

Phylum Chordata

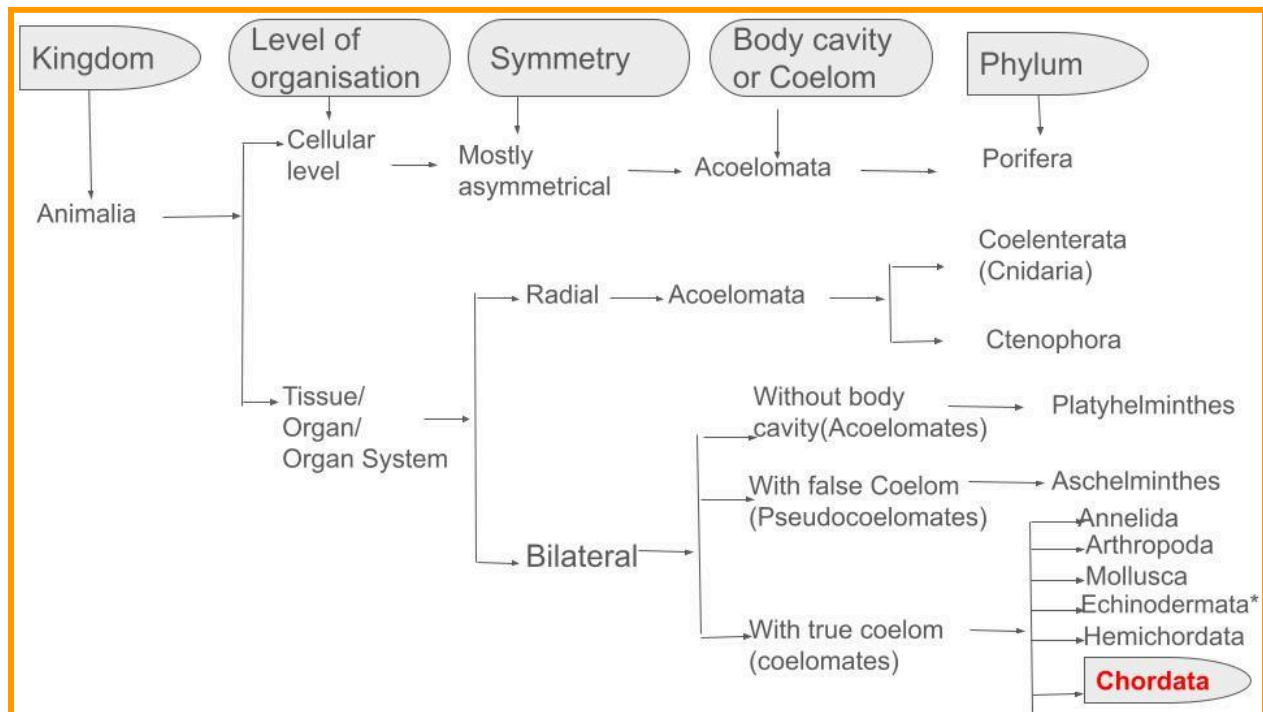
"From the mysterious depths of the ocean to the soaring heights of the sky, chordates dance to the rhythm of adaptation and survival."

Chordates exhibit a wide range of body plans and lifestyles, from simple filter-feeding sea squirts to complex and highly mobile vertebrates like fish, reptiles, birds, and mammals.

The name of Phylum chordata is derived from two Greek words, the *chorde* (=a string or cord) and *ata* (= bearing). The common characteristic feature of the phylum Chordata is the presence of a stiff, supporting rod like structure along the back,

the **notochord** (Gr. *noton*= back, L. *chorda*= cord) which is found in all the members of the phylum at some stage of their lives. The Phylum chordata was created by **Balfour** in 1880 and it is divided into three subphyla: Urochordata or Tunicata, Cephalochordata and Vertebrata. Subphyla Urochordata and Cephalochordata are often referred to as protochordates. So, the Phylum Chordata includes primarily Protochordata (Acroniata) and Vertebrata (Craniata).

Position of Chordates in kingdom Animalia:



*Echinodermata exhibits radial or bilateral symmetry depending on the stage.

Fundamental characters of Chordata:

Chordates are characterized by several general features that distinguish them from other animal phyla. These characteristics are present at some point in the life cycle of the organism and define the phylum Chordata. The following are these basic morphological traits as follows:

- Notochord (a longitudinal supporting rod-like structure)
- Dorsal tubular (hollow) nerve cord
- Pharyngeal gill-slits.

These three distinctive characteristics are unique for the phylum Chordata (Fig. 1.1). The existence of such common characteristics is considered as a result of inheritance from a common ancestry.

1. Notochord or chords dorsalis. The notochord is a rod-like, elongated, elastic structure situated just above the alimentary canal and immediately beneath the dorsal tubular nerve cord. It is made up of big, vacuolated notochordal cells that are encased in an elastic connective tissue

sheath on the inside and an outside fibrous layer (Fig. 1.2). It functions as a stiff axis and a rudimentary internal skeleton while allowing for bodily movement. It may remain in situ all through life, as in the case of lancelets, lampreys, and certain fish, or it may be totally or partially replaced by a vertebral column or backbone.

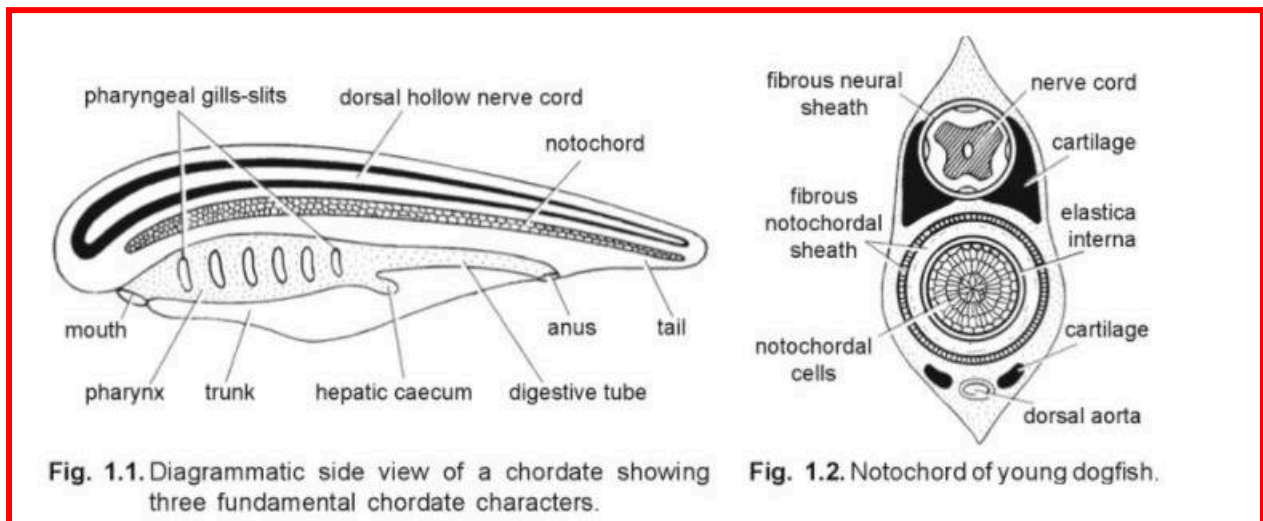
2. Dorsal tubular nerve cord: The dorsal, hollow or tubular, fluid-filled nerve cord of chordates is located just above the body's antero-posterior axis (Fig. 1.2). The nerve cord is formed by an infolding of mid-dorsal strip of neural ectoderm and encloses a cavity or canal, the neurocoel. The nerve cord extends lengthwise across the body, situated outside the coelom and above the notochord. In chordates, the tubular nerve cord remains constant throughout life. In vertebrates, the anterior region of nerve cord becomes specialized to form a cerebral vesicle or brain which is enclosed in a protective cartilaginous or bony cranium. The posterior part of nerve cord transforms

into spinal cord which is protected within the neural canal of the vertebral column.

3. Pharyngeal gill-slits. Gill-slits are paired openings leading from the pharynx to the exterior. In all the chordates, at some stage of their life history, a series of paired internal gill-slits or gill-clefts perforate through the pharyngeal wall of the gut behind the mouth.

The gill-slits have many alternative names, such as gill-clefts, pharyngeal or branchial-clefts, visceral-clefts, visceral or

branchial-pouches. Such gill-clefts appear during the development of every chordate, but in many aquatic forms they are lined with vascular lamellae which form gills for respiration. In terrestrial chordates which never breathe by gills, traces of gill-clefts are present during early development but disappear later in adults. In many animals equipped with lungs, branchial-clefts, or branchial-grooves are always found in the embryo.

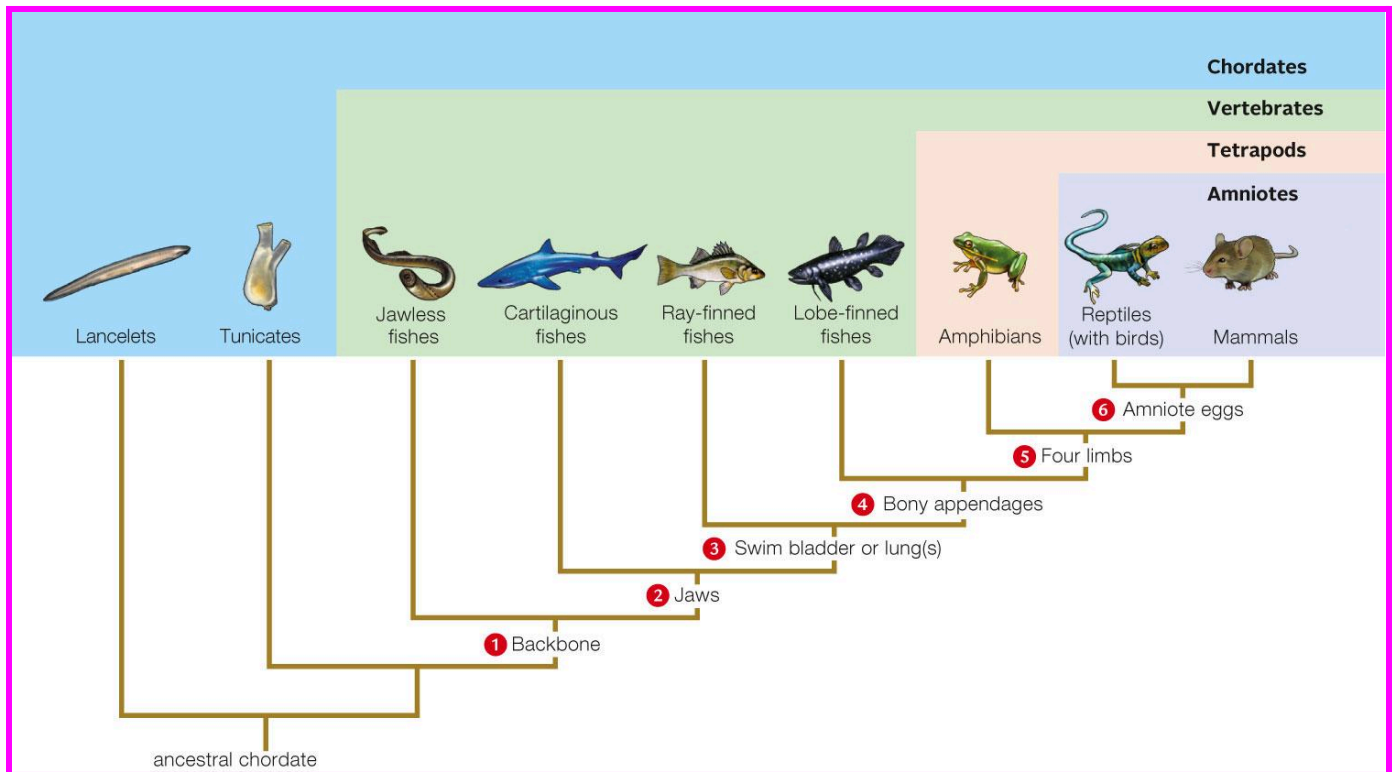


The above three common characters appear during early embryonic life of all the chordates. But all the above three characters rarely persist in the adult (e.g.,

Branchiostoma). Only one of these three primary characters of chordates is found in the adults of most of them, this is the dorsal tubular nerve cord, even this has its hollow

lumen greatly reduced in some, and in Urochordata the central nervous system degenerates in the adult. The other two characters completely disappear in the adults of most chordates. However, the three

primary characters are possessed only by chordates. These characters distinguish chordates from all other animals and appear to reveal their common ancestry.



General characters of phylum chordata:

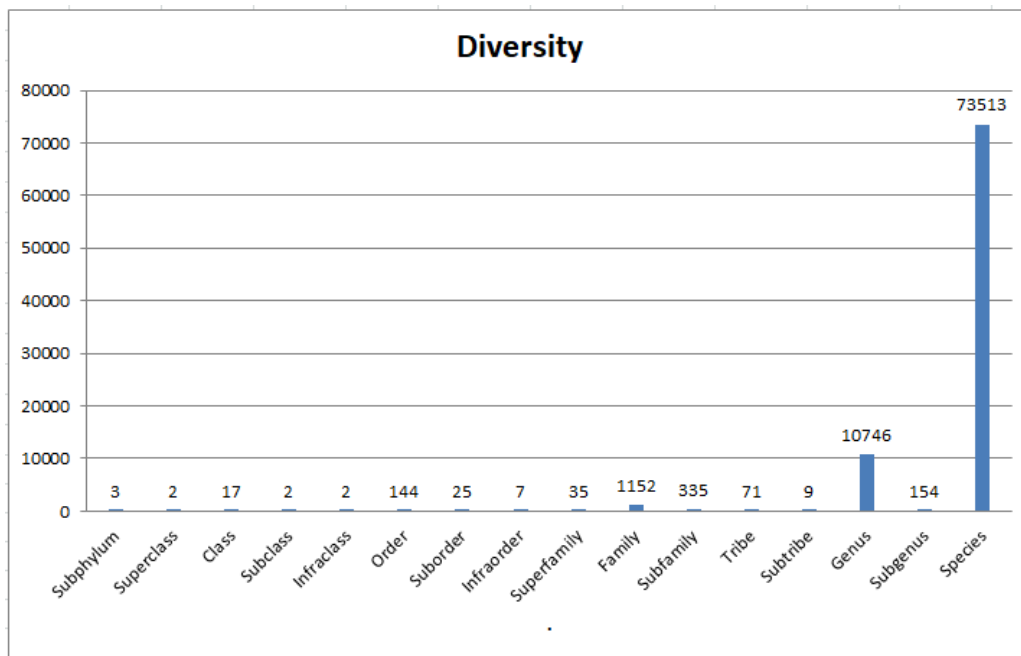
1. Chordates are aquatic, aerial or terrestrial. All are free-living with no fully parasitic forms.
2. Body small to large, bilaterally symmetrical and metamerically segmented.

3. A postanal tail usually projects beyond the anus at some stage of life and may or may not persist in the adult.
4. Exoskeleton often present; well-developed in most vertebrates.

5. Body wall triploblastic, i.e., presence of three germ layers: ectoderm, mesoderm and endoderm.
6. Coelomate animals, i.e., a well developed true coelom is always present which is enterocoelic or schizocoelic in origin.
7. Notochord is always essentially present at some stage of life cycle. It is completely or partly replaced by the vertebral column in the majority of animals.
8. A cartilaginous or bony, living and jointed endoskeleton present in the majority of members (vertebrates).
9. Paired pharyngeal gill-slits are present on either side of the pharynx at some stage of life, may or may not be functional.

10. Digestive system is complete with digestive glands.
11. Blood vascular system is closed. Heart ventral with dorsal and ventral blood vessels. Hepatic portal system is present which is well developed.
12. Excretory system comprising proto-or meso-or metanephric kidneys.
13. Nerve cord is dorsal and tubular. Anterior end is usually enlarged to form the brain.
14. Sexes separate with rare exceptions.

Statistics of chordates diversity:



(Catalogue of life accessed on 01.02.2024)