

Department of Anthropology
Anthropology 3334G-001
Primate and Human Paleontology
COURSE OUTLINE
Winter 2022

Classes: For the Winter '22 term, this course will be conducted remotely on an *asynchronous* week-to-week schedule.

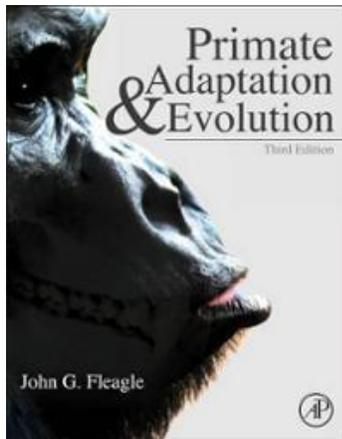
Instructor: Dr. Ian Colquhoun

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Office Hours: By appointment (email me to schedule a 'Zoom' session)

Course Description: The aim of this course, as the title suggests, is to introduce you to the study of the primate fossil record and the evolution of the Order Primates. Of course, our species, *Homo sapiens*, is a member of this diverse mammalian order (in the Class Mammalia, only the Order Rodentia, the rodents, and the Order Chiroptera, the bats, contain more species than the Order Primates). Thus, in order to accurately conceive of our own species in a phylogenetic context, students of anthropology should develop an understanding of how humans compare with other primate species -- our closest biologic relatives. Accordingly, this course employs both **paleontological** and **neontological** perspectives. That is, we will consider the extinct species of the primate fossil record (which is the *paleontological* portion of the course), as well as the examine the *major lineages of extant primates* (which represents the *neontological* aspect of the course). The extant primate lineages can serve as models by which to better understand the extinct fossil primate species (there is a saying in paleontological circles: "the present is the key to the past"). But, this approach also informs us on the limits of such modelling. Achieving a thorough understanding of primate evolutionary history allows for a fuller appreciation of the biological and behavioural variability of both modern *Homo sapiens* and the other extant species of the Order Primates.

Required Text:



Fleagle, J.G., 2013. *Primate Adaptation and Evolution* (3rd ed.). Academic Press, San Diego.

Course Prerequisite: Anthropology 2226A/B and registration in year 3 or 4 in any module.

Course Requirements & Evaluation:

Course requirements (aside from the expected work on your weekly topical readings) will include:

- a mid-term examination (**35%** of final grade),
- two article review & commentary assignments (2 x 15% each = **30%** of your final grade),
- a final examination (**35%** of final grade),

The format of the mid-term and final tests is yet to be finalized (they will either be 'take-home' format, short essay answer tests, or the tests may be in the form of written tests that will be administered utilizing cyber proctor software) -- stay tuned for further details on this! Regardless, material covered on the tests will come from the material posted on the course OWL site, and from the text (and other supplemental) readings, **but the material presented on OWL will be emphasized**. Be advised, that OWL material includes information that has been published *since* the 3rd edition of Fleagle's text was published and (obviously) is **not** covered in the course text (a good reason to pay attention to the information in the weekly slides!).

Learning Outcomes: Upon successful completion of this course, students will:

- be able to demonstrate familiarity with the major "crown clades" of extant primates, and will have developed an understanding of when the major primate lineages are first encountered in the fossil record;
- have gained an awareness of the major interpretive issues in primate paleontology, in particular the disjuncture between contesting approaches to dating major events in primate phylogeny (i.e., age estimates based on the fossil record vs. those based on molecular phylogenetic techniques);
- appreciate major patterns in the primate fossil record; and,
- have developed a solid comparative basis for understanding the biological context of *Homo sapiens* as one among several hundred species in the Order Primates.

Week-to-week Course Outline (tentative):

- Jan. 10: Introduction: Species concepts and forms of selection. Reading: Fleagle, chapter 1.
- Jan. 17: Issues in primatology and primate evolution: How can the primates be defined? Readings: Fleagle, chapters 3 & 9.
Supplemental reading:
Martin, R.D., 2012. Primates. *Current Biology* **22(18)**: R785–R790
<http://www.sciencedirect.com/science/article/pii/S0960982212008068>
- Jan. 24: Primate origins – the Cretaceous and early Tertiary. Readings: Fleagle, chapter 10 & 11.
- Jan. 31: Modern prosimians: the "lower" primates. Readings: Fleagle, chapter 4.
Supplemental readings:
Groves, C. & Shekelle, M., 2010. The Genera and Species of Tarsiidae. *International Journal of Primatology* **31**: 1071-1082 (journal available electronically via www.lib.uwo.ca);
Horvath, J.E. et al., 2008. Development and application of a phylogenetic toolkit: Resolving the evolutionary history of Madagascar's lemurs. *Genome Research* **18(3)**: 489-499
(early online version available at:
www.biology.duke.edu/yoderlab/reprints/2008Horvath_etalGR.pdf);
Masters, J.C. et al., 2013. Seeing the Wood through the Trees: The Current State of Higher Systematics in the Strepsirhini. *Folia Primatologica* **84(3-5)**:201-219 (Editor's Choice -- Free Access to Fulltext pdf at: <http://www.karger.com/Article/FullText/353179>);
Merker, S. et al., 2009. Elucidating geological and biological processes underlying the diversification of Sulawesi tarsiers. *Proceedings of the National Academy of Sciences* **106(21)**: 8459-8464
(pdf available at: <http://user.uni-frankfurt.de/~smerker/publications.htm>);
Yoder, A.D., 2007. Lemurs – A Quick Guide. *Current Biology* **17(20)**: R866-R868 (pdf available at: www.biology.duke.edu/yoderlab/reprints/2007YoderCB.pdf).
- Feb. 7: The first "euprimates": the fossil prosimians of the Eocene. Reading: Fleagle, chapter 12.
Supplemental reading:
Seiffert, E.R., 2007. Early Evolution and Biogeography of Lorisiform Strepsirrhines. *American Journal of Primatology* **69(1)**: 27-35 (journal available electronically via www.lib.uwo.ca).

- *Feb. 14:** *** Mid-term Exam**
- ** Feb. 21:** ****Reading Week -- no scheduled class!!**
- Feb. 28: Modern anthropoids I: The New World and Old World monkeys. Readings: Fleagle, chapters 5 and 6.
Video: "Monkeys of Hanuman".
Supplemental readings:
Hodgson, J.A., et al., 2009. Successive radiations, not stasis, in the South American primate fauna. *Proceedings of the National Academy of Sciences* **106(14)**: 5534-5539 (pdf available at: <http://www.pnas.org/content/106/14/5534.full>);
Raam, R.L., et al.2005. Catarrhine primate divergence dates estimated from complete mitochondrial genomes: concordance with fossil and nuclear DNA evidence. *Journal of Human Evolution* **48**: 237-257 (pdf available at: www.raaum.org/uploads/1/1/7/5/1175545/raaum2005p1072.pdf , or Google search "catarrhine divergence dates").
- Mar. 7: The early fossil anthropoids of the Oligocene and Miocene. Readings: Fleagle, chapter 13, 14 and 16.
Supplemental readings:
Delson, E., 1992. Evolution of Old World monkeys; pp. 217-222 in: *Cambridge Encyclopedia of Human Evolution* (J.S. Jones, R.D. Martin, D. Pilbeam, Sara Burney, eds.). Cambridge: Cambridge University Press. (pdf available at: http://pages.nycep.org/ed/download/pdf/Delson_1992.pdf).
Kay, R.F., 2012. Evidence for an Asian origin of stem anthropoids. *Proceedings of the National Academy of Sciences* **109(26)**: 10132-10133 (Published online before print June 13, 2012, doi: 10.1073/pnas.1207933109 -- pdf available at: <http://www.pnas.org/content/109/26/10132.full.pdf+html>);
Rosenberger, A.L. & Hartwig, W.C., 2001. New World Monkeys. *Encyclopedia of Life Sciences*: Nature Publishing Group / www.els.net (pdf available at: http://pages.nycep.org/rosenberger/.../NWM_Rosenberger_Hartwig.pdf);
Williams et al., 2010. New perspectives on anthropoid origins. *Proceedings of the National Academy of Sciences* **107(11)**: 4797-4804 (pdf available at: <http://www.pnas.org/content/early/2010/03/05/0908320107>).
- Mar. 14: Modern anthropoids II: The living hominoids. Readings: Fleagle, chapter 7.
Video: *National Geographic* "The New Chimpanzees".
Supplemental readings:
Gibbs, R.A. & Rogers, J., 2012. Genomics: *Gorilla gorilla gorilla*. *Nature* **483** (7388):164-165, doi:10.1038/483164a
(*Nature* is available online through www.lib.uwo.ca);
Pilbeam, D. & Young, N., 2004. Hominoid evolution: synthesizing disparate data. *Comptes Rendus Palevol* **3**: 305-321 (pdf available at: www.fas.harvard.edu/~palanth/Nate/.../pilbeam_young_2004.pdf).
Thinh, V.N., et al., 2010. Mitochondrial evidence for multiple radiations in the evolutionary history of small apes. *BMC Evolutionary Biology* **10**:74 (this paper is in an Open Access journal, available at: <http://www.biomedcentral.com/1471-2148/10/74>).
- Mar. 21: Fossil hominoids of the Miocene.
Readings: Fleagle, chapters 15.
Supplemental readings:
Ciochon, R., 2009. The mystery ape of Pleistocene Asia. *Nature* **459**: 910-911 (available at: <http://www.nature.com/nature/journal/v459/n7249/full/459910a.html>).
Dalton, R., 2009. Early man becomes early ape. *Nature* **459**: 899 (available at: <http://www.nature.com/news/2009/090617/full/459899a.html>).
Harrison, T., 2010. Apes Among the Tangled Branches of Human Origins. *Science* **327**: 532-534 (pdf available at: http://www.nyu.edu/gsas/dept/anthro/programs/csho/Content/Facultycvandinfo/Harrison/2010_Harrison.pdf).

- Mar. 28: Hominid origins. Reading: Fleagle, chapter 17.
Supplemental readings:
 Callaway, E., 2011. Ancient DNA reveals secrets of human history. *Nature* **476**: 136-137 (available at: <http://www.nature.com/news/2011/110809/full/476136a.html>).
 Gibbons, A., 2009. A New Kind of Ancestor: *Ardipithecus* Unveiled. *Science* **326**: 36-40 (pdf available from: <http://ts-si.org/files/ScienceArdi32636.pdf>).
 Krause, J., et al., 2010. The complete mitochondrial DNA genome of an unknown hominin from southern Siberia. *Nature* – doi:10.1038/nature08976 (pdf available at: http://www.eva.mpg.de/genetics/pdf/Krause_Complete_Nature_doi.pdf).
 Lovejoy, C.O., 2009. Reexamining Human Origins in Light of *Ardipithecus ramidus*. *Science* **326**: 74-74e8 (pdf available at: <http://www.centenary.edu/attachments/philosophy/aizawa/courses/philscif2010/lovejoyetal.2009e.pdf>).
 O'Higgins, P. & Elton, S., 2007. Walking on Trees. *Science* **316**: 1292-1294 (journal available electronically via www.lib.uwo.ca).
 Thorpe, S.K.S., et al., 2007. Origin of Human Bipedalism As an Adaptation for Locomotion on Flexible Branches. *Science* **316**: 1328-1331 (pdf available at: <http://www.cs.bham.ac.uk/research/projects/cogaff/talks/wonac/sue.d/Thorpe-et-al-Science-2007.pdf>).
 Wood, B. & Boyle, E.K., 2016. Hominin Taxic Diversity – Fact or Fantasy? *American Journal of Physical Anthropology* **159**-S61 (*Yrbk. Of Physical Anthropology*): 37-78.
- Apr. 1: Patterns in primate evolution, and the past and future of paleoprimatology..
 Reading: Fleagle, chapter 18.
Supplemental reading:
 Fleagle, J., 2000. The Century of the Past: One Hundred Years in the Study of Primate Evolution. *Evolutionary Anthropology* **9(2)**: 87-100 ;
 Fleagle, J., 2002. The Primate Fossil Record. *Evolutionary Anthropology* **11, Suppl. 1**: 20-23;
 Perelman, P., et al., 2011. A Molecular Phylogeny of Living Primates. *PLoS Genetics* **3**:e1001342 (*PLoS Genetics* is an Open Access journal available at: www.plosgenetics.org);
 Steiper, M.E. & Seiffert, E.R., 2012. Evidence for a convergent slowdown in primate molecular rates and its implications for the timing of early primate evolution. *Proceedings of the National Academy of Sciences* -- Published online before print April 2, 2012, doi: 10.1073/pnas.1119506109 PNAS April 2, 2012 (pdf available at: <http://www.pnas.org/content/early/2012/03/27/1119506109.full.pdf+html>);
 Steiper, M.E. & Young, N.M., 2008. Timing Primate Evolution: Lessons from the Discordance Between Molecular and Paleontological Estimates. *Evolutionary Anthropology* **17**: 179-188 (Note: *Evolutionary Anthropology* is available online through www.lib.uwo.ca).
- Apr. 2 & 3: Study Days

***FINAL EXAM;** the final exam is worth **35%** of the final grade (only material covered since the mid-term will be on the test). **The exam will be written in the April exam period (i.e., Apr. 4-30)** -- specific date and time to be announced.

Suggested Supplemental Readings for the Course (available online through www.lib.uwo.ca):

These are not readings to be used in the article review and commentary assignments. *But*, these sources could be of use in your brief article reviews and commentaries (or at least provide ideas for topics to explore).

1: Allometry, Life History, and Paleobiology -- These topics deal with comparative primatology in the understanding of growth, development, reproduction, and aging; relevant sources include:

Fleagle, Chap. 9.

Cartmill, M., 2002. "Historical Explanation and the Concept of Progress in Primatology". *Evolutionary Anthropology* 11 (Supp. 1): 12-15.

Conroy, G.C., 1987. "Problems of body-weight estimation in fossil primates". *International J. of Primatology* 8(2): 115-137; (another relevant source on this topic is: *Smith, R.J., 1985. "The Present as a Key to the Past: Body Weight of Miocene Hominoids as a Test of Allometric Methods for Paleontological Inference"; pp. 437-448 in: *Size and Scaling in Primate Biology* (W.L. Jungers, ed.), New York: Plenum Press (**note** -- this book is in the holdings of the Allyn & Betty Taylor Library: **QL737.P9S59 1985**, but is not available electronically – GoogleBooks carries only a portion of the chapter).

Hooton, E., 1954. "The Importance of Primate Studies in Anthropology". *Human Biology* 26(3): 179-188.

Martin, R.D., 2002. "Primatology as an Essential Basis for Biological Anthropology". *Evolutionary Anthropology* 11 (Supp. 1): 3-6.

Schmidt-Nielsen, K., 1975. Scaling in biology: The consequences of size. *Journal of Experimental Zoology* 194(1): 287-307 (alternatively, you could read: *Schmidt-Nielsen, 1984. "The Size of Living Things"; "Problems of Size and Scale", and "The Use of Allometry", chapters 1-3, pp. 1-32, in: *Scaling: Why is Animal Size So Important?*. Cambridge: Cambridge U. Press; **note** -- this book is in the holdings of the Allyn & Betty Taylor Library: **QL 799.S34**, but is in storage);

Strier, K.B., 2011. "Why Anthropology Needs Primatology". *General Anthropology – Bulletin of the General Anthropology Division* (AAA – Am. Anthro. Assoc.) 18(1): 1, 6-8. (available online at: <http://onlinelibrary.wiley.com/doi/10.1111/gena.2011.18.issue-1/issuetoc>).

2: On Analogy and Other Reconstruction Methods – the use, and limitations, of analogy vs. other approaches to the reconstruction of behaviour in fossil primates (or predicting behaviour of little-studied extant primates); relevant sources:

Fleagle, Chap. 10.

Dall, S.R.X. & Griffith, S.C., 2014. An empiricist guide to animal personality variation in ecology and evolution. *Frontiers in Ecology and Evolution* (vol. 2, article 3) doi: 10.3389/fevo.2014.00003 .

Janson, C.H., 2000. "Primate Socio-Ecology: The End of a Golden Age". *Evolutionary Anthropology* 9(2): 73-86.

Marino, L., 1996. "What Can Dolphins Tell Us About Primate Evolution?". *Evolutionary Anthropology* 5(3): 81-85.

Stanford, C.B., 2006. "The behavioral ecology of sympatric African apes: implications for understanding fossil hominoid ecology". *Primates* 47: 91-101.

Tavare, S. et al., 2002. "Using the fossil record to estimate the age of the last common ancestor of extant primates". *Nature* 416:726-729 (April 18).

Whiten, A., 2017. Culture extends the scope of evolutionary biology in the great apes. *Proceedings of the National Academy of Sciences* 114(30): 7790-7797. doi: 10.1073/pnas.1620733114 .

3: Systematics and Phylogeny -- studying the diversity, classification, and evolutionary relationships of modern and fossil primates; relevant readings:

Fleagle, Chap. 1.

Andrews, P. and Martin, L., 1987. "Cladistic Relationships of Extant and Fossil Hominoids". *Journal of Human Evolution* 16(1): 101-118.

Groves, C., 2001. "Why Taxonomic Stability Is a Bad Idea, or Why Are There So Few Species of Primates (Or Are There?)". *Evolutionary Anthropology* 10: 192-198.

Groves, C., 2012. "Species concepts in primates". *American Journal of Primatology* 74(8): 687-691.

Hey, J., 2006. "On the failure of modern species concepts". *Trends in Ecology and Evolution* 21(8) : 447-450;

Ridley, M. (2004). "The Reconstruction of Phylogeny"; pp. 423-470 in *Evolution* (3rd. ed), Oxford: Blackwell Publishing -- see: http://www.blackwellpublishing.com/ridley/tutorials/The_reconstruction_of_phylogeny1.asp), (**note** -- *this book is also in the holdings of the Allyn & Betty Taylor Library: **QH 366.2.R524**);

Tattersall, I., 2007. "Madagascar's Lemurs: Cryptic Diversity or Taxonomic Inflation?" *Evolutionary Anthropology* 16: 12-23.