CHRISTOPHER MICHAEL SMITH

Curriculum Vitae
Postdoctoral Research Fellow, Division of Anthropology, American Museum of Natural History
200 Central Park W, New York, NY 10024 | csmith2@amnh.org | 443-876-5495 | www.csmithevoanatomy.com

EDUCATION

2023	PhD	Biological Anthropology The Graduate Center, City University of New York (CUNY), New York, NY Dissertation: *Reimagining the Inner Ear: A morphometric modeling approach for establishing shape change in the evolution of the human otolith system* Advisors: Jeffrey T. Laitman, Eric Delson
2020	MPhil	Biological Anthropology The Graduate Center, City University of New York, New York, NY
2014	MA	Medical and Biological Illustration Johns Hopkins University School of Medicine, Baltimore, MD
2012	-	Schuler School of Fine Arts Atelier, Baltimore, MD
2011	BS, cum laude	Exercise Science, Salisbury University, Salisbury, MD

APPOINTMENTS

2023- Postdoctoral Research Fellow, Division of Anthropology, American Museum of Natural History, Manhattan, NY
2021-22 Writing Fellow, Hunter College, CUNY, Manhattan, NY
2018-21 Graduate Teaching Fellow, Lehman College, CUNY, Bronx, NY
2015-17 Academic Medical Illustrator, Icahn School of Medicine at Mount Sinai, New York, NY
2014-15 Research Assistant, Howard University College of Medicine, Washington D.C.

GRANTS

As Principal Investigator

2021-25 National Science Foundation (NSF) Doctoral Dissertation Research Improvement Grant (award #2051335). *The evolution of human balance: A morphometric model for establishing shape changes in the otolith organs of the vestibular system*. **$30,264**
2020-21 Provost's Pre-Dissertation Summer Research Grant. **$4,000**
2020-21 City University of New York Doctoral Student Research Grant. **$1,100**
2014 Vesalius Trust Research Scholar Grant. **$500**

As Senior/Key Personnel

In review [Recommended for funding] National Institute on Deafness and Other Communication Disorders (NIH) R01 Grant. *The biomechanics of benign paroxysmal positional vertigo.* (PI: Richard Rabbitt)
2015-18 American Association for Anatomy Innovation Grant. *Anatomical Network Analysis*. (PI: Rui Diogo)

PUBLICATIONS - Google scholar metrics: 452 citations; h-index=11; i10-index=11

Peer Reviewed Journal Articles

22. [*In review*] Cazenave M, Pietrobelli A, Luková A, Bachmann S, Dunmore C, Hammond A, Heile AJ, **Smith CM**, Stratford D, Syneck A, Pickering T, Skinner MM. South African hominins *Paranthropus* and *Australopithecus* had different locomotor repertoires.

21. [*In revision for the Journal of Human Evolution*] **Smith CM**, Hammond AS, Urciuoli A, Braga J, Beaudet A, Cazenave M, Laitman JT, Almécija S. Divergent otolithic systems in the inner ear of *Paranthropus robustus* and *Australopithecus africanus*.

20. **Smith CM**, David R, Almécija, S, Laitman J, Hammond AS. 2024. First Evolutionary Insights into the Human Otolithic System. *Communications Biology*. 7, 1244.

19. **Smith CM**, Curthoys IS, Laitman JT. 2024. A morphometric comparison of the ductus reuniens in humans and guinea pigs, with a note on its evolutionary importance. *The Anatomical Record*. 1–7. *Volume and issue forthcoming.

18. Racicot R, **Smith CM**. 2024. Cetology: The bare 'jaw' bones of whale evolution. *Current Biology*. 34(2): R67-R69.

17. Curthoys IS, **Smith CM**, Burgess A, Dlugaiczyk J. 2023. Neural data shows how a semicircular canal dehiscence causes enhanced oVEMPs, skull vibration induced nystagmus (SVIN) and the Tullio phenomenon. *Audiology Research*. 13(3): 418–430.

16. **Smith CM**, Curthoys IS, Laitman J. 2023. First evidence of the link between internal and external structure of the human inner ear otolith system using 3D morphometric modeling. *Scientific Reports*. 13, 4840.

15. **Smith CM**, Curthoys IS, Plontke SK, Menzel M, Mukherjee P, Wong C, Laitman J. 2022b. Insights into inner ear function and disease through novel visualization of the ductus reuniens, a seminal communication between hearing and balance mechanisms. *Journal of the Association for Research in Otolaryngology*. 23(5):633-645.

14. Pagano AS, **Smith CM**, Balzeau A, Márquez S, Laitman JT. 2022. Nasopharyngeal morphology contributes to understanding the "muddle in the middle" of the Pleistocene hominin fossil record. *The Anatomical Record*. 305(8): 2038-2064.

13. **Smith CM**, Curthoys IS, Mukherjee P, Wong C, Laitman J. 2022a. Three-dimensional visualization of the human membranous labyrinth – The Membrana Limitans and its role in vestibular form. *The Anatomical Record*. 305(5):1037-1050.

12. Hornibrook J, Mudry A, Curthoys I, **Smith CM**. 2021. Ductus Reuniens and Its Possible Role in Menière's Disease. *Otology and Neurotology*. 42(10): 1585–1593.

11. Pagano AS, Márquez S, **Smith CM**, Laitman JT. 2021. Identification of critical windows in early development of human upper respiratory tract and middle ear disease. *The Anatomical Record*. 304(9):1953– 1973.

10. **Smith CM**, Laitman JT. 2021. Alterations to vestibular morphology in highly bred domestic dogs may affect balance. *The Anatomical Record*. 304(1):116–126.

9. Diogo R, Ziermann JM, **Smith CM**, Algahmdi MA, Fuentes JSM, Duerinckx AJ. 2019. First use of anatomical networks to study modularity and integration of heads, forelimbs and hindlimbs in abnormal anencephalic and cyclopic vs normal human development. *Scientific Reports*. 9:7821.

8. Lopez CD, Kumar A, Lin AY, Bonfield CM, Weinzweig J, Naidich T, **Smith CM**, Taub PJ. 2018. Demystifying the 'Triple Point': Technical Nuances of the Fronto-Orbital Advancement. *The Journal of Craniofacial Surgery*. 29(3):796–99.

7. Ferrara JLM, **Smith CM**, Sheets J, Reddy P, Serody JS. 2017. Altered homeostatic regulation of innate and adaptive immunity in lower gastrointestinal tract GVHD pathogenesis. *Journal of Clinical Investigation*. 127(7):2441-2451.

6. Loganathan R, Rongish BJ, **Smith CM**, Czirok A, Benazeraf B, Little CD. 2016. Emergent tissue-scale motion patterns and extracellular matrix dynamics characterize amniote morphogenesis. *Development*. 143(12):2056-2065.

5. Ni J, Bao S, Johnson RI, Zhu B, Li J, Vadaparampil J, **Smith CM**, Campbell KN, Grahammer F, Huber TB, He JC, D'Agati VD, Chan A, Kaufman L. 2016. MAGI-1 Interacts with Nephrin to Maintain Slit Diaphragm Structure Through Enhanced Rap1 Activation in Podocytes. *Journal of Biological Chemistry*. 291(47):24406-24417.

4. Diogo R*, Esteve-Altava B*, **Smith CM***, Boughner JC, Rasskin-Gutman D. 2015. Anatomical Network Comparison of Human Upper and Lower, Newborn and Adult, and Normal and Abnormal Limbs, with Notes on Development, Pathology and Limb Serial Homology vs. Homoplasy. *PLOS One*. 10(10): e0140030. *denotes equal contribution

3. Diogo R, **Smith CM**, Ziermann JM. 2015. Evolutionary Developmental Pathology and Anthropology: a new field linking development, comparative anatomy, human evolution, morphological variations and defects, and medicine. *Developmental Dynamics*. 244(11):1357-1374.

2. Esteve-Altava, B, Diogo R, **Smith CM**, Boughner JC, Rasskin-Gutman D. 2015. What's in your head: anatomical networks link human musculoskeletal modularity, facial expression, and disease. *Scientific Reports*. 5:8298.

1. Diogo R, Walsh S, **Smith CM**, Ziermann JM, Abdala V. 2015. Resolution of a long-standing question: limb muscle identity and attachments are mainly related to topological position and not to anlage or homeotic identity of digits. *Journal of Anatomy*. 226(6):523-529.

Books and Book Chapters

Laitman JT, **Smith CM**. 2021. Leonardo da Vinci's representation of the head and skull: A blending of scientific precision and the search for hidden truths. In H de Lumley & PM Lledo (Eds.), Léonard de Vinci, pionnier de l'anatomie (pp. 159–178). CNRS Éditions. Paris, France.

Diogo R, Noden D, **Smith CM**, Molnar JL, Shaw M, Boughner J, Aziz MA. 2016. Learning and understanding human anatomy and pathology: an evolutionary and developmental guide for medical students. Taylor & Francis. Oxford, UK.

Smith CM, Molnar JL, Ziermann JM, Gondre-Lewis MC, Sandone C, Bersu ET, Aziz AM, Diogo R. 2015. Muscular and skeletal anomalies in human trisomy in an evo-devo context. Taylor and Francis. Oxford, UK. *Book derived from master's thesis.

INVITED TALKS

2024 Illuminating the world of the inner ear: Advances in visualizing the labyrinth inside our head. American Association for Anatomy Webinar
2024 The Medical Illustrator's Toolkit Drives New Approaches in Anatomical Research. Johns Hopkins University School of Medicine, Department of Art as Applied to Medicine
2024 Insights into the Evolution of the Human Inner Ear Labyrinth. New York Institute of Technology, Department of Anatomy
2024 Reconstructing the hominin membranous labyrinth. The Natural History Museum, Department of Earth Sciences, Vertebrates and Anthropology Palaeobiology. London, UK
2024 Reimagining the inner ear: Evidence for tripartite evolution of the human labyrinth. Johns Hopkins University School of Medicine, Department of Neurology
2021 Otolith Organ Anatomy and Physiology. Vestibular Implant and Related Technologies Meeting. Virtual format
2020 Medical Illustration: Combining art and science to reconstruct the evolution of human anatomy. Parsons School of Design
2018 The Field of Biomedical Visualization. Yale University, Department of Medical Education
2017 Art, Anatomy and VR. Mount Sinai Hospital, Department of Neurosurgery
2017 Art, Anatomy and VR. Mount Sinai Hospital, Department of Otolaryngology
2017 Anatomical Art and Virtual reality. Sotheby's
2016 The Field of Medical and Biological Illustration. George Mason University, Department of Biology
2015 Musculoskeletal Variation in Human Trisomy and Modularity. Mount Sinai Hospital, Department of Instructional Technology
2015 Human Musculoskeletal Variation and Modularity. Howard University, Department of Biology
2015 Biomedical Illustration. The Schuler School of Fine Art
2015 Muscular and Skeletal Variation in Humans and Implications for Understanding Modularity. George Washington University, Center for the Advanced Study of Human Paleobiology
2014 Becoming a Medical Illustrator. The Park School
2014 The Profession and History of Medical Illustration. The Schuler School of Fine Art

CONFERENCE PRESENTATIONS

25. [Accepted] Frerck, M, Frahm T, Helminski J, **Smith CM**, Rabbitt R. Evaluation of a Universal Canalith Repositioning Maneuver to treat 3-Canal Unilateral BPPV: Physical and Computational Models. Association for Research in Otolaryngology Midwinter Meeting. Poster presentation.

24. [Accepted] Helminski J, **Smith CM**, Rabbitt R. Universal Canalith Repositioning Maneuver for BPPV Clears All Three Ipsilateral Canals: Development and Implementation. American Physical Therapy Association. Annual Combined Sections Meeting. Podium presentation.

23. **Smith CM**, Johnson C, Benson R. 2024. Functional and spatial constraints in the mammalian vestibular system. American Association for Anatomy Annual Meeting. Podium presentation.

22. **Smith CM**. 2024. The Medical Illustrator's Toolkit Drives New Approaches to Anatomical Research. American Association for Anatomy Annual Meeting. Podium presentation.

21. **Smith CM**, Urciuoli A, Braga J, Cazanave M, Beaudet A, Almécija S, Laitman J, Hammond A. 2024. First insights into the inner ear otolith system of *Australopithecus* and *Paranthropus*. American Association of Biological Anthropologists Annual Meeting. Podium presentation.

20. **Smith CM**, Curthoys IS, Laitman J. 2023. Understanding a missing link in the evolution of mammalian hearing and balance systems through morphometric analysis of the Ductus Reuniens. International Congress of Vertebrate Morphology. Podium presentation.

19. **Smith CM**, Hammond A, Almecíja S, Curthoys I, Laitman J. 2023. Inner ear otolith organ morphology predicts head and neck orientation: Uncovering the link between balance and posture in primates. American Association of Biological Anthropologists Annual Meeting. Podium presentation.

18. **Smith CM**, Hammond A, Laitman J. 2023. Novel inner ear visualizations offer new insights into the function of the primate otolith system and relationships with phylogeny. American Association for Anatomy Annual Meeting. Poster presentation.

17. Pagano A, **Smith CM**, Abdelhameed A, Marquez S, Laitman J. 2023. The Levator Process: Identification of a novel Neanderthal autapomorphy. American Association of Anatomists Annual Meeting. Poster presentation.

16. **Smith CM**, Curthoys IS, Mukherjee P, Wong C, Laitman J. 2022. Unraveling the labyrinth of our balance system: Visualizing bony otolith organ structure through novel 3D modeling. American Association of Anatomists Annual Meeting. Poster presentation.

15. **Smith CM**, Hammond, A, Almécija, S, Laitman J. 2022. Comparative Morphology of the Hominid Inner Ear Otolith System. American Association of Biological Anthropologists Annual Meeting. Podium presentation.

14. **Smith CM**, Curthoys IS, Plontke SK, Menzel M, Mukherjee P, Wong C, Laitman J. 2022. Three-Dimensional Visualization of the Membranous Labyrinth: The Ductus Reuniens. Association for Research in Otolaryngology, Mid-Winter Meeting. Poster presentation.

13. **Smith CM**, Laitman J. 2021. The Importance of the Otolith System in Human Cognition. South African Neuroscience Society: Fossils to Mind Workshop. Podium presentation.

12. **Smith CM**, Curthoys IS, Mukherjee P, Wong C, Laitman J. 2021. Membrana Limitans shape variation and its role in vestibular form. American Association of Anatomists Annual Meeting. Poster presentation.

11. **Smith CM**. 2020. Medical Illustration & Paleoanthropology: Visualizing the evolution of the human vestibular system. 2020. Association of Medical Illustrators Annual Meeting. Virtual podium presentation.

10. **Smith CM**, Laitman JT. 2019a. The Unbalanced World of Highly Bred Domestic Dogs: An Examination of the Canid Inner Ears. International Congress of Vertebrate Morphology. Poster presentation.

9. **Smith CM**, Laitman JT. 2019b. Evidence for Morphological Constraint on Bony Ear Canal Length in Modern Humans. American Association of Anatomists Annual Meeting. Poster presentation.

8. **Smith CM**, Biernat MD, Hammond AH. 2018. The Localized Environment of Early Homo erectus at East Turkana, Northern Kenya. Koobi Fora Research and Training Program, Annual Workshop. American Museum of Natural History. Podium presentation.

7. **Smith CM**, Gregory J, Rudnicki, Danforth A, Zhong D, Iloreta A, Soriano R, Justin G. 2017. Virtual Reality in Medical Education: The Road We are On. American Association of Medical Colleges Annual Meeting. Poster presentation.

6. **Smith CM**, Tang CY, Ng J, Reidenberg J. 2017. Visualizing the Anatomy and Position of the Larynx in Balaenopterid Whales. American Association of Anatomists Annual Meeting. Podium presentation.

5. **Smith CM**, Diogo R. 2016. Non-pentadactyly, soft and hard tissue associations, evo-devo, and implications for medicine. 11th International Congress of Vertebrate Morphology. Podium presentation.

4. **Smith CM**, Reidenberg J. 2016. Reconstructing Baleen Whale Anatomy. The Art and Science of Whales Mini-Conference. Icahn School of Medicine at Mount Sinai. Podium Presentation.

3. Nabavizadeh A, **CM Smith**. 2015. A New Large-Scale Project in Comparative Anatomy Research and Illustration. Association of Medical Illustrators Annual Meeting. Podium Presentation.

2. **Smith CM**, Ziermann JM, Diogo R. 2015. Muscular and skeletal anomalies in human trisomy in an evo-devo context using 3-D imaging and anatomical dissections. Howard University Research Day 2015. Poster presentation.

1. Diogo R, **Smith CM**, Ziermann JM. 2015. Development and evolution of muscles of humans and other vertebrates: broader evolutionary and medical implications. EMBO Workshop on Integrative perspectives on musculoskeletal development. Ein Gedi, Israel. Poster presentation.

AWARDS/FELLOWSHIPS

2024 Postdoctoral Scientific Platform Award Finalist, American Association for Anatomy
2024 Postdoctoral Travel Award, American Association for Anatomy
2023 Postdoctoral Research Fellowship, Division of Anthropology, American Museum of Natural History
2023 Student Travel Award, American Association for Anatomy
2022 Student Travel Award, American Association for Anatomy
2021 Top Downloaded Article Award, The Anatomical Record
2019 Student Travel Award, American Association for Anatomy
2017 Graduate Center Fellowship, City University of New York
2016 Runner Up, Anatomical Society Best Paper Prize 2015
2014 Inez Demonet Scholarship, Vesalius Trust, for the highest academic and personal achievement in the field of visual communication in the health sciences
2012-13 William P. Didusch Scholarship, Johns Hopkins University School of Medicine
2012-13 W.B. Saunders Scholarship, Johns Hopkins University School of Medicine
2011 Chi Alpha Sigma College Athlete Honor Society, Salisbury University
2008-11 Dean's List, Salisbury University

FIELDWORK

2018 Koobi Fora Summer Field School, Lake Turkana, Kenya. June-July

CERTIFICATIONS

2016 Certified Medical Illustrator (CMI), Association of Medical Illustrators

TEACHING

Teaching positions

Term	Course	School	Role	Enrollment	Evaluation
Fall 2021	Human Gross Anatomy	Icahn School of Medicine at Mount Sinai	Senior Teaching Assistant	120	N/A
Spring 2021	Human Evolutionary Biology (ANT 171)	Lehman College, CUNY	Instructor of Record	30	Excellent (5/5 highest possible score)
Fall 2020	Human Gross Anatomy	Icahn School of Medicine at Mount Sinai	Senior Teaching Assistant	140	N/A
Fall 2020	Human Evolutionary Biology (ANT 171)	Lehman College, CUNY	Instructor of Record	30	Excellent (5/5 highest possible score)
Spring 2020	Human Evolutionary Biology (ANT 171)	Lehman College, CUNY	Instructor of Record	28	Excellent (5/5 highest possible score)
Fall 2019	Human Evolutionary Biology (ANT 171)	Lehman College, CUNY	Instructor of Record	27	Excellent (5/5 highest possible score)
Fall 2019	Human Gross Anatomy	Icahn School of Medicine at Mount Sinai	Teaching Assistant	120	N/A
Spring 2019	Introduction to Biological Anthropology (ANT 120)	Lehman College, CUNY	Instructor of Record	30	Excellent (5/5 highest possible score)
Fall 2018	Human Gross Anatomy	Icahn School of Medicine at Mount Sinai	Teaching Assistant	120	N/A
Fall 2018	Introduction to Biological Anthropology (ANT 120)	Lehman College, CUNY	Instructor of Record	30	Excellent (5/5 highest possible

					score)

Guest lectures

2024 Comparative Neuroanatomy (BSC518), University of Alabama
2024 Professional Development and Portfolio (ME.120.954), Department of Art as Applied to Medicine, Johns Hopkins University School of Medicine
2023 Comparative Neuroanatomy (BSC518), University of Alabama

SERVICE

Society memberships

2021- Association for Research in Otolaryngology (ARO)
2017- American Association for Biological Anthropology (AABA)
2015- American Association for Anatomy (AAA)
2012- Association of Medical Illustrators (AMI)

Society activities

2024 Program committee member, American Association for Anatomy
2024 Guest Editor, The Anatomical Record
2017 Social media committee member, American Association for Anatomy
2017-19 Scholarship committee Co-Chair, Association of Medical Illustrators
2016 Social media committee member, Association of Medical Illustrators
2014-15 Student member, Vesalius Trust Board of Directors (*Student member)

Institutional and Community activities

2023-24 Guest Scientist, Science and Nature Program, Department of Education, American Museum of Natural History
2022 Public tour of the fossil human origins reconstruction lab, Division of Anthropology, American Museum of Natural History
2021 Exhibited work in "The Eyes Have It" Art show, Lehman College Art Gallery, Lehman College
2020-22 Co-organizer, Racism and Bias in Academia Reading Group, New York Consortium in Evolutionary Primatology
2019-23 Co-organizer, Paleoanthropology Journal Club, New York Consortium in Evolutionary Primatology
2019 Presented research from the 3D printing laboratory at Lehman College to the New York City Council during a campus tour
2018-19 Graduate student organizer, New York Consortium in Evolutionary Primatology seminar series
2018 Guest Scientist, Sackler Educational Lab, American Museum of Natural History
2017-18 Co-organizer and presenter, Brain Awareness Week, Department of Neuroscience, Icahn School of Medicine at Mount Sinai
2016-18 Founding Organizer, SciViz.NYC – Visualizing Science conference
2016-18 Co-organizer and participant, "The Art of the Brain Exhibition" Department of Neuroscience, Icahn School of Medicine at Mount Sinai
2015 Exhibited work in the "Art and Anatomy" art show, Department of Anatomy, Howard University
2012-13 Graduate student volunteer, Association of Medical Illustrators Annual Meeting

Peer reviewer service
The Laryngoscope, The Anatomical Record, Journal of Human Evolution, PLOS One, The Innovation, PeerJ, Journal of the Association for Research in Otolaryngology

Press/Media coverage
In-press "The Role of an Artistic Mindset in Scientific Advancement: A conversation with Christopher Smith" Communications Biology Q&A, *Communications Biology*
In-press "Integrating Art and Science" *Body Banter Podcast*.
2024 "Beyond Hearing: Exploring the Evolutionary Secrets of the Human Inner Ear" *Springer Nature Research Communities.*
2017 "The Role of Art in Medicine and Health: A Glimpse at Medical Illustration with Jill Gregory and Chris Smith" *The Scoop* (publication for the Icahn School of Medicine at Mount Sinai).
2015 "Human Musculoskeletal Modularity" Interview with American Association of Anatomists.
2015 "Elsevier Announces Winners of Gray's Anatomy Art Contest" *PRNewsWire*.

SCIENTIFIC ILLUSTRATION/VISUALIZATION

Year	Project	Role	Audience	Format
2022	Created illustrations (including fossil reconstructions) and Cover art for book *HUMANS*	Illustrator (PI: Sergio Almecíja, PhD)	Public outreach	Print book
2022	Lemur ontogeny	Illustrator (PI: Andrea Baden, PhD)	Primatology research/Public outreach	Journal article (web/print)
2021	Vestibular Schwannoma removal	Illustrator (PI: Gregory Zipfel, MD; Craig Buchman, MD)	Patient education	Web display
2021	Baboon hybridization in Kenya	Illustrator (PI: Jenny Tung, PhD)	Primatology research/Public outreach	Journal article (web/print)
2020	Comparative ACE2 variation and primate COVID-19 risk	Illustrator (PI: James Higham, PhD)	Primatology research/Public outreach	Journal article (web/print)
2017	Interactive cranial nerve pathways	Project Lead/ Instructional Designer	Medical student education	Digital display
2017	Interactive head sinus morphology	Project Lead/3D artist	Medical student education	Digital display
2016	Head and Neck Cancer: Management and Reconstruction, 2nd Edition textbook	Illustrator/Instructional Designer (PI: Eric Genden, MD)	Surgical education	Textbook (print and digital)
2017	Voice Disorders: What Patients and Professionals Need to	Illustrator/Instructional Designer (PI: Mark Courey, MD)	Medical Professional and Patient education	Massive Open Online Course

	Know			
2016	Principles and Practice of Pediatric Plastic Surgery Textbook	Illustrator (PI: Brenda Bunch, MA)	Surgical education	Textbook (print and digital)
2015	Cleft Palate Surgical Textbook	Illustrator (PI: Brenda Bunch, MA)	Surgical education	Textbook (print and digital)
2013	Molting cycle of the puffin	Project Lead/Illustrator	Public outreach	Print for public display
2013	Diffuse Intrinsic Pontine Gliomas (DIPG)	Illustrator (PI: Monica Pearl, MD)	Patient education	Animation for digital display