

Classification of Humans

▶▶ Kingdom Animalia

- ⊕ organisms that ingest their food

- ⊕ have nervous, sensory and movement systems to sense and acquire food

▶▶ Phylum Chordata

- ⊕ possession of a notochord (a flexible internal rod runs along the back). In humans present during gestation and reabsorbed

Classification -contd

▶▶ Subphylum - Vertebrata

- ⊕ Bilateral symmetry
- ⊕ internal spinal cord covered by series of vertebrae

▶▶ Class Mammalia

- ⊕ Homiotherm- constant body temperature
- ⊕ Viviparous - live birth
- ⊕ Mammary glands
- ⊕ Heterodont

Primates

▶▶ Pentadactyly

⊕ retention of five digits on hands and feet

▶▶ Prehensile hands and feet

⊕ mobile grasping digits, with sensitive friction pads, nails replacing claws, palmar surface with friction skin, opposable thumb

▶▶ Retention of the clavicle

Primate characteristics - contd

- ▶▶ Stereoscopic vision (binocular vision)
 - ⊕ Eyes that look forward with overlapping visual fields - evolution of retina for color vision
- ▶▶ Enclosure of eyes in a bony ring or a bony socket
- ▶▶ Reduction in olfactory apparatus, especially snout

Primate characteristics - contd

- ▶▶ Lengthened maturation period
 - ⊕ of infant dependency and of gestation compared with most mammals. Relatively long life span
- ▶▶ Low reproductive rate
- ▶▶ Relatively large, complex brain
 - ⊕ especially those parts concerned with vision, tactile inputs, muscle coordination, and memory and learning

Why did a combination of prehension and keen vision evolve??

▶▶ G.E Smith and F Wood Jones - Arboreal theory

- ⊕ adaptations to life in trees
- ⊕ could not explain absence of characteristics in owls, chameleons, mongoose, tree shrews etc

▶▶ Matt Cartmill in 1970's - Visual predation theory

- ⊕ squirrels - relatively nonprehensile hands and feet, wide-set and laterally oriented eyes
- ⊕ Close set eyes characterize predators that rely on vision for hunting - vision directed predation;
- ⊕ for arboreal hunters grasping feet stabilize the animal and grasping hands make the capture

Explanation - contd

▶▶ Robert Sussman

- ⊕ challenged the above since many living prosimians locate insect prey by **smell or hearing** - visual predation per se not sufficient explanation
- ⊕ prehensility evolved to allow movement in the **food laden terminal branches** of angiosperms, while visual changes for making fine discriminations among small plant foods
- ⊕ **Are the three hypotheses mutually exclusive or complementary?**

Classification - based on..

- ▶▶ Bat, Canary, Shark, Lizard, Horse, Whale
- ▶▶ Biological classification system based on evolutionary descent
 - ⊕ organisms that have similar traits - inherited from a common ancestor
- ▶▶ Bat and whale share a more recent common ancestor than either has had with a lizard.

Homologous and Analogous traits

▶▶ Homologous traits - traits that are similar in structure but may not have the same function

⊕ Arm of human, bat, whale

▶▶ Analogous traits - traits that have the same function but not the same structure

⊕ wings of insect and bird

Primitive Vs Derived

▶▶ Homologous traits - either primitive or derived

- ⊕ When a trait has been inherited from an earlier form - referred to as primitive
- ⊕ Traits that have changed from an ancestral state - derived traits

▶▶ Example - in horse and humans

- ⊕ presence of mammary glands - primitive; presence of a single digit in horse - derived trait

▶▶ Concept of primitive and derived is relative

- ⊕ apes and humans - no tail (derived)
- ⊕ monkeys and apes - no tail in apes (derived)

When did the Primates Evolve

- ▶▶ 65 million years ago
- ▶▶ Big Bang – 15 billion years ago
 - ⊕ Sun 4.5 billion years ago
 - ⊕ Earth 4 billion years ago
- ▶▶ Hominids 4 million years ago
 - ⊕ Last 3 hours of an year
 - ⊕ Involves 200,000 generations

Why study Non Human Primates

- ▶▶ Fill the gaps in Human evolutionary history
- ▶▶ Understand how natural selection shapes behavior
 - ⊕ Jane Goodall – Chimpanzee
 - ⊕ Dain Fossey – Gorilla
 - ⊕ Birute Galdikas - Orangutan

Order - Primates

- ▶▶ Two suborders - Prosimians and Anthropoids
- ▶▶ Prosimians include
 - ⊕ Lemurs, Lorises and Tarsiers
- ▶▶ small to medium sized, post orbital bar
- ▶▶ well developed olfactory apparatus
 - ⊕ long muzzle with rhinarium
- ▶▶ claws on some digits (toilet claw on 2nd toe)
- ▶▶ tooth comb for foraging and grooming
- ▶▶ vision well developed though not fully stereoscopic

Prosimians

▶▶ Lemurs - 28 species

- ⊕ found in Madagascar only

- ⊕ “living fossil”

- ⊕ saifaka, ringtailed , Indrii, mouse lemur

▶▶ Lorises

- ⊕ in Africa and S.E Asia

- ⊕ Nocturnal, solitary

Tarsier

- ▶▶ Elongated ankle bones (tarsal) or foot bones
 - ⊕ provide leverage for vertical clinging and leaping
- ▶▶ Small in size, head, eyes and ears are large
- ▶▶ Can rotate its head 180 degrees
- ▶▶ South east Asia - Borneo, Philippines
- ▶▶ Single mated pair
- ▶▶ Rhinarium is absent, bony socket around the eye -
between prosimians and anthropoids

Anthropoids

▶▶ Monkeys

- ⊕ New world monkeys - Ceboidea
- ⊕ Old world monkeys - Cercopithecoidea

▶▶ Hominoidea

- ⊕ Apes, humans

▶▶ Nails on all digits

▶▶ complete bony eye socket

▶▶ extensive thumb and big toe opposability

▶▶ lack of rhinarium, and tooth comb

New World Monkeys - Platyrrhini

- ▶▶ Wide flaring nostrils and broad nasal septum
- ▶▶ 36 teeth (one additional premolar in each quadrant - 2.1.3.3)
- ▶▶ Most have a long prehensile tails
- ▶▶ completely arboreal and diurnal
- ▶▶ Howler monkey, Woolly monkey, spider monkey, capuchin, marmosets, aotus
- ▶▶ Central and South America

Old World Monkeys - Cercopithecoidea

- ▶▶ Narrower noses with thinner nasal septum and downward facing nostrils
- ▶▶ No prehensile tails, presence of cheek pouches
- ▶▶ 2 premolars in each quadrant
- ▶▶ arboreal and terrestrial
- ▶▶ in majority of OWM - Ischial callosities - hardened area of skin serving as cushion
- ▶▶ Proboscis, Mandril, Rhesus macaque, Baboons

Hominoidea

- ▶▶ Absence of a tail
- ▶▶ larger brains
- ▶▶ skeleton adapted for suspensory locomotion
 - short broad chests, dorsal scapulae, long arms, mobile wrists, elbows and shoulders

Hylobatidae - lesser apes

- ▶▶ Gibbons and Siamangs
- ▶▶ True brachiators, bipeds on ground
- ▶▶ disproportionately long arms and short legs
- ▶▶ diet - fruit, leaves, flowers and insects
- ▶▶ monogamous with dependent offsprings
- ▶▶ no sexual dimorphism
- ▶▶ S.E Asia and Malaysia

Pongidae - Orangutan

- ▶▶ “Man of the Jungle”, diet leaves & fruits
- ▶▶ Red sparse hair and wrinkled face
- ▶▶ pronounced sexual dimorphism - males with large fat pads
- ▶▶ solitary, females with dependent offspring
- ▶▶ quadrumanual - slow deliberate climb using all four limbs
- ▶▶ Fist walking on the ground
- ▶▶ Borneo and Sumatra - studied by Birute Galdikas

Panidae - African apes

- ▶▶ Gorilla - largest of the apes
- ▶▶ mostly terrestrial and knuckle walker
- ▶▶ gentle, tolerant, and vegetarian, 85% of their diet is leaves
- ▶▶ sexual dimorphism
- ▶▶ single male-multi female groups
- ▶▶ Zaire and Uganda - studied by Dian Fossey
- ▶▶ lowland gorillas (40,000), highland (600)

Chimpanzee

- ▶▶ man's closet relative - common chimp (*Pan troglodyte*); pygmy chimp (*Pan paniscus*)
- ▶▶ both arboreal and terrestrial
- ▶▶ multi male-multi female group
- ▶▶ studied by Jane Goodall

Hominidae

- ▶▶ humans and our direct ancestors
- ▶▶ reduced canine teeth
- ▶▶ nonprehensile big toes
- ▶▶ habitual bipeds - striding gait
- ▶▶ world wide distribution
- ▶▶ extreme brain enlargement and elaboration
 - ⊕ use 20% of of their body metabolic energy