

NEIL THOMAS ROACH

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EDUCATION

2012	PhD	Harvard University, Biological Anthropology
2007	AM	Harvard University, Biological Anthropology
2004	BA	University of Connecticut, Anthropology (<i>cum laude</i>)

RESEARCH INTERESTS

Biomechanics and functional anatomy of the human body
Homo paleoecology and land use patterns
Evolution of technology
Behavioral origins of the genus *Homo*

APPOINTMENTS

Present	Lecturer, Harvard University
Present	Research Affiliate, American Museum of Natural History
2015-17	College Fellow, Harvard University
2014-15	Postdoctoral Fellow, American Museum of Natural History
2014-15	Assistant Research Professor, The George Washington University
2012-15	Instructor, Koobi Fora Field School
2012-14	Postdoctoral Fellow, The George Washington University
2009-12	Resident Tutor - Biology and Anthropology, Harvard College
2009-11	Research Affiliate, Massachusetts General Hospital Sports Medicine Service

REFEREED PUBLICATIONS

In review **Roach, NT**, Rainbow, M, Herfat, S, Capellini, T, Feeley, BT, Young, N. The mechanical and evolutionary causes of rotator cuff disease. *J. Bone and Joint Surgery*.

15. **Roach, NT**, Hatala, KG, Ostrofsky, KO, Villmoare, B, Reeves, JS, Du, A, Braun, DR, Harris, JWK, Behrensmeyer, AK, Richmond, BG. *In press*. Pleistocene animal communities at a 1.5 million-year-old lake margin grassland and their relationship to *Homo erectus* paleoecology. *J. Human Evolution*.
14. Hatala, KG, **Roach, NT**, Ostrofsky, KO, Wunderlich, RE, Dingwall, HL, Villmoare, BA, Green, DJ, Braun, DR, Harris, JWK, Behrensmeyer AK, Richmond, BG. *Accepted*. Hominin tracks and trackway assemblages from Okote Member deposits near Ileret, Kenya and their implications for understanding fossil hominin paleobiology at 1.5 Ma. *J. Human Evolution*. 112. 93-104.
13. Hatala, KG, **Roach, NT**, Ostrofsky, KO, Wunderlich, RE, Dingwall, HL, Villmoare, BA, Green, DJ, Harris, JWK, Braun, DR, Richmond, BG. 2016. Footprints reveal direct evidence of group behavior and locomotion in *Homo erectus*. *Sci Rep*. 6(28766). doi/10.1038/28766
12. **Roach, NT**, Hatala, KG, Ostrofsky, KO, Villmoare, B, Reeves, JS, Du, A, Braun, DR, Harris, JWK, Behrensmeyer, AK, Richmond, BG. 2016. Pleistocene footprints show intensive use of lake margin habitats by *Homo erectus* groups. *Sci Rep*. 6(26374). doi/10.1038/26374
11. Tocheri, MW, Dommain, R, McFarlin, SC, Burnett, SE, Case, TD, Orr, CM, **Roach, NT**, Villmoare, BA, Eriksen, AB, Kalthoff, DC, Senck, S, Assefa, Z, Groves, CP, Jungers, WL. 2016. The evolutionary origins and population history of the Grauer gorilla. *Yearb Phys Anthropol*. 159. S4-S18
10. Young, NM, Capellini, TD, **Roach, NT**, Alemseged, Z. 2015. Fossil hominin shoulders support an African ape-like last common ancestor of humans and chimpanzees. *Proc Natl Acad Sci*. 112(38). 11829-11834
9. **Roach, NT**, Richmond, BG. 2015. Humeral torsion does not dictate shoulder position, but does influence throwing speed. *J. Human Evolution*. 85. 206-211
8. **Roach, NT**, Richmond, BG. 2015. Clavicle length, throwing performance and the reconstruction of the *Homo erectus* shoulder. *J. Human Evolution*. 80. 107-113
7. **Roach, NT**, Lieberman, DE. 2014. Upper body contributions to power generation during rapid, overhand throwing in humans. *J. Experimental Biology*. 217. 2139-2149
6. **Roach, NT**, Venkadesan, M, Rainbow, MJ, Lieberman, DE. 2013. Elastic energy storage in the shoulder and the evolution of high-speed throwing in *Homo*. *Nature*. 498. 483-486

5. **Roach, NT**, Lieberman, DE, Gill IV, TJ, Palmer, WE, Gill III, TJ. 2012. The effect of humeral torsion on rotational range of motion in the shoulder and throwing performance. *J. Anatomy*. 220. 293-301
4. Tryon, C, **Roach, NT**, Logan, A. 2008. The Middle Stone Age of the northern Kenyan Rift: age and context of new archaeological sites from the Kapedo Tuffs. *J Human Evolution*. 55. 652-664

EDITED COMMENTARY

3. Young, NM, Capellini, TD, **Roach, NT**, Alemseged, Z. 2016. Reply: A new direction for reconstructing our last common ancestor with chimpanzees. *Proc Natl Acad Sci*. doi/10.1073/pnas.1525673113
2. Young, NM, Capellini, TD, **Roach, NT**, Alemseged, Z. 2015. Reply: Woranso-Mille is consistent with an australopithecine shoulder intermediate between African apes and *Homo*. *Proc Natl Acad Sci*. doi:10.1073/pnas.1521824112

BOOK CHAPTERS

1. Richmond, BG, **Roach, NT**, Ostrofsky, K. 2016. Evolution of the Early Hominin Hand. In: *The Evolution of the Primate Hand: Perspectives from Anatomical, Developmental, Functional and Paleontological Evidence*. Ed: Kivell, TL, Lemelin, P, Richmond, BG, Schmitt, D. 515-543

DOCTORAL THESIS

- 2012 The biomechanics and evolution of high-speed throwing. Harvard University. (Committee: D. Lieberman, A. Biewener, R. Wrangham, L. Mahadevan, S. Larson, T. Gill)

RESEARCH SUPPORT

- Current *The developmental genetic basis for evolutionary variation in hominin shoulder shape*; National Science Foundation (BCS \$114,661; role: co-PI)
- Current *Excavation and analyses of 1.5 Ma land surfaces at Nariokotome, Kenya: Implications for intra-basin variation in behavior and ecology of Turkana Basin hominins*; Leakey Foundation (\$20,361; role: co-PI)
- 2012 Eliot Dissertation Fellowship, Harvard University (\$25,000)

- 2011 Cora du Bois Dissertation Fellowship, Cora du Bois Charitable Trust (\$4,000)
- 2010 Doctoral Dissertation Improvement Grant (BCS 0961943), National Science Foundation (\$17,485)
- 2009 Merit Fellowship, Harvard University (\$13,000)
- 2006 Biomechanics Fellowship (DGE 0221682), National Science Foundation (\$42,000)
- 2006 Field Research Grant, American School for Prehistoric Research (\$5,400)

CURRENT & FORTHCOMING GRANT APPLICATIONS

- 1/2019 Stick digging and the evolution of the australopith forelimb – NSF:BCS (role: PI)
- 7/2019 Community structure and animal land use patterns in the Etosha seasonal floodplain ecosystem: Implications for understanding hominin land use and ichnofossils – National Geographic (role co-PI: with K. Hatala, A. Behrensmeyer)

FIELDWORK

- Present* Hominin land use and faunal community structure at Nariokotome, West Turkana, Kenya (with A. Behrensmeyer & K. Hatala)
- 2013-15 Hominin footprints, fossils, and their context in the early Pleistocene of Koobi Fora, Kenya (with D. Braun & K. Hatala)
- 2013-14 Throwing performance and upper body anatomy in the Daasanach people, Ileret, Kenya
- 2008 Paleoenvironmental comparison of hominin and fossil chimpanzee localities, Baringo, Kenya (with S. McBrearty)
- 2007 Geological of the Turkana Basin, Kenya (with F. Brown)
- 2006 Archaeological survey of Middle Stone Age deposits, Olorgesailie, Kenya (with C. Tryon & R. Potts)
- 2006 Survey and material sourcing of Middle Stone Age lithics, Silali, Kenya (with C. Tryon)
- 2005 Archaeology of contact interval Mashantucket Pequot, CT, USA (with K. McBride)

- 2005 Bioarchaeology of Metacomet's War Pequot prison camp, CT, USA (with K. McBride)
- 2002 Landscape approach to Middle Stone Age archaeology, Baringo, Kenya (with S. McBrearty)
- 2000 Volcanology of the Campi Flegrei, Naples, Italy (with J. Block)

AWARDS

- 2017 Certificate in Teaching Excellence, Harvard University, Course: Building the Human Body
- 2017 Certificate in Teaching Excellence, Harvard University, Course: Human Evolutionary Anatomy
- 2016 Certificate in Teaching Excellence, Harvard University, Course: Human Evolution through Developmental Change
- 2016 Certificate in Teaching Excellence, Harvard University, Course: Human Evolutionary Anatomy
- 2015 Certificate in Teaching Excellence, Harvard University, Course: Human Evolution through Developmental Change
- 2012 Aleš Hrdlička Prize for Outstanding Student Paper, American Association of Physical Anthropologists
- 2012 Anatomy in Anthropology Student Prize, American Association of Anatomists
- 2011 Derek C. Bok Excellence in Teaching Award (nominee), Harvard University
- 2010 Distinction in Teaching Award, Harvard University, Course: Evolutionary Human Physiology and Anatomy
- 2010 Distinction in Teaching Award, Harvard University, Course: Human Evolution and the Human Body
- 2009 Distinction in Teaching Award, Harvard University, Course: Evolutionary Human Physiology and Anatomy
- 2008 Distinction in Teaching Award, Harvard University, Course: Human Evolution
- 2007 Graduate Research Fellowship (honorable mention), National Science Foundation

- 2005 Tribal Commendation, Mashantucket Pequot Tribal Nation
- 2004 Student Body President (elected), University of Connecticut
- 2003 President (elected), Connecticut Federation of College Democrats

INVITED TALKS

- 2018 Technology and the origins of the genus *Homo*. American Museum of Natural History
- 2017 Teasing apart the behavioral origins of the genus *Homo*. Yale University
- 2017 The paleoecology of *Homo*. Yale University
- 2016 Behavioral origins of the genus *Homo*. University of Albany
- 2015 Behavioral origins of the genus *Homo*. University of Toronto
- 2014 Evolved to pitch: How throwing changed human evolution. University of Pittsburgh
- 2014 Evolved to throw: How the shoulder changed human evolution. FORE Current Solutions in Shoulder and Elbow Surgery annual meeting. **Keynote address**
- 2013 Evolved to pitch: How throwing changed human evolution. Chatham University
- 2013 The biomechanics and evolution of high-speed throwing. Smithsonian - National Museum of Natural History
- 2010 The effects of forelimb anatomy on throwing performance: a biomechanical analysis. Yale University
- 2008 The Evolution of Throwing. University of Connecticut

PUBLISHED CONFERENCE ABSTRACTS

- 2018 **Roach, NT**. Stick digging and the evolution of the australopith forelimb. Am J Phys Anthropol. S66: 227. *Podium*.
- 2018 Young, M, Birkenstock, L, Young, N, **Roach, NT**, Capellini, T. The developmental genetics of the human scapula. Am J Phys Anthropol. S66: 308. *Podium*.

- 2018 Lee, EC, Clouthier, A, Bicknell, R, Bey, MJ, **Roach, NT**, Young, NM, Rainbow, MJ. *In silico* modeling of glenohumeral joint variation in biomechanical function and stability. Am J Phys Anthrop. S66: 155. *Podium*.
- 2017 Lee, ECS, **Roach, NT**, Clouthier, A, Bicknell, R. Bey, MJ, Young, NM, Rainbow, MJ. The effects of cranial orientation on shoulder biomechanics. Orthop Res Soc.
- 2017 Young, NM, **Roach, NT**, Herfat, S, Rainbow, MJ, Marmor, M, Feeley, B, Baum, T, Bey, M. Anatomical determinants of dysfunction inform the evolution of the human shoulder. Am J Phys Anthrop S64: 418. *Poster*.
- 2017 Herfat, S, **Roach, NT**, S, Rainbow, MJ, Baum, T, Bey, M, Marmor, M, Feeley, B, Young, NM. Anatomical shape of the shoulder as a predictor of rotator cuff injury. Ortho Res Soc. 339. *Podium*
- 2016 **Roach, NT**, Hatala, KG, Ostrofsky, KO, Villmoare, B, Reeves, JS, Du, A, Braun, DR, Harris, JWK, Behrensmeyer, AK, Richmond, BG. *Homo erectus* paleoecology and behavior based on 1.5 million year old footprints from northwestern Kenya. Am J Phys Anthrop S62: 270. *Podium*.
- 2016 Behrensmeyer, AK, Du, A, Villaseñor, A, Patterson, D, Richmond, BG, Hatala, KG, **Roach, NT**. Hominins in context – Paleogeography and ecology of the Okote Member, Koobi Fora Formation, East Turkana. Paleoanthropology: A3. *Podium*.
- 2016 Behrensmeyer, AK, Du, A, Villaseñor, A, Patterson, D, Richmond, BG, Hatala, KG, **Roach, NT**. Evidence for shifting base levels and climatic vs. tectonic controls on the fossil record of the Okote Member, Koobi Fora Formation, East Turkana. GSA Abstracts 47(7): 288.
- 2015 **Roach, NT**, Hatala, KG, Ostrofsky, K, Reeves, J, Behrensmeyer, AK, Richmond, BG. Hominin paleoecology and land use based on 1.5 Ma footprint surfaces at Ileret, Kenya. PaleoAnthropology: A28. *Podium*.
- 2015 **Roach, NT**, Williams, EM, Rainbow, M, Richmond, BG. The biomechanics and functional anatomy of stone tool manufacture. Am J Phys Anthrop S60: 267-268. *Podium*.
- 2015 Villmoare, BA, Grabowski, MW, **Roach, NT**, Hatala, KG, Williams-Hatala, EM. Facing the facts: Foods versus fists. A test of the Carrier and Morgan adaptive model for early hominin cranial structure. Am J Phys Anthrop S60: 313-314. *Poster*.
- 2015 Richmond, BG, **Roach, NT**, Hatala, KG, Ostrofsky, K, Behrensmeyer, AK, Bobe, R, Braun, DR, Reeves, J, Kiura, P, Villmoare, B. What can footprint assemblages

tell us about early hominin habitat preferences and social behavior? Am J Phys Anthrop S60: 266-267. *Podium.*

- 2015 Hatala, KG, **Roach, NT**, Ostrofsky, K, Richmond, BG. Earliest direct evidence of modern human-like foot function from 1.5 Ma hominin footprints at Ileret, Kenya. Am J Phys Anthrop S60: 160. *Podium.*
- 2014 **Roach, NT**, Williams, EM, Richmond, BG. Force production during stone tool knapping. PaleoAnthropology: A21. *Podium.*
- 2014 **Roach, NT**. Throwing and the reconstruction of the *Homo erectus* shoulder. Am J Phys Anthrop S58: 222. *Poster.*
- 2014 Richmond BG, Hatala KG, Behrensmeier AK, Bobe R, Braun DR, Dingwall HL, Green DJ, Kiura P, Ostrofsky K, **Roach NT**, Villmoare BA, Wunderlich RE, Harris JWK. Hominin size, behavior, and ecology based on 1.5-million-year-old footprint assemblages from Ileret, Kenya. Am J Phys Anthrop S58: 221. *Podium.*
- 2013 **Roach, NT**, Lieberman, DE. The biomechanics of power generation during human high-speed throwing. Am J Phys Anthrop S56: 233. *Podium.*
- 2012 **Roach, NT**, Lieberman, DE. Derived anatomy of the shoulder and wrist enable throwing ability in *Homo*. Am J Phys Anthrop S54: 250. *Podium.*
*Aleš Hrdlička & Anatomy in Anthropology student prizes
- 2011 **Roach, NT**, Lieberman, DE, Gill IV, TJ, Gill III, TJ, Palmer, WE. The effect of humeral torsion on shoulder range-of-motion and throwing performance. Am J Phys Anthrop S52: 254. *Podium.*
- 2010 **Roach, NT**, Venkadesan, M. High-speed throwing in humans requires elastic energy storage at the shoulder. Am J Phys Anthrop S50: 198-199. *Podium.*
- 2009 **Roach, NT**, Carmody, R, Reiches, M, McRae, E, Georgiev, A. Interpreting Hominin Variability: A test of the Template Method. Am J Phys Anthrop S48: 222. *Podium.*
- 2008 **Roach, NT**, Roebuck, P, Lieberman, DE. The Evolution of Throwing: Improving Performance through Kinematic Optimization. Am J Phys Anthrop S46: 140-141. *Podium.*
- 2007 Tryon, C., **Roach, N.T.**, Logan, A. Connecting the Dots: New Middle Stone Age sites from an unstudied region of the northern Kenyan Rift Valley. PaleoAnthropology: A33. *Poster.*

TEACHING

Current Courses: Building the Human Body (HEB1480); Human Evolutionary Anatomy (HEB1420); Research in Comparative Biomechanics (HEB1210)

Expertise in: Human Evolution, Hominin Paleoecology, Anatomy, Physiology, Biomechanics, Hominin Diet and Energetics, Experimental methods, Human adaptation

Awards (Harvard College): Human Evolutionary Anatomy (2), Human Evolution through Developmental Change (2), Evolutionary Anatomy and Physiology (2), Human Evolution and the Human Body (2), Human Evolution (1)

SERVICE

- Present Ad hoc review - *African Archaeological Review*, Agence Nationale de la Recherche (France), *American J Physical Anthropology*, *Anatomical Record*, *eLife*, *Ethnoarchaeology*, *J Anatomy*, *J of Human Biology*, *J Human Evolution*, Leakey Foundation, *Nature*, *PLoS One*, *PNAS*, *Scientific Reports*, *Quaternary Science Reviews*
- Present First generation student mentor, Harvard College
- 2009-16 Undergraduate academic advisor, Harvard College (25+ students ranging from those on academic probation to a Rhodes scholar)
- 2016 PhD thesis examiner, Australian National University (Ellen Feuerriegel)
- 2014-15 CASHP journal club moderator, The George Washington University
- 2011 Session chair, AAPA annual meetings
- 2009 Graduate representative to the HEB faculty, Harvard University

PUBLIC OUTREACH

- 2018 Commentary on BC terminal Pleistocene trackways – Science News, Fox News, CNN, Newsmax
- 2016 News coverage of footprint publications (covered by 24 media outlets, including *Science Daily*, *Das Spiegel*, *MSN News*)
- 2016 Commentary on new Laetoli prints – *Nature News*
- 2015 News coverage of last common ancestor PNAS paper (covered by 34 media outlets, including *BBC*, *Nature News*, *SF Chronicle*, *Washington Post*, *Christian Science Monitor*)

- 2015 News coverage of conference presentation, Hominin land use from 1.5 million year old footprints, (covered by *Nature News*, *ScienceDirect*, *NY Times*, *Huffpost*, *Archaeology magazine*)
- 2013 News coverage of the evolution of human throwing paper, (covered by 450+ media outlets including *NY Times*, *NPR*, *PBS NewsHour*, *Washington Post*; question on *Jeopardy!*)
- 2013 The Scientist is In, Smithsonian – National Museum of Natural History
- 2008 Human Origins Workshop, Harvard Museum of Natural History

PROFESSIONAL AFFILIATIONS

American Association of Physical Anthropologists; Paleoanthropology Society; British Institute in East Africa; American Association for the Advancement of Science; Smithsonian Institution