locomotion of corn snakes (*Elaphe guttata*). *Journal of Experimental Zoology*, 311A: 207-216. doi: 10.1002/jez.521

Astley, H. C. and Jayne, B.C. (2007) Effects of perch diameter and incline on the kinematics, performance and modes of arboreal locomotion of corn snakes (*Elaphe guttata*). *Journal of Experimental Biology*, 210: 3862-3872. doi: 10.1242/jeb.009050

Peer-Reviewed Engineering Conference Proceedings

Astley, H.C. (2018) Traversing Tight Tunnels—Implementing an Adaptive Concertina Gait in a Biomimetic Snake Robot. Earth and Space 2018, 16th Biennial International Conference on Engineering, Science, Construction, and Operations in Challenging Environments. doi.org/10.1061/9780784481899.017

Dai, J., Travers, M., Dear, T., Gong, C., Astley, H.C., Goldman, D.I., Choset, H. (2015) Robot-Inspired Biology: The Compound-Wave Control Template. *IEEE International Conference on Robotics and Automation (ICRA)*. doi: 10.1109/ICRA.2015.7140022

Gong, C., Travers, M., Astley, H. C., Goldman D. I., and Choset, H. (2015) Limbless Locomotors that Turn in Place. *IEEE International Conference on Robotics and Automation (ICRA)*. doi: 10.1109/ICRA.2015.7139720

Gong, C., Travers, M., Astley, H. C., Li, L., Mendelson, J., Hu, D. L., Goldman D. I., and Choset, H. (2014) Conditioned Basis Array Factorization: An Approach to Gait Pattern Extraction. *Robotics: Science and Systems*. Published online, in press (Edited by Dieter Fox, Lydia E. Kavraki and Hanna Kurniawati, ISBN 978-0-9923747-0-9).

Book Chapters

"Slithering across worlds—snake-inspired robots for extraterrestrial exploration", in Biomimicry for Aerospace: Technologies and Applications, 2022. Eds. Vikram Shyam, Marjan Eggermont, Aloysius Hepp.

External Grants Funded (PI)

- "CAREER: The Musculoskeletal Biomechanics and Control of Limbless Locomotion", NSF BIO IOS Award #2045581, 5/1/21-4/30/26, $1,111,830.00
- "First Steps: The Dynamics and Control of Underwater Walking", NSF Award #1929900, 9/1/19-8/31/21, $297,267
- Workshop: Designing a Network for Undergraduate Biomimicry Research and Education, NSF RCN UBE Award #1747598, 8/1/17-7/31/18, $19,840

External Grants Funded (Senior Personnel)

- "Biology Meets Engineering: Expanding Transdisciplinary STEM Education", NSF DRL Award #2342578, 8/2024-7/2028
    - Grant Role: Find & manage on-campus research experiences at U of Akron for HS students participating in the project

External Grants (Advisory Capacity Only)

- "Investigating the effects of push-point density in structured environments on kinematics of snake slithering." Company of Biologists Travel Fellowship, awarded to Ben van Blerk from University of Southampton
- "Skeletal and behavioral underpinnings of extreme locomotor diversity in snakes", NSF Postdoctoral Fellowship, awarded to Dr. Jessica Tingle, Award #2305218, 9/2023-9/2025
- "Advancing access equity and user safety through bio-inspired all-terrain mobility solutions", NSF I-Corps Teams Award #2330074, 6/1/23-11/31/23

Internal Grants Funded

- Principles governing the mechanics and control of snake strikes. Collaborative Research Initiative with Zoo Atlanta, funded by The Elizabeth Smithgall Watts Endowment and the Georgia Tech School of Biology. Funded 2015. $11,500
- Natural substrate and behavior of wild sidewinders. Collaborative Research Initiative with Zoo Atlanta, funded by The Elizabeth Smithgall Watts Endowment and the Georgia Tech School of Biology. Funded 2014. $7,500
- Turning without legs: the mechanics and control of maneuverability in snakes. Collaborative Research Initiative with Zoo Atlanta, funded by The Elizabeth Smithgall Watts Endowment and the Georgia Tech School of Biology. Funded 2013. $10,000
- Jumping with your ancestor's legs: The influence of phylogeny and function on musculoskeletal properties in anurans. Sigma Xi Grant In Aid of Research. Funded 2012. $800.
- Moving on limbs without limbs: Muscular mechanisms of the arboreal locomotion of snakes. Wieman/Wendel/Benedict Award. Funded 2007. $1,200
- Moving on limbs without limbs: How perch diameter and incline affect the arboreal locomotion of snakes. University of Cincinnati graduate student summer research fellowship. Funded July & August 2006. $3,000

Awards

- Early Career Research & Creativity Award, Buchtel College of Arts & Sciences, U. of Akron, 2023
- Akron Community Engaged Scholar – Center for Experiential Learning, U. of Akron, 2023
- 2013 John G. Peterson Pre-doctoral Fellow, Brown University
- Best Student Presentation, Honorable Mention, SICB 2012
- Outstanding Teaching Assistant – Lower Division Courses, U. of Cincinnati, 2008

Mentored Researchers & Students

- **Postdoctoral Researchers**
  - Jessica Tingle - Assistant Professor, Brown University
  - Christine Vega - current
- **Graduate Students**
  - Stephen Howe (Ph.D.) – Postdoc: NEOMED, independent contractor
  - Derek Jurestovsky (Ph.D.) – Postdoc: Penn. State
  - Colleen Unsworth (Ph.D.) – Founder: Natraverse, LLC.
  - Kaelyn Gamel (Ph.D.) – Naval Undersea Warfare Center
  - Charles Edwards (Ph.D.) –Bluestone Research (Archeological Consulting)
  - Kelsey Garner (Ph.D. Student) - current
  - Jacob Sherman (Ph.D. Student) - current
  - Zoha Naqawe (Ph.D. Student) - current
- **Undergraduate Students Supervised:**
  - **U. of Cincinnati:**
    - Alex Sturbaum (High School student)
  - **Brown:**
    - Alison Haruta (Undergraduate, Biology)
    - Caleb Anderson (High School student)
  - **Georgia Tech:**
    - Benjamin McInroe (Undergraduate, Physics)
    - Luke Buffardi (Undergraduate, Physics)
    - Navya Palacherla (Undergraduate, Mechanical Engineering)
    - Mark Lowder (Undergraduate, Biology)
    - Mohammed Aamir (Undergraduate, Mechanical Engineering)
  - **U. of Akron:**
    - Emily Trenka (Undergraduate, Computer Science)
    - Sophie Cressman (Undergraduate, Biochemistry & Applied Math)
    - Dana Cressman (Undergraduate, Chemical Engineering)
    - Amith Rao (Undergraduate, Natural Sciences)
    - Hamna Siddiqui (REU student (Dennison University), Biochemistry)
    - Dalia Laredo (REU student (Carnegie Mellon Uni.), Chem. Eng.)
    - David Leffler (Undergraduate, Biology)
    - Nicholas Stricklen (Undergraduate, Exercise Science)
    - Christina Lee (Undergraduate, Biology/Psychology)
    - Jennifer McCoy (RET Teacher)
    - Megan Lee (Undergraduate, Biology)

- Walid Abuhashim (Undergraduate, Biomedical Engineering)
- Logan Usher (Undergraduate, Biology)
- Nour Shakaki (Undergraduate, Psychology)
- Stephen Adasolna (REU Student, (Cheyney University of Penn.), Biology)
- Kelly Bryant (Undergraduate, Biology)
- Andrew Duff (Undergraduate, Mechanical Engineering)
- Nathalay Cisneros (Undergraduate, Biomedical Science)
- Tabitha Cooper (Undergraduate, Biology)
- Colton Kemp (Undergraduate, Mechanical & Biomedical Engineering)
- Andrew Preston Kovac (Undergraduate, Mechanical Engineering)
- Dev Patel (Undergraduate, Biology)
- Zachary Nopper (Undergraduate, Mechanical Engineering)
- Wenli Wu (Undergraduate, Biology)
- Sid Joy (High School Student)
- Emily Newenhisen (Undergraduate, Biology)
- Jacob Newell (Undergraduate, Mechanical Engineering)
- Jarey Pettay (Undergraduate, Biomedical Science)
- Ava Umlauf (Undergraduate, Biology)
- Zachary Nopper (Undergraduate, Mechanical Engineering)
- Daniel Bartlett (Undergraduate, Biology)
- Ashley Broadwater (Undergraduate, Biology)
- Kat Lichti (Undergraduate, Engineering Technology)
- Ryan Hogan (Undergraduate, Biology)
- Sophie Kheder (Undergraduate, Biology)
- Sarvesh Sudhaharan (Undergraduate, Biology)
- Spencer Bradford (Undergraduate, Biology)
- Bizaya Gurung (High School Student)

Invited Talks & Workshops

- "Bending through the world: functional and behavioral mechanisms of snake slithering", Kent State University Seminar, November 2024
- "Sneaky Snakes & Slithering Snakebots" with Snakes On A Plane, for Science on Screen initiative of the Coolidge Corner Theater with support from the Alfred P. Sloan Foundation, March 2024
- "To Move a Snake: Insights into the Musculoskeletal Function of Snakes and Consequences for Locomotion" for the 11th International Symposium on Adaptive Motion of Animals and Machines, Kobe University, June 2023.
- International Workshop on Biodiversity and Bioinspiration, Universiti Brunei Darussalam, 1/2023
- "Mechanics of Multi-articular Muscles", for "The Mathematical Laws of Morphology and Biomechanics" Virtual Seminar series, organized by Kathleen Foster and Alessandro Selvitella, November 2022
- Integrative Organismal Modeling of Movement workshop series, Physical Models for Evolutionary Biology section, August 2022
    - "Physical Models for Evolutionary Biology", co-Presenter

    - "Actuating Physical Models", co-Presenter
- "Robotic Reptiles & Slithering Servomotors: Biomimetic Snake Robots for Exploration, Rescue, and Repair", Penn State University, Sigma Xi, February 2021
- "Control & Evolution of Sidewinding", Johns Hopkins University Seminar, Dept. of Mechanical Engineering, February 2020
- "Snake Patterns & Predation", Visual Research class at Amsterdam Applied University, February 2019
- "Control and evolution of sidewinding", Ohio University Seminar, November 2018
- "Robotic Reptiles & Slithering Servomotors: Biomimetic Snake Robots for Exploration, Rescue, and Repair", Cleveland Museum of Natural History, November 2018
- "Control and evolution of sidewinding", John Carroll University Seminar, March 2018
- "Control and evolution of sidewinding", Case Western Reserve University Seminar, February 2018
- "Control and evolution of sidewinding", guest lecture in Introduction to Biomimicry, RISD winter intersession course, January 2018
- "Control and evolution of sidewinding", Brown University Morphology Group Seminar, January 2018.
- "Snakes in Space: Limbless Biomimetic Snake Robots for Extraterrestrial Exploration", Nature-Inspired Exploration for Aerospace Summit 2017, October 2017
- "First Steps: Using Biological and Robotic Models to Understand the Vertebrate Colonization of Land", Robotics-Inspired Biology Symposium at Intelligent Robots & Systems (IROS) Conference, Vancouver, September 2017
- "Control and evolution of sidewinding", NEOMED Seminar Series, May 2017
- "Control and evolution of sidewinding", University of Akron Biology Colloquium, September 2016.
- "Crucial advantages of tail use in the evolution of vertebrate terrestrial locomotion", Atlanta Metro Physics Teachers group, November 2015.
- "The Diversity and Evolution of Locomotor Muscle Properties in Anurans", Determinants of Skeletal Muscle Diversity Syposium (E. Azizi & L. P. Hernandez), American Physiological Society Intersociety Meeting: Comparative Approaches to Grand Challenges in Physiology. October 2014
- "Performance, Mechanics and Diversity of Anuran Jumping", Rowland Institute, February 2013

Peer Reviews for:

Journal of Experimental Biology
Bioinspiration & Biomimetics
Proceedings of the Royal Society B
Journal of Experimental Zoology A
Journal of Comparative Physiology B
Functional Ecology
The Herpetological Journal
Herpetologica
Journal of Zoology
PLoS ONE
Zoology

Herpetological Conservation and Biology
PeerJ
BMC Evolutionary Biology
Journal of Evolutionary Biology
Journal of Morphology
Current Biology
Evolution
Integrative & Comparative Biology
Robotics and Autonomous Systems
NSF BIO
Nature Communications
IEEE Latin America Transactions
Living Machines
Proceedings of the Royal Society A

Teaching Experience

- Courses:
  - The Biology of Monsters (undergrad) seminar/outreach course, U. of Akron
  - Digital Skills for Biologists (grad-level skills course), mixed lab/lecture fusion, U. of Akron
  - Comparative Biomechanics (grad/undergrad-level), lecture, U. of Akron
  - Anatomy & Physiology (undergrad), lecture, U. of Akron
  - Research Techniques in Integrated Bioscience (graduate), lecture, U of Akron
- Guest Lectures:
  - "Animal Control Strategies for Robotics", Bioinspired Robotics, (Dr. Nourhani), 3/24
  - "Bioinspired Robotics and Snakebots", Bioinspired Robotics, (Dr. Nourhani), 2/24
  - "Biomimetic Robotic Control", Robotics, (Dr. Mahajan), 4/24
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  - "Bioinspired Robotics and Snakebots", Bioinspired Robotics, (Dr. Nourhani), 2/23
  - "Biomimetic Robotic Control", Robotics, (Dr. Mahajan), 4/22
  - "Biomimetic Robotic Control", Biomimicry & Entrepreneurship (Dr. Nadkarni), 1/22
  - "Evolution and Diversity of Connective Tissue" and "Function & Mechanics of Connective Tissue", Connective Tissues (Dr. Sahai), 1/22
  - "Biomimetic Robotic Control", Biomimicry Foundations (Dr. Niewiarowski), 11/21
  - "Biomimetic Robotic Control", Robotics, (Dr. Mahajan), 4/21
  - "Biomimetic Robotic Control", Biomimicry & Entrepreneurship (Dr. Nadkarni), 1/21
  - "Biomimetic Robotic Control", Introduction to Biomimicry (Dr. Niewiarowski), 11/20
  - Demonstration for Dr. Kolodziej's art class

- "Biomimetic Robotic Control", Introduction to Biomimicry (Dr. Niewiarowski), 11/5/19
- "Biomimetic Robotic Control", Biomimicry & Entrepreneurship class, (Dr. Nadkarni), 2/20
- Demonstration on snakes for Dr. Niewiarowski's Vertebrate Zoology lab 10/7/19
- "Power Amplified Jumping in Anurans", 4/24/20, Master Herpetologist Class
- "Biomimetic Robotic Control", Biomimicry & Entrepreneurship class, (Dr. Nadkarni), 2/19
- "Biomimetic Robotic Control", Robotics, (Dr. Mahajan), 4/19
- "Snake Patterns & Predation" Visual Research class at Amsterdam Applied University, (Dr. van den Driesche) 2/19
- "Biomimetic Robotic Control", Biomimicry & Entrepreneurship (Dr. Nadkarni), 2/18
- "Control and evolution of sidewinding", guest lecture in Introduction to Biomimicry (Dr. Kennedy), RISD winter intersession course, 1/18
- "Snake scales", Biomimicry Design Challenge class (Dr. Gruber), 9/17
- "Mechanics of Animal Locomotion", 2/17, Biomimicry Design Challenge (Dr. Petra Gruber), U. of Akron
- "Vertebrate Paleontology Through the Lens of Functional Morphology", 10/15, Georgia State University's Vertebrate Paleontology class.
- "Mechanics of Animal Locomotion", 1/15, Georgia Tech's Vertebrate Zoology class.

- Graduate Teaching Assistant:
  - August 2009 – January 2013. Brown University, Alpert Medical School.
    - Mean evaluation score: 4.8/5.0
    - Staffed all lab sections of a double-credit cadaver-based dissection lab, participated in lectures, exam prep, grading, and course development.
    - Guest lectures on the body wall (10/2013) and compartments of the leg (10/2012).
  - September 2005 – June 2008. University of Cincinnati, Dept. of Biological Sciences.
    - Outstanding Teaching Assistant Award, Lower-division courses
    - Staffed laboratory sections for freshman anatomy and physiology lab sections, including short lectures, exam preparation, grading, and laboratory management
    - Staffed laboratory section for an upper-level Vertebrate Zoology course, including specimen curation, exam preparation, grading, and live specimen demonstrations.
    - Staffed laboratory section for an upper-level, project-based Human Physiology & Biomechanics course, including equipment maintenance and troubleshooting, after-hours access for projects, student guidance and exam evaluation.
  - September 2001 – June 2002. University of Cincinnati, Department of Aerospace Engineering.
    - Recitation sections for sophomore-level statics and dynamics classes, including class-wide problem demonstrations and exam grading.

Professional Affiliations

- Society for Integrative and Comparative Biology
- Society for Experimental Biology
- American Society of Ichthyologists and Herpetologists

Field Experience

- With B.C. Jayne, project: Arboreal locomotion of the Brown Tree Snake (*Boiga irregularis*), Guam, August 21st to September 12th, 2005.
- With M. Bertness, project: Locomotor modes of brittle stars, Belize, January 12th to 19th, 2009
- With T. Roberts & R. Marsh, project: Maximal performance and the Celebrated Jumping Frogs of Calaveras County, Angel's Camp, CA, May 12th to 18th, 2009
- With P. Schiebel, project: Preliminary field observations of sidewinder and fringe-toed lizard locomotor behavior and habitat. Sonora Desert, Yuma, AZ, September 20th to 23rd, 2013

Outside Service:

Consultation for "Slither: How Nature's Most Maligned Creatures Illuminate Our World" by Stephen Hall, 3/2025

Symposium Organizer, "Long Limbless Locomotors Over Land: The mechanics and biology of elongate, limbless vertebrate locomotion", 2020 Meeting of the Society for Integrative & Comparative Biology

Session Chair, "Muscle Physiology I", 2019 Meeting of the Society for Integrative & Comparative Biology

Judge, Best Student Poster Competition, Society for Integrative & Comparative Biology, Division of Vertebrate Morphology, January 2018

Organizer for Midwest Regional Society for Integrative & Comparative Biology, October 2017, Akron, OH.

Co-organizer for the "Robotics-Inspired Biology" Symposium at Intelligent Robots & Systems (IROS) conference in Vancouver, Canada, 9/28/17

Organizer for Southeastern Regional Society for Integrative & Comparative Biology, October 2015, Atlanta, GA

Session Chair, "Towards a General Framework for Predicting Animal Movement Speeds in Nature", 2015 Meeting of the Society for Integrative & Comparative Biology

Session Chair, "Complementary session: Terrestrial locomotion: Where do we stand, where are we going?", 2014 Meeting of the Society for Integrative & Comparative Biology

President, Graduate Student Association, Dept. of Ecology & Evolutionary Biology, 2012

Session chair, "Terrestrial Biomechanics: Jumping", 2012 Meeting of the Society for Integrative & Comparative Biology

Brown Bag Seminar Series co-organizer, Brown University, Department of Ecology and Evolutionary Biology Spring 2011

Session chair, “Gait, Rattle & Roll”, 2011 Meeting of the Society for Integrative & Comparative Biology

Abstracts, Presentations & Posters

- Naqawe, Z., Sherman, J.J., Vega, C.M., Astley, H.C. Relationship Between Body Posture and Force Generation in Slithering Snakes. (1/2026). Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)
- Sherman, J.J., Garner, K.L., Tingle, J.L., and Astley, H.C. Muscle shortening and vertebral column curvature during propulsive vertical bending in snakes. (1/2026). Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)
- Vega, C.M., Garner, K.L., Astley, H.C. Elucidating the Consequences of Perturbations During Snake Slithering. (1/2026). Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)
- Garner, K.L., Tingle, J.L., and Astley, H.C. *In vivo* muscle contractions in snakes performing repeated locomotor trials using X-ray videos. (1/2026). Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)
- Stroud, T., Anderson, D., Struble, M. Gamel, K., Astley, H.C. Gibb, A. Mayerl, C.J. Aquatic and terrestrial locomotor forces in the common snapping turtle (*Chelydra serpentina*). (1/2026). Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)
- Lin, J., Astley, H.C., Goldman, D.I. Axial muscle multiarticularity in the sandfish lizard (*Scincus scincus*). (1/2026). Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)
- Naqawe, Z., Sherman, J.J., Vega, C.M., Astley, H.C. Relationship Between Body Posture and Force Generation in Slithering Snakes. (8/2025) International Conference on Vertebrate Morphology (virtual).
- Vega, C.M., Garner, K.L., Astley, H.C. Elucidating the Consequences of Perturbations During Snake Slithering. (8/2025) International Conference on Vertebrate Morphology (virtual).
- Sherman, J.J., Garner, K.L., Tingle, J.L., and Astley, H.C. Muscle shortening and vertebral column curvature during propulsive vertical bending in snakes. (8/2025) International Conference on Vertebrate Morphology (virtual).
- Astley, H.C. Only skin deep: a novel biomimetic control strategy for rectilinear locomotion in snake robots. (1/2025) Annual meeting of the Society for Integrative and Comparative Biology. (Atlanta, GA)
- Sherman, J.J., Garner, K.L., Tingle, J.L., and Astley, H.C. Muscle shortening and vertebral column curvature during propulsive vertical bending in snakes. (1/2025) Annual meeting of the Society for Integrative and Comparative Biology. (Atlanta, GA)
- Vega, C.M., Garner, K.L., Astley, H.C. Elucidating the control mechanisms of snake slithering during perturbations. (1/2025) Annual meeting of the Society for Integrative and Comparative Biology. (Atlanta, GA)
- Sherman, J.J., Garner, K.L., Tingle, J.L., and Astley, H.C. X-ray videos reveal patterns of muscle shortening versus vertebral column curvature during propulsive vertical bending in snakes. (6/2024) 2024 Meeting of the Society for the Study of Amphibians & Reptiles. (Ann Arbor, MI)

- Garner, K.L., Tingle, J.L., and Astley, H.C. Do repetitive locomotor trials lead to reduced muscle strain in snakes? (6/2024) 2024 Meeting of the Society for the Study of Amphibians & Reptiles. (Ann Arbor, MI)
- Astley. H.C. Code-free animated snake robots for outreach and education. (6/2024) 2024 Meeting of the Society for the Study of Amphibians & Reptiles. (Ann Arbor, MI)
- Vega, C.M., and Astley, H.C. Elucidating the control mechanisms of snake slithering during perturbations. (6/2024) 2024 Meeting of the Society for the Study of Amphibians & Reptiles. (Ann Arbor, MI)
- Bartlett, D. T., Raffle, K., Pettit, H., Brainard, M., Houghlan, P., Gamel, K.M., Nopper, Z. O., Harden, R., Astley, H.C., Garner, A. M., Londraville, R. L. Fish Out of Water: Effect of Substrate on Jumping Forces in the Blackspotted Rockskipper. (1/2024). Annual meeting of the Society for Integrative and Comparative Biology. (Seattle, WA)
- Garner, K. L., Tingle, J. L., Astley, H. C. Do repetitive locomotor trials lead to reduced muscle strain in snakes? (1/2024). Annual meeting of the Society for Integrative and Comparative Biology. (Seattle, WA)
- Nopper, Z., Gamel, K. M., Bartlett, D. T., Astley, H.C. Calculating Joint Torques in Axolotls during Underwater Walking with Aquatic Force Plate. (1/2024). Annual meeting of the Society for Integrative and Comparative Biology. (Seattle, WA)
- Tingle, J. L., Garner, K. L., Astley, H.C. An in vivo examination of snake muscle shortening and vertebral column curvature using X-ray video. (1/2024). Annual meeting of the Society for Integrative and Comparative Biology. (Seattle, WA)
- Gamel, K. M., Astley, H. C., Flammang, B.E. Fish out of Water: Kinetics of Amphibious Transition. (1/2024). Annual meeting of the Society for Integrative and Comparative Biology. (Seattle, WA)
- Edwards, C. S., Astley, H.C. Head rotation impacts the force required for penetration in damp granular media. (1/2024). Annual meeting of the Society for Integrative and Comparative Biology. (Seattle, WA)
- Tingle, J. L., Jurestovsky, D. J., Astley, H. C. The relative contributions of multiarticular snake muscles to movement in different planes. (8/2023). 46th American Society for Biomechanics Annual Meeting. (Knoxville, TN).
- Tingle, J. L., Jurestovsky, D. J., Astley, H. C. The relative contributions of multiarticular snake muscles to movement in different planes. (7/2023). Joint Meeting of Ichthyologists and Herpetologists (JMIH). (Norfolk, VA).
- Gamel, K. M., Astley, H. C. Using Inverse Dynamics to Quantify Joint Mechanics of Underwater Walking in Axolotls. (1/2023). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Nopper, Z., Gamel, K. M., Astley, H.C. Detecting Hydrodynamic Wake Forces with an Underwater Force Plate. (1/2023). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Zhou, H., Donatelli, Gamel, K. M., Astley, H.C., Laneuville, O., Standen, E. Feel it in Your Bones: Differences in the Skeletal Anatomy of Terrestrial and Aquatic Mudskippers. (1/2023). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Umlauf, A., Astley, H.C., Gamel, K. M., Pettay, J. Underwater Ground Reaction Forces of Spotted Prawn. (1/2023). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)

- Tingle, J. L., Jurestovsky, D. J., Astley, H. C. The relative contributions of multiarticular snake muscles to movement in different planes. (1/2023). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Edwards, C. S., Newell, J., Astley, H. C. Lateral head rotation decreases penetration force of a robophysical model in damp granular media. (1/2023). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Kovac, A. P. Astley, H.C., Unsworth, C.K., Tarchick, M., McInerney. S. The Effects of Crocodilian Tail Serrations on Water Surface Disturbance (1/2023). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Astley, H.C. Frogs as Two-Stage Rockets. (7/2022). Fast Movements, Impacts, and Deformations. (Raleigh, NC)
- Davis, R.A., Cole, M., Astley, H.C., Andronowski, J.M. The Effects of Prolonged Opioid Exposure on Bone Fracture Strength of Rabbit Middle Ribs. (2/2022). American Academy of Forensic Sciences. (Seattle, WA)
- Zimmerman, H., Astley, H.C. Using Mechanical Models to Test the Consequences of Jaw Hinge Offset. (1/2022). Annual meeting of the Society for Integrative and Comparative Biology. (Phoenix, AZ)
- Gamel, K.M., Pinti, S.G., Astley, H.C. Lights, Camera, Axolotl: Exploring the Dynamics of Underwater Walking Using an Underwater Force Plate and Synchronous Videography. (1/2022). Annual meeting of the Society for Integrative and Comparative Biology. (Phoenix, AZ)
- Jurestovsky, D.J., Joy, S.P., Astley, H.C. Cornered snakes strike with more force. (1/2022). Annual meeting of the Society for Integrative and Comparative Biology. (Phoenix, AZ)
- Gamel, K.M., Pinti, S.G., Astley, H.C. Design and Fabrication of a Low-cost, 3D printed Underwater Force Plate. (1/2022). Annual meeting of the Society for Integrative and Comparative Biology. (Phoenix, AZ)
- Edwards, C.S., Astley, H.C. Lateral head movement reduces force required for penetration in damp granular media. (1/2022). Annual meeting of the Society for Integrative and Comparative Biology. (Phoenix, AZ)
- Jurestovsky, D.J., Astley, H.C. Corn snake sarcomeres are predominantly on the descending limb of the length-tension curve. (1/2022). Annual meeting of the Society for Integrative and Comparative Biology. (Phoenix, AZ)
- Zimmerman, H., Small, B.M., Walro, D.F., Astley, H.C. Mesh-like Surface Features of *Castilleja* Seeds Increase Aerodynamic Drag. (1/2022). Annual meeting of the Society for Integrative and Comparative Biology. (Phoenix, AZ)
- Davis, R.A., Gamel, K.M., Andronowski, J.M,, Astley, H.C. Micro-scale Fluid Flow in Human Cortical Bone Examined through Reynolds-Matched Flow Testing of 3D Printed Synchrotron μCT Scans. (1/2022). Annual meeting of the Society for Integrative and Comparative Biology. (Phoenix, AZ)
- Fu, Q., Astley, H.C., Li, C. Snakes traversing complex 3-D terrain. (2/2021). Annual meeting of the Society for Integrative and Comparative Biology. (online)
- Howe, S.P., Bryant, K., Duff, A., Astley, H.C. Robophysical models clarify the effects of body depth on fish maneuverability. (2/2021). Annual meeting of the Society for Integrative and Comparative Biology. (online)

- Kaba, A.K., Rieser, J.M., Paez, V.M., Astley, H.C., Goldman, D.I. Amplitude Modulation in Sidewinding Locomotion Driven by Contact Sensing Facilitates Movement in Heterogeneous Environments. (3/2020). Annual March Meeting of the American Physics Society. (moved online due to COVID).
- Astley, H. C. Symposium Introduction - Long Limbless Locomotors Over Land: The mechanics and biology of elongate, limbless vertebrate locomotion. (1/2020). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Astley, H.C. Mechanics of Multi-articular Muscles Minimize Moments. (1/2020). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Gamel, K.M, Astley , H.C. Design and Fabrication of an Underwater Force plate. (1/2020). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Howe, S.P., Astley, H.C. Bio-inspired Control Algorithms Integrating Steady Swimming and Maneuvering in Fish Robots. (1/2020). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Jurestovsky, D.J., Usher, L., Astley, H.C. Propulsion via vertical undulation in snakes. (1/2020). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Unsworth, C.K., Astley, H.C. Quantifying the compliance of the millipede body while traversing irregular terrain. (1/2020). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Kaba, A.K., Rieser, J.M., Paez, V.M., Astley, H.C., Goldman, D.I. Amplitude Modulation in Sidewinding Locomotion Driven by Contact Sensing Facilitates Movement in Heterogeneous Environments. (1/2020). Annual meeting of the Society for Integrative and Comparative Biology. (Austin, TX)
- Herndon, C., Astley, H.C., Owerkowicz, T., Fenton, F. Long refractory period protects alligators from cardiac fibrillation across temperature changes. (8/2019) 10th International Congress of Comparative Physiology and Biochemistry. (Ottawa,Canada)
- Howe, S.P., Astley, H.C. Giving Fish Robots a Pulse: Implementing Bio-inspired Control Algorithms in Fish Robots. (3/2019) American Physics Society March Meeting. (Boston, MA)
- Schiebel, P., Rieser, J., Astley, H.C., Hubbard, A. M., Diaz-Cruz, K., Goldman, D.I. Mechanics of snake slithering on deformable substrates. (3/2019) American Physics Society March Meeting. (Boston, MA)
- Paez, V.M., Astley, H.C., Mendelson III, J.M.R., Goldman, D.I. A robophysical model for studying obstacle navigation in sidewinders. (3/2019) American Physics Society March Meeting. (Boston, MA)
- Reiser, J.M., Astley, H.C., Mendelsom III, J.M.R., Gong, C. Dai, J., Chong, B., Schiebel, P.E., Ozkan aydin, Y., Hubbard, A.M., Rankin, J.W., Hutchinson, J.R., Hatton, R. L., Choset, H., Goldman, D.I. Geometric mechanics and locomotion in dissipative environments. (3/2019) American Physics Society March Meeting. (Boston, MA)
- Unsworth, C.K., Abuhashim, W.A., Brannoch, S.K., Svenson, G.J., Astley, H.C. Biomechanics of the Praying Mantis Foreleg Strike. (1/2019) Annual meeting of the Society for Integrative and Comparative Biology. (Tampa, FL)

- Jurestovsky, D.J., Astley, H.C. The Effect of the Zygosphene/Zygantrum Joint on the Range of Motion in Snake Vertebrae. (1/2019) Annual meeting of the Society for Integrative and Comparative Biology. (Tampa, FL)
- Schiebel, P.E., Rieser, J.M., Astley, H.C., Hubbard, A.M., Diaz, K., Goldman, D.I. Mechanics of Snake Slithering on Deformable Substrates. (1/2019) Annual meeting of the Society for Integrative and Comparative Biology. (Tampa, FL)
- Astley, H.C., Siddiqui, H.K., Laredo, D. High Hysteretic Energy Loss in Mouse Tendons. (1/2019) Annual meeting of the Society for Integrative and Comparative Biology. (Tampa, FL)
- Unsworth, C.K., Tarchick, M.J., McInerney, S.J., Astley, H.C. The Effects of Crocodilian Tail Serrations on Surface Water Disturbance. (1/2019) Annual meeting of the Society for Integrative and Comparative Biology. (Tampa, FL)
- Howe, S.P., Leffler, D., Astley, H.C. Midlines in motion: Connecting Midline Curvature Dynamics to Heading Change and Center of Mass Deflection in Fishes. (1/2019) Annual meeting of the Society for Integrative and Comparative Biology. (Tampa, FL)
- Rieser, J.M., Astley, H.C., Gong, C., Chong, B., Schiebel, P.E., Rankin, J.W., Michel, K., Nicieza, A., Hutchinson, J.R., Hatton, R.L., Choset, H., Goldman, D.I. Comparative geometric mechanics of animal locomotion in dissipative environments. (1/2019) Annual meeting of the Society for Integrative and Comparative Biology. (Tampa, FL)
- Astley, H.C., Diaz, K., Mendelson III, J.M.R., Goldman, D.I. Sidewinding, Slithering, Sand, and Snakes; How complex substrates and surprising failures can lead to innovative locomotor solutions. (10/2018) Fall Central Sectional Meeting of the American Mathematical Society, Special Session on Bio-inspired Mechanics and Propulsion I, invited by Silas Alben. (Ann Arbor, MI)
- Astley, H.C. Traversing Tight Tunnels – Implementing an Adaptive Concertina Gait in a Biomimetic Snake Robot. (1/2018) Annual meeting of the Society for Integrative and Comparative Biology. (San Francisco, CA) (poster)
- Han, S.I., Astley, H.C. & Blackledge, T. Slingshot Motion of the *Hyptiotes* Spider Created by External Power Amplification in the Web. (1/2018) Annual meeting of the Society for Integrative and Comparative Biology. (San Francisco, CA)
- Howe, S. P. & Astley, H.C. Examining Turn Kinematics in Fish for the Control of Biomimetic Fish Robots. (1/2018) Annual meeting of the Society for Integrative and Comparative Biology. (San Francisco, CA)
- Garner, A.M., Keith, A.J., Schnarrenberger, A., Astley, H.C., Niewiarowski, P.H. The Effects of Running Orientation on Gecko Locomotor Performance. (1/2018) Annual meeting of the Society for Integrative and Comparative Biology. (San Francisco, CA) (poster)
- Astley, H.C. Biomimetic Replication of snake concertina locomotion. (10/2017). Midwest Regional Society for Integrative & Comparative Biology. (Akron, OH)
- Howe, S. P. & Astley, H.C. Exploring the kinematics of fish maneuvers. (10/2017). Midwest Regional Society for Integrative & Comparative Biology. (Akron, OH)
- Han, S.I., Astley, H.C. & Blackledge, T. External Power Amplification in the Web of *Hyptiotes cavatus*, the Triangle Spider. (10/2017). Midwest Regional Society for Integrative & Comparative Biology. (Akron, OH)

- Howe, S. P. & Astley, H.C. Exploring Fish New Wave: Understanding fish turn kinematics for the control of biomimetic fish robots. (10/2017) Nature-Inspired Exploration for Aerospace Summit 2017. (Cleveland, OH)
- Astley, H.C., Mendelson, J.R., & Goldman, D.I. Side-Impact Collision: Obstacle Negotiation Mechanics in Sidewinding Snakes. (1/2017) Annual meeting of the Society for Integrative and Comparative Biology. (New Orleans, LA)
- Herndon, C.J., Uzelac, I., Astley, H.C., & Fenton, F.H. Voltage and calcium dynamics in alligator hearts in comparison to mammals. (1/2017) Annual meeting of the Society for Integrative and Comparative Biology. (New Orleans, LA)
- Diaz Cruz, K., Astley, H.C., Mendelson, J.R., & Goldman, D.I. Undulation on granular media: a robophysical investigation. (1/2017) Annual meeting of the Society for Integrative and Comparative Biology. (New Orleans, LA)
- Camp, A.L., Astley, H.C., Horner, A.M., Roberts, T.J., & Brainerd, E.L. Fluoromicrometry: using X-ray video to measure the in vivo muscle dynamics of animal behaviors. (1/2017) Annual meeting of the Society for Integrative and Comparative Biology. (New Orleans, LA)
- Astley, H. C., McInroe, B., Gong, C., Kawano, S., Blob, R., Choset, H., and Goldman, D. I. Crucial advantages of tail use in the evolution of vertebrate terrestrial locomotion. 3/2016. March meeting of the American Physical Society. (Baltimore, MD)
- McInroe, B., Gong, C., Kawano, S., Astley, H. C., Blob, R., Choset, H., and Goldman, D. I. Robotic and mathematical modeling reveals principles of appendage coordination in terrestrial locomotion. 3/2016. March meeting of the American Physical Society. (Baltimore, MD)
- Schiebel, P.E., Zhang, T., Gong, C., Yu, M., Dai, J., Astley, H.C., Travers, M., Choset, H., Goldman, D.I. Slithering on sand: kinematics and controls for success on granular media. 3/2016. March meeting of the American Physical Society. (Baltimore, MD)
- Gong, C., Astley, H. C., Schiebel, P.E., Dai, J., Travers, M., Goldman, D.I., Choset, H. Geometric Mechanics Reveals Optimal Complex Terrestrial Undulation Patterns. 3/2016. March meeting of the American Physical Society. (Baltimore, MD)
- Astley, H. C., McInroe, B., Gong, C., Kawano, S., Blob, R., Choset, H., and Goldman, D. I. Crucial advantages of tail use in the evolution of vertebrate terrestrial locomotion. 1/2016. Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)
- Reynaga, C.M., Astley, H. C., Azizi, E. Morphological and kinematic constraints of quadrupedal walking in frogs. 1/2016. Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)
- Gong, C., Astley, H. C., Dai, J., McInroe, B., Schiebel, P.E., Travers, M., Goldman, D.I., Choset, H. Geometric Mechanics: A Framework for Studying Animal Locomotion. 1/2016. Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)
- Schiebel, P.E., Zhang, T., Gong, C., Dai, J., Astley, H.C., Travers, M., Choset, H., Goldman, D.I. Slithering on sand: kinematics and controls for success on granular media. 1/2016. Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)
- McInroe, B., Gong, C., Kawano, S., Astley, H. C., Blob, R., Choset, H., and Goldman, D. I. Robotic and mathematical modeling reveals principles of appendage coordination in

terrestrial locomotion. 1/2016. Annual meeting of the Society for Integrative and Comparative Biology. (Portland, OR)

- Astley, H. C., Gong, C., Choset, H., and Goldman, D. I. Geometric Mechanics of Sidewinding. 11/2015. Atlanta Area Systems Biophysics Meeting. Atlanta, GA.
- Astley, H. C., McInroe, B., Gong, C., Kawano, S., Blob, R., Choset, H., and Goldman, D. I. Crucial advantages of tail use in the evolution of vertebrate terrestrial locomotion. 10/2015. South-Eastern Society for Integrative and Comparative Biology (regional meeting). Atlanta, GA.
- Lowder, M., Astley, H. C. and Goldman, D. I. Broad Comparative Study of Snake Locomotion on Sand. 10/2015. South-Eastern Society for Integrative and Comparative Biology (regional meeting). Atlanta, GA.
- McInroe, B., Gong, C., Kawano, S., Astley, H. C., Blob, R., Choset, H., and Goldman, D. I. Crucial advantages of tail use in the evolution of vertebrate terrestrial locomotion. 7/2015. Conference of the International Physics of Living Systems (iPoLS) Network. Washington, DC.
- Astley, H. C., Gong, C., Dai, J., Travers, M., Serrano, M. M., Vela, P., Choset, H., Mendelson, J., Hu, D. L., and Goldman, D. I. Independent modulation of orthogonal body waves enables versatile and rapid maneuverability in sidewinding. 3/2015. March Meeting of American Physical Society. (San Antonio, TX).
- McInroe, B., Astley, H.C., Kawano, S., Blob, R., Goldman, D.I. Animal and robot experiments to discover principles behind the evolution of a minimal locomotor apparatus for robust legged locomotion. 3/2015. March Meeting of American Physical Society. (San Antonio, TX).
- Astley, H. C., Gong, C., Travers, M., Serrano, M. M., Vela, P., Choset, H., Mendelson, J., Hu, D. L., and Goldman, D. I. Independent modulation of orthogonal body waves enables versatile and rapid maneuverability in sidewinding. 1/2015. Annual meeting of the Society for Integrative and Comparative Biology. (West Palm Beach, FL)
- McInroe, B., Astley, H.C., Kawano, S., Blob, R., Goldman, D.I. Biological and robotic modeling of the evolution of legged locomotion on land. 1/2015. Annual meeting of the Society for Integrative and Comparative Biology. (West Palm Beach, FL)
- Astley, H. C., Gong, C., Travers, M., Serrano, M. M., Vela, P., Choset, H., Mendelson, J., Hu, D. L., and Goldman, D. I. Independent modulation of orthogonal body waves enables versatile and rapid maneuverability in sidewinding. 10/2014. Southeastern regional meeting of the Society for Integrative and Comparative Biology. (Chapel Hill, N.C.)
- Astley, H. C., Gong, C., Serrano, M. M., Choset, H., Mendelson, J., Hu, D. L., and Goldman, D. I. Independent modulation of orthogonal body waves enables versatile and rapid maneuverability in sidewinding. 7/2014. International Meeting of the Physics of Living Systems Student Research Network. (Munich, Germany).
- McInroe, B., Astley, H.C., Kawano, S., Blob, R., Goldman, D.I. Using a robot to study the evolution of legged locomotion. 7/2014. International Meeting of the Physics of Living Systems Student Research Network. (Munich, Germany).
- McInroe, B., Astley, H.C., Kawano, S., Blob, R., Goldman, D.I. 3/2014. Using a robot to study the evolution of legged locomotion. March Meeting of American Physical Society. (Denver, CO).

- Astley, H.C., Serrano, M.M., Gong, C., Choset, H, Mendelson, J., Hu, D., and Goldman, D.I. 3/2014. Turning and maneuverability during sidewinding locomotion. March Meeting of American Physical Society. (Denver, CO).
- Astley, H.C., Serrano, M.M., Gong, C., Choset, H, Mendelson, J., Hu, D., and Goldman, D.I. 2/2014. Turning and maneuverability during sidewinding locomotion. Georgia Institute of Technology, Department of Physics, Physics of Living Systems seminar.
- McInroe, B. M., Astley, H. C., Kawano, S., Blob, R. and Goldman, D. I. 1/2014. Construction of a mudskipper-inspired robot to study crutching locomotion on flowable ground. Annual Meeting of the Society for Integrative and Comparative Biology. (Austin, TX).
- Astley, H.C. and T.J. Roberts. 1/2014. The mechanics of elastic loading and recoil in anuran jumping. Annual Meeting of the Society for Integrative and Comparative Biology. (Austin, TX).
- Astley, H.C. and T. J. Roberts. 10/2013. Performance, Mechanics and Diversity of Anuran Jumping. Georgia Institute of Technology, Department of Physics, Physics of Living Systems seminar.
- Astley, H.C. and T.J. Roberts. 1/2013. Where's the catch? Examining the catch mechanism in anuran jumping using inverse dynamics. Annual Meeting of the Society for Integrative and Comparative Biology. (San Francisco, CA).
- Astley, H.C. and T.J. Roberts. 1/2013. The diversity and evolution of locomotor muscle properties in anurans. Annual Meeting of the Society for Integrative and Comparative Biology. (San Francisco, CA).
- Astley, H.C. and T.J. Roberts. 11/2012. Where's the catch? Examining the catch mechanism in anuran jumping using inverse dynamics. Northeastern Regional Division of Vertebrate Morphology Meeting (SICB) (Amherst, MA).
- Astley, H.C. and T.J. Roberts. 06/2012. Biomechanics of frog jumping. XROMM course, Brown University.
- Astley, H.C. and T. J. Roberts. 4/2012. Performance, Mechanics and Diversity of Anuran Jumping. Brown University, Department of Ecology & Evolutionary Biology, Brown Bag seminar.
- Astley, H.C., Haruta, A. and Roberts, T.J. 1/2012. The Effects of Substrate Compliance on Jump Performance in the Cuban Tree Frog (*Osteopilus septentrionalis*). Annual Meeting of the Society for Integrative and Comparative Biology. (Charleston, SC).
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