



# Chapter 10 Pelagic Tunicata

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# References

- **Bone Q, 1998. The biology of pelagic tunicates. 340p**



## **Chordata**（脊索动物门）

- **Urochordata**（尾索动物亚门）

  - Appendiculariae**（有尾纲） = **Copelata**

  - Thaliacea**（海樽纲）

  - Ascidiacea**（海鞘纲）

- **Cephalochordata**（头索动物亚门）

- **Vertebrata**（脊椎动物亚门）

# General characteristics

## Chordata Urochorda

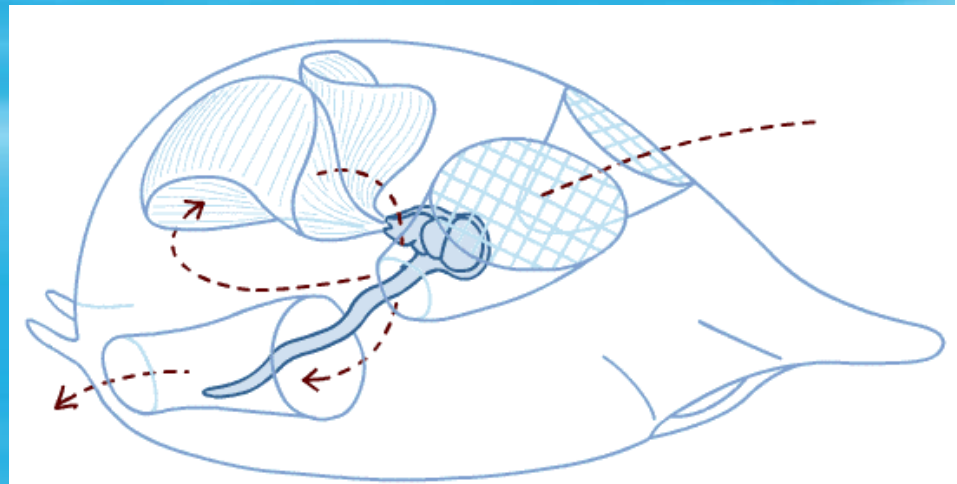
- **Except for Larvacea, the notochord only exists in the tail of larvae. The adults possess no notochord. (Urochorda)**
- **Adult is enclosed in a sac-like tunica composed of tunicin secreted by the integument. (Tunicata)**
- **Without sensory organs and tubus medullaris in the adult, and with an open circulatory system.**
- **Usually hermaphrodites, with sexual or budding reproduction.**



# 10.1 Appendicularia = Copelata

## 10.1.1 General Morphology

- do not undergo metamorphosis, the adult with a tail supported by a notochord
- gill sac simply
- endostyle short, groove-like
- ♀ ♂ hermaphrodite
- “house”



## 10.1.2 External features

- **1 Trunk**
- **2 Tail**



# 10.1.3 Internal features

## 1 Digestive system

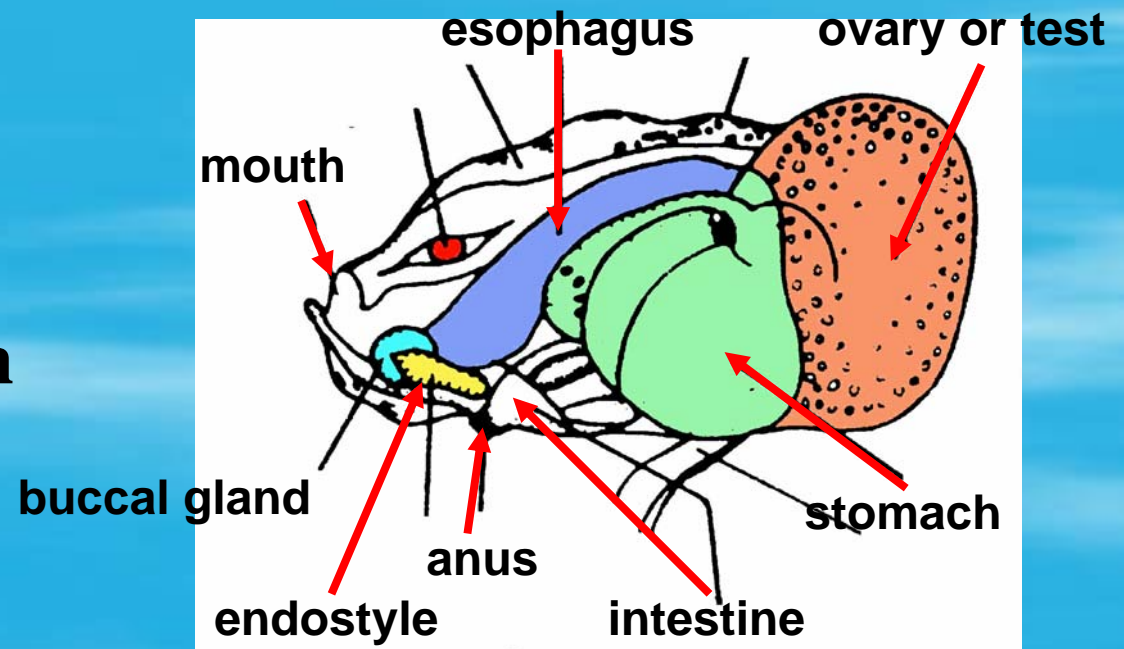
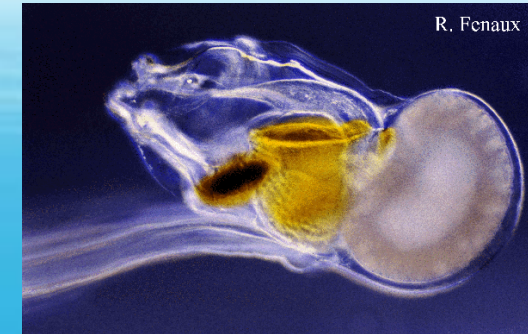
mouth → pharynx →  
esophagus → stomach →  
intestine → anus

endostyle, buccal gland

## 2 Circulatory system

## 3 Reproductive system

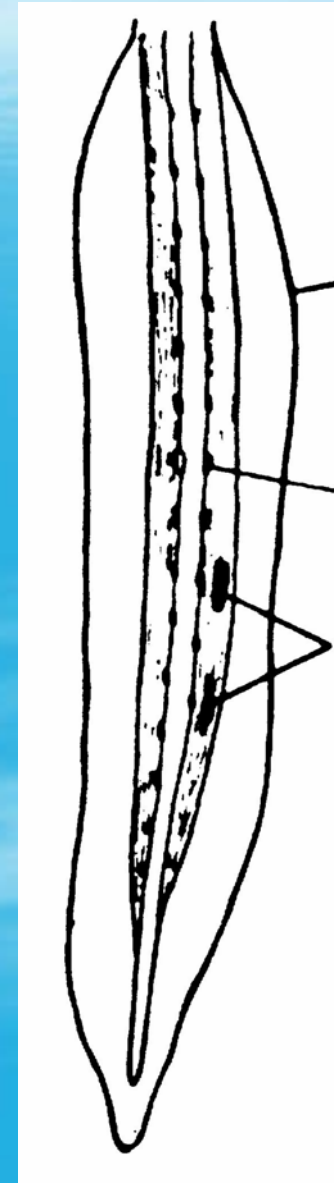
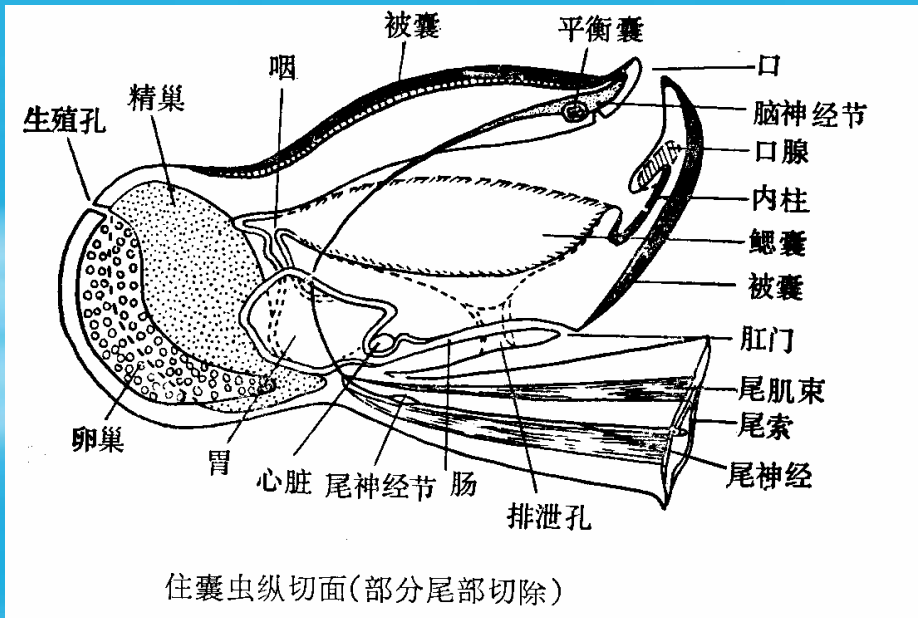
hermaphrodite



### 3 Nervous system

- cerebral ganglion
- caudal ganglion

### 5 Notochord and Muscle Bands





## 10.1.4 Classification

**One order, Urochorda with two families, the main characteristics for classification are:**

- **(1) the ratio of body to tail in size and their shape**
- **(2) the shape of the endostyle**
- **(3) the position of the gill opening**
- **(4) the shape of the gonads**

**Family Oikopleuridae: *O. longicauda***

**Family Fritillaridae: *F. pellucida***

# Common species

- **Family Oikopleuridae**

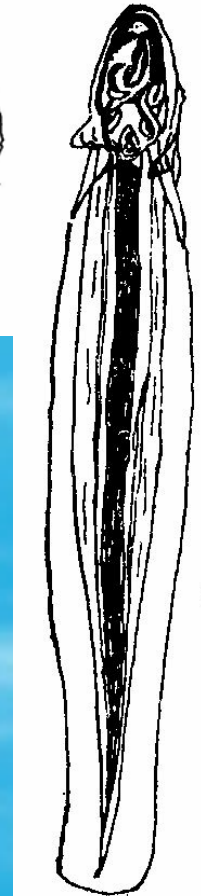
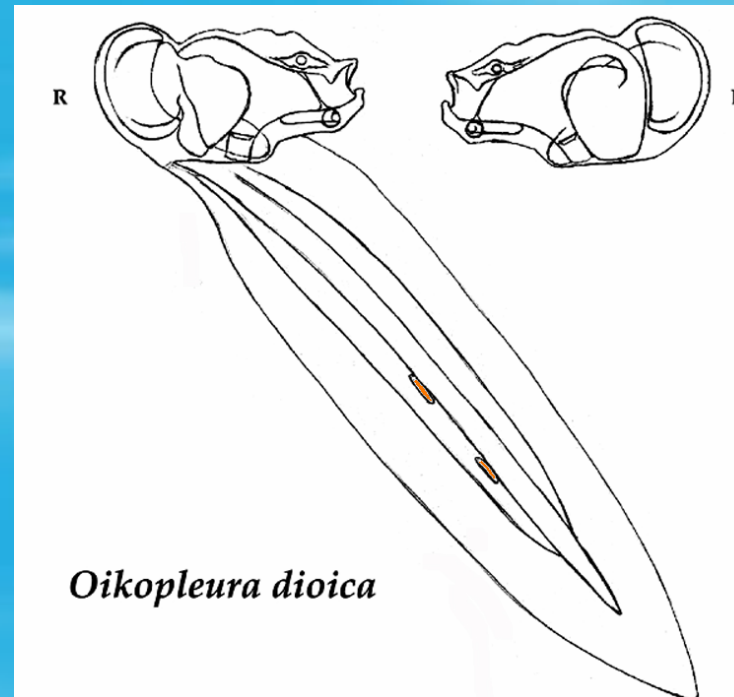
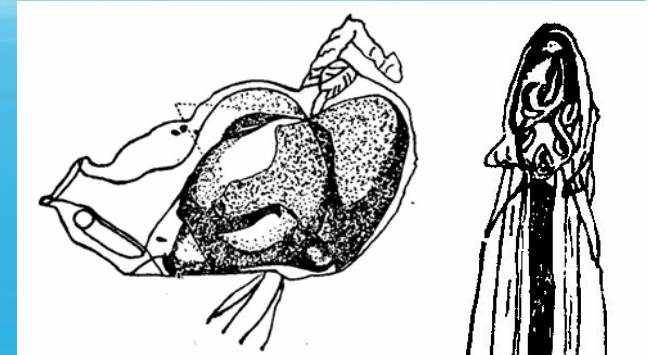
**Body oval**

**Endostyle short and straight**

**Tail several times longer than trunk**

*Oikopleura longicauda*

*O. dioica*



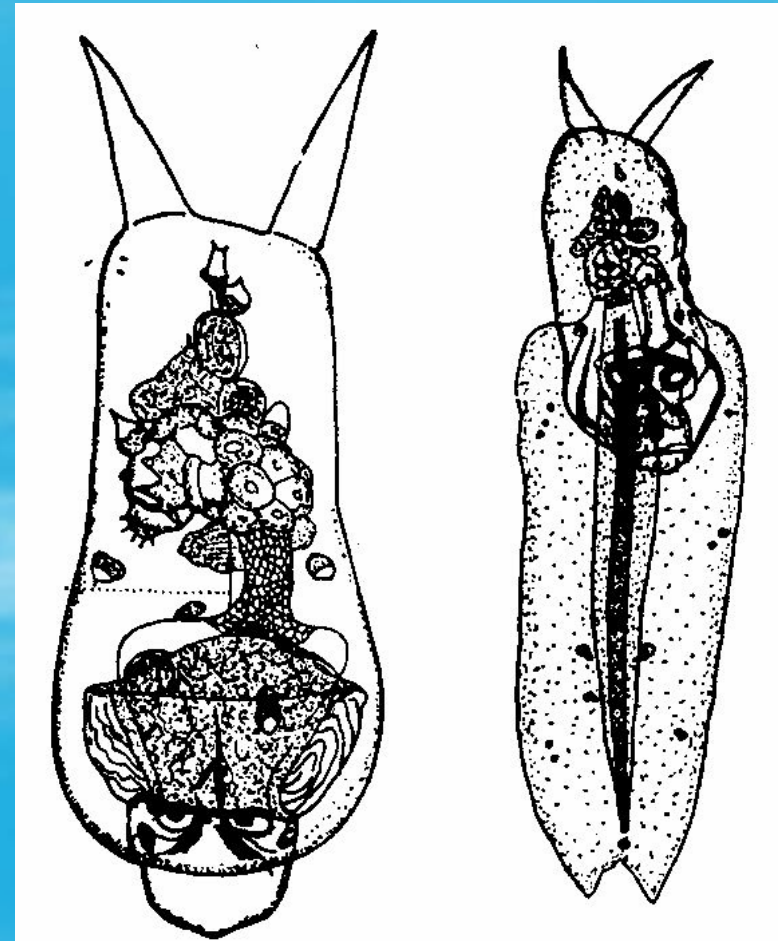
- **Family Fritillaridae**

**Body long square**

**Endostyle bent**

**Tail short and wide with a deep groove**

*Fritillaria pellucida*



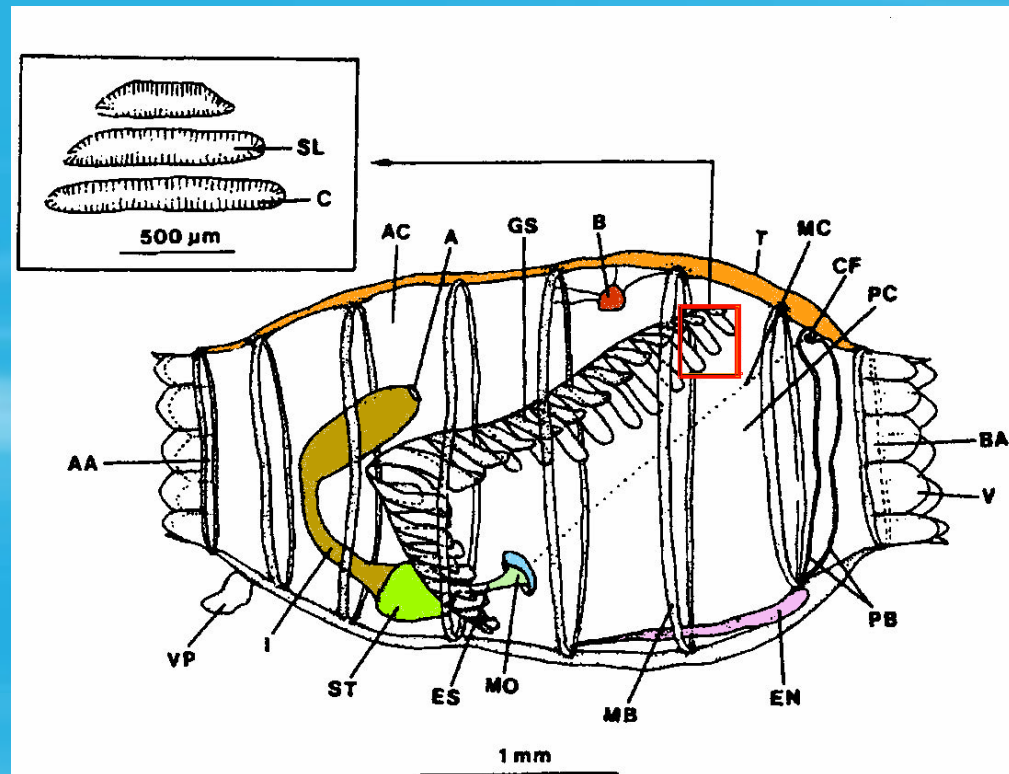
# 10.2 Thaliacea

## 10.2.1 General Morphology

transparent barrel-like body covered with a solidified and thin tunica

## 10.2.2 External features

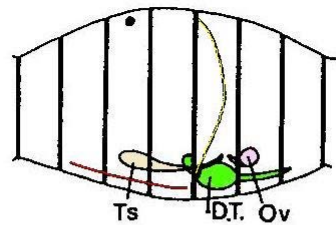
- circummoral lobe
- circumatrial lobe
- cadophore
- tunica
- branchial sac



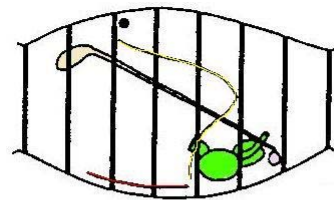


## 10.2.3 Internal features

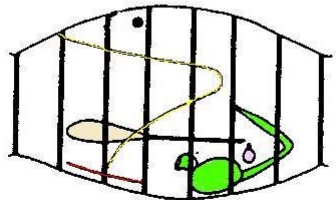
- 1 Muscle, eight hoop-like muscle bands
- 2 Digestive system
- 3 Circulatory system, heart
- 4 Nervous system, cerebral ganglion with two pairs of nerves



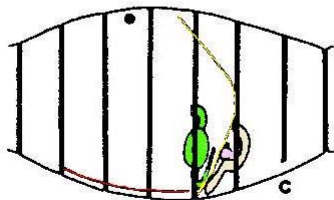
*Dolioloides*



*Dolioletta*



*Doliolum*



*Doliolina*

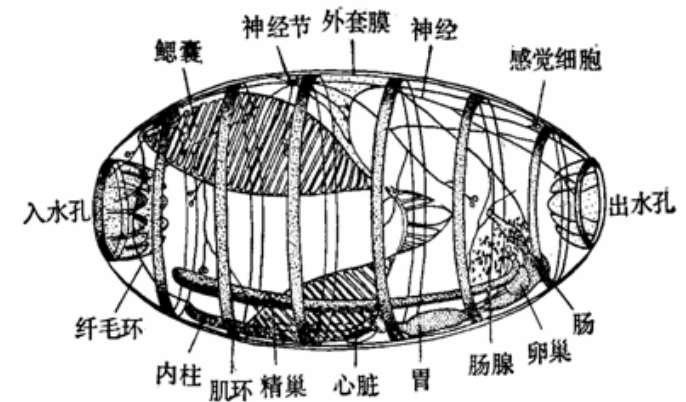
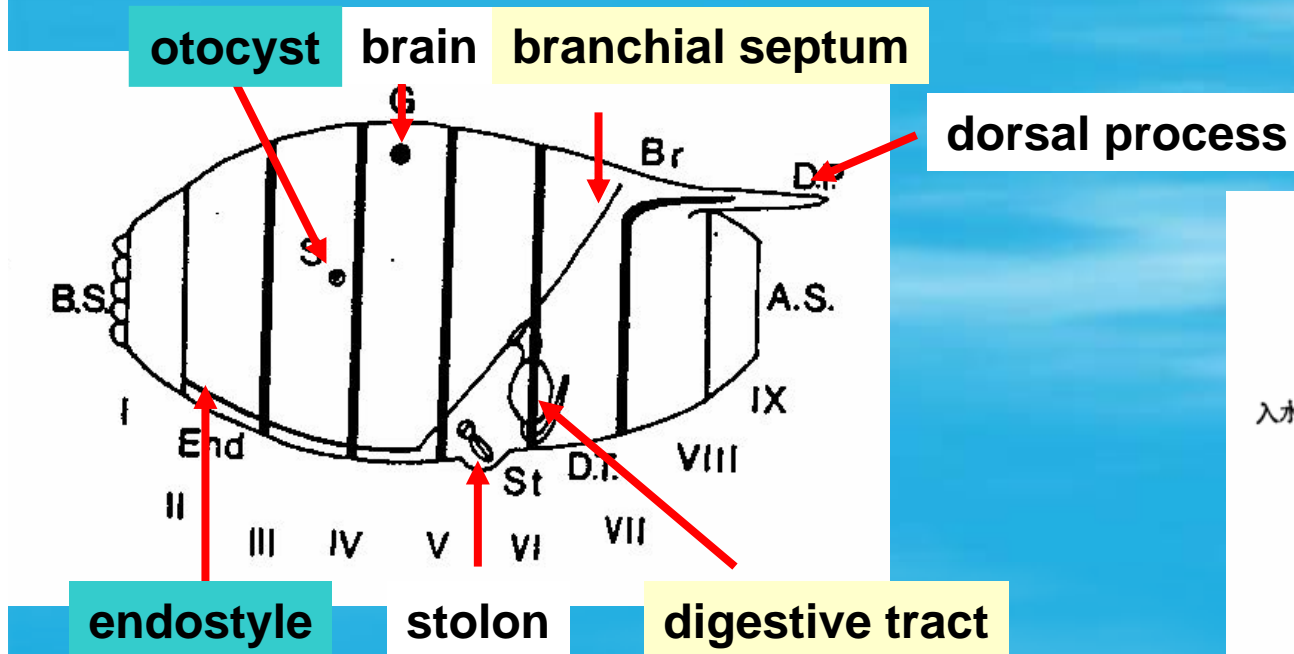


# 5 Reproductive system

(1) blastozooids: ♀ ♂ protogynous hermaphrodite

(2) oozoids differed from blastozooids in:

- muscle bands: oozoids 9, blastozooids 8;
- circumoral lobes: 10, 12;
- circumatrial lobes: 12, 10;
- oozoids have a stolon, a cadophore and an otocyst



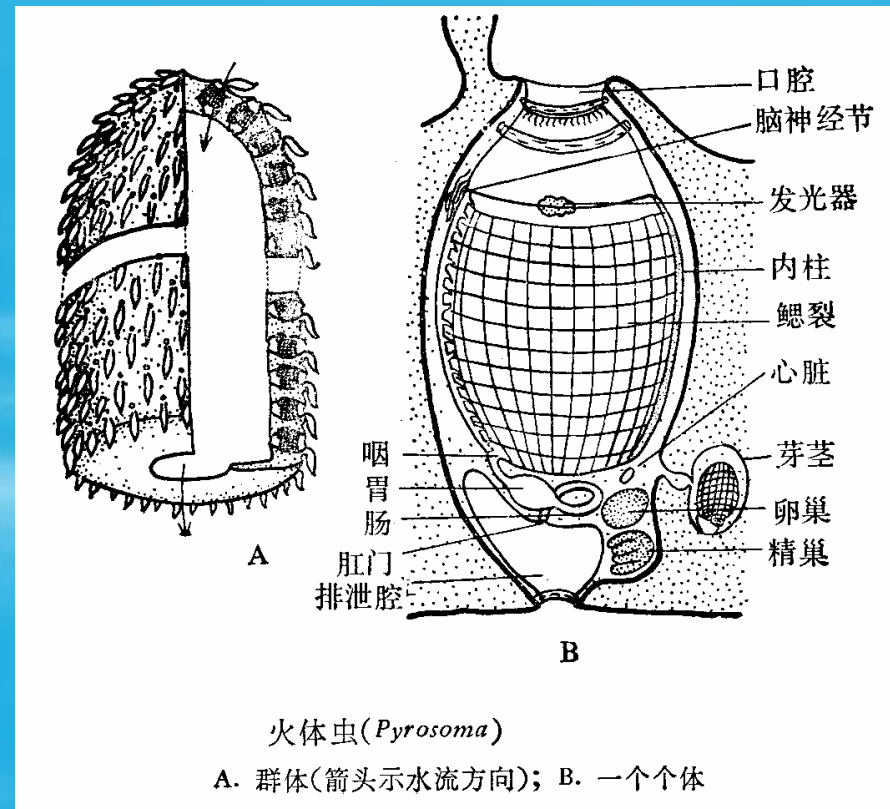
# 10.2.4 Classification

	磷海樽目(火体虫目) <b>Pyrosomida</b>	全肌目 <b>Cycloronyaria</b>	半肌目 <b>Desmomyaria</b>
体形	群体，呈圆筒形	个体，酒筒形	个体，梭形
体开口数	1个，在底部	2个（入、出水口）	2个
发光器	有	无	无
鳃腔与排泄管情况	分开	分开	不分开（联成一个腔）
环肌	少，环围前后体端	多，完全包围体部	少数环状，多数在腹面中断
发育	直接，无幼虫期	间接，有世代交替	直接，无幼虫期，有世代交替
代表种	火体虫科 <b>Pyrosomidae</b> 火体虫属 <b>Pyrosoma</b>	海樽科 <b>Doliolidae</b> 海樽属 <b>Doliolum</b> 拟海樽 <b>Dolioletta</b>	纽鳃樽科 <b>Salpidae</b> 纽鳃樽属 <b>Salpa</b>

# Order Pyrosomatida

- Family Pyrosomatidae

*Pyrosoma*:



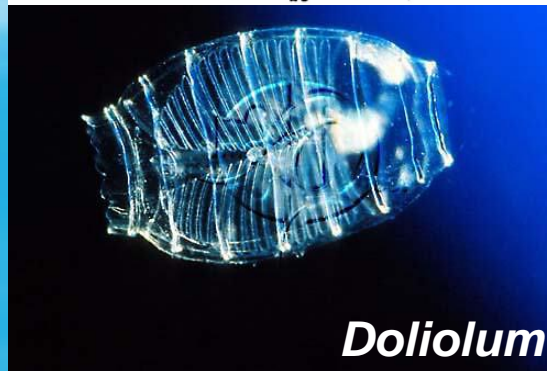
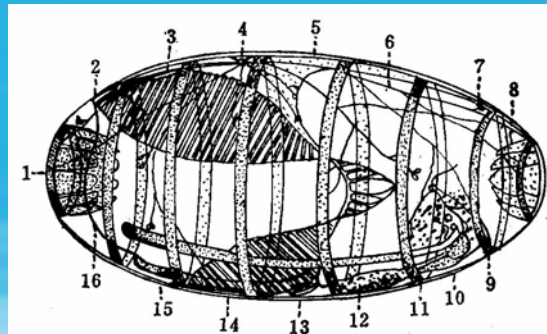


# Order Cycloronyaria

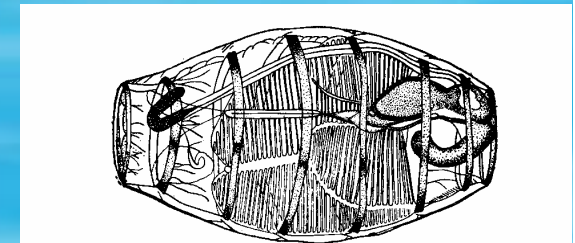
## Family Doliolidae

Thin test surrounded by 8 or 9 circular muscle bands.  
Branchial cavity spacious, larger than half of the body.  
The digestive tract is situated ventrally in the peribranchial cavity.

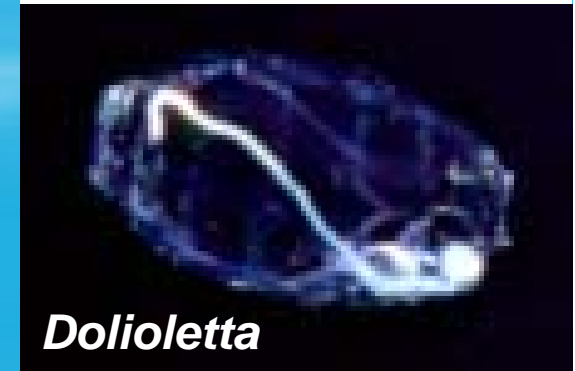
- *Doliolum*
- *Dolioletta*



*Doliolum*



软拟海樽 (*Dolioletta gegenbauri*) 的有性个体



*Dolioletta*

# Order Desmomyaria

## Family Salpidae

**Branchial and cloacal cavities form a continuous space in the anterior part of the body.**

**Alimentary canal lying ventrally.**

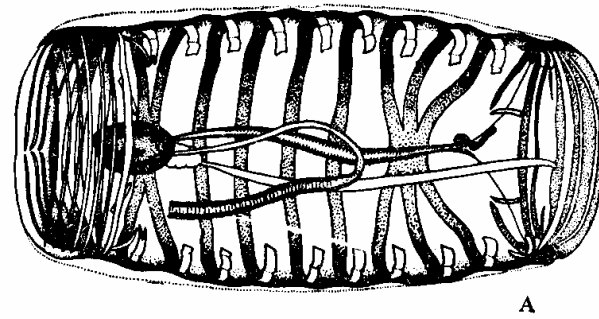
**Life cycle complicated with alternation of generations including sexual and asexual individuals.**

- *Salpa*
- *Thalia*
- *Cyclosalpa*

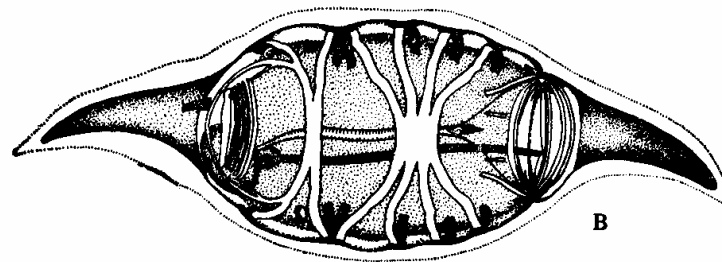
# *Salpa* 纽鳃樽

## *S. fusiformis*

Alimentary canal forms a compact “nucleus”.



A



B

梭形纽鳃樽 (*Salpa fusiformis*)

A. 单体; B. 复体

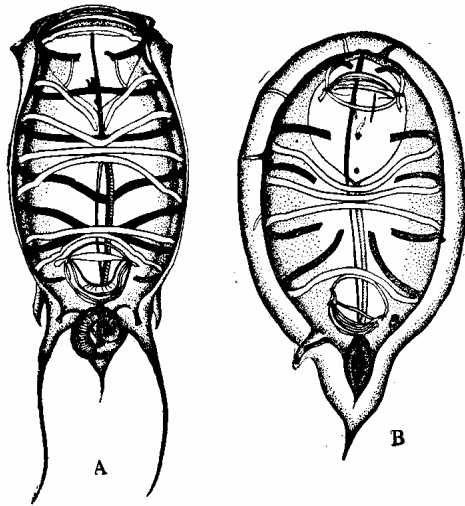




# *Thalia* 萨利纽鳃樽

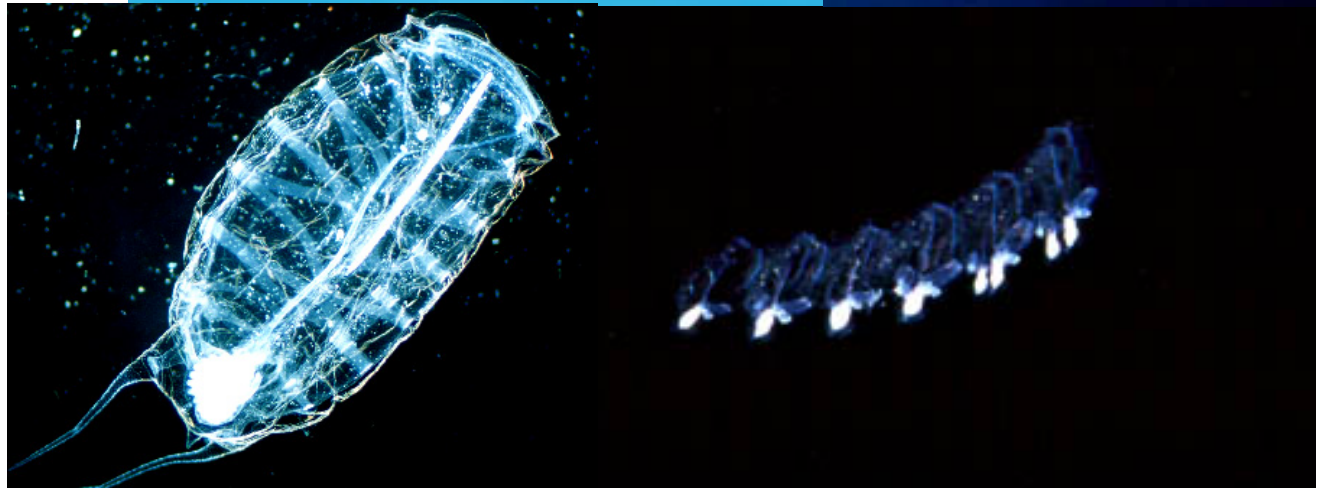
Alimentary canal curved, with well-developed posterior processes.

Test is thick and firm.



萨利纽鳃樽 (*Thalia democratica*)

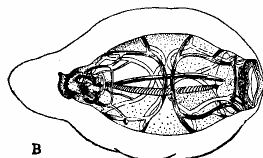
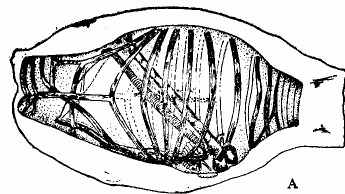
A. 单体; B. 复体





# *Cyclosalpa*

**Elongated alimentary canal without compact “nucleus”.**



佛环纽鳃樽 (*Cyclosalpa floridana*)

A. 单体; B. 复体

# 10.3 Biology and Significance

## 10.3.1 Distribution

1 neritic species: **Oikopleuridae**

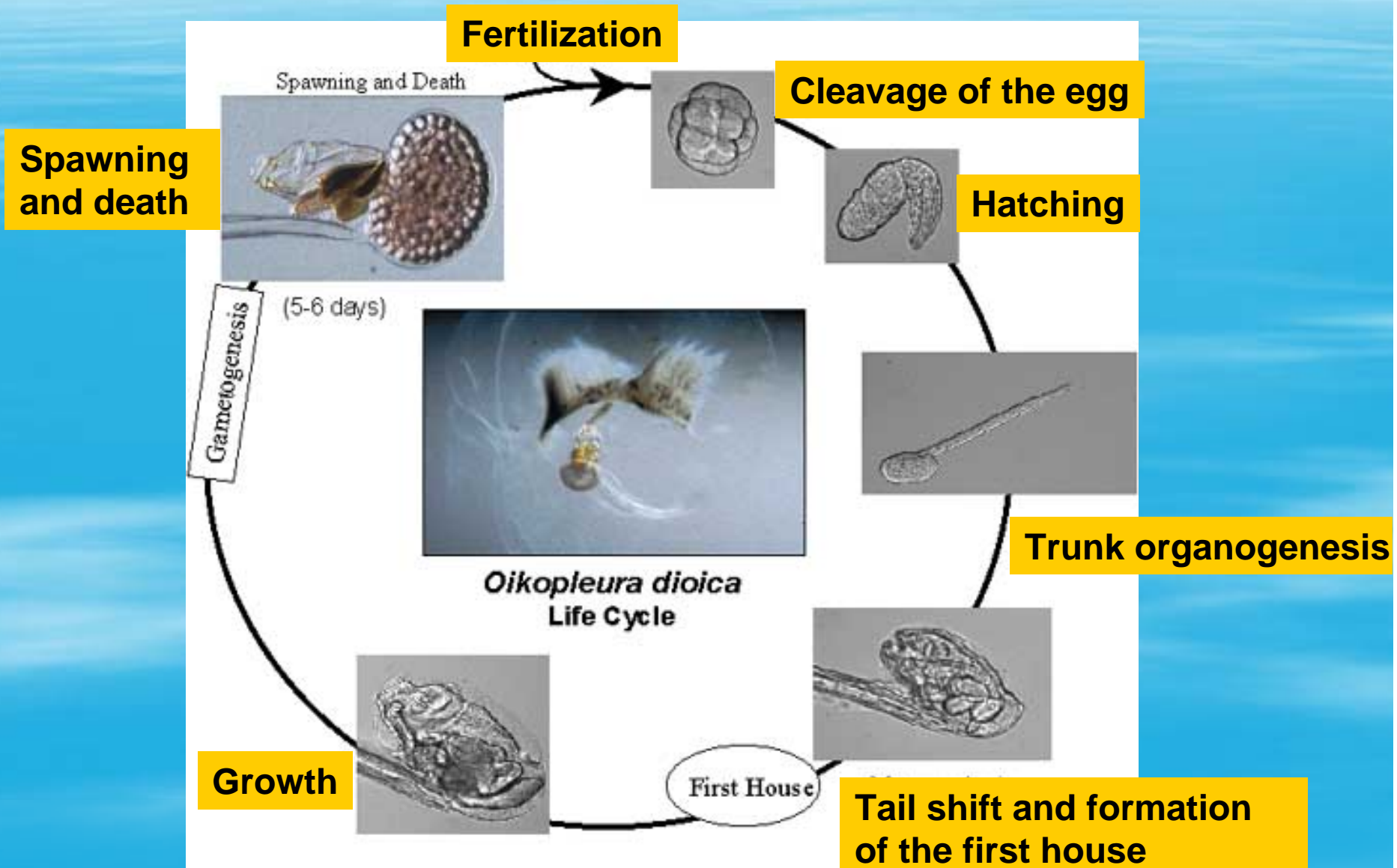
2 oceanic species: *Doliolum*, *Salpa*, *Pyrosoma*, etc.

## 10.3.2 Feeding

## 10.3.3 Reproduction and Life history

- **1 Larvacea**
- ♀ ♂ hermaphrodites (a few protogynous hermaphrodites)
- ♂ testis matures earlier than ovary
- external fertilization
- direct development
- **2 Thaliacea**
- ♀ ♂ hermaphrodites
- ♀ ovary matures earlier than testis
- internal fertilization

# Life cycle of *Oikopleura dioica*





# Life history of *Doliolum*

