Henry P. Tsai

Curriculum Vitae

Current Position and Contact Information

Assistant Professor
Southern Connecticut State University
Department of Biology

Telephone: 203-392-9775
Email: tsaih2@southernct.edu
Website: https://henryptsai.com/

Office address:
Jennings Hall 217
Southern Connecticut State University
Department of Biology
New Haven, CT 06515

Mailing address:
615 Fitch Street
Hamden, CT 06514

Research Interests

I am broadly interested in the evolution of vertebrate locomotion, with a particular interest in archosaurs (crocodilians, birds, and extinct forms such as dinosaurs). My research focuses on the mechanical functions, kinematics, and developmental significance of appendicular joints.

- Morphological convergence and disparity in archosaur limb joints during body size evolution.
- Evolution of the sauropsid (reptilian) limb joints and its significance to locomotor postural evolution.
- Evolution and ontogeny of tetrapod connective tissues.
- Mechanical behavior and physiology of tetrapod joint soft tissues.
- Visible Anatomy: Contrast-enhanced soft-tissue staining and imaging techniques.
- X-ray reconstruction of moving morphology (XROMM).

Education and Professional Appointments

2021-Current: Assistant Professor, Southern Connecticut State University

2018-2021: Assistant Professor, Missouri State University

2015-2018: Postdoctoral Associate, Ecology and Evolutionary Biology
Brown University

2015: Ph. D., Integrative Anatomy
University of Missouri
Doctoral thesis: Archosaur hip joint anatomy and its significance in body size and locomotor evolution.
Doctoral adviser: Casey M. Holliday
Doctoral committee: Carol V. Ward, Kevin M. Middleton, Libby W. Cowgill, John R. Hutchinson
Graduation date: May, 2015

2010: B.S., Ecology and Evolutionary Biology.
University of California, Irvine.
Adviser: Tomasz Owerkowicz.

2006: Esperanza High School, Anaheim, CA.

Publications

2020: **Tsai, H. P.**, K. M. Middleton, J. R. Hutchinson, and C. M. Holliday. 2020. More than one way to be a giant: Convergence and disparity in the hip joints of saurischian dinosaurs. Evolution, doi: 10.1111/evo.14017.

2019: **Tsai, H. P.,** M. L. Turner, A. R. Manafzadeh, and S. M. Gatesy. Contrast-enhanced XROMM reveals in vivo soft tissue interactions in the hip of *Alligator mississippiensis*. Journal of Anatomy. doi:10.1111/joa.13101

2018: **Tsai, H. P**., K. M. Middleton, J. R. Hutchinson, and C. M. Holliday. 2018. Hip joint articular soft tissues of basal Dinosauromorpha: evolutionary and biomechanical implications for Saurischia. Journal of Vertebrate Paleontology, 37(6), doi: 10.1080/02724634.2017.1427593

2016: Gignac, P. M., N. J. Kley, J. A. Clarke, M. W. Colbert, A. C. Morhardt, D. Cerio, I. N. Cost, P. G. Cox, J. D. Daza, C. M. Early, M. S. Echols, R. M. Henkelman, A. N. Herdina, C. M. Holliday, Z. Li, K. Mahlow, S. Merchant, J. Müller, C. P. Orsbon, D. J. Paluh, M. L. Thies, **H. P. Tsai**, and L. M. Witmer. 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, 228: 889–909. doi: 10.1111/joa.12449

2015: **Tsai, H. P.** and C. M. Holliday. 2015. Articular soft tissue anatomy of the archosaur hip joint: Structural homology and functional implications. Journal of Morphology. 276:601-630

2013: Holliday, C. M., **H. P. Tsai**, R. J. Skiljan, I. D. George, and S. Pathan. 2013. A 3D interactive model and atlas of the jaw musculature of *Alligator mississippiensis*. PLoS One, 8(6), e62806. doi: 10.1371/journal.pone.0024935

2011: **Tsai, H. P.** and C. M. Holliday. 2011. Ontogeny of the alligator cartilago transiliens and its significance for sauropsid jaw muscle evolution. PLoS ONE 6(9): e24935. doi: 10.1371/journal.pone.0024935

Manuscripts in Preparation

Tsai, H. P. in prep. Early development and growth of limb joint cartilage in the American alligator. In prep

Tsai, H. P., and C. M. Holliday. in prep. A 3D interactive model and atlas of the hind limb musculature of *Alligator mississippiensis*. to be submitted to PLoS ONE.

Tsai, H. P., and C. Griffin. In prep. The cartilaginous hips of Diplodocoidea: functional implications for highly specialized locomotor behaviors among sauropods.

Mallison, H., C. M. Holliday, **H. P. Tsai**, and D. Schwarz-Wings. in prep. Preservation of limb joint cartilage in the stegosaurian dinosaur *Kentrosaurus aethiopicus*.

Research Funding Support

2021: National Endowment for the Humanities: Collection improvement for Missouri Institute of Natural Sciences, *in prep*

2020: Greenberg Family Wildlife Foundation (private donation). $18,000

2019: McQueary College of Health and Human Services First Summer Research Support. $6,000

2018: Major Equipment funding, Department of Biomedical Sciences, Missouri State University $5,226

2018: Missouri State University Faculty Research Grant. $7,500

2015: The Bushnell Research and Education Fund, Brown University. $4,000

2012: Jurassic Foundation Research Grant. **Tsai, H. P.** Functional morphology of the saurischian hip joint soft tissues and its significance for archosaur locomotor evolution. $3,445.

2010: Undergraduate Research Opportunities Program. University of California, Irvine. **Tsai, H. P.** Effect of terrestrial and aquatic exercise on limb bone morphology and microstructure of the American alligator (*Alligator mississippiensis*). $837.

Travel Grant Support

2018: Missouri State University Graduate College International Travel Awards. $2,625

2012: Doris O. and Samuel P. Welles Research Fund. **Tsai, H. P.** Functional morphology of the cartilaginous epiphysis of archosaurs and it significance for archosaur locomotor evolution. $606.

Integrative Anatomy Student Association Conference Travel Award. $275.

2011: Jackson School of Geosciences Travel Grant. **Tsai, H. P.** Pelvic anatomy of *Alligator mississippiensis* and its significance for interpreting limb function in fossil archosaurs. $400.

2010: University of Missouri Life Science Travel Grant. $700.

Honors and Awards

2014: Edwin H. and Margaret M. Colbert Student Poster Prize, 74th Annual Meeting of the Society of Vertebrate Paleontology. $600.

2013: 1st Place, Life Sciences Research Week Poster Session, University of Missouri. $350.

2010 – 2015: University of Missouri Life Science Research Fellow. $25,000/year.

2009: Exceloi90-plence in Research, University of California, Irvine.

Professional Experience

2022– current: Course coordinator for Anatomy and Physiology series (BIO 200 and 201).

2022– current: Teaching faculty for Human Anatomy and Physiology (BIO 200), Comparative Physiology (BIO 401), and Special Topics Seminar (BIO 561).

2021– current: Teaching faculty for Vertebrate Zoology (BIO 228) and Human Physiology (BIO 542).

2021– current: Graduate research advisor for A. Collett. Southern Connecticut State University.

2021: Teaching faculty for Vertebrate Zoology (BIO 228) and Human Physiology (BIO 542).

2020– current: Academic advisement (undergraduate).

2018– 2021: Undergraduate research advisor for M. Harman, C. Herrell, T. Mottl, L. Candrl, K. Dang, J. Simkins, L. Wilson. Missouri State University

2018– current: Research associate at the Missouri Institute of Natural Science: Anatomical consultation, exhibit design and construction.

2018– current: Teaching faculty for Undergraduate Human Anatomy (BMS 307), Medical Human Anatomy & Radiology (BMS 717), Clinical Gross Anatomy (OTE 645), and Human Embryology (BMS 582). Missouri State University.

2016 – 2017: Mentoring undergraduate researchers James Napoli and David Perry.

2015 – 2018: Teaching associate for 1st year Medical School Human Gross Anatomy (BIOL 3644 IMS I). Brown University.

2015 – 2018: lecturer for 1st year Medical School Human Gross Anatomy (BIOL 3644 IMS I). Brown University.

2014: Assistant lecturer for Undergraduate Human Gross Anatomy (PTH_AS 2201). University of Missouri.

Assistant lecturer for Human Anatomy (BIO 203). Westminster College, MO.

2013 – 2015: Vice president of the MU Integrative Anatomy Student Association.

2012 – 2013: Mentoring undergraduate researchers Kaleb Sellers and Ally McEntire, as well as high school student Sami Pathan.

2011 – 2012: Teaching assistant for 1st Year Medical School Human Gross Anatomy (PTH_AS 7222), University of Missouri.

2008 – 2010: Undergraduate researcher at the Hicks Lab. University of California, Irvine.

2008 – 2009: Fieldwork volunteer, Museum of the Rockies, Montana State University, MT.

Additional Training

2018: Master Advisor Workshop Program, Missouri State University

2017: Sheridan Teaching Seminar (Certificate I) Program, Brown University

Professional Services

Departmental committees served at Southern Connecticut State University
- Biology Student Research Oversight Committee (2021-present)
- Biology Department Curriculum Committee (2021-present)

University committees served at Southern Connecticut State University
- Asian American and Pacific Islanders Committee (2021-present)

Departmental committees served at Missouri State University:
- Space and Equipment Committee (2018-19)
- Marketing and Recruitment Committee (2019-2021)
- Masters thesis committee of Trey Shupp (2019-2021). Project title: *Neuronal Migration in Developmental Hyperserotonemia: Assessment of Vesicular Glutamate in the Raphe Nuclei*

Masters thesis committee of Cebisa Mdekazi (University of the Witwatersrand, Johannesburg, South Africa). Project title: *Anatomy of the ankle in Early Jurassic South African Crocodylomorphs and insights into ankle ontogeny of Crocodylus niloticus.*

Conference session host: Diversity session Racial and Ethnic Minorities, Society of Vertebrate Paleontology, 2020

Conference session contributor: Paleontologist of Color, Society of Vertebrate Paleontology, 2016

Conference session moderator: International Congress of Vertebrate Morphology, 2016; 2019.

Reviewer: Journal of Morphology, Journal of Anatomy, International Journal of Molecular Sciences, PLOS ONE, PeerJ, Indiana University Press, Anatomical Record, Palaeontologia Electronica.

Published Abstracts

2021: **Tsai, H. P.,** C. Herrell. Development of appendicular joint cartilages in *Alligator mississippiensis*: Evolutionary and Biomechanical Implications for Archosauria. 81st Annual Meeting of the Society of Vertebrate Paleontology.

2020: **Tsai, H. P.**, C. Griffin. The cartilaginous hips of sauropods: Functional implications for highly specialized locomotor behaviors. 80th Annual Meeting of the Society of Vertebrate Paleontology.

Tsai, H. P., C. Griffin. The cartilaginous hips of Diplodocoidea: functional implications for highly specialized locomotor behaviors among sauropods. Annual Meeting of the Society of Integrative and Comparative Biology.

2019: **Tsai, H. P.**, M. L. Turner, A. R. Manafzadeh, and S. M. Gatesy. Significance of hip kinematics for interpreting articular soft tissue function in *Alligator mississippiensis*: evolutionary and biomechanical implications for Archosauria. 12th International Congress of Vertebrate Morphology.

2018: **Tsai, H. P.**, M. L. Turner, A. R. Manafzadeh, and S. M. Gatesy. Significance of hip kinematics for interpreting articular soft tissue function in *Alligator mississippiensis*. Annual Meeting of the Society of Integrative and Comparative Biology.

Tsai, H. P., M. L. Turner, A. R. Manafzadeh, and S. M. Gatesy. Significance of hip kinematics for interpreting articular soft tissue function in *Alligator mississippiensis*: Implications for Fossil Archosauria. Midwest Regional Meeting of the Divisions of Vertebrate Morphology and Comparative Biomechanics of the Society of Integrative and Comparative Biology.

Tsai, H. P., M. L. Turner, A. R. Manafzadeh, and S. M. Gatesy. Contrast-enhanced XROMM reveals in vivo soft tissue interaction in the hip of *Alligator mississippiensis*: implications for Pseudosuchia. 78th Annual Meeting of the Society of Vertebrate Paleontology.

2017: **Tsai, H. P.**, K. M. Middleton, and C. M. Holliday. The cartilage cone of archosauromorphs: implications for hip loading and femoral ossification. Annual Meeting of the Society of Integrative and Comparative Biology.

2016**: Tsai, H. P.**, K. M. Middleton, and C. M. Holliday. The cartilage cone of archosauromorphs: implications of chondro-osseous junction on hip joint loading and femoral ossification. 76th Annual Meeting of the Society of Vertebrate Paleontology.

Tsai, H. P., M. L. Turner, A. R. Manafzadeh, and S. M. Gatesy. Hip joint kinematics of *Alligator mississippiensis*: Significance of articular soft tissues for interpreting hind limb function. 2016 Northeast Regional Meeting of the Divisions of Vertebrate Morphology and Comparative Biomechanics of the Society of Integrative and Comparative Biology.

Tsai, H. P., K. M. Middleton, and C. M. Holliday. The cartilage cone of archosauromorphs: biomechanical implications for hip joint loading and femoral ossification. 11th International Congress of Vertebrate Morphology.

Tsai, H. P., K. M. Middleton, and C. M. Holliday. The hip joint functional module and its significance in the evolution of avian locomotor posture. Annual Meeting of the Society of Integrative and Comparative Biology.

2015: **Tsai, H. P.** Archosaur hip joint anatomy and its significance in body size and locomotor evolution. 2015 Northeast Regional Meeting of the Divisions of Vertebrate Morphology and Comparative Biomechanics of the Society of Integrative and Comparative Biology.

Tsai, H. P. The hip joint functional module and its significance in the evolution of avian locomotor posture. 75th Annual Meeting of the Society of Vertebrate Paleontology. Alfred S. Romer Session.

Tsai, H. P., K. M. Middleton, and C. M. Holliday. More than one way to be a giant: Convergence and disparity in saurischian dinosaur hip joints during body size evolution. Annual Meeting of the Society of Integrative and Comparative Biology.

2014: **Tsai, H. P.**, K. M. Middleton, and C. M. Holliday. Archosaur hip joint and its significance in body size and locomotor evolution. Annual Meeting of the Society of Integrative and Comparative Biology.

Tsai, H. P., K. M. Middleton, and C. M. Holliday. More than one way to be a giant: Convergence and disparity in saurischian dinosaur hip joints during body size evolution. 74th Annual Meeting of the Society of Vertebrate Paleontology.

2013: **Tsai, H. P.** and C. M. Holliday. Anatomy of archosaur pelvic soft tissues and its significance for interpreting hindlimb function. Annual Meeting of the Society of Integrative and Comparative Biology.

Tsai, H. P. and C. M. Holliday. Anatomical reconstruction of archosaur hip joint soft tissues and its significance for interpreting hindlimb function. 10th International Congress of Vertebrate Morphology.

Tsai, H. P., K. M. Middleton, and C. M. Holliday. Anatomical reconstruction of archosaur hip joint soft tissues and its significance for interpreting hindlimb function. 73rd Annual Meeting of the Society of Vertebrate Paleontology.

2012: **Tsai, H. P.,** C. V. Ward, and C. M. Holliday. Pelvic anatomy of *Alligator mississippiensis* and its significance for interpreting limb function in fossil archosaurs. Annual Meeting of the Society of Integrative and Comparative Biology.

Tsai, H. P. and C. M. Holliday. Anatomy of archosaur pelvic soft tissues and its significance for interpreting hindlimb function. 72nd Annual Meeting of Society of Vertebrate Paleontology.

2011: **Tsai, H. P.,** C. V. Ward, and C. M. Holliday. Pelvic anatomy of *Alligator mississippiensis* and its significance for interpreting limb function in fossil archosaurs. 71st Annual Meeting of Society of Vertebrate Paleontology.

2010: **Tsai, H. P.,** T. Owerkowicz, L. Sanchez, K. Felbinger, F. Andrade, J. M. Blank, J. Eme, J. Gwalthney, and J. W. Hicks. Chronic exercise does not alter limb bone morphology or microstructure in the American alligator. Annual Meeting of the Society of Integrative and Comparative Biology.

Tsai, H. P., T. Owerkowicz, L. Sanchez, K. Felbinger, F. Andrade, J. M. Blank, J. Eme, J. Gwalthney, and J. W. Hicks. Chronic exercise does not alter limb bone morphology or microstructure in the American alligator. 70th Annual Meeting of Society of Vertebrate Paleontology.

Invited Presentations

2021: **Tsai, H. P.** Development of appendicular joint cartilages in *Alligator mississippiensis*: Evolutionary and Biomechanical Implications for Archosauria. Annual meeting of Experimental Biology/American Association of Anatomists.

2018: **Tsai, H. P.** Dinosaur joints: Soft tissues are the hard issues. California State University San Bernardino. Visiting Research Seminar Series,

Tsai, H. P. Dinosaur joints: Soft tissues are the hard issues. National Taiwan University. Research Seminar in the Department of Life Sciences.

2015: **Tsai, H. P.**, K. M. Middleton, and C. M. Holliday. Solutions for gigantism: evolutionary and biomechanical implications of dinosaur hip joint soft tissues. Annual meeting of Experimental Biology/American Association of Anatomists.

2014: **Tsai, H. P.** Hips don't lie: The Evolution of Gigantism in Dinosaurs. University of Missouri Pathology and Anatomical Sciences Departmental Grand Rounds.

Other Presentations

2017: **Tsai, H. P.**, M. L. Turner, A. R. Manafzadeh, and S. M. Gatesy. Significance of hip kinematics for interpreting articular soft tissue function in *Alligator mississippiensis*: evolutionary and biomechanical implications for Saurischia. Last Days of Pangea, a Triassic-Jurassic Research Symposium at the Bruce Museum (Greenwich, Connecticut).

Tsai, H. P., M. L. Turner, A. R. Manafzadeh, and S. M. Gatesy. Gator's Gonna Gait: Significance of hip kinematics for interpreting articular soft tissue function in *Alligator mississippiensis*. Brown Bag seminar for the Department of Ecology and Evolutionary Biology, Brown University.

2016: **Tsai, H. P.** Dinosaur joints: Soft tissues are the hard issues. Brown Bag seminar for the Department of Ecology and Evolutionary Biology, Brown University.

2015: **Tsai, H. P.,** K. M. Middleton, J. R. Hutchinson, and C. M. Holliday. The hip joint functional module and its significance in the evolution of avian locomotor posture. MU Life Sciences Week.

2014: **Tsai, H. P.** How to walk your Dinosaur? Archosaur hip joint anatomy and its significance in body size and locomotor evolution. MU 4th Year Life Sciences Fellow Seminar.

Tsai, H. P., K. M. Middleton, and C. M. Holliday. More than one way to be a giant: convergence and disparity in dinosaur hip joints during body size evolution. MU Life Sciences Week.

2013: **Tsai, H. P.** and C. M. Holliday. Anatomy of archosaur hip joint soft tissues and its significance for interpreting hindlimb function. MU Life Sciences Week.

Tsai, H. P. and C. M. Holliday. Anatomy of archosaur pelvic soft tissues and its significance for interpreting hindlimb function. Paleofest at Burpee Museum of Natural History.

2012: **Tsai, H. P.,** C. V. Ward, and C. M. Holliday. Pelvic anatomy of *Alligator mississippiensis* and its significance for interpreting limb function in fossil archosaurs. MU Life Sciences Week.

Tsai, H. P., C. V. Ward, and C. M. Holliday. Pelvic anatomy of *Alligator mississippiensis* and its significance for interpreting limb function in fossil archosaurs. MU Health Sciences Day.

2011: **Tsai, H. P.** and C. M. Holliday. Anatomy, histology, and ontogeny of the sesamoid cartilage in the jaw muscles of *Alligator mississippiensi*s and its significance for sauropsid jaw muscle evolution. MU Health Sciences Day.

Tsai, H. P. and C. M. Holliday. Anatomy, histology, and ontogeny of the sesamoid cartilage in the jaw muscles of *Alligator mississippiensis* and its significance for sauropsid jaw muscle evolution. MU Life Sciences Week.

2010: **Tsai, H. P.** and C. M. Holliday. Anatomy, histology, and ontogeny of the sesamoid cartilage in the jaw muscles of *Alligator mississippiensis* and its significance for sauropsid jaw muscle evolution. ARKUMOKY.

Public Outreach

2021: Major's Fair, Southern Connecticut State University

2020: Job shadowing for Jey Murray, a 7th grade student at New Covenant Academy (Springfield, MO).

2019: Expand Your Horizon: Weird Science, A comparative anatomy demonstration for middle school students

Major's Fair, Missouri State University

Extreme Earth Expo: an all-age public outreach table event at the St. Louis Science Center

Career Day at Pleasant View Elementary School: Paleontologist

2018: Summer Visit Day for prospective undergraduates at Missouri State University

Godzilla! Science behind the Rampage: Guest speaker for Science on the Silver Screen series event. The Bruce Museum, Greenwich, CT.

2017: Dinosaur State Park Day: a grade K-12 level public outreach presentation on dinosaur paleontology. Dinosaur State Park, Rocky Hill, CT.

2015: Extinctions and Survivors: macroevolution and the great transitions of life: a guest lecture in AP Environmental Science, Los Alamitos High School. Los Alamitos, CA.

2013 – 2015: Dinosaurs and Cavemen: a public outreach presentation on vertebrate paleontology. Rockbridge High School. Columbia, MO.

2011 – 2014: Summers@Mizzou Scrub-In to Healthcare program, University of Missouri.

2010 – 2014: MU Adventures in Education: a grade K-12 level presentation on vertebrate functional anatomy and paleontology.

2014: School of Medicine Young Medics Camp, a K-10 level presentation on human anatomy. University of Missouri.

2013: Collaboration with Jon Zahourek (Anatomy in Clay® Learning System) to produce detailed anatomical models of *Alligator mississippiensis*.

2011: 6th grade biology student letter correspondent "How to be a Paleontologist". Columbia, MO.

2010: 9th grade biology student letter correspondent at San Clemente High School. San Clemente, CA.

Inside Alligator: Vertebrate Anatomy, Function and Paleontology. University of Missouri, MO.

Scientific Illustrations and Art

2020: Computer-aided design (CAD) and physical skeletal reconstruction of "Henry" the *Triceratops* (MINS V-1034) exhibit for the Missouri Institute of Natural Sciences.

2017: Full-size anatomical reconstruction of *Dilophosaurus wetherilli* head and neck with integrated animatronics.

2015: Full-size anatomical reconstruction of *Carnotaurus sastrei* head and neck.

2014: Anatomical diagrams of sauropsid hip joints, featured in primary literature (Tsai and Holliday, 2015).

2013: *Triceratops* herd, featured on the personal website of John Scannella. (www.johnscannella.com).

2012: *Aegisuchus witmeri*, featured in primary literature (Holliday and Gardner, 2012) as well as public media (National Geographic, Time Magazine).

Professional Associations

2021 – Present: Research Associate at Yale Peabody Museum (New Haven, MO)

2019 – Present: Society for the Study of Evolution

2018 – Present: Research Associate at the Missouri Institute of Natural Sciences (Springfield, MO)

2016 – Present: Grey Parrot Anatomy Project

2015 – Present: The Austin Working Group: Advancing Contrast-Enhanced CT Imaging in the Biological Sciences.

2012 – Present: The International Society of Vertebrate Morphology.

2010 – Present: American Association of Anatomists.

Integrative Anatomy Student Association.

The Paleontological Society.

2009 – Present: Society of Integrative and Comparative Biology.

Society of Vertebrate Paleontology.

2009 – 2015: University of Missouri Life Sciences Fellow.

2007 – 2009: Orange County Society of Conservation Biology.