

## **TOPIC: - ORIGIN OF CHORDATES**

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The phylum chordata consists of both invertebrate and vertebrate chordates. It is a large and diverse phylum. It includes about 60,000 species.

The phylum Chordata is derived from two Greek words, the chorde ( string or cord) and ata ( bearing). The common characteristic feature of phylum Chordata is the supporting rod-like structure along the back, the notochord (Gr., noton = back; L. chorda = cord) . Thus, chordates are those animals which have a cord, i.e., notochord.

The chordates include organisms having a notochord, a dorsal tubular (hollow) nerve cord, pharyngeal gill-slits and a few features such as axiate organisation, bilateral symmetry, triploblastic condition, coelom, metamerism (segmentation), organ-systems, etc., that are common with the nonchordates.

### **THEORIES ABOUT ORIGIN OF CHORDATES**

It is believed that Chordates have originated from invertebrates. It is difficult to determine from which invertebrate group the chordates were developed. Chordate ancestors were soft bodied animals. Hence they were not preserved as Fossils.

**1. ANNELID THEORY:** This theory suggests that the chordates have evolved from an annelid stock. The annelids show bilateral symmetry, metamerism, head, lateral Coelom, complete digestive tract, closed circulatory system, hemoglobin, etc., like chordates. The resemblance is enhanced if; an annelid is turned upside down. But the mouth would be dorsal which is unlike that of chordates. Metamerism and appendages of annelids differ in nature from those of the chordates. Coelome is schizocoelic in annelids and enterocoelic in lower chordates. Haemoglobin is dissolved in the plasma in annelids but it is present in the red blood corpuscles in chordates. Annelid nerve cord is double, and, ventral in contrast to single, hollow, dorsal nerve cord of chordates. Annelid and chordates differ in their embryology; hence it is difficult to accept this theory.

**2. ECHINODERM - HEMICHORDATE THEORY:** This theory infers origin of chordates, hemichordates and echinoderms from a common ancestor. This theory is based on the following evidences.

**a) EMBRYOLOGICAL EVIDENCE :** Both echinoderms and chordates have enterocoelic coelome, mesoderm and deuterostomous mouth. There is resemblance between the bipinnaria larva of certain echinoderms and the tornaria larva of hemichordates.

**b) SEROLOGICAL EVIDENCE:** A close similarity exists between the proteins of the body-fluid of chordates and echinoderms. Hence the chordates are more related to echinoderms.

The radial symmetry of adult echinoderms will disprove their relationship with the bilaterally symmetrical chordates.

**3. COELENTERATE THEORY:** According to this theory chordates were developed from coelenterates. Radial symmetry coelenteron, cnidoblasts etc, were 1st and advanced characters were developed to give rise to chordates.

**General Characters of Chordata:**

1. Chordates are aquatic, aerial or terrestrial. All are free-living with no finally 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 vertebral column in 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 usually enlarged to form brain.