



Department of Anthropology

**Anthropology 3334G-001
Primate and Human Paleontology
COURSE OUTLINE
Winter 2016**

Classes: Mondays 1:30-4:20 PM, SSC 2257 (Bio-Archaeology Teaching Lab)

Instructor: Dr. Ian Colquhoun

Office: SSC 3428

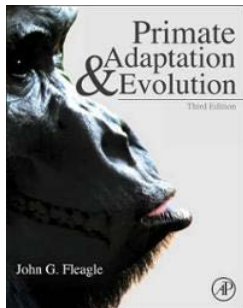
Office Hours: M 9:00-11:00 AM

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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, as well as the major lineages of extant primates (as the latter can serve as models by which to better understand the former, but also inform 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.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Course Requirements: Course requirements (aside from your weekly attendance of lectures being expected) will include:

- a mid-term examination (**25%** of final grade),
- three article review exercises (@ 10% each = **30%** of your final grade),
- a final examination (**35%** of final grade),
- discussion session participation (**10%** of final grade).

The format of the exams will include true/false, multiple choice, fill-in-the-blank and short answer questions. Material covered on the exams will come from lectures, text readings, discussion sessions, and supplementary discussion group readings, **but lecture and discussion material will be emphasized**. Be advised, lectures will include material that is **not** covered in the course text (a good reason to always attend class!).

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

- be able to demonstrate familiarity with the major “crown clades” of extant primates, and 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.

Statement on Accessibility at Western

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you.

Western’s commitment to Accessibility, visit:

<http://wss.uwo.ca/Student%20Services%20Organizational%20Units/Accessibility%20at%20Western/index.html>

Student Development Services <http://www.sdc.uwo.ca/ssd/> has staff members who specialize in assisting students with various disabilities to adjust to the university environment. These disabilities include, but are not limited to, vision, hearing and mobility impairments, learning disabilities, chronic illnesses, chronic pain, and attention deficit/hyperactivity disorders. Students who require special accommodations for disabilities should make a formal request through Student Development Services as early in the semester as possible.

Statement on Plagiarism and Scholastic Offences:

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following website:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offense.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement currently in place between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Evidence of suspected plagiarism will be reported to the Department Chair, who will give the student an opportunity to respond to the allegation. Where a determination of plagiarism has been made, the Chair shall assess appropriate penalties up to and including a zero on the assignment and failure in the course. The case will be reported to the Dean, who may assess additional penalties.

Western Medical Accommodation Policy (Medical Notes):

In May, 2008, The University of Western Ontario's Senate approved a new medical note policy, which affects all students. The following is an outline of that policy. For more detailed information and forms, please visit <https://studentservices.uwo.ca/secure/index.cfm> , and for further policy information please visit http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf

Documentation from Family Physicians and Walk-In Clinics:

A Western Student Medical Certificate (SMC)* is required where a student is seeking academic accommodation. This documentation should be obtained at the time of the initial consultation with the physician or walk-in clinic. An SMC* can be downloaded under the Medical Documentation heading of the following website:

<https://studentservices.uwo.ca/secure/index.cfm> .

Hard copies are available from the student's home Faculty Academic Counselling Service.

Documentation from Student Health Services:

Students obtaining documentation from Student Health Services should sign a "release of information." This form authorizes Student Health Services to provide information to the student's home Faculty. Release of information forms are available from, and can be arranged through, the student's home Faculty Academic Counselling Office.

Documentation from Hospital Urgent Care Centres or Emergency Departments:

Students should request that an SMC* be filled out. Students may bring this form with them, or request alternative Emergency Department documentation. Documentation should be secured at the time of the initial visit to the Emergency Department. Where it is not possible for a student to have an SMC* completed by the attending physician, the student must request documentation sufficient to demonstrate that his/her ability to meet his/her academic responsibilities was seriously affected.

*To print or see an example of the Western Student Medical Certificate (SMC) please visit

<https://studentservices.uwo.ca/secure/index.cfm> and click on 'Student Medical Certificate.pdf'.

SUPPORT SERVICES

Students who are in emotional/mental distress should refer to Mental Health@Western

<http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.

Additional Statements:

Statement on Use of Electronic Devices: Students are requested to switch off cell phones while in lecture. Students are not permitted access to cell phones during the mid-term and final exams. There will be no need for the use of calculators during either the mid-term or final exam. Electronic dictionaries, PDAs, Smart phones, etc., are not permitted during the mid-term or final exam. Students may use laptop computers to take notes during lecture, but only if this laptop usage is not a distraction to other students in the class -- use of a laptop by a student for purposes other than those directly related to the course (e.g., watching YouTube; exchanging messages over MSN; etc.) would be grounds for disallowing further use of the laptop in class by the student.

Statement on Use of Personal Response Systems ("Clickers"): "Clickers" will not be used in this course.

The above Statements are based on material that is available at:

http://www.uwo.ca/univsec/handbook/exam/courseoutlines_undergrad.pdf

Course Outline (tentative):

- Mon. Jan. 4: Introduction: Species concepts and forms of selection. Reading: Fleagle, chapter 1.
- Mon. Jan. 11: 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>
- Mon. Jan. 18: Primate origins – the Cretaceous and early Tertiary. Readings: Fleagle, chapter 10 & 11.
- Mon. Jan. 25: 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).
- Mon. Feb. 1: 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).
- *Mon. Feb. 8: * Mid-term Exam**
- **Mon. Feb. 15: **Reading Week -- no scheduled class!!**
- Mon. Feb. 22: 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>);
Raaum, 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”).

- Mon. Feb. 29: 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>).
- Mon. Mar. 7: 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>).
- Mon. Mar. 14: 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).

Mon. Mar. 21: 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>).

Mon. Mar. 28: Patterns in primate evolution, and the past and future of paleoprimateology..
 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).

Mon. Apr. 4: Review.

***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. 9-30)** -- specific date and time to be announced.

Discussion Groups and Article Review Exercises:

Beginning September 16, lectures will run from 1:30 until @ 3:20 (with a break @ 2:20, or so). The last part of each class will see one-third of the class engaging in a discussion group every third week. Discussion groups will meet according to the following schedule:

| | <u>Group 1</u> | <u>Group 2</u> |
|----------------------|----------------|----------------|
| <u>Discussion #1</u> | Jan. 18 | Jan. 25 |
| <u>Discussion #2</u> | Feb. 22 | Feb. 29 |
| <u>Discussion #3</u> | Mar. 14 | Mar. 21 |

The discussion group format is intended to allow us to highlight certain issues or problems that are of importance in the interpretation, understanding and reconstruction of primate adaptation and evolution. You should be sure to have read the relevant material for each discussion session (see below) before coming to class and to the discussion group so that you are prepared to discuss and comment on the material.

Each discussion will also include a short follow-up research assignment. Each follow-up research assignment will involve you searching out **two (2)** pertinent references **published since 2008 in peer-reviewed academic journals**, and **for each peer-reviewed paper you select**, provide a 2-3 page, double-spaced **summary of its content** and **commentary on its importance** to the **study of primate adaptation and evolution**. Thus, for each discussion follow-up assignment, you will be producing an article review document that is 4-6 pages in length (i.e., two (2) peer-reviewed papers, each given a 2-3 page review and commentary).

The purpose of these assignments is to allow you to explore the primary research literature on primate adaptation and evolution more fully than is possible within the limits of our weekly class time. You will, therefore, likely find yourself using bibliographic data bases (such as Science Citation Index) in order to track down relevant articles in academic journals such as (but certainly not limited to): *American Journal of Physical Anthropology*; *Evolutionary Anthropology*; *Folia Primatologica*; *International Journal of Primatology*; *Journal of Human Evolution*; *Nature*; *Science*; *Proceedings of the National Academy of Sciences*, etc. Recent issues of all the journals just listed (as well as many other relevant journals) are available online through www.lib.uwo.ca, in many cases spanning back several years. **Note: journal articles that are included in the course reading list as supplemental readings are not to be selected for these article review exercises**; not to worry, however – there is no shortage of recent fossil discoveries and comparative analyses reported in the recent paleoprimatological literature! One further hint – conducting searches with Google Scholar (or, even just a plain Google search) is, more and more, becoming a quick and efficient way of locating electronic versions of peer-reviewed journal publications. Of course, if you have any questions, drop by my office for a quick conferral (also usually quicker and more efficient than zapping e-mails back and forth!).

Each article review exercise will be graded out of 10 marks; their total value is **30%** of your final grade in the course. Reviews 1 and 2 will each be due three weeks after your discussion group meets (**i.e., at the next meeting of your discussion group**); **late submissions will be subject to a late penalty of 3 marks per class**. For all three discussion groups, review 3 will be due when the second last class of the term meets (Nov. 25). The topic areas for the discussions and article review exercises are as follows (unless otherwise noted*, discussion group readings are available online through www.lib.uwo.ca):

Discussion #1: Allometry, Life History and Paleobiology -- comparative primatology in the understanding of growth, development, reproduction and aging; relevant readings:

Fleagle, Chap. 9.

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

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., 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 on 2-Hr Reserve at Allyn & Betty Taylor Library: **QL 799.S34** ; alternatively, you could read Schmidt-Nielsen, 1975 -- *Scaling in biology: The consequences of size. Journal of Experimental Zoology* **194** (1): 287-307);

*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 on 2-Hr Reserve at Allyn & Betty Taylor Library: **QL737.P9S59 1985**);

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>).

Discussion #2: 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 readings:

Fleagle, Chap. 10.

Dunbar, R.I.M., 1989. "Ecological Modelling in an Evolutionary Context". *Folia Primatologica* 53: 235-246.

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).

Discussion #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.

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 (**note** -- this book is on 2-Hr Reserve at Allyn & Betty Taylor Library: **QH 366.2.R524**);

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