

ANTH 462: Primate Evolution
Spring Term 2017
University of Oregon

Instructor: Dr. Stephen Frost
Office: Condon 353
Office Hours: TR 9:00 – 10:00 a.m.
Lecture Room: 313 Condon

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Lecture Time: TR 2:00 – 3:50 p.m.

Text: Fleagle, J. 2013. *Primate Adaptation and Evolution*, 3rd Ed. Academic Press.

Description: This course explores the primate fossil record from the origin of primates through the various adaptive radiations of extant primates. It consists primarily of lecture sessions, but several class periods will be taken to examine extant and fossil specimens where available. The subjects will follow an essentially chronological/evolutionary sequence, beginning with primate origins, strepsirrhines and prosimian haplorhines, and then proceeding through the radiations of anthropoids.

While this course focuses on primate morphology and evolution, background in several subjects is expected, including basic anatomy, primate diversity, biological classification, evolutionary theory, stratigraphy, taphonomy, and geochronology.

Requirements: Evaluation will be based on the following criteria:

Attendance and participation:	5%
Annotated bibliographies:	20%
Quizzes	20%
Group Encyclopedia Article	25%
Final Paper	30%

Participation is based on attendance, asking informed questions based on course readings during lecture and participation in labs.

Annotated bibliographies are due every Tuesday and cover all assigned articles from the previous week. These are listed at the end of this syllabus and available on Canvas. Each entry should include the article citation plus a short paragraph (ca. 100 – 200 words) describing the article's subject and why it matters.

There will be four quizzes. Two of these will involve specimen identification and be weighted more heavily than the other two.

During the third week of class, you will be divided into groups of two or three, which will each develop an encyclopedia article for a fossil primate species or other taxon. The chosen subject must currently be a stub or not exist on Wikipedia, and needs to be approved by me.

Final paper is described in a separate document posted on Canvas.

Students with disabilities: If you have a documented disability and anticipate needing accommodations in this course, please make arrangements to meet with the me soon. Please request that the Counselor for Students with Disabilities send a letter outlining your approved accommodations. [Disability Services: disabsrv@uoregon.edu, 346-1155; <http://ds.uoregon.edu/>].

Schedule: Following, is a tentative schedule of lecture and lab topics. Readings from the optional course text for each lecture topic are given in parentheses. In addition, several peer-reviewed articles are also to be read (weekly average about 60 pp). These are on Canvas, and listed at the end of this syllabus. These readings are intended to provide background for the lectures, as well as alternative opinions. Material in the lectures is often different from that given in the assigned reading. **This schedule is very tentative, expect changes!**

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| April | 4 | Lecture 1: Geochronology, Cenozoic Timescale, Taphonomy (Chapter 10) |
| | 6 | Lecture 2: Paleoclimatology, Paleogeography (Chapter 10) |
| | 11 | Lecture 3: Extant Primate Radiations (Chapters 4-7) |
| | 13 | Lecture 4: Primate Origins and Place Among Mammals (Chapter 11) |
| | 18 | Lecture 5: Plesiadapiforms (Chapter 11) |
| | 20 | Lab 1: <i>Extants and Plesiadapiforms</i> |
| | 25 | Lecture 6: Adapiformes (Chapter 12) |
| | 27 | Lecture 7: Lemuriformes and Subfossil Lemurs (Chapter 12; Chapter 4: pp. 73-77) |
| May | 2 | Lab 2: <i>Strepsirhines</i> |
| | 4 | Lecture 8: Tarsiformes (Chapter 12) |
| | 9 | Lecture 9: Early Stem Anthropoids (Chapter 13) |
| | 11 | Lecture 10: New World Anthropoids (Chapter 14) |
| | 16 | Lab 3: <i>Haplorhines</i> (Fossil Quiz I) |
| | 18 | Lecture 11: Primitive Stem Catarrhines (Chapter 15) |
| | 23 | Lab 4: <i>Stem Catarrhines</i> |
| | 25 | Lecture 12: Hominoids (Chapter 15) |
| | 30 | Lab 5: <i>Hominoids</i> |
| June | 1 | Lecture 13: Cercopithecoids: Victoriapithecines and Cercopithecines (Chapter 16) |
| | 2 | Lecture 14: Cercopithecoids: Colobines (Chapter 16) |
| | 4 | Lab 6: <i>Cercopithecoids</i> |
| | 13 | 12:30 Fossil Quiz II, Papers Due, Projects Due. |

Week 1

Lecture 1: Geochronology, Cenozoic Timescale, Taphonomy

- Brown FH, Van Couvering JA. 2000. Stratigraphy. In: (Delson E, Tattersall I, Van Couvering JA, Brooks AS, eds.) *Encyclopedia of human evolution and prehistory*, 2nd Ed. New York: Garland. p 674-677.
- Brown FH. 2000. Tephrochronology. In: (Delson E, Tattersall I, Van Couvering JA, Brooks AS, eds.) *Encyclopedia of human evolution and prehistory*, 2nd Ed. New York: Garland. p 704.
- Brown FH. 2000a. Paleomagnetism. In: (Delson E, Tattersall I, Van Couvering JA, Brooks AS, eds.) *Encyclopedia of human evolution and prehistory*, 2nd Ed. New York: Garland. p 532-534.
- Time Chart showing the cenozoic from the introduction of Delson E, Tattersall I, Van Couvering JA, and Brooks AS (2000) *Encyclopedia of Human Evolution and Prehistory*, 2nd Ed. New York: Garland.
- Weins RC. 2002. *Radiometric dating: a Christian perspective*. New Mexico: Self Published.

Lecture 2: Paleoclimatology, Paleogeography

- Van Couvering JA. 2000b. Sea Level Change. In: (Delson E, Tattersall I, Van Couvering JA, Brooks AS, eds.) *Encyclopedia of human evolution and prehistory*, 2nd Ed. New York: Garland. p 627-632.
- Zachos J, Pagani M, Sloan L, Thomas E, Billups K. 2001. Trends, rhythms, and aberrations in global climate 65 Ma to present. *Science* 292:686-693.

Week 2

Lecture 3: Extant Primate Radiations

- Delson E, Tattersall I. 2000. Primates. In: (Delson E, Tattersall I, Van Couvering JA, Brooks AS, eds.) *Encyclopedia of human evolution and prehistory*, 2nd Ed. New York: Garland Publishing. p 590-595.
- Rosenberger AL, Hartwig WC. 2013. Primates (Lemurs, Lorises, Tarsiers, Monkeys and Apes). In: eLS. John Wiley & Sons, Ltd: Chichester.

Lecture 4: Primate Origins and Place Among Mammals

- O'Leary MA, Bloch JI, Flynn JJ, Gaudin TJ, Giannini NP, Goldberg SL, Kraatz BP, Luo Z-X, Meng J, Ni X, Novacek MJ, Perini FA, Randall ZS, Rougier GW, Sargis EJ, Silcox MT, Simmons NB, Spaulding M, Velazco PM, Weksler M, Wible JR, Cirranello AL. 2013. The placental mammal ancestor and the post-K-Pg radiation of placentals. *Science* 339:662-667.
- Sargis EJ, Boyer DM, Bloch JI, Silcox MT. 2007. Evolution of pedal grasping in Primates. *J. Hum. Evol.* 53:103-17.
- Silcox MT, Sargis EJ, Bloch JI, Boyer DM. 2013. Morphological evidence for primate origins and supraordinal relationships. In: (Henke W, Tattersall I, eds) *Handbook of Paleoanthropology*. Berlin, Heidelberg: Springer-Verlag. p 1-27.
- Chester SBG, Bloch JI, Boyer DM, Clemens WA. 2015. Oldest known euarchontan tarsals and affinities of Paleocene *Purgatorius* to Primates. *Proc. Natl. Acad. Sci. USA*. 112:1488-1492.

Week 3

Lecture 5: Plesiadapiforms

- Block JI, Silcox MT, Boyer DM, Sargis EJ. 2007. New Paleocene skeletons and the relationship of plesiadapiforms to crown-clade primates. *Proc. Natl. Acad. Sci. USA* 104:1159-1164.

- Orliac MJ, Ladevèze S, Gingerich PD, Lebrun R, Smith T. 2014. Endocranial morphology of Paleocene *Plesiadapis tricuspidens* and evolution of the early primate brain. *Proc. R. Soc. B* 281:20132792.
- López-Torres S, Selig KR, Prufrock KA, Lin D, Silcox MT. 2017. Dental topographic analysis of paromomyid (Plesiadapiformes, Primates) cheek teeth: more than 15 million years of changing surfaces and shifting ecologies. *Histor. Bio.* 2017:1-13.

Week 4

Lecture 6: Adapiformes

- Godinot M. 2014. Fossil record of the primates from the Paleocene to the Oligocene. In: (Henke W, Tattersall I, eds) *Handbook of Paleooanthropology*. Berlin, Heidelberg: Springer-Verlag. p 1-102.

Note: For this week just read pages 1-23 through Adapiforms.

- Maiolino S, Boyer DM, Bloch JI, Gilbert CC, Groenke J. 2012. Evidence for a grooming claw in a North American adapiform primate: implications for anthropoid origins. *PLoS ONE* 7:e29135.
- Samuels JX, Albright LB, Fremd TJ. 2015. The last fossil primate in North America, new material of the enigmatic *Ekgmowechashala* from the Arikarean of Oregon. *Am. J. Phys. Anthropol.* 158:43-54.

Lecture 7: Lemuriformes and Subfossil Lemurs

- Herrera JP, Dávalos LM. 2016. Phylogeny and divergence times of lemurs inferred with recent and ancient fossils in the tree. *Syst. Bio.* 65:772-791.
- Seiffert ER. 2007. Early evolution and biogeography of lorisiform strepsirhines. *Am. J. Primatol.* 69:27-35.
- López-Torres S, Schillaci MA, Silcox MT. 2015. Life history of the most complete fossil primate skeleton: exploring growth models for *Darwinius*. *R. Soc. Open Sci.* 2:150340.

Week 5

Lecture 8: Tarsiiformes

- Godinot M. 2014. Fossil record of the primates from the Paleocene to the Oligocene. In: (Henke W, Tattersall I, eds) *Handbook of Paleooanthropology*. Berlin, Heidelberg: Springer-Verlag. p 1-102.

Note: For this week just read pages 27-48 on Omomyoids and Tarsiids.

- Beard KC. 2008. The oldest North American primate and mammalian biogeography during the Paleocene–Eocene Thermal Maximum. *Proc. Natl. Acad. Sci. USA* 105:3815-3818.
- Gebo DL, Smith R, Dagosto M, Smith T. 2015. Additional postcranial elements of *Teilhardina belgica*: the oldest European primate. *Am. J. Phys. Anthropol.* 156:388-406.
- Rossi JB, Ni X, Beard KC. 2006. Cranial remains of an Eocene tarsier. *Proc. Natl. Acad. Sci. USA* 103:4381-4385.

Week 6

Lecture 9: Early Stem Anthropoids

- Godinot M. 2014. Fossil record of the primates from the Paleocene to the Oligocene. In: (Henke W, Tattersall I, eds) *Handbook of Paleooanthropology*. Berlin, Heidelberg: Springer-Verlag. p 1-102.

Note: For this week just read pages 48-60 on Eosimiids, North American Enigmas and Amhipithecids.

- Ni X, Li Q, Li L, Beard KC. 2016. Oligocene primates from China reveal divergence between African and Asian primate evolution. *Science* 352:673-677.

- Seiffert ER. 2012. Early primate evolution in Afro-Arabia. *Ev. Anth.* 26:239-253.

Lecture 10: New World Anthropoids

- Rosenberger AL, Hartwig WC. 2013. New World Monkeys. In: eLS. John Wiley & Sons, Ltd: Chichester.
- Kay RF. 2015. Biogeography in deep time – What do phylogenetics, geology, and paleoclimate tell us about early platyrrhine evolution? *Mol Phylogenet Evol* 82:358-374.
- Bond M, Tejedor MF, Campbell KE, Chornogubsky L, Novo N, Goin F. 2015. Eocene primates of South America and the African origins of New World monkeys. *Nature* 520:538-541.
- Bloch JL, Woodruff ED, Wood AR, Rincon AF, Harrington AR, Morgan GS, Foster DA, Montes C, Jaramillo CA, Jud NA, Jones DS, MacFadden BJ. 2016. First North American fossil monkey and early Miocene tropical biotic interchange. *Nature* 533:243-246.

Week 7

Lecture 11: Primitive Stem Catarrhines

- Harrison T. 2013. Catarrhine origins. In: (Begun DR, ed) *A companion to paleoanthropology*. Blackwell. pp. 376-393.
- Sankhyan AR, Kelley J, Harrison T. 2017. A highly derived pliopithecoid from the Late Miocene of Haritalyangar, India. *J Hum Evol* 105:1-12.
- Cote S, McNulty KP, Stevens NJ, Nengo IO. 2016. A detailed assessment of the maxillary morphology of *Limnopithecus evansi* with implications for the taxonomy of the genus.
- Shearer BM, Ungar PS, McNulty KP, Harcourt-Smith WEH, Dunsworth HM, Teaford MF. 2015. Dental microwear profilometry of African non-cercopithecoid catarrhines of the Early Miocene. *J Hum Evol* 78:33-43.
- Michel LA, Peppe DJ, Lutz JA, Driese SG, Dunsworth HM, Harcourt-Smith WEH, Horner WH, Lehman T, Nightingale S, McNulty KP. 2014. Remnants of an ancient forest provide ecological context for Early Miocene fossil apes. *Nat Comm* 5:3236.

Week 8

Lecture 12: Hominoids

- Harrison T. 2010. Apes among the tangled branches of human origins. *Science* 327:532-534.
- Kunimatsu Y, Nakatsukasa M, Sawada Y, Sakai T, Saneyoshi M, Nakaya H, Yamamoto A, Mbua E. 2016. *Anthropol Sci.* 124:75-83.
- DeMiguel D, Alba DM, Moyà-Solà S. 2014. Dietary specialization during the evolution of western Eurasian hominoids and the extinction of European great apes. *PLoS ONE* 9:e97442.
- de Bonis L, Koufos GD. 2014. First discovery of postcranial bones of *Ouranopithecus macedoniensis* (Primates, Hominoidea) from the late Miocene of Macedonia (Greece). *J Hum Evolution* 74:21-36.
- Zhang Y, Harrison T. 2017. *Gigantopithecus blacki*: a giant ape from the Pleistocene of Asia revisited. *Am J Phys Anthropol* 162:153-177.

Week 9

Lecture 13: Cercopithecoids: Victoriapithecines and Cercopithecines

- Stevens NJ, Seiffert ER, O'Connor PM, Roberts EM, Schmitz MD, Krause C, Gorscak E, Ngasala S, Heironymus TL, Temu J. 2013. Palaeontological evidence for an Oligocene divergence between Old World monkeys and apes. *Nature* 497:611-614.

- Gibling CC. 2013. Cladistic analysis of extant and fossil African papionins using craniodental data. *J Hum Evol* 64:399-433.
- Gilbert CC, Bibi F, Hill A, Beech MJ. 2014. Early guenon from the late Miocene Baynunah Formation, Abu Dhabi, with implications for cercopithecoid biogeography and evolution. *Proc Natl Acad Sci USA* 111:10119-10124.
- Levin NE, Haile-Selassie Y, Frost SR, Saylor BZ. 2015. Dietary change among hominins and cercopithecids in Ethiopia during the early Pliocene. *Proc Natl Acad Sci USA* 112:12304-12309.
- Nishimura TD, Ito T, Yano W, Ebbestad JOR, Takai M. 2014. Nasal architecture in *Procynocephalus wimani* (Early Pleistocene, China) and its implications for phyletic relationship with *Paradolichopithecus*. *Anthropol Sci* 122:101-113.

Week 10

Lecture 14: Cercopithecoids: Colobines

- Frost SR, Gilbert CC, Pugh KD, Guthrie EH, Delson E. 2015. The hand of *Cercopithecoides williamsi* (Mammalia, Primates): earliest evidence for thumb reduction among colobine monkeys. *PLoS ONE* 10:e0125030.
- Rossie JB, Gilbert CC, Hill A. 2013. Early cercopithecoid monkeys from the Tugen Hills, Kenya. *Proc. Natl. Acad. Sci. USA*. 110:5818-5822.
- Takai M, Thaung-Htike, Zin-Maung-Maung-Thein, Soe AN, Maung M, Tsubamoto T, Egi N, Nishimura TD, Nishioka Y. 2015. First discovery of colobine fossils from the Late Miocene/Early Pliocene in central Myanmar. *J Hum Evol* 84:1-15.