

Vertebrates

Tetrapods

Class Mammalia (Mammals)

Mammal evolution:

- Descended from lineage of synapsid amniotes See Fig. 20.1 in text
- Therapsid lineage gave rise to all modern mammals See Figs. 20.2 and 20.3 in text
- Upright limbs positioned under body
- Evolution of hair and diphyodont tooth replacement
- Survived 'Age of Reptiles' in small numbers then radiated greatly

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General features:

- About 4600 species
- Considerable morphological diversity
- Specific defining traits:
 1. Presence of hair and mammary glands
 2. Endothermy (share this trait with birds)
 3. Placenta for embryo nutrition
 4. Tooth specialization
 5. Highly advanced brain and sense organs

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Important adaptations:

1. Skin modifications
 - Hair unique to mammals
 - Hair shed and replaced
 - Development of horns and antlers See Figs. 20.5-20.9 in text
 - Sweat and scent glands for cooling and communication
 - Mammary glands also unique to mammals

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Important adaptations:

2. Feeding specializations See Figs. 20.10 and 20.11 in text

- Tooth morphology linked closely with diet
- Heterodont teeth allow for regional specialization
- Insectivores, herbivores, carnivores, and omnivores
- Digestive tracts accommodate different food types

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Important adaptations:

3. Mammal reproduction See Figs. 20.17-20.19 in text

- Mating seasons usually well-defined
- 3 reproductive strategies define major mammal groups:
 1. Monotremes (egg-layers)
 2. Marsupials (develop in pouch)
 3. Placental (nutrition from placenta)
- Most mammals are placental
- All rear young on milk
- Litter size variation

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Important adaptations:

4. Respiration and limb modification See Fig. 20.4 in text

- Very high metabolic rate
- 4-chambered heart like birds
- Muscular diaphragm for ventilating large lungs
- Secondary palate separates respiratory and digestive tracts
- Limb modification for specific functions

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Important adaptations:

5. Migration vs. Territoriality See Figs. 20.13 and 20.14 in text

- Very few mammals make routine migrations
- Many mammals defend territories marked by scent glands
- Defense is intra- and interspecific
- Mammal home ranges are larger foraging areas

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Evolution of humans

- Darwin's theories based only on anatomical similarities
- Fossil, biochemical, and chromosomal evidence for common descent with apes
- Humans and apes are primates derived from an arboreal ancestor
 - Evolutionary importance of grasping fingers
- Apes appear 25MY ago and adopted terrestrial lifestyle
- First Hominids appear 8MY ago

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Evolution of humans

- Poor fossil record of early Hominids
- Appearance of Australopithecus about 4.5 MY ago See Figs. 20.25 – 20.27 in text
- Genus Homo appears about 2 MY ago
- Three potential species
 - Homo habilis (2 MY ago)
 - Homo erectus (1.5 MY ago)
 - Homo sapiens (0.3 MY ago)
- First Homo sapiens were Neanderthals

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