GENERAL CHARACTERISTICS OF CEPHALOCHORDATA

With about twenty-five species inhabiting shallow tropical and temperate oceans, the Cephalochordata is a very small group of the animal kingdom. Known as lancelets or *Amphioxus* (from the Greek for "both [ends] pointed," with reference to their shape), cephalochordates are small, eel-like, unprepossessing animals that spend much of their time buried in sand. However, because of their remarkable morphology, they have proved crucial in understanding the morphology and evolution of chordates in general including vertebrates.

Cephalochordates have all the typical chordate features. The **dorsal nerve cord** is supported by a muscularized rod, or **notochord**. The pharynx is perforated by over 100 **pharyngeal slits** or "gill slits", which are used to strain food particles out of the water. The musculature of the body is divided up into V-shaped blocks, or **myomeres**, and there is a **post-anal tail**. All of these features are shared with vertebrates. On the other hand, cephalochordates lack features found in most or all true vertebrates: the brain and the sense organs are very small and poorly developed, and there are no true **vertebrae**.

Today, *Amphioxus* may be extremely common in shallow sandy environments: at Discovery Bay, Jamaica, up to five thousand individuals per square meter of sand have been reported. In some parts of the world, Amphioxus is eaten by humans or by domestic animals; they are important food items in some parts of Asia, where they are commercially harvested.

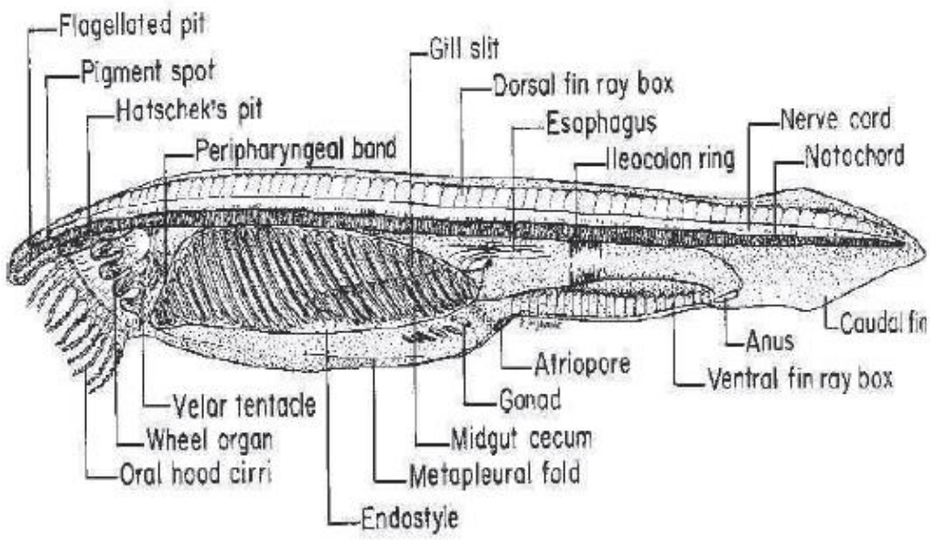

Fig: Structure of Amphioxus

GENERAL CHARACTERS OF CEPHALOCHORDATA

- Body is fish-like and is useful for burrowing and swimming.
- It has a head.
- It shows a tail.
- Appendages are absent.
- Dorsal, caudal and ventral fins are present.
- Body- wall shows one- cell thick, non-ciliated epidermis, dermis, connective tissue, striated muscle and parietal peritoneum.
- It has no exoskeleton.
- Notochord extends from the anterior end to posterior end.
- Enterocoelic coelom is present; however, it is reduced in the pharyngeal region by atrium.
- Alimentary canal is long. It includes a large pharynx with many gill-slits. Ciliary mode of feeding is developed.
- Gills perform respiration.
- Circulatory system is closed.
- Heart and respiratory pigments are absent.
- Hepatic portal system is present.
- Excretory system shows paired protonephridia with solenocytes.
- Brain is not present.
- Two pairs of cerebral and several pairs of spinal nerves are present.
- Sexes are separate. Gonads are metamerically arranged and are without gonoducts.
- Asexual reproduction never occurs.
- Fertilization is external.

CLASSIFICATION OF CEPHALOCHORDATA

The sub-phylum Cephalochordata includes a single class-Leptocardii, which has single family Branchiostomidae. The family contains only two genera *Branchiostoma* and *Asymmetron.*

The characteristics and body structure of cephalochordates can be described under the following heads:

(a) CHORDATE FEATURES OF CEPHALOCHORDATA (AMPHIOXUS):

- Presence of dorsal tubural nerve cord.
- Presence of a long notochord from anterior end to posterior end on the dorsal side. Because, it extends to the cephalic region, the group is called Cephalochordata.
- Gill silts are present in the Pharynx.
- Presence of post anal tail.
- Presence of liver diverticulum.
- Development of hepatic portal system.
- Presence of myotomes which are useful for locomotion.
- Presence of dorsal, caudal and ventral fins.

(b) PRIMITIVE CHARACTERS OF CEPHALOCHORDATA:

- The excretory system contains protonephridia.
- In Chordata, the presence of solenocytes is not reported. But, in *Amphioxus*
- solenocytes are associated with nephridium.
- Absence of heart and kidney.
- Absence of paired limbs or paired fins.
- Absence of distinct head.
- Absence of distinct paired sense organs.
- Gonads are without gonoducts.

(c) SPECIAL CHARACTERS OFCEPHALOCHORDATA:

- Because of its ciliary mode of feeding, the pharynx is elaborated with many gill slits. .
- Oral hood is well developed for ciliary mode of feeding.

- Because of its ciliary mode of feeding the atrium is very well developed. Thus, *Amphioxus* shows some special characters which are developed because of its ciliary mode feeding.

CEPHALOCHORDATES RELATIONSHIP WITH OTHER GROUP OF ANIMALS:

Cephalochordates show many close relationship with Urochordata. However, in some points they differ from Urochordates

Similarities:-

- Presence of gill slits in pharynx.
- Presence of endostyle in pharynx.
- Presence of ciliry mode of feeding.
- Presence of atrium.

Differences:

- Absence of test in Cephalochordates.
- Absence of distinct heart in Cephalochordates.
- Presence of notoçhord and nervecord in the adults in Cephalochordates
- Presence of myotomes in the adult in Cephalochordates

In this way Cephalochordates differ with Urochordates.

Cephalochordates show some invertebrate features

- Presence of paired nephridia like annelids.
- Presence of flame cells like Helminths.
- Presence of soft body and slug like appearance like molluscs.

By considering the above facts we come to a conclusion that: *Amphioxus* is a chordate animal. It is a degenerate jawless chordate. It mainly shows chordate features and differs from urochordates in some aspects. Hence, it is separated and kept in a separate sub-phylum called Cephalochordate.