FAUNAL ANALYSIS

Lab Research Methods in Archeology (3 credits)

Spring Semester 2013, Tuesdays 6:10 - 8:00 PM

HAH Seminar Room 202

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Course Synopsis

This class introduces the fundamental elements of analyzing faunal remains from archeological and paleontological contexts. The course begins with an introduction to basic cladistics as an organizing framework for the study of species and the tree of life. This is followed by discussions of the fossil record in deep time and the geological time scale. The class also provides an introduction to the key osteological characteristics of primates (including humans), other mammals (e.g., antelopes), and other vertebrates (e.g., birds, fish). This introduction is followed by a series of case studies of how leading researchers apply various methods to the study of faunas through time and across space in different archeological and paleontological contexts. Topics of discussion include hominins as fauna, methods for capturing morphology, biomechanics, analyzing micromammals and macromammals, and environmental reconstructions. Each student develops a research project and presents the results to the class at the end of the semester.

Course objectives

In this course, students gain an understanding of the basic methods of faunal analysis in archeological and paleontological contexts. Students learn how to carry out cladistics analyses and the latest techniques for collecting, describing, and characterizing faunal remains. By the end of the course students should be familiar with the current literature on the use of vertebrate fossils for reconstructing paleoenvironments associated with the evolutionary history of our species.

Grading

For each class period, students receive questions to be answered in ~two-page essays. The questions draw from the readings and the lectures; therefore attendance is paramount. The essays will be due the week following the lecture for which the questions are posed. These essays count for 75% of the course grade. Students also carry out a research project to be presented to the class as a poster

at the end of the semester (April 23). This research project counts for 25% of the class grade. Further instructions for the research project are provided separately.

Schedule

Please note that the course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.

January 15 – René Bobe: Introduction to the course

January 22 – René Bobe: Cladistics and the tree of life

January 29 – René Bobe: Fossils and the Geologic Time Scale

February 5 – Brian Richmond: Functional morphology

February 12 – Bernard Wood: Hominins as Fauna

February 19 – Bernard Wood: Capturing Morphology

February 26 – David Patterson: Micromammals and hominin paleoecology

March 5 – Briana Pobiner: Methods of zooarcheology

March 19 – Amelia Villaseñor: Mammals and community ecology in East Africa

March 26 – Andrew Du: Reconstructing hominin environments

April 2 – SAA and Paleoanthropology meetings: students work on research projects

April 9 – Emily Goble: Fossil mammals from the Baringo Basin, Kenya

April 16 – Kay Behrensmeyer: Modern bone assemblages and ecology

April 23 – Student presentations

Readings

January 22 – Cladistics and the tree of life

- Baum, D.A., S. DeWitt, and S. Donovan. 2005. The tree-thinking challenge. Science 310:979-980, including Supplementary Online Material.
- Baum, D.A. and S. Offner. 2008. Phylogenies and tree-thinking. American Biology Teacher 70:222-229.
- The History of Life: Looking at the Patterns http://evolution.berkeley.edu/evolibrary/article/evo_03
- Tree of Life: http://www.onezoom.org/mammals.htm

January 29 – Fossils and the Geologic Time Scale

- Feibel, C.S. 1999. Tephrostratigraphy and geological context in paleoanthropology. Evolutionary Anthropology 8:87-100.
- Feibel, C.S. 2011. A Geological History of the Turkana Basin. Evolutionary Anthropology 20:206-216.
- Up-to-date Geological Time Scale: http://www.geosociety.org/science/timescale/

February 5 – Brian Richmond: Functional morphology

- Hildebrand, M. 1995. Chapter 24: Running and Jumping, in *Analysis of Vertebrate Structure*. John Wiley & Sons, New York (pages 457-481).
- Plummer, T.W., L.C. Bishop, and F. Hertel. 2008. Habitat preference of extant African bovids based on astragalus morphology: operationalizing ecomorphology for palaeoenvironmental reconstruction. Journal of Archaeological Science 35:3016–3027.

February 12 – Bernard Wood: Hominins as Fauna

- Bobe, R. and M. Leakey. 2009. Ecology of Plio-Pleistocene mammals in the Omo-Turkana Basin and the emergence of *Homo*. Pages 173-184 *in* F.E. Grine, J.G. Fleagle, and R.E. Leakey, editors. The first humans: origins of the genus *Homo*. Springer, Dordrecht.
- Wood, B. and M. Leakey. 2011. The Omo-Turkana Basin Fossil Hominins and Their Contribution to Our Understanding of Human Evolution in Africa. Evolutionary Anthropology 20:264-292.

February 19 – Bernard Wood: Capturing Morphology

- Wood, B. 2010. Systematics, Taxonomy, and Phylogenetics: Ordering Life, Past and Present. Pages 56-73 *in* C.S. Larsen, editor. Companion to Physical Anthropology. Wiley-Blackwell, New York.
- Wood, B. 2011. Wiley-Blackwell Encyclopedia of Human Evolution. Wiley-Blackwell, Oxford. Look up the following entries: Computed Tomography, Geometric Morphometrics, Morphology, Morphometrics (available on-line at the Gelman Library).

February 26 – David Patterson: Micromammals and hominin paleoecology

- Reed, D. 2007. Serengeti micromammals and their implications for Olduvai paleoenvironments. Pages 217-255 in R. Bobe, Z. Alemseged, and A.K. Behrensmeyer, editors. Hominin Environments in the East African Pliocene: An Assessment of the Faunal Evidence. Springer, Dordrecht.
- Louchart, A., H. Wesselman, R.J. Blumenschine, et al. 2009. Taphonomic, Avian, and Small-Vertebrate Indicators of Ardipithecus ramidus Habitat. Science 326:66-664.

March 5 – Briana Pobiner: Methods of zooarcheology

- Pobiner, B.L. and R.J. Blumenschine. 2003. A taphonomic perspective on Oldowan hominid encroachment on the carnivoran paleoguild. Journal of Taphonomy 1:115-141.
- Pobiner, B.L., M.J. Rogers, C.M. Monahan, and J.W.K. Harris. 2008. New evidence for hominin carcass processing strategies at 1.5 Ma, Koobi Fora, Kenya. Journal of Human Evolution 55:103-130.

March 19 – Amelia Villaseñor: Mammals and community ecology in East Africa

- Pyron, R.A. and F.T. Burbrink. 2010. Hard and soft allopatry: physically and ecologically mediated modes of geographic speciation. Journal of Biogeography 37:2005-2015.
- Lorenzen, E.D., R. Heller, and H.R. Siegismund. 2012. Comparative phylogeography of African savannah ungulates. Molecular Ecology 21:3656–3670.
- Reed, K.E. 2008. Paleoecological patterns at the Hadar hominin site, Afar Regional State, Ethiopia. Journal of Human Evolution 54:743-768.

March 26 – Andrew Du: Reconstructing hominin environments

- Behrensmeyer, A.K. 1985. Taphonomy and the paleoecologic reconstruction of hominid habitats in the Koobi Fora Formation. Pages 309-323 in Y. Coppens, editor. L'Environnement des Hominidés au Plio-Pléistocène. Masson, Paris.
- Quinn, R.L., C.J. Lepre, J.D. Wright, and C.S. Feibel. 2007. Paleogeographic variations of pedogenic carbonate d13C values from Koobi Fora, Kenya: implications for floral compositions of Plio-Pleistocene hominin environments. Journal of Human Evolution 53:560-573.

April 9 – Emily Goble: Fossil mammals from the Baringo Basin, Kenya

- Bobe, R., A.K. Behrensmeyer, and R.E. Chapman. 2002. Faunal change, environmental variability and late Pliocene hominin evolution. Journal of Human Evolution 42:475-497.
- Gilbert, C.C., S.R. Frost, and D.S. Strait. 2009. Allometry, sexual dimorphism, and phylogeny: A cladistic analysis of extant African papionins using craniodental data. Journal of Human Evolution 57:298-320.
- Jablonski, N., M. Leakey, C. Kiarie, and M. Antón. 2002. A new skeleton of Theropithecus brumpti (Primates: Cercopithecidae) from Lomekwi, West Turkana, Kenya. Journal of Human Evolution 43:887-923.

April 16 – Kay Behrensmeyer: Modern bone assemblages and ecology

- Behrensmeyer, A.K. 1993. The bones of Amboseli. National Geographic Research & Exploration 9:402-421.
- Behrensmeyer, A.K. and J.H. Miller. 2012. Building links between ecology and palaeontology using taphonomic studies of recent vertebrate communities. Pages 69-91 *in* J. Louys, editor. Palaeontology in Ecology and Conservation. Springet, New York.
- Western, D. and A.K. Behrensmeyer. 2009. Bone Assemblages Track Animal Community Structure over 40 Years in an African Savanna Ecosystem. Science 324:1061-1064.