

Vertebrate Biology

Traditional Vertebrate Classification

*denotes extinct taxa

Phylum Chordata

The Phylum Chordata includes the well-known vertebrates (fishes, amphibians, reptiles, birds, mammals). The vertebrates and hagfishes together comprise the taxon Craniata. The remaining chordates are the tunicates (Urochordata), lancelets (Cephalochordata), and, possibly, some odd extinct groups. With few exceptions, chordates are active animals with bilaterally symmetric bodies that are longitudinally differentiated into head, trunk and tail. The most distinctive morphological features of chordates are the notochord, nerve cord, and visceral clefts and arches.

Subphylum Craniata (Vertebrata)

Superclass: Agnatha (jawless vertebrates)

No paired fins, cartilaginous skeleton, no scales, but bony dermal plates in Ostracoderms, cranium, but no vertebrae

*Ostracoderms

Class: Myxini (Pteraspidomorphi) (hagfishes / slime eels)

Class: Cephalaspidomorphi (Lamprey)

order: Petromyzontiformes (lampreys, Ammocoetes larvae)

Marine lampreys are parasitic, and spawn in fresh water to Ammocoetes larvae. Hagfish are marine bottom scavengers.

Superclass: Gnathostomata (jawed vertebrates)

***Class: Acanthodi** (armored Paleozoic jawed fishes)

Probably the oldest jawed fish. Spiny projections, dermal armor, paired fins, operculum, ranged from a few inches up to 2 meters.

***Class: Placodermi** (placoderms; armored jawed fishes)

Plate-like armor, abundant in Devonian Period, cartilaginous skeleton, up to 10 meters long!

Class: Chondrichthyes (cartilaginous fish)

Arose in Devonian period, placoid scales, great sense of smell, lateral line system, ventrally positioned mouth.

subclass: Elasmobranchii (sharks, rays)

subclass: Holocephali (chimeras or rat fish)

Class: Osteichthyes (bony fish) (over 20,000 species)

Operculum, bony skeleton, terminal mouth, swim bladder in most

subclass: Actinopterygii (ray-finned fish)

95% of all bony fish are in this division. They possess light modern cycloid or ctenoid scales.

subclass: Sarcopterygii (fleshy-finned fish)

*Ancestor of amphibian, common in Devonian Period, extinct except *Latimeria* discovered off of South African Coast in 1938.*

Class: Amphibia (amphibians)

"Both Life", Fewest numbers of species of all classes. Changes present for adaptation to terrestrial life. Land has many habitats, more oxygen than water, but is less dense for supporting body than water. The temperature fluctuates more on land.

***subclass: Labyrinthodontia (labyrinthodonts)**

Oldest tetrapod, from about 350 mya. Minute dermal scales, ray-fin tail, skull similar to Crossopterygian, sensory structures for aquatic environment. Gave rise to Reptiles.

subclass: Lissamphibia

*"Smooth amphibians". Origin may be **monophyletic** from the Labyrinthodont, or **diphyletic** with Anurans arising from Labyrinthodonts and Urodeles and Apodans separately from*

Crossopterygians. Features include most glandular skin, not scales, keratinized skin, double circuit circulatory pattern.

***order: Proanura**

order: Anura (frogs, toads)

order: Urodela (tailed amphibians, salamanders, *Necturus*)

order: Apoda (caecilians)

Burrow in swampy areas, many are blind

Class: Reptilia (reptiles)

"Creeps", originates in mid-Carboniferous Period with the Cotylosaurs and are dominant through the end of the Cretaceous Period. Originated from Labyrinthodonts. Reptiles are amniotes, have eggs with shells, keratinized skin with scales, imperfect 4-chambered heart, stronger skeleton & muscles than previous groups. Classified according to temporal arches.

subclass: Anapsida (*stem reptiles - Cotylosaurs, turtles)

subclass: Lepidosauria (lizards, snakes, amphisbaenians, *Sphenodon*)

Lepidosauria is the most successful group of reptiles

subclass: Archosauria (crocodiles, *dinosaurs, *flying reptiles, *thecodonts)

***subclass: Euryapsida - Sauropterygia, Ichthyosauria** (plesiosaurs, fishlike reptiles)

***subclass: Synapsida** (mammal-like reptiles - therapsids)

Single temporal fossa, size of a large dog, Permian-Jurassic Periods, ancestor of mammals.

Class: Aves (birds)

Originated from bipedal dinosaurs, Archaeopteryx in Jurassic Period, have feathers, modern birds have no teeth, are endothermic, four-chambered heart, have great social organization and complex behaviors.

***subclass: Archaeornithes (ancestral birds - Archaeopteryx)**

subclass: Neornithes (familiar birds)

Class: Mammalia (mammals)

Originated from Therapsids, have hair, mammary glands, 4-chambered heart, non-nucleated RBCs, endothermic, diaphragm for breathing, extensive cerebral cortex, and dentary bone is sole lower jaw bone.

subclass: Prototheria (egg-laying mammals (oviparous); monotremes are the only living order, platypus, echidnas = spiny anteater)

subclass: Theria

infraclass: Metatheria (yolk sac serves as placenta; pouched mammals; opossum, wallaby, kangaroo)

infraclass: Eutheria (true placental mammals; viviparous)

Check out this really cool animal taxonomy link!

[Tree of Life](#)