

1 Extant Primates

An Overview With Regard to Taxonomic Classification

Anth 1013 Lecture
29 September 2004

2 Taxonomy

§ Taxonomy

§ Field that specializes in the “rules” of classification

§ Classifying biological organisms—including primates

§ Based on the system originally proposed by Linnaeus

§ Binomial nomenclature: *Genus species*

§ Genus name always capitalized; species name not capitalized

§ Always underlined (or in italics)

§ Can abbreviate genus name

§ Ex: *Homo sapiens* written as *H. sapiens*

3 Taxonomy (cont.)

1 § Organisms divided into a hierarchical system

§ Each group further divided into an increasingly specific category

2 § Basic Linnaean Hierarchy

§ Kingdom

§ Phylum

§ Class

§ Order

§ Family

§ Genus

§ Species

4 The Order *Primates*

§ All primates included within the order *Primates*

§ Suborders

§ Prosimii

§ Anthropoidea

§ Divisions say something about relatedness of species within the group

5 Differing Classifications

§ Depending on what criteria are used, taxonomic classifications can look different

§ Most agree on the suborder division of primates: prosimians and anthropoids

§ What makes for inclusion/exclusion from these groups?

§ Remember, we look for characteristics that are shared by members

§ What about biochemical data?

§ Humans and chimpanzees are identical in 145 of 146 amino acids that code for the hemoglobin beta chain

§ DNA hybridization: 98.4% of human and chimpanzee DNA bases match

6 Differing Classifications (cont.)

§ Renaming of the suborders

§ Strepsirhini instead of Prosimii

§ Does not include the tarsier

§ Haplorhini instead of Anthropoidea

§ Includes tarsiers, monkeys, apes, and humans

7 The Suborders

- 1 § Prosimians
 - § rhinarium
 - § mark territories with scent
 - § more laterally placed eyes
 - § shorter gestation and maturation
 - § small body size
 - § dental comb
 - § No postorbital closure
 - § unfused mandibular symphysis
 - § grooming claw on the second toe

- 2 § Anthropoids
 - § larger body size
 - § larger brain (to body size)
 - § complete rotation of eyes to front of face
 - § no rhinarium
 - § increased gestation and maturation periods
 - § more mutual grooming
 - § postorbital closure
 - § fused mandibular symphysis
 - § nails

8 Prosimians

§ Infraorders

- § Lemuriformes (all lemurs)
- § Lorisiformes (lorises and galagos)

§ All found in the Old World (i.e., Africa and Asia)

§ Tarsiers

- § Traditionally included with prosimians as infraorder Tarsiiformes
- § We will discuss them separately

9 Infraorder: Lemuriformes (Lemurs)

- § Found only on the island of Madagascar and adjacent islands off the eastern coast of Africa
- § Range in size from the small-bodied (5 in.) to the large-bodied (2 ft.)
- § Either arboreal or terrestrial

10 Ring-tailed Lemur (*Lemur catta*)

- § diurnal
- § quadrupedal walkers and runners, mainly terrestrial
- § 30% of day and 65% of traveling time on ground
- § most terrestrial of Prosimians
 - § live in large social groups of 20, with more or less equal number of males and females

11 Ring-tailed Lemur (*Lemur catta*)

- § societies center around a group of females who are dominant over the males
- § diet consists of fruits and leaves
- § They have a dental formula of 3-1-3-3

12 **Infraorder Lemurformes, Family Indridae**

§ *Indri indri*

- § they only have four instead of six teeth in their dental comb
- § specialized leapers, long hindlimbs
- § single births, and most are monogamous
- § some populations have larger groups
- § Diurnal
- § No tail

13 ***Propithecus sifaka***

§ *Propithecus sifaka* :

- § medium size
- § very long limbs, especially legs
- § diurnal
- § vertical clingers and leapers
- § Frugivores, also eat leaves (seasonally)
- § live in moderate size groups (3-9 individuals)
- § single infant birth, once a year
- § defend large territories from other groups

14 ***Daubentonia madagascariensis*:**

The aye aye

- § Perhaps the most intriguing of the lemurs
- § Has claws on its hands and feet
- § Its third digit is elongated and thin with a hook claw
- § Nocturnal lemur

15 **Lorisiformes**

§ Lorises

- § At least 8 species found in the tropical forest habitats of India, Sri Lanka, Southeast Asia, and Africa
- § Slow, quadrupedalism; suspension by hind limbs while feeding

§ Galagos

- § Around 6 to 9 species found in forested and woodland savanna areas of sub-Saharan Africa
- § Vertical clingers and leapers

- § Both lorises and galagos have relatively long life spans for small-bodied mammals (about 14 and 19 years, respectively)

16 **Tarsiers**

- § 3 species found on islands of SE Asia
- § Nocturnal insectivores
- § Clingers and leapers
- § Mated pair with offspring
- § **Nearly enclosed eye orbit and no rhinarium**
- § Immovable eyes with 180° rotation of head

17 **Anthropoids**

§ Some general traits of anthropoids:

- § larger body size
- § larger brain (to body size)
- § complete rotation of eyes to front of face
- § no rhinarium

- § increased gestation and maturation periods
- § more mutual grooming
- § postorbital closure
- § fused mandibular symphysis
- § nails

18 **Infraorders of Anthropoids**

1 **§ Platyrrhines (New World monkeys)**

- § small to medium body size
- § rounded shaped external nostrils (name)
- § they have three premolars
- § fused tympanic ring, that does not extend laterally as a bony tube
- § parietal and zygomatic bones join to separate the frontal from the sphenoid
- § all have a tail, and in five genera it is prehensile
- § most lack an opposable thumb

2 **§ Cattarrhines (Old World monkeys, apes, and humans)**

- § nostrils are narrow and face downward
- § have two rather than three premolars 2-1-2-3
- § frontal sphenoid contact
- § tubular external auditory meatus
- § All OWM, Gibbons, Chimps have expanded ischial tuberosities
- § much larger than platyrrhines
- § more folivorous and terrestrial
- § no prehensile tail

19 **Playrrhines and Catarrhines**

20 **Platyrrhini: Family Callitrichidae**

- § The family callitrichidae is composed of two genera, *Callithrix* (marmoset) and *Saguinus* (tamarin)
- § smallest and most distinctive of NWM
- § unique dental formula of 2-1-3-2, loss of third molars
- § short snouts with long braincases
- § skeletons have long trunks, legs, and tails
- § all digits except the big toe end in claws
 - § this adaptation allows them to cling to the sides of tree trunks to feed on gums, saps, and insects.
- § Typically give birth to twins
- § males play a major role in care for infants and are responsible for transporting them
- § one female with several breeding males

21 ***Callithrix***

§ Marmosets

- § Enlarged incisors with enamel on one surface
 - § Chisel shape
- § Bite holes in trees to extract gums, saps, and resins
- § Also forage for insects and are frugivorous

22 **Tamarins**

§ Lion Tamarin

- § largest callitrichines
- § 3 species (1 golden)
- § lowland rainforest of southeastern Brazil

23 **Tamarins**

- § *Saguinus imperator* (tamarin) named for emperor Franz Joseph of Austria because of its sweeping mustache
- § from the upper Amazonian region of Peru and Bolivia
- § diet of fruit, nectar and insects

§ social group consist of family

24 **Infrared Platyrrhini, Family Cebidae**

§ ***Cebus*, the squirrel monkey**

- § frugivores, insectivorous
- § live in large groups that vary from sizes from 12 to 100
- § system of vocal communication
- § hierarchy of adult females
- § give birth to a relatively large single offspring

25 ***Saimiri sciureus***

§ **Squirrel monkey**

- § all are gray to yellow monkeys with short fur and a long tail
- § commonly used as laboratory animals, and were once common as pets
- § arboreal quadrupeds

26 ***Cebus*, the capuchin or organ-grinder monkey**

- § short fur covered prehensile tail
- § medium size, sexually dimorphic
- § large premolars, used to open nut shells
- § short fingers with an opposable thumb
- § arboreal quadrupeds
- § opportunistic monkeys that use their manipulative abilities and strength to obtain food

27 **Capuchin**

- § fruit, nuts, and insects
- § live in social groups of a dozen or so individuals with several adult males, several females, and offspring
- § Sexual dimorphism and obvious dominance hierarchy among males
- § genus is divided into four species, most common is white capped from central America

28 ***Alouatta***

§ **Howler monkey**

- § broad distribution, ranging from southern Mexico to Argentina
- § 6 species
- § all are large and sexually dimorphic
- § have prehensile tails
- § Diet of fruit and flowers

29 ***Alouatta***

- § live in groups of containing a single adult male , several adult females and their offspring
- § Competition between males for groups
- § Both vocalizations and aggressive attacks

30 ***Alouatta***

- § small cranial capacity, the mandible is quite large and deep, and the hyoid bone is

- expanded into a very large, hollow
 - § Resonating chamber
- § slow quadrupedal monkeys that rarely leap
- § poorly differentiated thumbs

- 31 ***Atleles*, spider monkeys**
 § four species that range from the Yucatan peninsula of Mexico through Amazonia

§ variable in details of coloration

§ large , graceful, long slender limbs

- 32 ***Atleles*, spider monkeys**
 § prehensile tail
 § not sexually dimorphic
 § fingers and toes are long and slender
 § extremely diverse locomotor patterns
 - § use both arboreal quadrupedalism and suspensory behavior including brachiation and climbing

- 33 ***Atleles*, spider monkeys**
 § feed primarily on ripe fruit, but in some seasons they eat large amounts of new leaves
 § groups contain generally a dozen or so individuals of both sexes many ages
 § during the day the large group breaks down into smaller foraging groups of five or so
 § single births, cared for by mother

- 34 ***Aotus*, owl monkey**
 § the only nocturnal higher primate
 § medium size with no marked sexual dimorphism
 § long legs and tail
 § slightly opposable thumbs
 § have a compressed claw- like nail on the fourth digit for grooming
 § larger orbits than any other anthropoid

- 35 ***Aotus*, owl monkey**
 § predominately quadrupedal but are adept leapers
 § frugivores, supplemented by foliage and insects
 § social group consists of a monogamous pair with offspring
 § rarely groom one another
 - § rare for monogamous pairs
 § male provides care for infant

- 36 **Catarrhini**
 § Old World monkeys, apes, and humans
 § nostrils are narrow and face downward
 § have two rather than three premolars 2-1-2-3
 § frontal sphenoid contact

- § tubular external auditory meatus
- § expanded ischial callosities
- § much larger than platyrrhines
- § more folivorous and terrestrial
- § no prehensile tail

37 **The Suborder Anthroidea**

38 **Old World Monkeys belong to two distinct families**

1 § **Colobines**

- § predominately leaf and seed eaters
- § complex stomachs
- § narrower incisors and molar teeth with cusps
- § broad interorbital region
- § deep jaw
- § long legs and short arms
- § long tail

2 § **Cercopithecines**

- § fruit eaters
- § have cheek pouches
- § broader incisors and molar teeth with high crowns and relatively low cusps
- § narrow interorbital region
- § shallow jaw
- § arms and legs have similar length
- § short tail

39 **Cercopithecines**

- § The cercopithecines are predominately an African group, with the exception of the genus *Macaca*
- § **Macaques**
 - § medium size
 - § share many characteristics with the African baboons
 - § long snouts, large incisors, and chromosome #44
 - § widest distribution of any nonhuman primate
 - § most common laboratory primate: Rhesus (*Macaca mulatta*)

40 **Macaques**

- § They live in relatively large, multi-male social groups, with troops of some species containing fifty or more individuals
- § During the day, these groups regularly split into several smaller groups for foraging
- § Social relations within macaque groups are complex
 - § Female hierarchies and matrilineages are important factors

41 **Macaques**

- § Varying degrees of being arboreal or terrestrial
 - § Depends upon habitat, but are quadrupeds
 - § Little leaping and no suspensory
- § Short fingers and an opposable thumb
- § frugivores, also leaves, flowers, bark and various animal prey

42 **Baboons**

- § Largest cercopithecines
 - § Sexually dimorphic
 - § long molars and broad incisors

- § canines are very sexually dimorphic
- § long snouts
- § pronounced brow ridge

43 **Baboons**

- § Divided into three genera
- § Limbs are nearly equal in length
- § Relatively short tails
- § Large ischial callosities
- § Females have very pronounced sexual swellings during estrus
- § Forests and savannas of sub-Saharan Africa

44 **Olive Baboon**

- § *Papio anubis*
- § Live in woodland savannas, grasslands, acacia scrubs, and other open areas
- § Terrestrial quadrupeds

45 **Olive Baboon**

- § Climb trees or rocky cliffs for sleeping and resting
- § Diet
 - § ripe fruits, roots, tubers, and grass seeds
 - § small mammals, (hares, young gazelles)

46 **Olive Baboon**

- § females frequently mate with several male baboons during the course of their cycle
- § several one-male groups regularly associate to form clans at night
- § during the day individual males with their harem forage separately

47 ***Hamadryus***

- § Live in large, socially complex, multi-male troupes
 - § 40-80 individuals
- § Pronounced dominance hierarchy among males
- § Intense competition among adult males for access to estrous females

48 **Mandrills**

- § *Mandrillus sphinx*
- § Large, forest baboons
- § extremely sexually dimorphic
 - § size and coloration
- § Males are characterized by brightly colored faces and rumps
- § males have long muzzles with pronounced maxillary ridges and long tooth rows

49 **Mandrills**

- § short tails

§ hindlimbs and forelimbs of nearly equal length

§ diet of fruit and leaves

§ social attributes very similar to *Hamadryus*

50 **Gelada**

§ *Theropithecus gelada*

§ highlands of Ethiopia

§ extremely sexually dimorphic

§ males have long, shaggy manes and pronounced facial whiskers (hair is much shorter in females)

§ both sexes have striking, red hourglass patches of skin on their chests

§ live in treeless grasslands

51 **Gelada**

§ Forage on the ground all day and sleep on rocky cliffs at night

§ most terrestrial nonhuman primates

§ quadrupeds

§ exclusively herbivorous, eating grass, seeds, and roots

§ live in one male groups of three to twenty individuals, which may gather in bands

52 **Gueonons**

§ Gueonons

§ Small, forest monkeys of sub-Saharan Africa

§ At least 19 species

§ diverse in color and appearance, but similar in size

§ medium size with moderate degree of sexual dimorphism

§ all have sexually dimorphic canines

§ longer hindlimbs than forelimbs

§ long tail

53 **Guenons**

§ They are all forest dwellers, show considerable variation in canopy level

§ all species are basically arboreal quadrupeds

§ frugivorous and insectivorous

§ most species live in single male groups

§ Spot-nosed monkey (*C. nictitans*)

54 **Colobus Monkeys**

Colobines

§ Leaf-eating monkeys of Africa and Asia

§ Complex stomachs that enable them to maintain bacterial colonies for digesting cellulose

55 **Colobus Monkeys**

§ Black and white colobus monkey

§ found in rainforest and patchy dry forest

§ diet of leaves

§ sexually dimorphic

- § quadrupeds, but also leap
- § live in very small groups of a single adult male, one or two females, and offspring
- § Olive colobus,
 - § smallest and least known
 - § live in swamp forest
 - § eat mainly new leaves

56 **Langurs**

- § Hanuman langur (*Presbytis entellus*)
- § India, Sri Lanka, well into the Himalayan mountains of Nepal

57 **Langurs**

- § Considerable amount of diversity is seen over this broad range of habitats
- § eat fruit, flowers, and new leaves
- § social groups vary from ten to one hundred individuals
- § there is typically one adult male per ten individuals

58 **Langurs**

- § Groups centered around related adult females that aid one another in care for each other's offspring
- § Male residence in groups is usually short-lived
 - § One male in a group that fathers all the offspring

59 **Langurs**

- § Bands of roving males attack a group, drive out the resident male, and kill dependent infants
- § One of the intruders then establishes dominance

60 **Odd-Nosed Monkeys**

- § All characterized by odd-shaped noses
- § The best known of these is *Nasalis larvatus*, the proboscis monkey
 - § Found in Borneo
- § most sexually dimorphic of all colobines
 - § males are almost twice the size of females
- § Little is known about their locomotion, except they are good leapers
- § Diet consists of leaves
- § Live in multi-male groups averaging about twenty animals

61 **Next Time**

- § The Hominoids
 - § Lesser apes, great apes, and humans