

## Anthropology 215



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## Mammalian features

- 1) warm blooded
- 2) well formed & differentiated teeth
- 3) pectoral nipples
- 4) offspring conceived in mother's reproductive tract and nourished after birth with mother's milk produced by mammary glands



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## Definition of a Primate

Unguiculate, clavicate, placental mammals, with orbits encircled by bone; three kinds of teeth, at least at one time of life; brain always with a posterior lobe and calcarine fissure; the innermost digit of at least one pair of extremities opposable; hallux with a flat nail or none; a well developed caecum; penis pendulous; testes scrotal; always two pectoral mammae. (Mivart 1873)



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## Primate Heritage



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## Primate Characteristics

- Fingernails
- Opposable thumbs and/or big toes (power grip/precision grip)
- Relatively and absolutely large brains
- Dental specializations (incisor, canine, premolar and molar)
- Stereoscopic vision (orbits enclosed with bone)/Color vision
- Semi-erect, bipedal or quadrupedal posture
- Prehensile hands or feet
- Large clavicles

@Robert Martin

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## Evolutionary Trends of Orders (LeGros Clark, 1959:42)

- Enhanced digital mobility, especially the thumb and big toe
- Preservation of generalized limb structure, 5 digits on hand and foot, and retention of the clavicle
- Laws replaced by flattened nails
- Progressive abbreviation of snout
- Elaboration of visual apparatus, with binocular vision in most forms.
- Reduction of sense of smell
- Modification of teeth
- Expansion and elaboration of brain (cerebral cortex)
- Reduction of litter, longer period of learning
- Longer life expectancy
- Social grouping

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## Primate Characteristics

- Pentadactylism (5 digits)
- Flat nails (replace claws)
- Prehensile hands and feet
- Power and precision grip



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## Erect Posture



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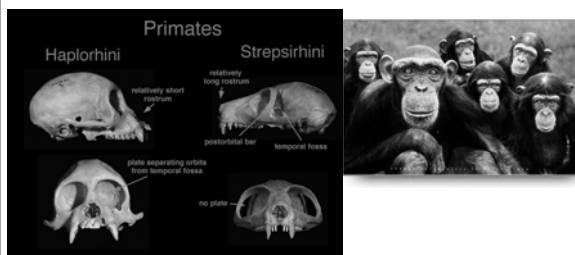
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## Shift from Smell to Vision



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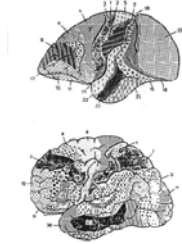
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## Relatively Large Brains

- Manual dexterity
- Eye-hand coordination
- Stereoscopic vision



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## Primate Reproductive Strategy

- Extensions of Prenatal and Postnatal life cycles
- Greater parental investment
- Giving birth to single offspring



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## Social Way of Life

- Complex behavior
- Learning
- Behavioral flexibility



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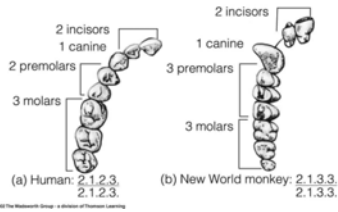
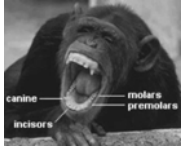
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## Primate Teeth



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## Arboreal Theory

- improved vision/ tactileness/eye-hand coordination
- de-emphasis on smell
- limbs for tree climbing



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## Visual Predation Theory

- Cartmill
- flowering plants (angiosperms) and insects



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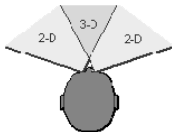
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## Overlapping Visual Fields

- Binocular vision
- Optic chiasma/incomplete decussation



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## Hearing/Olfaction

- Not well developed in primates



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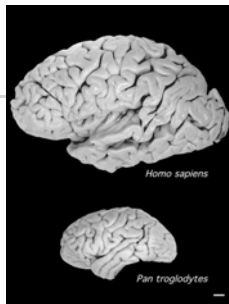
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## Primate Brains

Greatly expanded Cortex  
Encephalization



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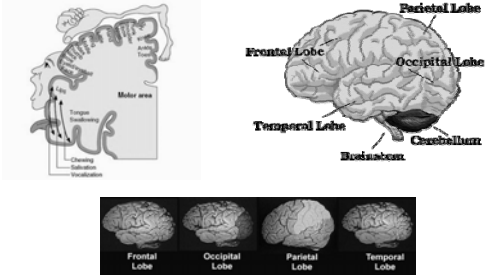
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## Functions of Brain



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## Occipital lobe

- Visual cortex
- Lunate or simian sulcus in some primates



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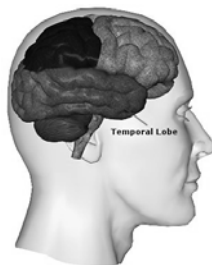
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## Temporal lobe

- Auditory cortex
- Storage of visual and auditory memories
- Receives impulses from the other areas of the cortex
- Consciousness



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## Frontal Lobe

- Expanded more than rest of cortex
- Highest levels of cortical activity
- Vertical forehead
- Prefrontal area



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## Parietal Lobe

- Motor and somatic sensory cortex (between frontal and parietal lobes)
- Association cortex: intracortical connections from auditory, somatic and visual centers
- Secondary association area
- Inferior posterior parietal region: a major speech areas



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## Primate Locomotion

- Vertical clinging and Leaping
- Quadrupedalism
- Brachiation
- Bipedalism



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### Clinging & Leaping



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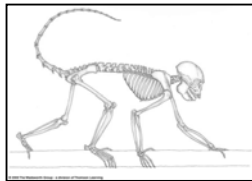
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### Arboreal Quadrupedalism



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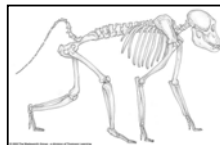
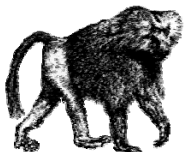
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### Terrestrial Quadrupedalism



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## Knuckle Walking



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## Brachiation



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## Human Bipedalism



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**Slide 32**

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**MP1**

Michael Pietruszewsky, 10/11/2006

## Primate Hands

- Prehensility
- Opposability
- Flattened Nails
- Plantar friction pads
- Nerve endings



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## Human Bipedalism

- Skull balanced on the vertebral column (foramen magnum at center skull base)
- Lumbar curve
- Pelvic modifications
- Lengthening of leg bones
- Foot specialized

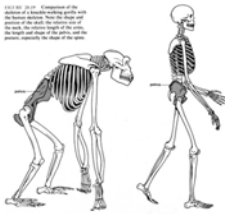
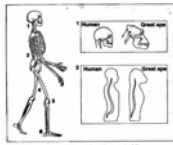


FIGURE 20.10 Comparison of the skeletal structure of a quadruped and a biped. The quadruped skeleton is hunched over, and the biped skeleton is upright. The biped skeleton has a more vertical vertebral column and longer leg bones.

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