A Brief History of Primates

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What did the first primate look like?

Purgatorius

Cenozoic Era (post-dinosaur)

• Oligocene Epoch, 37.5 mya – Old & New World monkeys
  – Eye-sockets enclosed in bone
  – Shorter snouts

• Miocene Epoch, 22.5 mya – The earliest apes appear
  – Most were quadrupeds, rather than brachiators or knuckle-walkers
  – Ancestors of apes and gibbons diverged from Old World Monkeys in Africa

Cenozoic Era (post-dinosaur)

• Pliocene, 5.5 mya - Human-like apes emerged
  – Bipedal
  – Use tools to obtain food
  – Ancestors of humans diverged from chimpanzee and gorilla ancestors in the African savannas
  – Homo sapiens appeared 2 mya

Cenozoic Era (post-dinosaur)

• Paleocene Epoch, 65 mya - The earliest primates appear
  – Small, most likely terrestrial
  – Insectivores... then seeds, fruits, nuts & leaves

• Eocene Epoch, 53.5 mya – Prosimians
  – Primates diversified and some become arboreal
  – Prehensile hands and feet, opposable thumbs and toes with nails
  – Longer lower limbs
  – Frontally oriented eye sockets, stereoscopic vision
Theories of Primate Evolution

Arboreal Theory
G. Elliot Smith (1912) & Wood Jones (1916)
Primate adaptations arose in response to an arboreal way of life
- forelimbs developed for climbing and vision became stereoscopic, resulting in improved hand-eye coordination
- reduction in olfaction, shortened snouts

BUT many animals are well adapted for arboreal life yet do not possess characteristic primate traits

Visual Predation Theory
M. Cartmill (1972)
Primate adaptations arose from nocturnal, visually-oriented predation of insects in terminal branches
- grasping hands and feet for foraging for insects from terminal branches of trees and shrubs
- optic convergence for detecting insect prey

BUT most primates are omnivorous, and nocturnal primates depend more on hearing and olfaction than vision to catch insects

Angiosperm Exploitation Theory
Robert R. Sussman (1991)
Primate adaptations arose in response to feeding on fruits in terminal branches
- evolution of modern primates parallels the rapid diversification of angiosperms (flowering plants), co-evolutionary relationship

Perhaps all three theories are interdependent and can be used together to explain primate origins

Arboreal-Predation-Angiosperm Exploitation Theory

What does it mean to be a primate?

- Shortened snout
- Several types of teeth
- Forward-facing eye orbs & Stereoscopic vision
- Clavicles
- Two separate bones in forearms and lower legs
- Nails rather than claws
- Increased thumb mobility
- Grasping feet (lost in humans)

- Trend toward more vertical posture
- Trend toward different use of forelimbs and hindlimbs
- Trend toward longer life spans, slow rate of reproduction and delayed maturity
- Trend toward larger brain size
What does it mean to be a primate?

- Complex social lives
- Tend to be very vocal and communicative

The Prosimians

- Well-developed sense of smell
- Prominent snout, larger olfactory bulbs
- Partial binocular vision, often nocturnal vision
- Some digits have claws instead of nails
- Developed manual dexterity
- Immobilized upper lips, which are joined to a wet patch of skin around the nostrils
New World Monkeys  
*Platyrrhines*

- Neotropical forest habitats of Central and South America
- Small (6” pygmy marmoset) to medium sized (3’ howler monkeys)
- Wide, circular nostrils which are spaced apart
- Long tails, which are sometimes prehensile
- No buttock pads (ischial callosities)
- No cheek pouches
Old World Monkeys

*Catarrhines*

- Live in Africa and Asia
- Larger than New World Monkeys
- Narrow and downward pointing nostrils
- Longer hind legs than forearms
- Flattened nails
- Prominent buttock pads, ischial pads
- Tails (not prehensile)

Old World Monkeys

*Catarrhines*

- Subfamily: Colobines
  - Long tails, diverse coloration
  - The coloration of nearly all the young animals differ remarkably from the adults
  - Almost exclusively herbivores
  - Have a large, complex stomach to aid in digestion of leaves
  - No cheek pouches
Old World Monkeys  
*Catarrhines*

- Subfamily: Cercopithecines
  - Arboreal species have long tails, but tail is small or nonexistent on terrestrial species
  - Well-developed thumbs
  - Ischial callosities may change color during mating period
  - Omnivorous
  - Cheek pouches
Diana Guenon

Lion-Tailed Macaque

Patas Monkey

Sulawesi Macaque

Japanese Macaque

Mandrill
The Lesser Apes

- Live in small, monogamous groups
- The adult female is the dominant individual in the group
- Renowned for their complex vocalizations
- Long arms for climbing, swinging and hanging

The Great Apes

- The largest and heaviest primates
- Upright body posture, able to walk on 2 legs
- No tails
- Broad-chested
- Short noses
- Large brain to body size ratio
- Live in Africa and Asia
The Great Apes

Common traits
- Multi-male, multi-female fission-fusion communities
- Male philopatry, female dispersal
- Promiscuous mating habits
Bonobos and Chimpanzees

Bonobos
- Female-dominant
- Make love, not war
- Egalitarian dominance style

Chimpanzees
- Male-dominant
- Comparatively more aggressive
- Despotic dominance style

Any Questions?