## Affinities of Amphioxus / Cephalochordata

**Branchiostoma** was first discovered by German scientist **Pallas** in 1778 and he considered it a Mollusc with the name *Limax lanceolatus*. An Italian scientist Costa (1834) named it as *Branchiostoma lanceolatum*.

## Origin

**Garstang** (1928), **Berrill** (1955), **Romer** (1959) and **Barrington** (1965) proposed that *Branchiostoma* originated from sessile Urochordata.

The sessile Urochordate produced free-swimming tadpole larvae. Some of these larvae gave rise to *Branchiostoma* as well as vertebrates by **neotony**.

## Affinities

*Branchiostoma* is an interesting animal. It is an assemblage of invertebrate, chordate and unique characters.

- 1. Affinities with Annelida: *Branchiostoma* resembles annelids in the following characters:
  - a) Bilaterally symmetrical body.
  - b) Metamerical segmentation.
  - c) Protonephridia.
  - d) Filter feeding

But annelids differ from Cephalochordates in the absence of chordate characters and the presence of **schizocoelic** coelom.

Affinities with Mollusca: *Branchiostoma* resembles an oyster because it exhibits a ciliary mode of feeding and respiratory current similar to those of molluscs. This made Pallas (1778) consider it as a slug and named it *Limax lanceolatus*.

However molluscs differ from Branchiostoma in the absence of segmentation. Similarly, *Branchiostoma* differs from molluscs in the absence of foot.

- 3. Affinities with Echinodermata: *Branchiostoma* resembles echinoderms in the following characters:
  - a) Asymmetrical body.
  - b) Enterocoelous coelom.

- c) Perforations in the calyx of fossil crinoids resembling the **gill slits** of *Branchiostoma*.
- d) The energy-rich compound **phosphocreatine** is present both in ophiuroids and *Branchiostoma*.

It is believed that all these similarities are due to a remote common ancestry.

- 4. Affinities with Chordates: *Branchiostoma* is a chordate because it possesses the following three chordate characters:
  - a) Dorsal tubular nerve cord
  - b) Notochord
  - c) Gill slits
- 5. Affinities with Hemichordata: Branchiostoma resembles hemichordates in the following characters:
  - a) Gill slits and gill bars
  - b) Filter feeding mechanism
  - c) Respiratory mechanism
  - d) Enterocoelous coelom
  - e) Numerous gonads without gonoducts.
- 6. Affinities with Urochordata: Branchiostoma resembles Urochordates in the following features:
  - a) Ciliary mode of feeding.
  - b) Respiratory mechanisms.
  - c) Large pharynx having many gill-clefts, an endostyle and peripharyngeal bands.
  - d) An atrium with atriopore.
  - e) Early developmental stages.

However, the urochordates differ from the Branchostoma in the following features:

Unsegmented body, absence of nephridia and Test.

- 7. Affinities with Cyclostomata: Branchiostoma resembles the Ammocoetes larva of Cycostomes in the following features:
  - a) Slender fish like body.
  - b) Continuous dorsal median fin.
  - c) Mouth surrounded by oral hood.

- d) Presence of velum
- e) Pharynx with an endostyle and gill-slits.
- f) Presence of notochord and nerve cord.
- 8. Affinities with Vertebrates: Branchiostoma also show similarities with other vertebrates in several ways such as:
  - a) Post-anal tail.
  - b) Metameric myotomes.
  - c) Coelom lined by mesodermal epithelium.
  - d) Mid-gut diverticulum is comparable with the liver.
  - e) Well-formed hepatic portal system.
  - f) Forward flow of blood in ventral vessels and backward flow of blood in dorsal blood vessels.

Cephalochordates differ from cyclostomes and other vertebrates in most of their primitive characteristics, such as the absence of a head, paired limbs, skull, vertebral column, blood without RBC, brain and gonoducts.

- 9. **Specialized Characters**: Branchiostoma developed some specialized characters which are peculiar to itself. They are the following:
  - a) Large pharynx c) Atrium
  - b) Numerous gill slits d) Oral hood

10. **Degenerate Characters**: Branchiostoma exhibits the following degenerative characters:

- a) Sedentary life.
- b) Brain and sense organs are reduced.
- c) Notochord extends far to the cerebral vesicle.

## **Conclusion:**

On analysing the various anatomical features, it is clear that Branchiostoma is a chordate. Garstang (1928) and Berrill (1958) stated that Branchiostoma arose from Ascidian tadpole larva by neoteny. It is evident, that Branchiostoma is a chordate that originates from Urochordates. Though it is a primitive chordate, it is not the ancestor of other vertebrates.