NEW YORK UNIVERSITY
Department of Anthropology SPRING, 2012

ANTH-UA 56 – Comparative Biology of the Living Primates

Mondays and Wednesdays 3:30-4:45
Room 706, 25 Waverly Place, Department of Anthropology

CONTACT INFORMATION

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SUMMARY OF COURSE

The study of the comparative anatomy of the primates, our closest living relatives, is fundamental to a sound understanding of human biology and evolution. This course surveys the anatomy of the living primates from a structural, functional and evolutionary perspective. The subject is reviewed topically by examining different anatomical systems and behaviors – external features, the cranium, dentition and dietary behavior, postcranial anatomy and locomotor behavior, sensory and nervous systems, dentition and dietary behavior, and reproductive anatomy. The role of comparative anatomy in functional and behavioral studies, taxonomy, and phylogenetic analyses is emphasized.

READINGS

(1) There is no formal textbook for this course.
(2) All students will need to buy a copy of *The Pictorial Guide to the Living Primates* by Noel Rowe (Pogonias Press, 1996), available in paperback. This book will be used throughout the course for reference and for class projects.
(3) Required readings are available on Blackboard. These are review articles and research papers from the primary literature (i.e., scientific journals and chapters from edited volumes) on comparative biology of the primates (and other mammals). They include a mix of historically important articles and recent advances.

REQUIREMENTS

(1) There will be no **final exam**.
(2) Five **quizzes** will be given during class (as shown in the course schedule), and will be based on readings and material covered in the previous classes. The lowest grade will be dropped from the final calculation. There will be no make-up quizzes. (40% of grade).
(3) **Class reports** will be assigned throughout the semester. These will consist of brief reports that discuss key issues or analyze comparative data (20% of grade).
(4) **Class project** at the Bronx Zoo on primate locomotor behavior (30% of grade). Equivalent of a term paper.
(5) **Class participation** in discussion is critical to understanding the concepts and readings (10% of grade). It is important that you keep up with the readings and come prepared each class.

COURSE SCHEDULE

January 23	Primates: taxonomy and zoogeography
January 25	Primate adaptive diversity
January 30	Primate locomotion
February 1	Body size, allometry and sexual dimorphism
February 6	External features
February 8	**Practical Session 1: Skeleton (QUIZ 1)**
February 13	External features
February 15	Cranium
February 20	**Presidents' Day (no classes)**
February 22	Sensory apparatus
February 27	Brain size and anatomy
February 29	Dietary behavior
March 5	Dentition: Structure
March 7	**Practical Session 2: Cranium & Dentition (QUIZ 2)**
March 12	**Spring Recess**
March 19	Dentition: Diversity
March 21	Dentition: Function and behavior
March 26	Alimentary tract
March 28	**Practical Session 3: Postcranial skeleton (QUIZ 3)**
April 2	Musculo-skeletal system: biomechanics and functional morphology
April 4	Axial skeleton
April 9	Forelimb
April 11	Hip
April 16	Hip (AAPA meetings)
April 18	**Practical Session 4: Axial skeleton & forelimb (QUIZ 4)**
April 23	Hind limb
April 25	Hands and feet
April 30	Reproductive anatomy and behavior
May 2	**Practical Session 5: Hip and hindlimb (QUIZ 5)**
May 7	Reproductive anatomy and behavior. **No Final Exam – Zoo report due.**

Reading List: Comparative Biology of the Living Primates

All papers are available on Blackboard

January 25: Primate adaptations
Silcox et al. (2007): Primate origins and supraordinal relationships.

January 30: Locomotion
Cartmill (1974): Pads and claws in arboreal locomotion.
Clevedon Brown & Yalden (1973): The description of mammals 2 – Limbs and locomotion of terrestrial mammals.
Dagosto & Gebo (1998): Methodological issues in studying positional behavior.
Gebo (1996): Climbing, brachiation, and terrestrial quadrupedalism.
Gebo & Chapman (1995): Positional behavior in five sympatric Old World monkeys.
Hunt et al. (1996): Standardized descriptions of primate locomotor and postural modes.
Rollinson & Martin (1981): Comparative aspects of primate locomotion, with special reference to arboreal cercopithecines.
Thorpe et al. (2007): Origin of human bipedalism as an adaptation for locomotion on flexible branches.

February 1: Allometry and dimorphism
Fleagle (1985): Size and adaptation in primates.
Martin (1990): The importance of body size.
Plavcan (2011): Understanding dimorphism as a function of changes in male and female traits.
Schmidt-Nielsen (1975): Scaling in biology.

February 6 & 13: External features
Bradley & Mundy (2008): The primate palette.
Clevedon Brown (1973): The description of mammals – The external characters of the head.
Hickman (1979): The mammalian tail: a review of functions.
Soligo & Mueller (1999): Nails and claws in primate evolution.
Wheeler (1984): The evolution of bipedality and loss of functional body hair in hominids.

February 15: Cranium
Kay & Kirk (2000): Osteological evidence for the evolution of activity pattern and visual acuity in primates.
Rae & Koppe (2004): Holes in the head.
Ravosa et al (2000): Masticatory stress, orbital orientation and the evolution of the primate postorbital bar.
Ross (1995): Muscular and osseous anatomy of the primate anterior temporal fossa and the functions of the postorbital septum.
Walker et al. (2008): The semicircular canal system and locomotion: The case of extinct lemuroids and lorisoids.

February 22: Sensory
Brennan & Keverne (2004): Something in the air?
Dominy et al. (2001): The sensory ecology of primate food perception.
Dominy et al. (2003): Historical contingency in the evolution of primate color vision.
Heffner (2004): Primate hearing from a mammalian perspective.
Jacobs (2003): Progress toward understanding the evolution of primate color vision.
Kirk (2004): Comparative morphology of the eye in primates.
Kirk (2006): Effects of activity patterns on eye size and orbital aperture in primates.
Kobayashi & Kohshima (2001): Unique morphology of the human eye and its adaptive meaning.
Ross & Kirk (2007): Evolution of eye size and shape in primates.
Smith et al. (2001): Reappraisal of the vomeronasal system of catarrhine primates.
Smith et al. (2007): Evolution of the nose and nasal skeleton in primates.
Tomasello et al. (2007): Reliance on head versus eyes in the gaze following of great apes and human infants.
Wysocki & Preti (2004): Facts, fallacies, fears and frustrations with human pheromones.

February 27: Brain
Barton (2006): Primate brain evolution.
Dunbar (2003): The social brain: Mind, language and society in evolutionary perspective.
Falk (2007): Evolution of the primate brain.
Martin (1990): Evolution of the primate central nervous system.
Schoenemann (2006): Evolution of the size and functional areas of the human brain.

February 29: Dietary behavior
Dominy et al. (2001): The Sensory ecology of primate food perception (also for Feb 22).
Garber (1987): Foraging strategies among living primates.
Lambert (1998): Primate digestion.
Lambert (2005): Competition, predation, and the evolutionary significance of the cercopithecine cheek pouch.
Lambert (2007): The biology and evolution of ape and monkey feeding.
Nash (1986): Dietary, behavioral, and morphological aspects of gummivory in primates.

March 5: Dentition - structure
Lucas et al. (2008): Dental enamel as a dietary indicator in mammals.
Maas & Dumont (1999): Built to last.
Schwartz (2000): Taxonomic and functional aspects of the patterning of enamel thickness distribution in extant large-bodied hominoids.

March 21: Dentition- function
Hiiemae & Kay (1973): Evolutionary trends in the dynamics of primate mastication.
Hylander (1975): Incisor size and diet in anthropoids with special reference to Cercopithecidae.
Kay (1975): The functional adaptations of primate molar teeth.
Semprebon et al. (2004): Can low-magnification stereomicroscopy reveal diet?
Strait (1997): Tooth use and the physical properties of food.

Teaford (1994): Dental microwear and dental function.
Teaford & Ungar (2007): Dental adaptations of African apes.
Ungar (1998): Dental allometry, morphology, and wear as evidence for diet in fossil primates.
Ungar & Sponheimer (2011): The diets of early hominins.

March 26: Alimentary tract
Chivers & Hladik (1980): Morphology of the gastrointestinal tract in primates.
Martin (1990): Primate diets and dentitions.

April 2: Musculo-skeletal
Biewener (1990): Biomechanics of mammalian terrestrial locomotion.
Fleagle (1976): Locomotor behavior and skeletal anatomy of sympatric Malaysian leaf-monkeys.
Maynard-Smith (1956): Some locomotory adaptations in mammals.

April 4: Vertebrae
Lovejoy (2005): The natural history of human gait and posture, part 1.
McCollum et al. (2010): The vertebral formula of the last common ancestor of African apes and humans.
Schultz & Straus (1945): The number of vertebrae in primates.
Shapiro (1993): Functional morphology of the vertebral column in primates.
Whitcome et al. (2007): Fetal load and the evolution of lumbar lordosis in bipedal hominins.
Williams (2011): Variation in anthropoid vertebral formulae: Implications for homology and homoplasy in hominoid evolution.

April 9: Forelimb
Cartmill & Milton (1977): The lorisiform wrist joint and the evolution of "brachiating" adaptations in the Hominoidea.
Larson (2007): Evolutionary transformation of the hominin shoulder.
Rose (1993): Functional anatomy of the elbow and forearm in primates.

April 11 & 16: Hip
Lieberman et al. (2006): The human gluteus maximus and its role in running.
Lovejoy (1988): Evolution of human walking.
Lovejoy (2005): The natural history of human gait and posture, part 2.

April 23: Hindlimb
Lovejoy (2005): The natural history of human gait and posture, part 3
Napier (1967): The Antiquity of Human Walking.

April 25: Hands and feet
Gebo (1993): Functional morphology of the foot in primates.
Midlo (1934): Form of hand and foot in primates.
Napier (1962): The evolution of the hand.

Richmond & Strait (2000): Evidence that humans evolved from a knuckle-walking ancestor.
Richmond (2007): Biomechanics of phalangeal curvature.
Tuttle (1969): Knuckle-walking and the problem of human origins.

April 30 & May 7: Reproduction
Harcourt (1995): Sexual selection and sperm competition in primates.
Martin (1990): Primate reproductive biology.
Martin (2007): The evolution of human reproduction.
Martin (2008): Evolution of placentation in primates: Implications of mammalian phylogeny.
Moller (1988): Ejaculate quality, testes size and sperm competition in primates.
Rosenberg (1992): The evolution of modern human childbirth.
Ross (1998): Primate life histories.