

# **Bionomics, general characteristics and classification of Chordates**

BSc. Part II Zoology (Hons) Paper-III

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## **GENERAL CHARACTERISTICS**

- ▶ Aquatic, aerial or terrestrial all free living with no fully parasitic forms.
- ▶ Bilaterally symmetrical and metamerically segmented.
- ▶ Exoskeleton often present well developed in most vertebrates.
- ▶ Body wall triploblastic with 3 germinal layers: ectoderm, mesoderm and endoderm.
- ▶ Coelomate animals with a true coelom, enterocoelic or schizocoelic in origin.
- ▶ A skeletal rod, the notochord, present at some stage in life cycle.
- ▶ Digestive system complete with digestive glands.
- ▶ Blood vascular system closed. Heart ventral with dorsal and ventral blood vessels. Hepatic portal system well developed.
- ▶ Excretory system comprising proto –or meso-or meta-nephric kidneys.

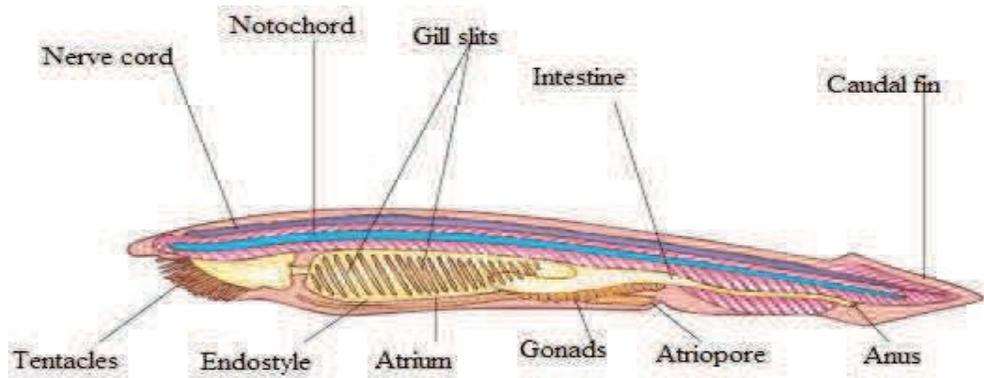
## **CLASSIFICATION OF CHORDATES**

### **PHYLUM CHORDATA**

#### **Group ACRANIA**

(Protochordata – Primitive chordates without head and vertebral column)

Subphylum **HEMICHORDATA**, Example *Balanoglossus*, *Cephalodiscus*, *Rhabdopleura*, these are primitive and doubtful chordates; they are now classified under non-chordates after echinoderms.



*Primitive chordate character*

Subphylum **UROCHORDATA**, Example- **Herdmania**, *Salpa*, *Doliolum*, *Pyrosoma*, *Oikopleura*. These are *sedentary* or planktonic tunicates in which chordate characters manifest in the larval stage.

Subphylum **CEPHALOCHORDATA**, Example - **Amphioxus**  
 These are typical chordates having chordate characters in the larval as well as adult stages.

**Group CRANIATA (=EUCHORDATA)**

(Chordates with skull, with 54,000 species of true chordates)

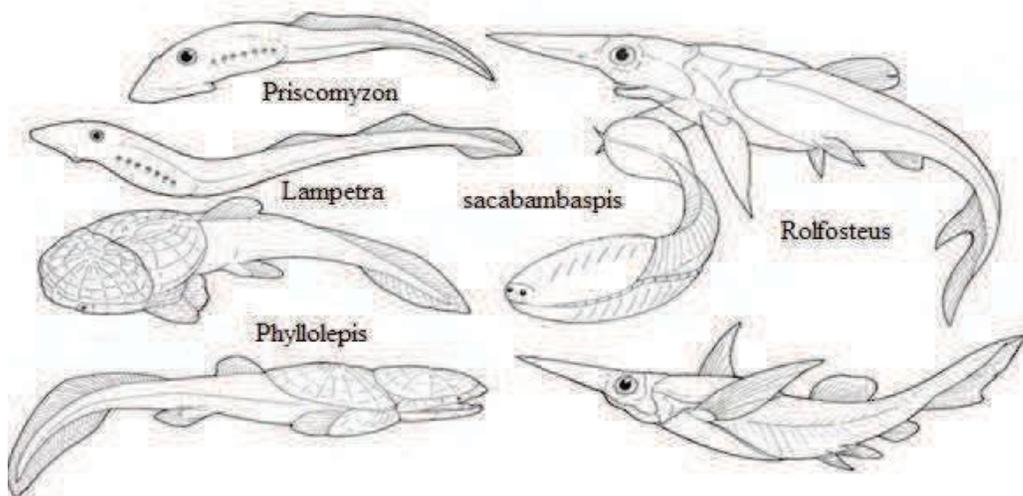
Subphylum **VERTEBRATA**, chordates with head or skull, brain and vertebral column.

- ▶ Division **AGNATHA**, 90 species of paraphyletic group of jawless fishes, which were the first vertebrates. Living forms are elongated, scaleless, slimy parasites and scavengers that include lampreys and hagfishes. They have no paired fins.
- ▶ Class **OSTRACODERMI**, extinct shelled jawless fishes of Ordovician period. For Example- *Cephalaspsis*.
- ▶ Class **CYCLOSTOMATA**, jawless fishes of today, without scales and paired fins.

- ▶ Order **Myxinoidea**: the hagfish's containing 40 species. *Myxine*, *Bdellostoma*, *Eptatretus* are good examples.
- ▶ Order **Petromyzontia**: lampreys, 41 species, parasitic on other fishes. **For Example-** *Petromyzon*.
- ▶ Division **GNATHOSTOMATA**, vertebrates with jaws that are modified gill arches and paired appendages. They include cartilaginous fishes, bony fishes and tetrapods.

## SUPER CLASS I: PISCES

Class **PLACODERMI**, extinct group of spiny sharks. For Example- *Climatius*.



*Super class Pisces*

Class **CHONDRICHTHYES**: cartilaginous fishes that have cartilaginous skeleton, ventral mouth, placoid scales, heterocercal tail fin and 5 pairs of gill slits.

- ▶ Subclass **Elasmobranchii**— 850 species of sharks, rays and skates.
- ▶ Subclass **Holocephali**— 30 species of ratfish (*Chimaeras*).

Class **OSTEICHTHYES** 20,000 species, bony fishes. Skeleton bony, four pairs of gills, covered with operculum, possess swim bladder or lung.

- Subclass **Actinopterygii**, ray-finned fishes.
- Superorder **Chondrostei**, 25 species of sturgeons, bichirs and paddlefish.
- Superorder **Holostei**, which includes *Lepistosteus* (7 species) and *Amia* (1 species)
- Superorder **Teleostei**, includes 20,000 species of bony fishes, such as tarpon, herring, perch, etc.
- Subclass **Crossopterygii**, includes 2 species of coelacanth (*Latimeria*).

Class **CHOANICHTHYS (=DIPNOI)**, has 6 species of lungfishes under three genera, namely, *Protopterus*, *Lepidosiren* and *Neoceratodus*.

## **SUPER CLASS CTETRAPODA:**

Two pairs of paired appendages

### Class **AMPHIBIA**

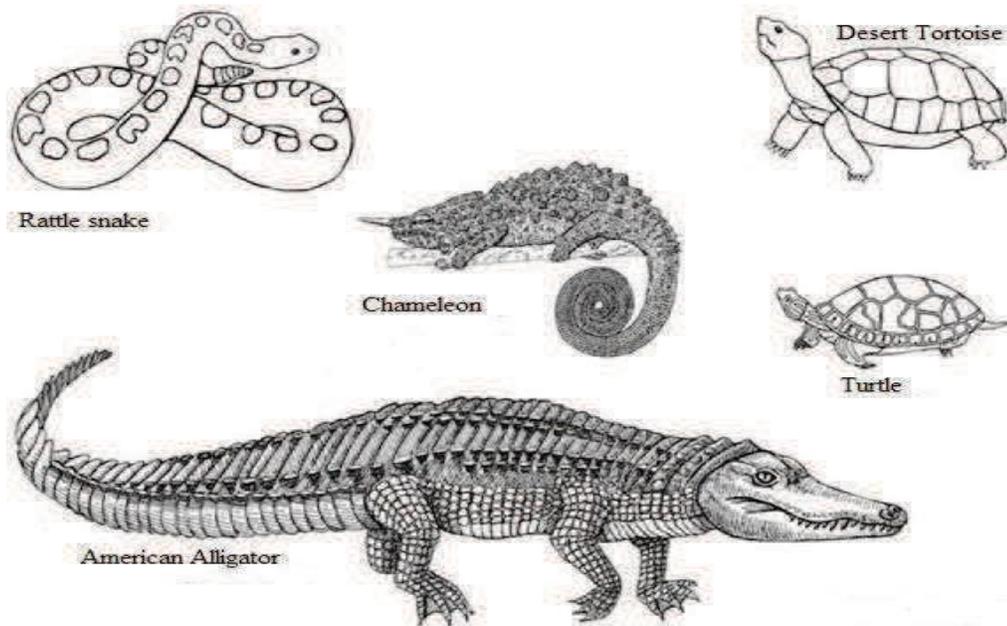
- ▶ Order **Gymnophiona** (Apoda) —165 species of burrowing caecilians, elongated bodies, and limbless, dermal scales embedded in annular folds of skin.
- ▶ Order **Caudata** (Urodela) —425 species of salamanders, tailed amphibians, usually with two pairs of limbs.
- ▶ Order **Anura** (Salientia) —4300 species of frogs and toads, tail-less amphibians, long hind limbs for jumping, head and trunk fused. They have sound producing and hearing organs.

Class **REPTILIA**, 7800 species, turtles, crocodiles, lizards, snakes, etc. These are the true landvertebrates and never come return breeding in water.

They have internal fertilization and produce large cleidod eggs with leathery

shells and are ectotherms. Bodies covered with epidermal scales and vertebrae are procoelous.

- ▶ Order **Chelonia**, 300 species of turtles and tortoises having bony shell on the body.
- ▶ Superorder **Lepidosauria**, lizard-like with acrodont or pleurodont dentition.
- ▶ Order **Rhynchocephalia (=Sphenodontia)**, 2 species of tuatara (*Sphenodon*) in New Zealand. They have acrodont teeth, amphicoelous vertebrae and a parietal eye.
- ▶ Order **Squamata**, with pleurodont teeth, procoelous vertebrae, without third eye.
- ▶ Suborder **Lacertilia** includes 4000 species of lizards.
- ▶ Suborder **Ophidia** includes 2700 species of snakes.
- ▶ Superorder **Archosauria** includes modern crocodiles and extinct dinosaurs.
- ▶ Order **Crocodylia**, 23 species of alligators, crocodiles and gavials



*Different types of Reptiles*

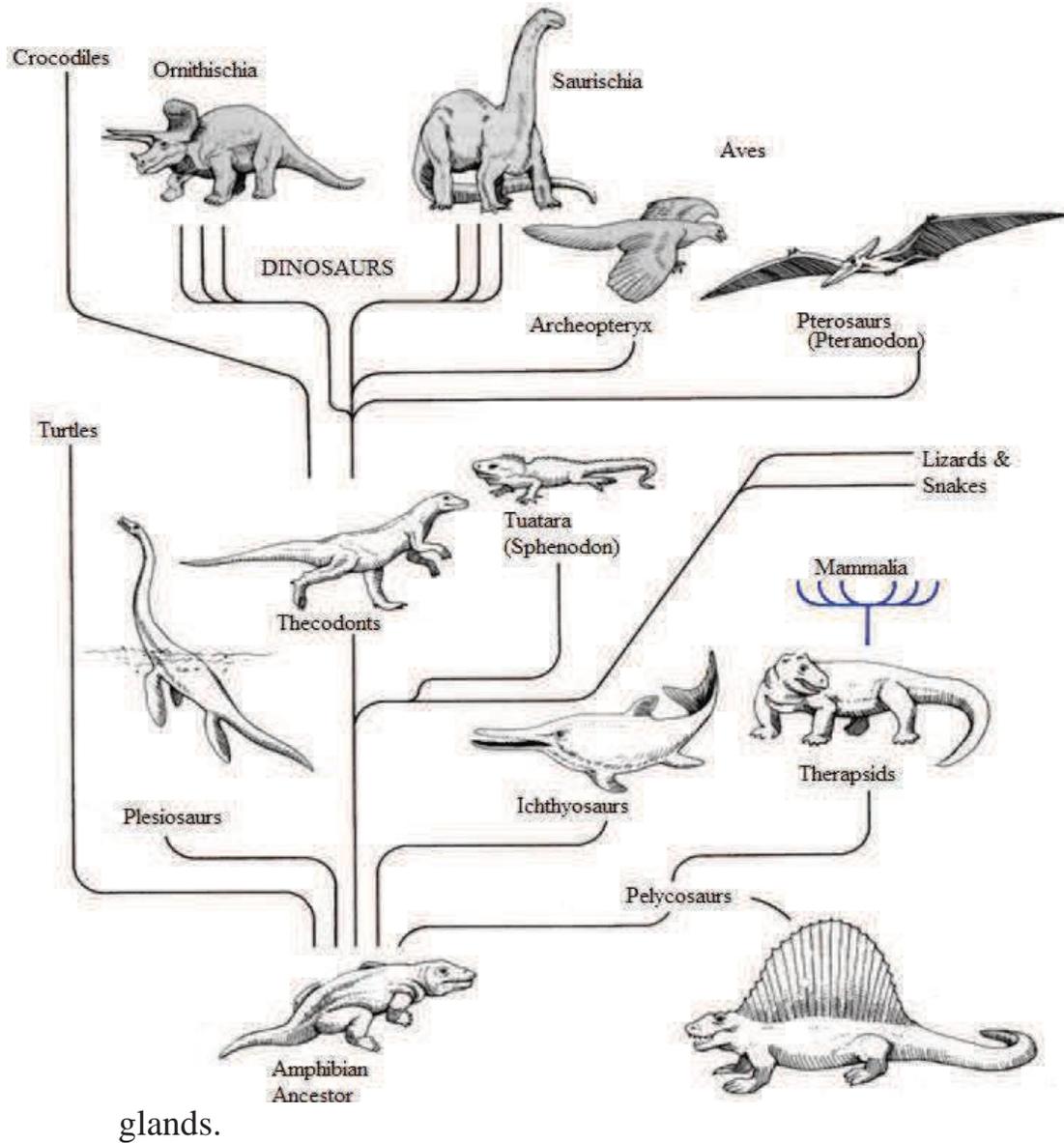
Class **AVES**, 9100 species.

Birds being feathered bipeds have internal fertilization and lay hard-shelled eggs and are endotherms. Nearly every anatomical feature is related to ability to fly. They are the only animals with feathers that are modified from reptilian scales.

Class **MAMMALIA**, 4,500 species.

Mammals evolved in the late Triassic, the time dinosaurs first appeared and diversified greatly following the extinction of dinosaurs during the Coenozoic. Characteristics include hairs for protection and from heat loss; mammary glands; heterodont teeth; endothermy; 4 chambered hearts etc.

- ▶ Subclass **PROTOTHERIA, Order Monotremata**, egg laying mammals having 6 species in Australia and New Zealand. No teeth and true mammary glands.
- ▶ Subclass **METATHERIA, Order Marsupialia**, 275 species of marsupials that have brief gestation period after which the embryo develops in a pouch. They have prolonged lactation and parental care. Marsupials include: opossum, kangaroo, koala, Tasmanian devil, wombat, etc.
- ▶ Subclass **EUTHERIA, 16 orders** which include 4700 species of placental mammals that are truly viviparous, with a placenta for gas and nutrient exchange between the mother and foetus. They also have true mammary



*Different class of chordate*

**SUMMARY**

The chordates are of various body forms but they all have notochord, dorsal tubular nerve cord, pharyngeal slits and a post anal tail at some stage of life. Various theories have been proposed to explain the origin and evolution of chordates but none of them is completely satisfactory. However, it is believed that they evolve sometimes before Cambrians. The most advanced forms of chordates are mammals.