

ANG 6587

GRADUATE SEMINAR IN BIOLOGICAL ANTHROPOLOGY

Spring 2011

<u>Time:</u>	W 6:00 – 8:50 pm	<u>Instructor:</u>	Dr. Robert McCarthy
<u>Place:</u>	SO 190		Office: SO 173
<u>Format:</u>	Lecture and discussion		Phone: 561-297-1355
			E-mail: rmccar10@fau.edu
			Office hours: TTh 1-3 pm, by appt.

Course objectives:

This course will introduce students to the fundamental principles of, and terminology associated with, paleoanthropology, providing a basis for further study of the subject. Students will be encouraged to think critically about all aspects of paleoanthropology, including such topics as evolution and natural selection and human evolutionary history. The course will be run as a combination of lecture and discussion, and students are expected to read relevant sections in the textbook and selected readings prior to class, and to come prepared with questions and comments.

Readings:

- (1) Klein, R.G. 2009. *The Human Career*, 3rd ed. University of Chicago Press.
- (2) Selected readings (SR) available on Blackboard, from the instructor or online from e-journals.

Course format:

In this course, you will practice the two “Rs” (and one “P”) that will make up 75% of what you will be doing for the rest of your academic career (regardless of which subfield you are in): **Reading, Writing, and Presenting.**

Reading: each week, you will read one or two scientific papers about the discovery, identification, taxonomy, or functional anatomy of hominins.

Writing: every third week, you will prepare a brief (3-4 single-spaced pages) report based on your critical analysis of an academic paper.

Presenting: you will be responsible for one 10- to 20-minute Powerpoint presentation during the course of the semester. One to two presentations will be scheduled for the beginning of each class period. Students will be expected to explain a scientific article to the class, and to analyze and critically examine the ideas therein.

Each class period will be structured in the following manner:

- (1) introduction [5-10 minutes];
- (2) student presentation and questions [30 minutes];
- (3) background on hominins – fossils, dates, sites, anatomy, archaeology [~1 – 1.5 hr(s)];
- (4) discussion of thematic issues [~1 – 1.5 hr(s)]

Grading:

Your grade in this course will be based on your scores on two examinations (50%), one presentation (20%), short weekly reports and reviews (20%, or 5% each), and attendance (10%). Four times during the semester, students will prepare reports on an assigned article. Further details will be made available in class or on Blackboard during the course of the semester. Letter grades for the course will be assigned according to standard FAU policy.

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) located in Boca Raton - SU 133 (561-297-3880), in Davie - MOD I (954-236-1222), in Jupiter - SR 117 (561-799-8585), or at the Treasure Coast - CO 128 (772-873-3305), and follow all OSD procedures.

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see http://www.fau.edu/regulations/chapter4/4.001_Honor_Code.pdf.

<p><u>Note:</u> This syllabus is subject to change at any time. Updates will be posted on Blackboard.</p>

CLASS SCHEDULE

<u>Date</u>	<u>Topic 1 - Theory</u>	<u>Topic 2 - Hominins</u>	<u>Reading</u>	<u>Presentation</u>	<u>Due</u>
Jan. 13	Evolution		Chapter 1		
Jan. 19	Outline of human evolution		Chapter 2		
Jan. 26	Primate adaptations	Miocene hominoids	Chapter 3		Report
Feb. 2	Bipedalism	Earliest hominins	Chapter 4		
Feb. 9	Social groups	Australopiths	Chapter 4		
Feb. 16	Feeding ecology	Paranthropiths	Chapter 4		Report
Feb. 23	Stone tools and culture	Habilines	pp. 234-278		
Mar. 2	-	-			EXAM
Mar. 9	<u>NO CLASS – MID-SEMESTER BREAK</u>				
Mar. 16	Taxonomy	Erectines I	Chapter 5		Report
Mar. 23	Geology and stratigraphy	Erectines II	Chapter 5		
Mar. 30	Species concepts	Archaic <i>Homo</i>	Chapter 5		
Apr. 6	Behavior and archaeology	Neanderthals I	Chapter 6		Report
Apr. 13	<u>NO CLASS – AAPA MEETINGS</u>				
Apr. 20	Cognition and language	Neanderthals II	Chapter 6		
Apr. 27	Molecular evolution	<i>Homo sapiens</i>	Chapter 7		
May 4	FINAL EXAM, 7:00 – 9:30 PM				EXAM

SELECTED READINGS / BIBLIOGRAPHY / QUESTIONS

(↘ indicates papers around which discussion will center)

Jan. 19 Outline of human evolution

- ↘ Wood, B. & B.G. Richmond. (2000). Human evolution: taxonomy and paleobiology. *J. Anat.* **196**, 19-60.
- ↘ Tattersall, I. (1992). Species concepts and species identification in human evolution. *J. Hum. Evol.* **22**, 341-349.

Additional Readings:

Wolpoff, M.H., A.G. Thorne, J. Jelinek, & Y. Zhang. (1994). The case for sinking *Homo erectus*: 100 years of *Pithecanthropus* is enough! *Cour. Forschung. Senck.* 171, 341-361.

QUESTIONS: how many species of early hominin are there?

Jan. 26 Miocene hominoids / primate adaptations

- ↘ Wrangham, R. & D. Pilbeam. (2001). African apes as time machines. In Galdikas *et al.* (eds.). *All Apes Great and Small, Volume I: African Apes*. Plenum Publishers, New York.

Additional Readings:

Begun, D.R. (2002). European hominoids. In W.C. Hartwig (ed.). *The Primate Fossil Record*, pp. 339-368. University Press, Cambridge.

Kelley, J. (2002). The hominoid radiation in Asia. In W.C. Hartwig (ed.). *The Primate Fossil Record*, pp. 369-384. University Press, Cambridge.

Suwa G. *et al.* (2007). A new species of great ape from the late Miocene epoch in Ethiopia. *Nature* 448, 921-924.

Ward, S.C. & D.L. Duren. (2002). Middle and late Miocene African hominoids. In W.C. Hartwig (ed.). *The Primate Fossil Record*, pp. 385-397. University Press, Cambridge.

Moya-Sola, S. *et al.* (2004). *Pierolapithecus catalaunicus*, a new Middle Miocene great ape from Spain. *Science* **306**, 1339-1344.

QUESTIONS: what hominoid gave rise to modern chimpanzees? Can we identify stem hominoids? Can we reconstruct the morphological or, for that matter, behavioral characteristics of the LCA?

Feb. 2 Earliest hominins / bipedalism

- ↘ White, T.D. (2009). *Ardipithecus ramidus* and the paleobiology of early hominids. *Science* 326, 64-86.

Additional Readings:

Brunet, M. *et al.* (2002). A new hominid from the upper Miocene of Chad, central Africa. *Nature* **418**, 145-151.

- Wolpoff, M. *et al.* (2006). An ape or *the* ape: Is the Toumaï cranium TM 266 a hominid? *PaleoAnthropology* **2006**, 36-50.
- Senut, B. *et al.* (2001). First hominid from the Miocene (Lukeino Formation, Kenya). *C.R. Acad. Sci. Paris* **332**, 137-144.
- Richmond, B.G. & W.L. Jungers. (2008). *Orrorin tugenensis* femoral morphology and the evolution of hominin bipedalism. *Science* **319**, 1662-1665.
- White, T.D., G. Suwa & B. Asfaw. (1994). *Australopithecus ramidus*, a new species of hominid from Aramis, Ethiopia. *Nature* **371**, 306-312.
- Leakey, M.G., C.S. Feibel, I. McDougall & A.C. Walker. (1995). New four-million-year-old hominid species from Kanapoi and Allia Bay, Kenya. *Nature* **376**, 565-571.
- Raichlen, D.A., Pontzer, H. & Sockol, M.D. (2008). Laetoli footprints and early hominin locomotor kinematics. *J. Hum. Evol.* **54**, 112-117.
- Sockol, M., D.A. Raichlen & H. Pontzer. (2007). Chimpanzee locomotor energetics and the origin of human bipedalism. *Proc. Natl. Acad. Sci. USA* **134**, 12265-12269.

QUESTIONS: what types of locomotor repertoires did the very earliest (putative) hominins (*Sahelanthropus*, *Ardipithecus*, *Orrorin*, *Australopithecus anamensis*) exhibit? Is there any way to use details about chimpanzee and human locomotion to try to determine how (or if) these early hominins walked bipedally?

Feb. 9 Australopiths / social groups

- Lovejoy, C.O. (1981). The origin of man. *Science* **211**, 344-350
- Reno, P.L., R.S. Meindl, M.A. McCollum, O. Lovejoy. Sexual dimorphism in *Australopithecus afarensis* was similar to that of modern humans. *Proc. Natl. Acad. Sci. USA* **100**, 9404-9409.
- Gordon, A.D., D.J. Green, B.G. Richmond. 2008. Strong postcranial size dimorphism in *Australopithecus afarensis*: Results from two new resampling methods for multivariate data sets with missing data. *Am. J. Phys. Anthropol.* **135**, 311-328.

Additional Readings:

- Kimbel, W.H. and L.K. Deleuzene. (2010). “Lucy” redux: A review of research on *Australopithecus afarensis*. *Yrbk. Phys. Anthropol.* **52**, 2-48.
- Lovejoy, C.O. (1981). The origin of man. *Science* **211**, 344-350.
- Susman, R.L., J.T. Stern and W.L. Jungers. (1984). Arboreality and bipedality in the Hadar hominids. *Folia Primatol.* **43**, 283-306.
- Lockwood, C.A. *et al.* (2007). Extended male growth in a fossil hominin species. *Science* **318**, 1443-1446.
- Geary, D.C. and Flinn, M.V. (2001). Evolution of human parental behavior and the human family. *Parenting: Science and Practice* **1**, 5-61. Available at <http://web.missouri.edu/~gearyd/GearyFlinnParent.pdf>
- Richmond, B.G. & D.S. Strait. (2000). Evidence that humans evolved from a knuckle-walking ancestor. *Nature* **404**, 382-385.
- Strait, D.S. *et al.* (2009). The feeding biomechanics and dietary ecology of *Australopithecus africanus*. *Proc. Natl. Acad. Sci. USA* Early Edition.
- Richmond, B.G., L.C. Aiello & B.A. Wood. (2002). Early hominin limb proportions. *J. Hum. Evol.* **43**, 529-548.

QUESTIONS: In what types of social groups did australopiths live? How could you tell?

Feb. 16 Paranthropiths / feeding ecology

- ✎ McCollum, M. (1999). The robust australopithecine face: A morphogenetic perspective. *Science* **284**, 301-305.

Additional Readings:

- Constantino, P. & B. Wood. (2007). The evolution of *Zinjanthropus boisei*. *Evol. Anthropol.* 16, 49-62.
- Constantino, P. & B. Wood. (2004). *Paranthropus* paleobiology. In *Miscelánea en homenaje a Emiliano Aguirre Vol. III: Paleoantropología*, pp. 136-151. Museo Arqueológico Regional.
- Spencer, M.A. (1998). Force production in the primate masticatory system: electromyographic tests of biomechanical hypotheses. *J. Hum. Evol.* **34**, 25-54.
- Demes, B. & N. Creel. (1988). Bite force, diet and cranial morphology of fossil hominids. *J. Hum. Evol.* **17**, 657-670.

QUESTIONS: Do you think it is more likely that robust australopiths / paranthropiths are monophyletic or diphyletic? Why?

Feb. 23 Habilines / stone tools and culture

- ✎ Wood, B. & Collard, M. (1999). The human genus. *Science* **284**, 65-71.

Additional Readings:

- Johanson, D. *et al.* (1987). New partial skeleton of *Homo habilis* from Olduvai Gorge, Tanzania. *Nature* **327**, 205-209.
- Leakey, L.S.B., P.V. Tobias & J.R. Napier. (1964). A new species of genus *Homo* from Olduvai Gorge. *Nature* **202**, 7-9.
- Blumenschine, R.J. *et al.* (2003). Late Pliocene *Homo* and hominid land use from western Olduvai Gorge, Tanzania. *Science* **299**, 1217-1221.
- Lieberman, D.E., D. Pilbeam & B.A. Wood. (1996). A probabilistic approach to the problem of sexual dimorphism in *Homo habilis*: A comparison of KNM-ER 1470 and KNM-ER 1813. *J. Hum. Evol.* **17**, 503-511.
- Mercader, J. *et al.* (2007). 4,300-Year-old chimpanzee sites and the origins of percussive stone technology. *Proc. Natl. Acad. Sci. USA* **104**, 3043-3048.
- Pruetz, J.D. and P. Bertolani. (2007). Savanna chimpanzees, Pan troglodytes verus, hunt with tools. *Current Biology* **17**, 412-417.
- Semaw, S. *et al.* (2003). 2.6-Million-year-old stone tools and associated bones from OGS-6 and OGS-7, Gona, Afar, Ethiopia. *J. Hum. Evol.* **45**, 169-177.

QUESTIONS: Do you think that *Homo habilis* is one species or two? Does it belong in *Homo*, even?

Mar. 16 + 23 *Homo erectus*, geology and stratigraphy

- Bramble, D.M., Lieberman, D.E. Endurance running and the evolution of *Homo*. *Nature* **432**, 345-352.
- Lordkipanidze, D. *et al.* (2007). Postcranial evidence from early *Homo* from Dmanisi, Georgia. *Nature* **449**, 305-310.
- Antón, S.C. (2003). Natural history of *Homo erectus*. *Yrbk. Phys. Anthropol.* **46**, 126-170.
- Graves, R.R., Lupo, A.C., McCarthy, R.C. *et al.* (2010). Just how strapping was KNM-WT 15000? *J. Hum. Evol.* **59**, 542-554.

Additional Readings:

- Asfaw, B. *et al.* (2002). Remains of *Homo erectus* from Bouri, Middle Awash, Ethiopia. *Nature* **416**, 317-320.
- Gabunia, L. *et al.* (2000). Earliest Pleistocene hominid cranial remains from Dmanisi, Republic of Georgia: Taxonomy, geological setting, and age. *Science* **288**, 1019-25.
- Vekua, A. *et al.* (2002). A new skull of early *Homo* from Dmanisi, Georgia. *Science* **297**, 85-89.
- Xu, R. *et al.* (2008). Early evidence of the genus *Homo* in East Asia. *J. Hum. Evol.* **55**, 1075-1085.
- Shen, G., Gao, X., Gao, B., Granger, D.E. (2009). Age of Zhoukoudian *Homo erectus* determined with ²⁶Al/¹⁰Be burial dating. *Nature* **458**, 198-200.
- Walker, A. & R.E.F. Leakey, eds. (1993). Selections from *The Nariokotome Homo erectus skeleton*. Harvard University Press, Cambridge.

Taxonomy

- Plavcan, J.M. & D.A. Cope. (2001). Metric variation and species recognition in the fossil record. *Evol. Anthropol.* **10**, 204-222.
- Villmoare, B. (2005). Metric and non-metric randomization methods, geographic variation, and the single-species hypothesis for Asian and African *Homo erectus*. *J. Hum. Evol.* **49**, 680-701.

Additional Readings:

- Cope, D.A. & M.G. Lacy. (1995). Comparative application of the coefficient of variation and range-based statistics for assessing the taxonomic composition of fossil samples. *J. Hum. Evol.* **29**, 549-576.
- Kidder, J.H. & A.C. Durband, (2004). A re-evaluation of the metric diversity within *Homo erectus*. *J. Hum. Evol.* **46**, 299-315.
- Lockwood, C.A., W.H. Kimbel & D.C. Johanson. (2000). Temporal trends and metric variation in the mandibles and dentition of *Australopithecus afarensis*. *J. Hum. Evol.* **31**, 537-548.
- Skinner, M.M., A.D. Gordon & N.J. Collard. (2006). Mandibular size and shape variation in the hominins at Dmanisi, Republic of Georgia. *J. Hum. Evol.* **51**, 36-49.
- Wolpoff, M.H. & S.-H. Lee. (2001). The Late Pleistocene human species of Israel. *Bull. et Mém. de la Société d'Anthropologie de Paris n.s.* **13**, 291-310.

QUESTIONS: Did *Homo erectus* run? What is its body size and shape? Should we consider it to be one long-lived, “worldwide” species? Or is there support for the idea that it should be split into several species? If so, how do we determine how many species it should be split into?

Mar. 30 Archaic *Homo* / Species concepts

- Arsuaga, J.L. *et al.* (1997). Size variation in Middle Pleistocene humans. *Science* **277**, 1086-1088.

Additional Readings:

- Arsuaga, J.L. *et al.* (1993). Three new human skulls from the Sima de los Huesos Middle Pleistocene site in Sierra de Atapuerca, Spain. *Nature* **362**, 501-502.
- Bermudez de Castro, J.M. *et al.* (1997). A hominid from the Lower Pleistocene of Atapuerca, Spain: Possible ancestor to Neandertals and modern humans. *Science* **276**, 1392-1395.
- Rightmire, P. (1998). Human evolution in the Middle Pleistocene: The role of *Homo heidelbergensis*. *Evol. Anthropol.* **6**, 218-227.

QUESTIONS: One question: How many species?

Apr. 6 + 20 Neanderthals

- Mellars, P. (2004). Neanderthals and the modern human colonization of Europe. *Nature* **432**, 461-465.
- Green, R.E., Krause, J., *et al.* (2010). A draft sequence and preliminary analysis of the Neandertal genome. *Science* **328**, 710-722.

Additional Readings:

- Bar-Yosef, O. (2000). In Bar-Yosef, O. & Pilbeam, D. (eds.). *The Geography of Neandertals and Modern Humans in Europe and the Greater Mediterranean*, pp. 107-156. Peabody Museum, Harvard Univ., Cambridge, MA.
- Krings, M. *et al.* (2000). A view of Neandertal genetic diversity. *Nature Genet.* **26**, 144-6.
- Krings, M. *et al.* (1999). DNA sequence of the mitochondrial hypervariable region II from the Neandertal type specimen. *Proc. Nat. Acad. Sci. USA* **96**, 5581-5.
- Serre, D. *et al.* (2004). No evidence of Neandertal mtDNA contribution to early modern humans. *PLoS Biology* **2**, 313-317.

QUESTIONS: What is the evidence for Neanderthals being a separate species from modern *H. sapiens*? Was Neandertal behavior different from that of earlier members of our species, or the same?

Behavior, archaeology, cognition, speech and language

- Kuhn S.L., Stiner, M.C. (2006). What's a mother to do? The division of labor among Neandertals and modern humans in Eurasia. *Curr Anthropol* **47**, 953-980.
- McCarthy, R.C., D.S. Strait, F.W. Yates & P. Lieberman. (in revision). A recent origin for fully modern human speech capabilities. *Proc. Nat. Acad. Sci. USA*.

Additional Readings:

- Lieberman, P. & R.C. McCarthy. (2007). Tracking the evolution of language and speech: Comparing vocal tracts to identify speech capabilities. *Expedition* **49**, 15-20.
- Enard, W. *et al.* (2002). Molecular evolution of *FOXP2*, a gene involved in speech and language.

Nature **418**, 869-872.

Krause *et al.* (2007). The derived *FOXP2* variant of modern humans was shared with Neandertals. *Curr. Biol.* **17**, 1908-1912.

Henshilwood, C.S. *et al.* (2004). Middle Stone Age shell beads from South Africa. *Science* **304**, 404.

Klein, R.G. (2000). Archaeology and the evolution of human behavior. *Evol. Anthropol.* **9**, 7-36.

McBrearty, S. & A. Brooks. (2000). The revolution that wasn't: A new interpretation of the origin of modern human behavior. *J. Hum. Evol.* **39**, 453-563.

Mithen, S. (1999). Selections from *Prehistory of the Mind*. Thames & Hudson, London.

Apr. 27 *Homo sapiens* / molecular evolution

Lieberman, D.E. (2008). Speculations about the selective basis for modern human craniofacial form. *Evol. Anthropol.* **17**, 55-68.

Additional Readings:

Ingman, M., H. Kaessmann, S. Paabo & U. Gyllensten. (2000). Mitochondrial genome variation and the origin of modern humans. *Nature* **408**, 652-653.

Stringer, C. (2002). Modern human origins: Progress and prospects. *Phil. Trans. R. Soc. Lond. B* **357**, 563-579.

Underhill, P. *et al.* (2001). The phylogeography of the Y-chromosome binary haplotypes and the origins of modern human populations. *Ann. Hum. Genet.* **65**, 43-62.

White, T.D. *et al.* (2003). Pleistocene *Homo sapiens* from Middle Awash, Ethiopia. *Nature* **423**, 742-747.

QUESTIONS: What differentiates fossil and modern *H. sapiens* from Neanderthals and other archaic hominins? What is the nature of this transition?