TOPIC: GENERAL CHARATERISTICS AND CLASSIFICATION OF UROCHORDATA

LECTURE NO:03

BSC PART 1-PAPER II-GROUP A

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AUTHOR: DR.NIRMAL KUMARI

OBJECTIVE

To understand the systematics and functional morphology of Urochordates. To study their affinities and adaptations to different modes of lives.

To describe and explain the basic biology, evolution and development of Urochordata. To impart knowledge in comparative anatomy and development of urochordata

INTRODUCTION

The urochordates, sometimes known as the tunicates, are commonly known as "sea squirts. The body of an adult tunicate is quite simple, being essentially a sack with two siphons through which water enters and exits.Water is filtered inside the sack-shaped body.Urochordates are small marine animals with larvae that swim freely and adults that attach themselves to the ocean floor. The 1,300 species of urochordates, like all members of the phylum Chordata, possess four characteristic anatomical structures as embryos: a flexible body-length rod **notochord** that provides resistance against muscular contractions and allows for more efficient movement; a **dorsal**, hollow, **nerve cord** that forms the central nervous system; slits in the beginning of the digestive tract (the pharynx) that allow filter feeding and gas exchange; and a **postanal tail**.

GENERAL CHARACTERISTICS AND CLASSIFICATION

GENERAL CHARACTERISTICS

These animals are known as ‘sea squirt’. The tunicates were first regarded as sponges. Lamark in 1816 placed Tunicata in between the Radiata and Vermes in his system of classification. Later, they were included in Mollusca. In 1866 Kowalevsky kept them in chordates. Their chordate features are clearly seen in the larval stages. All Urochordates are marine and occur in all the seas. Majority of them are sedentary and some are pelagic. The life-history of urochordates passes through a dramatic change. Their chordate characters are more pronounced during larval period. While in adults they are more like invertebrates than chordates. Therefore, the characters are described in two heads — larval characters and adult characters.

Body shows variation in size and form.

The body is unsegmented and has no tail

The body is covered by a test. It is formed by tunicine which is rallied to cellulose. Hence the name Tunicata

Body wall shows one-layered epidermis, dermis is made by connective tissue and muscles, and atrial epithehum.

Celome is absent.

Atrial cavity surrounds the pharynx, into this cavity the gill slits, anus and genital ducts will Open. It opens through atrial aperture.

Larva has notochord in the tail. It disappears during metamorphosis.

Respiratory system contains gills in the pharyngeal wall.

Ciliary mode of feeding is common.

Open type of Circulatory system is seen.

The heart is ventral and it periodically reverses its function.

Nervous system is represented by a single dorsal ganglion in the adult.

Excretion is carried on by nephrocytes.

Asexual reproduction is by budding.

Bisexual animal and cross fertilisation is favored.

Fertilization is external.

CLASSICFICATION UP TO ORDER LEVEL

Subphylum Urochordata is divided into three classes.

CLASS 1. ASCIDIACEA

CLASS 2. THALIACEA

CLASS 3. LARVACEA (APPENDICULARIA)

CLASS 1. ASCIDIACEA:

These are sedentary tunicates.

The body is covered by a test.

Pharynx is large and contains gill-slits.

Notochord, nerve-cord and tail are absent in adults.

These are bisexual animals.

Life-history includes a typical tadpole larva.

The class is divided into two orders.

Order 1. Enterogona

These ascidians bear one gonad in the intestinal loop. Neural gland is ventral to

the ganglion. Tadpole larva is seen.

Ex: Ascidia and Ciona.

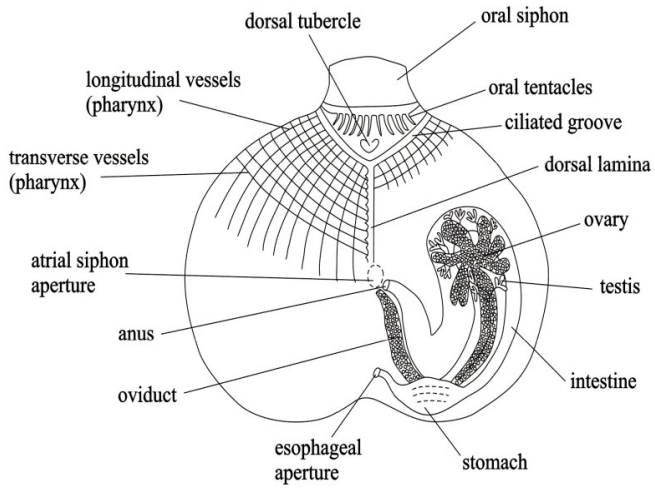

Fig. 3.1: Internal Structure of Ascidia

Order: 2. Pleurogona.

In these ascidians, gonads are paired and are present in the atrial wall. Neural gland is dorsal to the ganglion:

Ex: Herdmania, Botryllus.

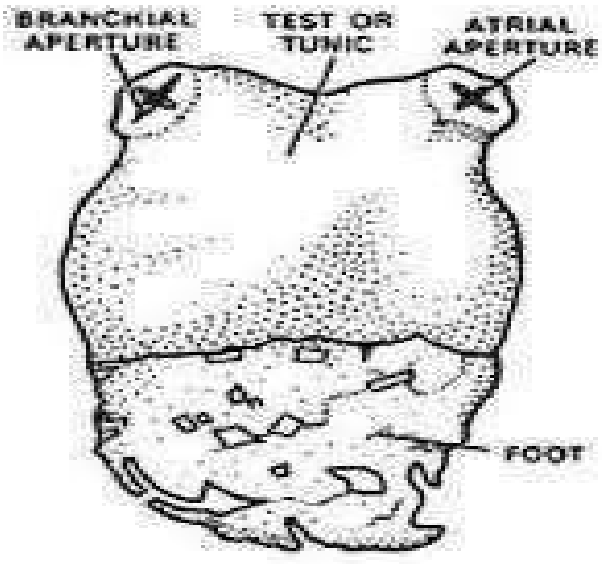

Fig 3.2 Test of Herdmania

CLASS 2.THALIACEA:-

These urochordates are free-swimming and pelagic forms.

They are covered by transparent test.

The brachial and atrial apertures are placed at anterior and posterior ends.

Pharynx is small.

Notochord, nerve-cord and tail are absent in the adult.

Asexual reproduction is by budding.

These are bisexual animals.

Tailed larva may be present or absent.

Alternation of generations can be seen in the life history.

The class Thaliacea is divided into three orders.

Order1. Doliolida (Cyclomyarla)

Barrel shaped body is completely covered by muscle bands,

Pharynx is small.

Number of gill slits is less.

Tailed larva is seen.

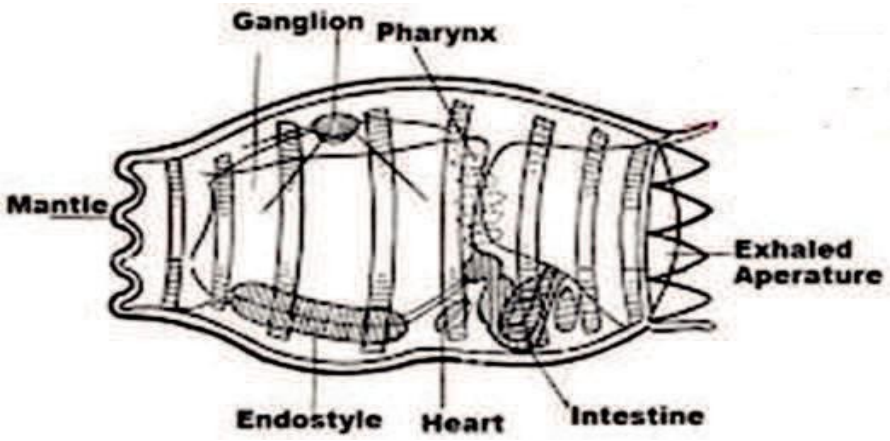

Fig 3.3: Doliolum

Sexual Blasto-zooid and asexual oozooid stages will alternate in the life

cycle. Ex: Doliolum.

Order2. Pyrosomlda:

This order includes colonial forms.

Muscle bands are small and present at the ends.

Gill-slits are many.

Tailed larval stage is
absent. Ex:
Luminescent
colonial form.

Order 3. Salpida (Hemimyaria):-

Muscle bands are complete dorsally and incomplete ventrally.

This order includes organisms whose body prism is like.

Only one pair of lateral gill slits are present.

Taile d larval stage is absent.

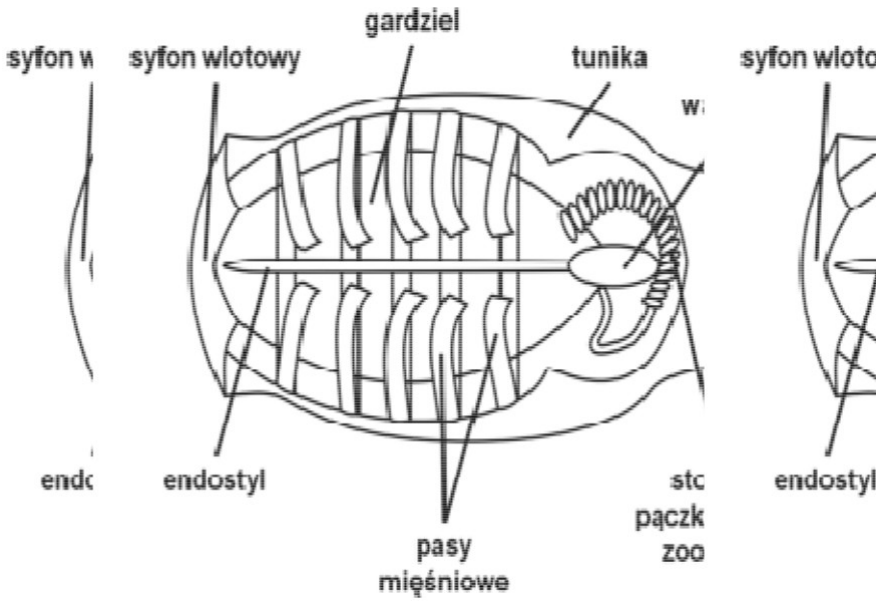

Fig: 3.4 Salpa

Life history includes alternation of generations. Ex: Salpa.

CLASS: 3. LARVACE A (APPENDICULARIA)

These are free – swimming pelagic tunicates. True test c overing is lacking.

They show loose gelatinous house. This house is useful for filter feeding. Two gill slits are present.

Atrium is absent.

Notochord and nerve cord are persistent They show tail throughout their life.

Neotenic forms are included. Ex: Oikopleura. ‘

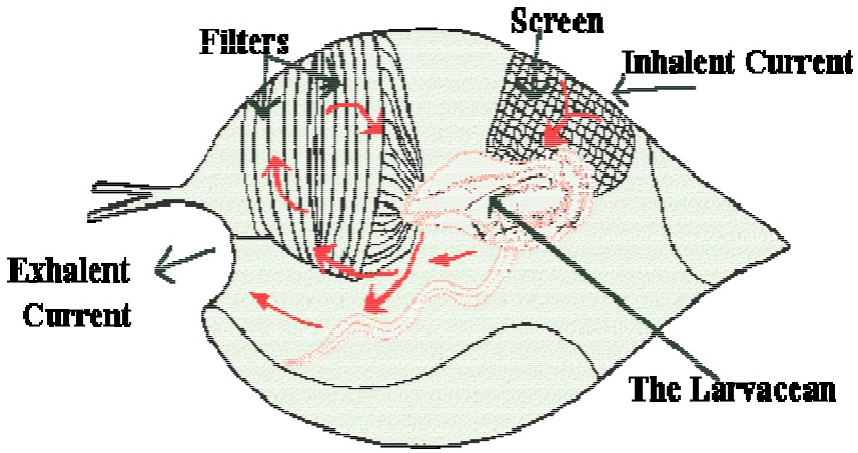

Fig 3.5 A Larvacean in it’s house