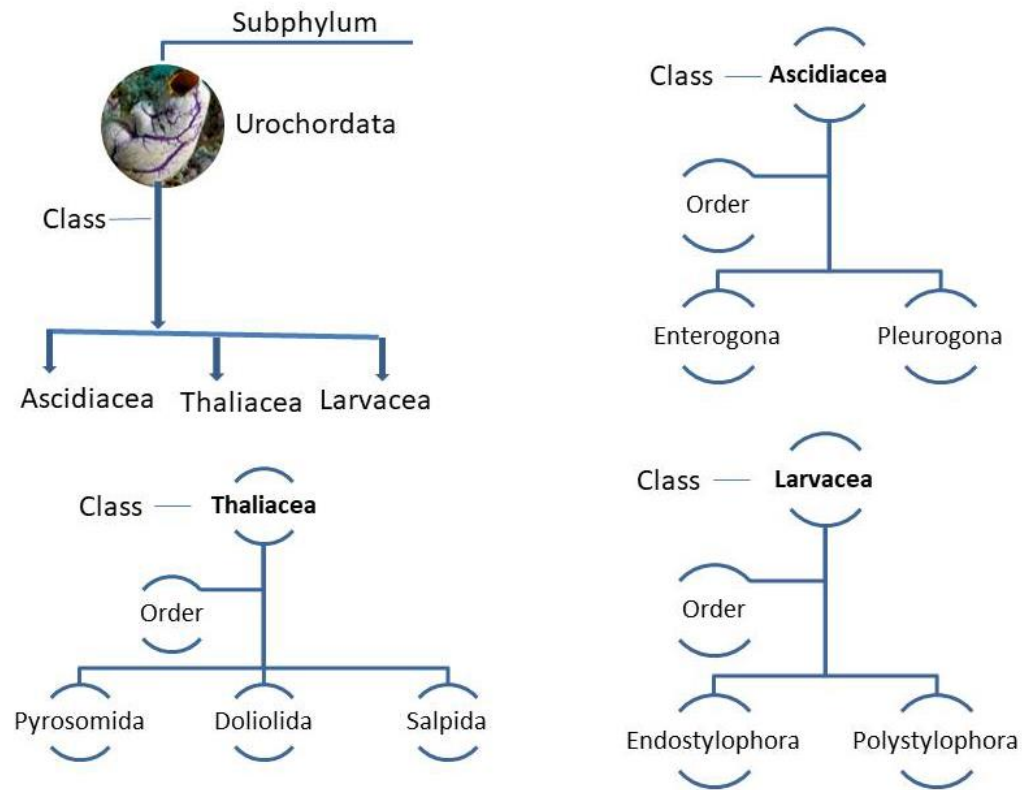




Classification of Urochordata

Subphylum Urochordata is divided into three classes — **Ascidiacea**, **Thaliacea** and **Larvacea**.



A. Class — Ascidiacea

Ascidiacea, commonly known as ascidians or sea squirts, is a class of marine invertebrates belonging to the phylum Chordata. These animals are filter-feeding, sessile organisms that are often found attached to rocks, shells, or other substrates in marine environments.

General characters:

1. Comprises mostly brightly coloured marine animals.
2. Some species are solitary, others are colonial.
3. Adults are sessile, but larvae are planktonic and do not feed.

- Adults having sac-like body, covered by tunic.
- Most of the chordate characters that were present during larval period disappear during metamorphosis into adult.
- In adult, nervous system transforms into a nerve ganglion.

Order 1. Enterogona

- Body sometimes divided into thorax and abdomen.
- Neural gland usually ventral to ganglion.
- Gonad 1, lying in or behind intestinal loop.
- Larva with 2 sense organs (ocelli and otolith).



Suborder 1. Phlebobranchia

- Pharynx with internal longitudinal vessels.
- Budding rare.

Examples : *Ascidia*, *Ciona*, *Phallusia*.

Suborder 2. Aplousobranchia

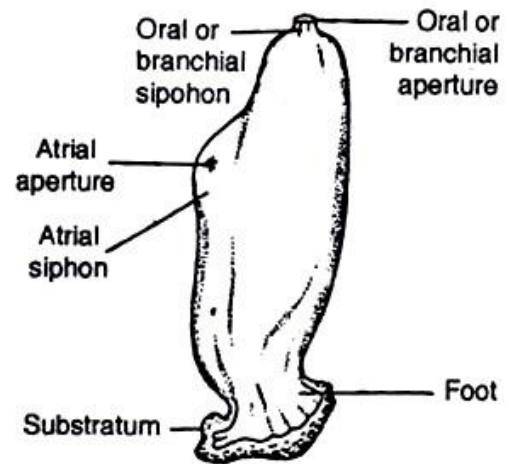
- Pharynx without longitudinal vessels.
- Budding common.

Example ; *Clavelina*.

Order 2, Pleurogona

- Body compact, undivided.
- Neural gland dorsal or lateral to ganglion.
- Gonads 2 or more embedded in mantle wall.
- Larva with otolith. Separate eye absent.

Examples : *Herdmania*, *Botryllus*, *Molgula*, *Styela*.



External organisation of adult *Ascidia*

Fig. (a & b): *Ascidia*

B. Class — Thaliacea

Thaliacea is another class of marine invertebrates within the phylum Chordata, and it includes organisms commonly known as salps, doliolids, and pyrosomes. Like Ascidiacea, Thaliacea are part of the subphylum Tunicata, but they differ in various aspects of their biology and life history.

Here are some key characteristics of Thaliacea:

Gelatinous Zooids: Thaliaceans are characterized by their gelatinous, barrel-shaped or tubular bodies. The individuals, known as zooids, are arranged in colonies and are typically transparent or translucent.

Colonial Lifestyle: Thaliaceans exhibit a colonial lifestyle, with numerous zooids forming a colony. The colony may take on different shapes, such as chains, rings, or gelatinous tubes.

Filter-Feeding: Like ascidians, thaliaceans are filter-feeders. They use their mucous-covered filters to extract plankton and other small particles from the water as it passes through their bodies.

Tunicate Characteristics: Thaliaceans have a tunic, similar to ascidians, which provides structural support. However, their tunic is more gelatinous and less rigid compared to that of ascidians.

Larvacean Stage: The life cycle of thaliaceans includes a larvacean stage, where the larvae have a tadpole-like appearance with a notochord and other chordate characteristics. The larvaceans secrete a temporary mucous house, which serves both as a protective structure and as a means to enhance filter-feeding efficiency.

Bioluminescence: Some thaliaceans, particularly pyrosomes, are known for their ability to produce bioluminescence, emitting light in response to certain stimuli.

Thaliaceans are important components of marine ecosystems, contributing to the cycling of nutrients and serving as prey for various marine organisms. Their gelatinous bodies and filter-feeding behavior make them efficient at capturing and processing small particles in the water.

General Characters:

1. Adults free living, pelagic, in warm and temperate seas. Solitary or colonial.
2. Body shape and size variable.
3. Tunic permanent, thin and transparent, with circular muscle bands.
4. Atriopore located posteriorly.
5. Pharynx with 2 large or many small gill-slits.
6. Sexes united. Larva formed or absent.
7. Adult without notochord, nerve cord and tail.
8. Asexual budding from a complex stolon.

9. Life history with an alternation of generations.

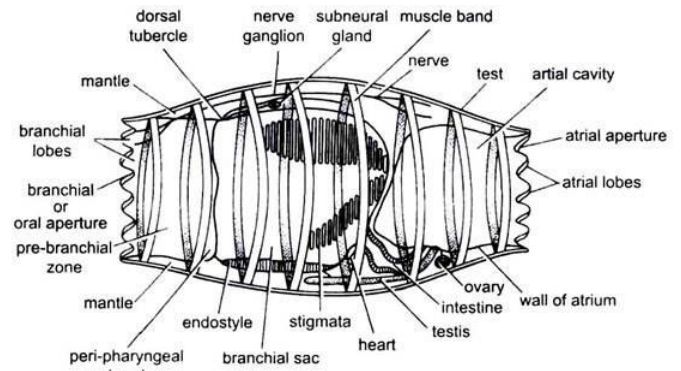
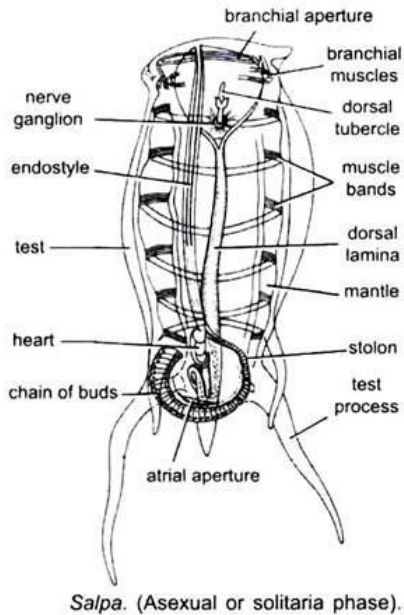


Fig. 5.8. *Doliolum*. (Sexual form).

Examples: *Salpa* (Fig. a), *Doliolum* (Fig. b).

Order 1. Pyrosomida

1. Colony compact, tubular, closed at one end and phosphorescent throughout the life, due to the invasion of its egg by a symbiotic luminescent bacteria.
2. Zooids embedded in a common test.
3. Muscle bands confined to body ends.
4. Gill-slits tall, numerous, upto 50.
5. No free-swimming larval stage.
6. Reproduces by budding.

Examples : Single genus, *Pyrosoma*.

Order 2. Doliolida (= Cyclomyaria)

1. Body characteristically barrel-shaped.
2. Muscle bands form 8 complete rings.
3. Gill-slits small, few to many.
4. A tailed larva with notochord present.

Examples . *Doliolum*, *Doliopsis*.

Order 3. Saipida (= Desmomyaria)

1. Body cylindrical or prism-shaped.

2. Muscle bands incomplete ventrally.
3. Pharynx communicates freely with atrium through a large gill-slit.
4. Tailed larva absent.

Examples : *Salpa*, *Scyclosalpa*.

C. Class — Larvacea

Larvacea is a class of small, free-swimming marine invertebrates within the subphylum Tunicata, which also includes ascidians and thaliaceans. Larvaceans are often colloquially referred to as "larvacean tadpoles" due to their tadpole-like appearance during their entire life cycle. They are also known as appendicularians.

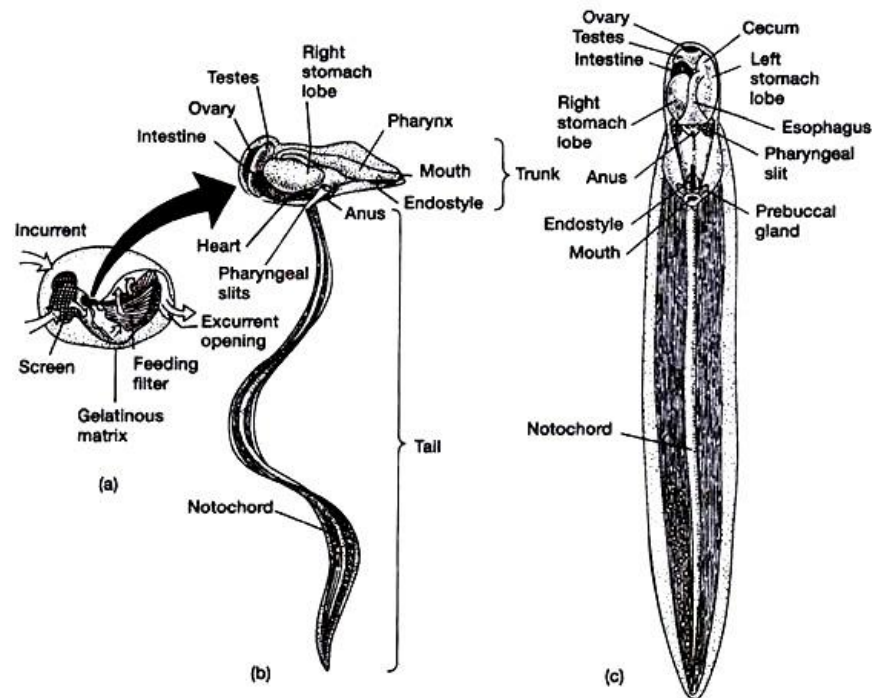
Here are some key characteristics of larvaceans:

Small Size: Larvaceans are typically small, ranging from a few millimeters to a few centimeters in size. **Transparent, Gelatinous Body:** Similar to thaliaceans, larvaceans have a transparent, gelatinous body. Their

body plan is streamlined, and they possess a notochord and other typical chordate characteristics.

Free-Swimming Tunicate Stage: Larvaceans spend their entire life in a free-swimming stage, without undergoing metamorphosis into a sessile form. Unlike ascidians, they do not become attached to a substrate.

Filter-Feeding: Larvaceans are efficient filter-feeders. They use their mucous filters to capture small particles, such as plankton, from the water. The mucous filter is shaped like a complex house or "house-shaped" structure, which is discarded and rebuilt regularly.



Oikopleura : (a) within its gelatinous house, (b) and (c) Free floating forms

House Secretion: Larvaceans secrete a mucous house, which serves as both a protective structure and a means to enhance their filter-feeding efficiency. The house is typically discarded and replaced every few hours.

Rapid Pumping Action: Larvaceans exhibit rapid pumping actions to create water currents for filter-feeding. This behavior allows them to actively capture particles in their mucous filters.

Larvaceans play a crucial role in marine ecosystems by participating in nutrient cycling and serving as a food source for various marine organisms. Their ability to filter large volumes of water and capture small particles contributes to the overall health and balance of the marine environment.

General characters:

1. Small (5 mm long), solitary, free-swimming, pelagic, neotenic, larva-like forms with persistent notochord, nerve cord and brain.
2. Test forming a temporary house, renewed periodically.
3. Atrium and atrial aperture absent.
4. Gill-slits 2, opening directly to outside.
5. Sexes united. No metamorphosis.

Order 1. Endostylophora

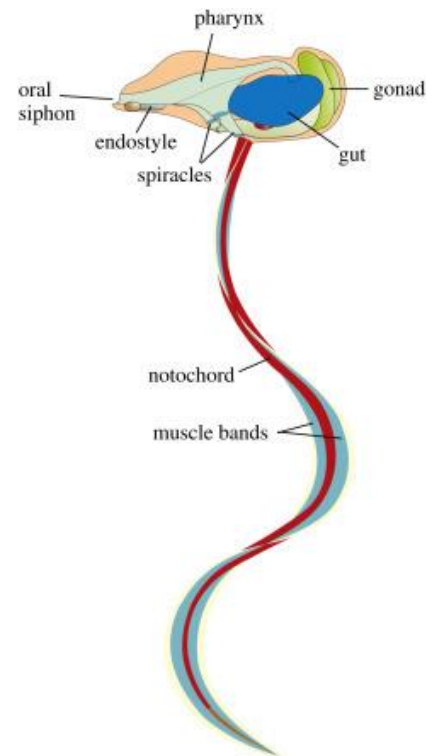
1. House bilaterally symmetrical, with separate inhalent and exhalent apertures.
2. Pharynx with endostyle.

Examples : *Oikopleura*, *Appendicularia*.

Order 2. Polystylophora

1. House biradially symmetrical, with single aperture.
2. Pharynx without endostyle.

Example : *Kowalevskia*.



Appendicularia