

MAMMALS: EVOLUTION & CLASSIFICATION

Big Picture

Over time, reptiles evolved into mammals. Mammalian ancestors such as pelycosaurs, therapsids, and cynodonts started developing mammalian traits. These gave rise to early mammals that still had some reptilian traits. After the extinction of dinosaurs, these early mammals flourished and evolved into modern mammals.

Key Terms

Pelycosaur: Reptile-like land vertebrate.

Therapsids: Evolved from pelycosaurs and have more mammalian traits.

Cynodonts: Evolved from therapsids and later evolved into mammals.

Monotreme: Earliest mammal that reproduces by laying eggs.

Marsupial: Early mammal in which the embryo is born at an early, immature stage and completes its development outside the mother's body in a pouch on her belly.

Placental Mammal: Mammal with a placenta that sustains the fetus while it develops.

Evolution of Mammals

Mammalian Ancestors

Pelycosaurs (275 million years ago): reptile-like land vertebrate

- Had a few mammalian traits such as different types of teeth

Some pelycosaurs evolved into **therapsids**

- Therapsids developed lots of mammalian traits

After mass extinction, some therapsids evolved into **cynodonts**

- Cynodonts were nocturnal, developed even more mammalian traits (such as ability to regulate body temperature)
- Cynodonts later evolved into mammals

Evolution of Early Mammals

Monotremes evolved 150 million years ago—still had some non-mammalian traits such as laying eggs

- Marsupials evolved from monotremes
- Marsupials evolved into placental mammals

Evolution of Modern Mammals

- After mass extinction at the end of the Cretaceous Period, dinosaurs went extinct
- Conditions were ideal for mammals to take over:
 - More resources for mammals
 - Temperature changes favored mammals since they were warm-blooded
 - More flowering plants → more food for mammals' preys → more food for mammals

Mammalian Classification

Mammals were traditionally grouped into 17 orders. Recently, scientists have started to classify mammals based on their ancestors. The new classification method, phylogenetic classification, separates mammals into 4 superorders.

Classification of Placental Mammals

Traditional classification puts mammals into 17 orders:

Order	Example	Sample Trait
Insectivora	mole	small sharp teeth
Edentata	anteater	few or no teeth
Pholidota	pangolin	large plate-like scales
Chiroptera	bat	digits support membranous wings
Carnivora	coyote	long pointed canine teeth
Rodentia	mouse	incisor teeth grow continuously
Lagomorpha	rabbit	chisel-like incisor teeth
Perissodactyla	horse	odd-toed hooves
Artiodactyla	deer	even-toed hooves
Cetacea	whale	paddlelike forelimbs
Primates	monkey	five digits on hands and feet
Proboscidea	elephant	tusks
Hymacoides	hymax	rubbery pads on feet
Dermoptera	colugo	membrane of skin between legs for gliding
Pinnipedia	seal	feet with fins
Sirenia	manatee	paddle-like tail
Tubulidentata	armadillo	teeth without enamel

Phylogenetic Classification

Phylogenetic classification groups mammals by common ancestor.

Superorder	Example
Afrotheria	armadillos, elephants, manatees
Xenarthra	anteaters, sloth, armadillos
Laurasiatheria	bats, whales, hoofed mammals, carnivores
Supraprimates	primates, rabbits, rodents

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**James L. Sumich, John Francis
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