

## Classification of subphylum Cephalochordata:

### Unit 2 Protochordates; ZOOA-CC3-5-TH

#### Historical Resume of Subphylum Cephalochordata:

The first individual of this group was described by Pallas in 1778. He regarded the specimen as a slug and named it *Umax lanceolatus*. Yarrell (1836) studied the animal in detail and gave the name *Amphioxus lanceolatus*. Costa (1834) suggested the name of the genus as *Branchiostoma*. Since then the biological name of the genus has been established as *Branchiostoma* according to the law of priority.

#### Important Features of the Subphylum Cephalochordata Lankester, 1877:

[Gk. Kephale, a head], Approx. 23 species.

- a. Cephalochordates are small, fish-like translucent marine chordates.
- b. The body is laterally compressed and tapered at both ends with a post-anal tail. They are commonly called “lancelets” for the shape of the body.
- c. There is a low continuous dorsal and caudal fin; no paired fins.
- d. Body muscles are arranged as a series of V-shaped blocks of striated muscles fibres running throughout the body, called the myotomes (myomeres) and are

separated by sheets of connective tissue, the myosepta or called myocommas.

e. Epidermis is single layered.

f. The persistent notochord extends from the tip of the tail to the region beyond the brain, hence called Cephalochordata.

g. Ventral mouth surrounded by small tentacles, leads into large pharynx with numerous gill-slits open into the atrium.



Fig 1:Fossil cephalochordates Pikaia from midcambrian.

h. Blood vascular system is closed type and lacking of a specialized heart. The blood is colourless and without any respiratory pigment.

i. The dorsal hollow nerve cord runs immediately dorsal to the notochord and opens to the exterior through an anterior neuropore.

j. The excretory organs are protonephridia with solenocytes, derived from ectoderm.

k. Ductless gonads are metamericly arranged.

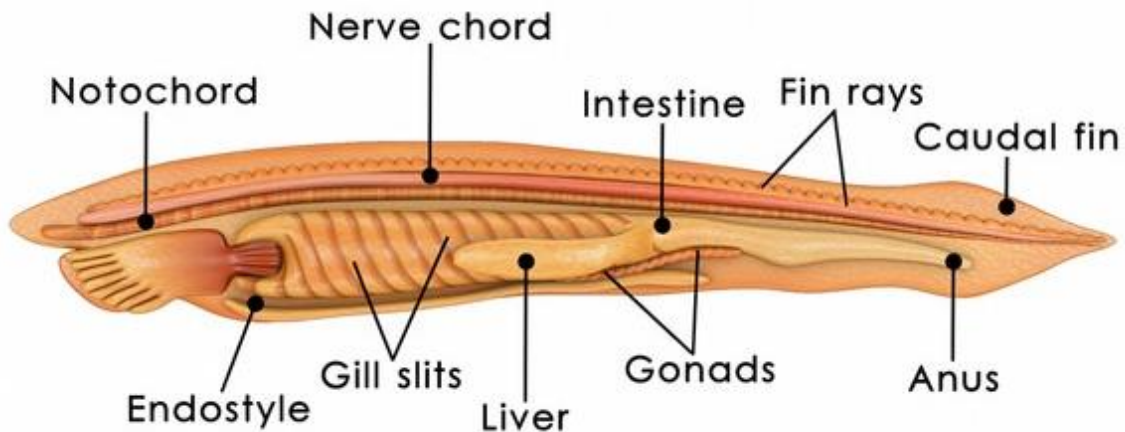


Fig 2: *Branchiostoma*

l. Sexes are separate (dioecious). Fertilization takes place in sea-water.

m. Radial cleavage.

n. Development with a transparent asymmetrical planktotrophic larva is similar to the shape of an adult.

### Fossil History:

The oldest known cephalochordates is *Pikaia* (Fig. 1), recorded from the Burgess Shales of Canada, about the middle Cambrian period. The anatomical characteristic features are more or less same as *Branchiostoma* except a pair of sensory tentacles that are found at the end of the body.

### Geographical Distribution:

Cephalochordates are found near shore areas (sub-tidal areas) of the seas of temperate and tropical regions.

**Size:** 50 to 70 mm.

### **Habit and Habitat:**

They are the inhabitants of coarse sands, shell gravels and fine sands of the seas. In coarse sand and gravel they will bury completely, but in finer sandy areas the anterior end protrudes into the water column.

### **Scheme of Classification:**

Marshall and Williams (1964) pertain a single class Cephalochordate under the subphylum Cephalochordata, but without any order under the class Cephalochordate. Godeaux (1974) comprises a single order Amphioxi under the subphylum Cephalochordata but without any class.

Berrill (1950), Barrington (1979), **Young (1981)**, Romer and Parson (1986), Ruppert and Barnes (1994), Kent and Miller (1997), Anderson (1998), Pechenik (2000) and Kardong (2002) **do not mention any class and order under Cephalochordata. We follow in this classification Young's (1981) scheme, adopted from the book "The Life of Vertebrates (3rd ed.)"**.

### **Systematic Resume:**

The subphylum Cephalochordata comprises a single family Brachiostomatidae with two genera Branchiostoma (Costa, 1834) and Asymmetron (Andrews, 1893). Other genera as Epigonichthys is now synonym with Asymmetron and Amphioxides, once considered as member of the family Amphioxidae,

now considered as giant larval individuals of the genus *Asymmetron*.

Genus 1. *Branchiostoma* [Approx. 16 species]

Gonads lie on each side of the body. They inhabit the tropical and sub-tropical seas.

Example:

*B. lanceolatum* (Sri Lanka, India, Mediterranean, N. W. Europe, eastern part of U.S.A.); *B. belcheri* (Sri Lanka, India, Torres Strait, Singapore, Borneo); *B. capense* (S. Africa); *B. indicum* (India, Sri Lanka); *B. pelagicum* (India); *B. elongatum* (Peru); *B. nakagawae* (Japan); *B. caribbaeum* (N. and S. America and West Indies); *B. californiense* (California, U.S.A.); *B. tattersali* (India).

Genus 2. *Asymmetron* [Approx. 7 species]

Gonads lie only on the right side. They inhabit the tropical seas.

Example:

*A. cingalense* (Sri Lanka); *A. cultellum* (Sri Lanka, Australia); *A. lucayanum* (Maldives, Bahamas, Zanzibar); *A. caudatum* (Louisiane Archipelago); *A. bassanum* (Australia); *A. maldivense* (Maldives, Zanzibar); *A. hectori* (New Zealand).

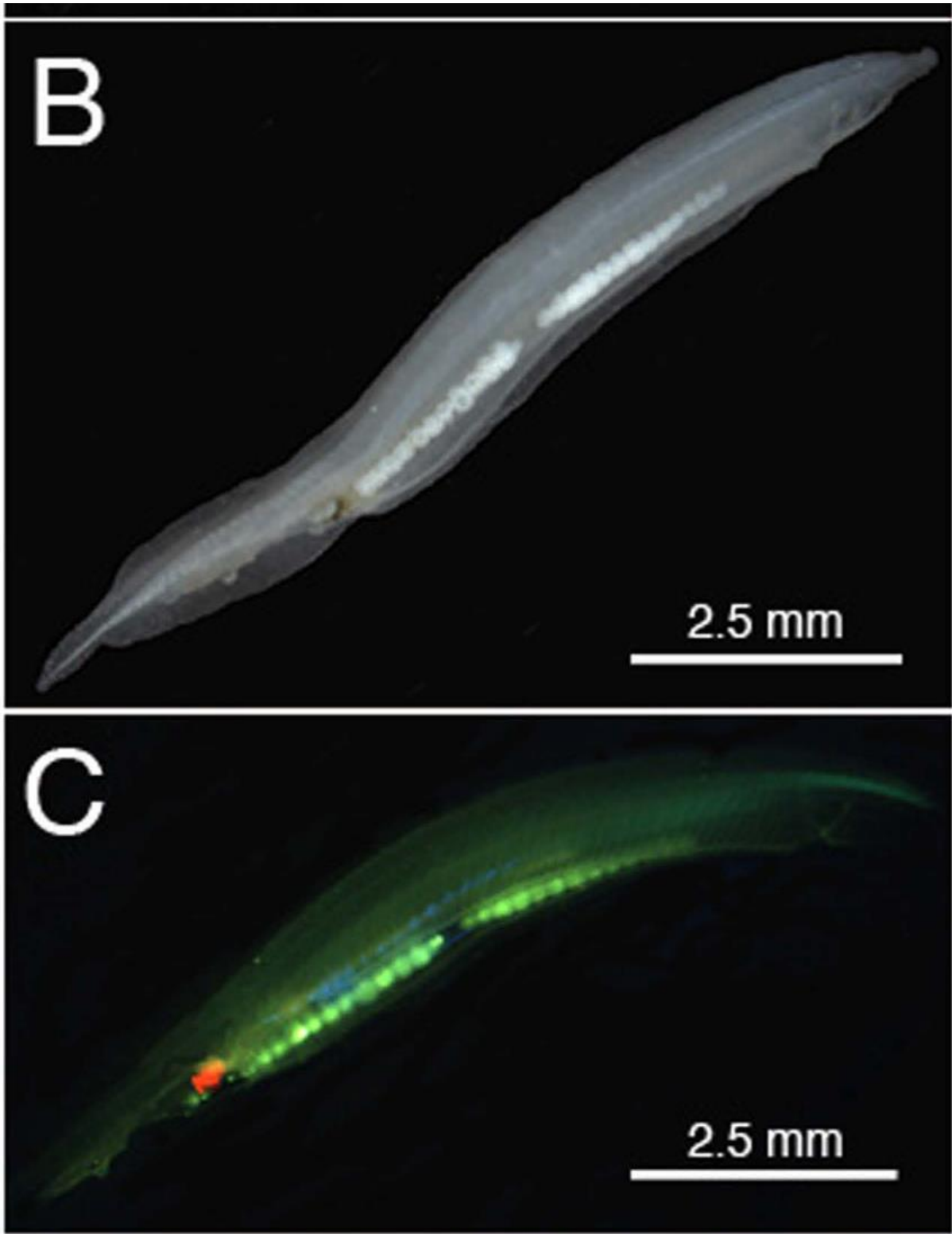


Fig 3: *Asymmetron*

**Table 17 : Families, genera and species known from India**

| Taxa   | World | India |
|--|-------|-------|
| Subphylum cephalochordata                      |       |       |
| Family Branchiostomatidae                      | 1     | 1     |
| Genera   | 1     | 1     |
| Species  | 15    | 6     |
| Family Epigonichthyidae<br>or Asymmetriontidae | 1     | —     |
| Genera   | 1     | —     |
| Species  | 6     | —     |

### Indian Cephalochordates

#### Collection and Research

Gray (1847), Thurston (1890), Foster-cooper (1903), Tattersall (1903) and Prosad (1934) described several species of cephalochordates, collected from different parts of Indian coasts. Kurian (1953) recorded *Branchiostoma lanceolatum* from the west coast of Travancore (part of Kerala state at present). Azariah (1953, '65, '71) several species from the Tamilnadu coast and studied the habit and habitat of *Branchiostoma*.

The author (Badal Chandra Bharati Goswami) collected *Branchiostoma lanceolatum* from the Okha coast (Gujarat).

*Branchiostoma lanceolatum*, *B. indicum*, *B. tattersali* and *B. belcheri* (Tamilnadu coast), *B. lanceolatum* (Okha coast, Gujarat), *B. indicum*, *B. pelagicum*, and *B. lanceolatum* (Gulf of Mannar) have been recorded from the Indian coasts.