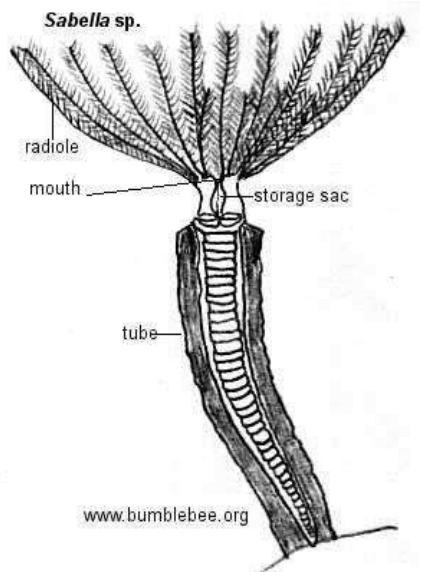
# VIVEKANANDA COLLEGE
# THAKURPUKUR
# KOLKATA-700063
# NAAC ACCREDITED GRADE—'A'

TOPIC : CLASSIFICATION OF PHYLUM ANNELIDA
COURSE TITLE : Non-Chordates II – Coelomates
PAPER : CC3 (ZOOA-CC2-3-TH)
UNIT : 2
SEMESTER : II
NAME OF THE TEACHER : RANU CHAKRAVARTY
NAME OF THE DEPARTMENT: DEPARTMENT OF ZOOLOGY.

# ANNELIDA

# ANNELIDS

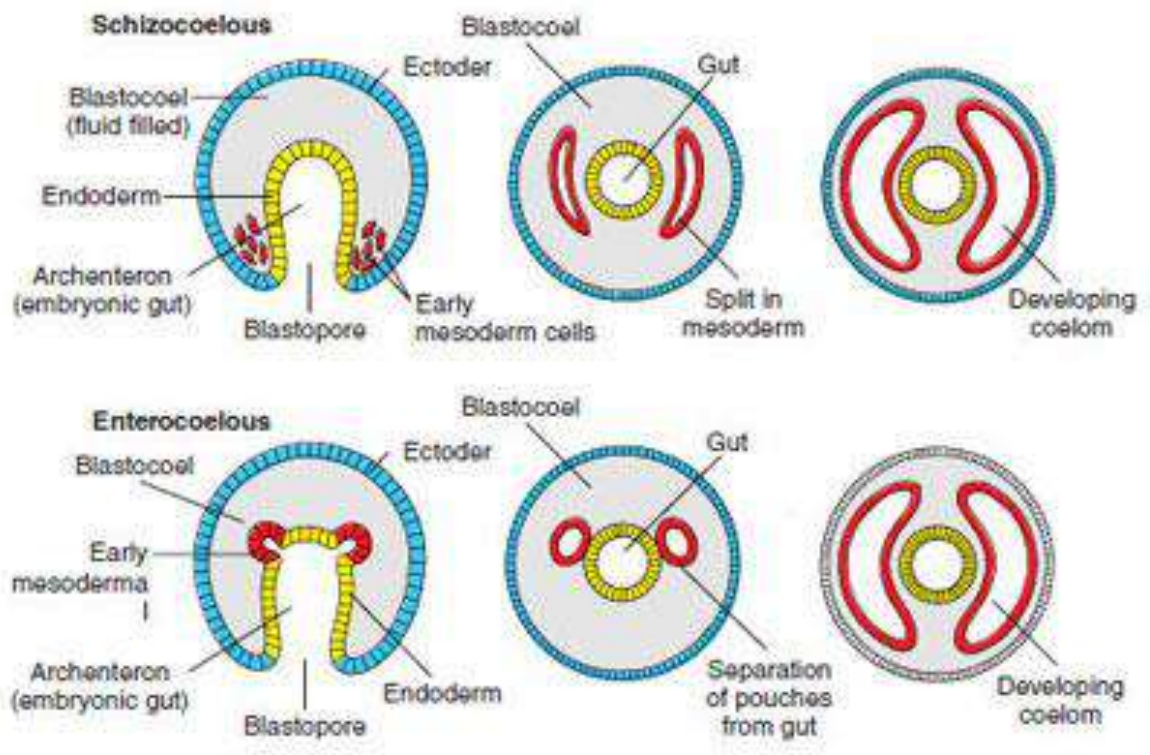
- The term annelida was first coined by Lamarck for higher segmented forms.
- (L.,annelus, little ring + Gr., eidos, form)
- Exhibits great variety of body forms.
- Both marine and fresh water forms. Some are terrestrial. Parasitic or commensal.



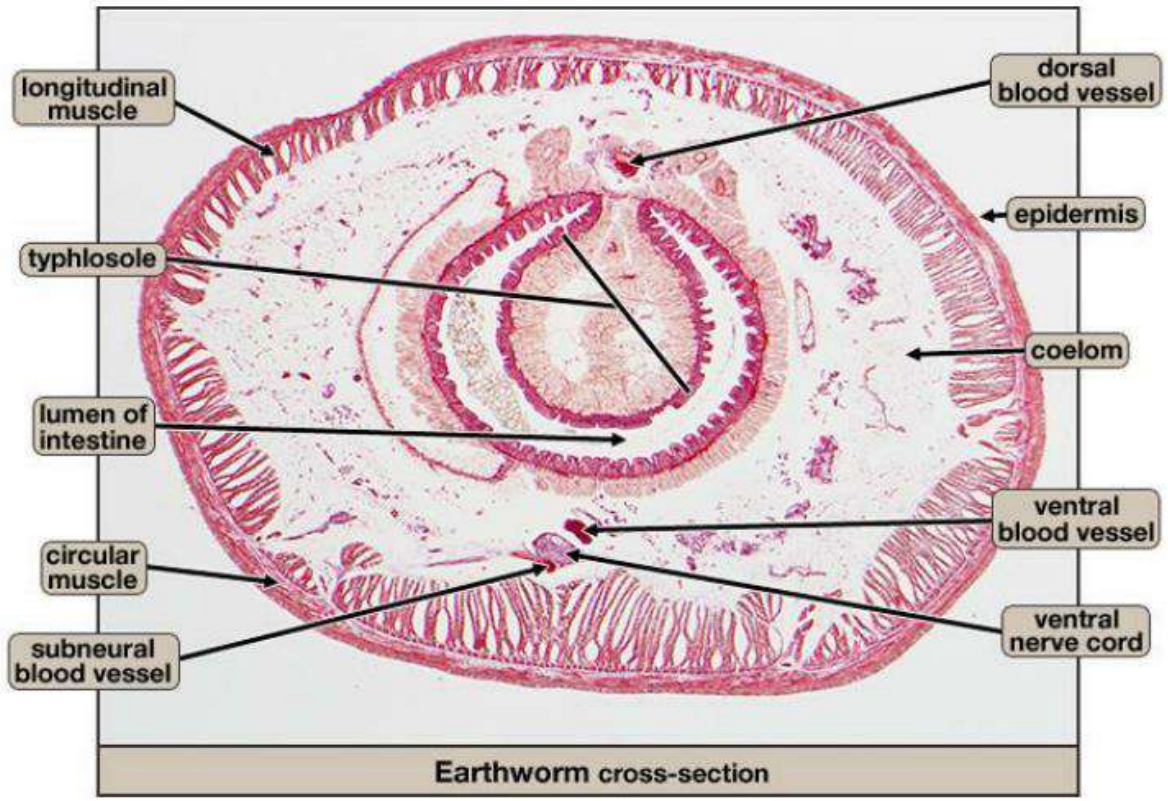

# General characters

- Triploblastic.
- Elongated, bilaterally symmetrical.
- True schizocoelus coelom.
- Metamerically segmented body.

  Internally sperated by transverse s

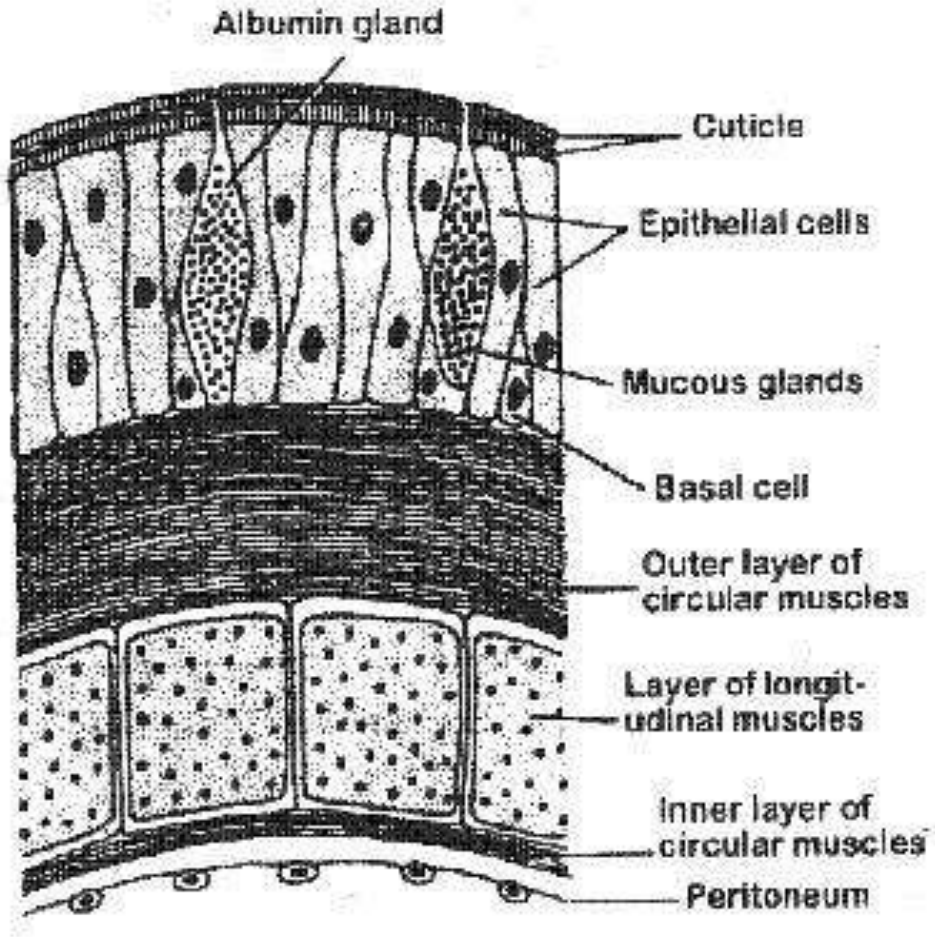


# Annelida cross section (segmented worm)



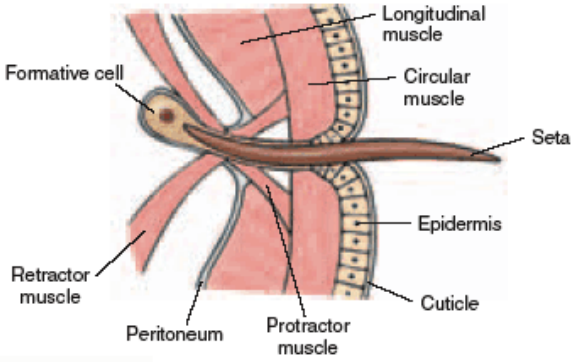
# General characters

- Epidermis with a single layer of columnar epithelial cells, covered externally by a thin cuticle non- chitinous.
- Outer circular muscle fibre and inner longitudinal muscle fibre.

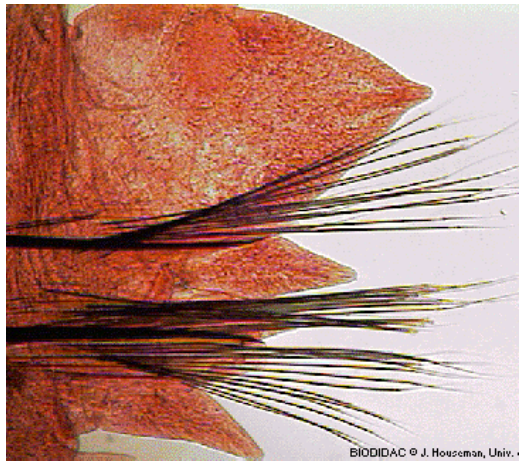


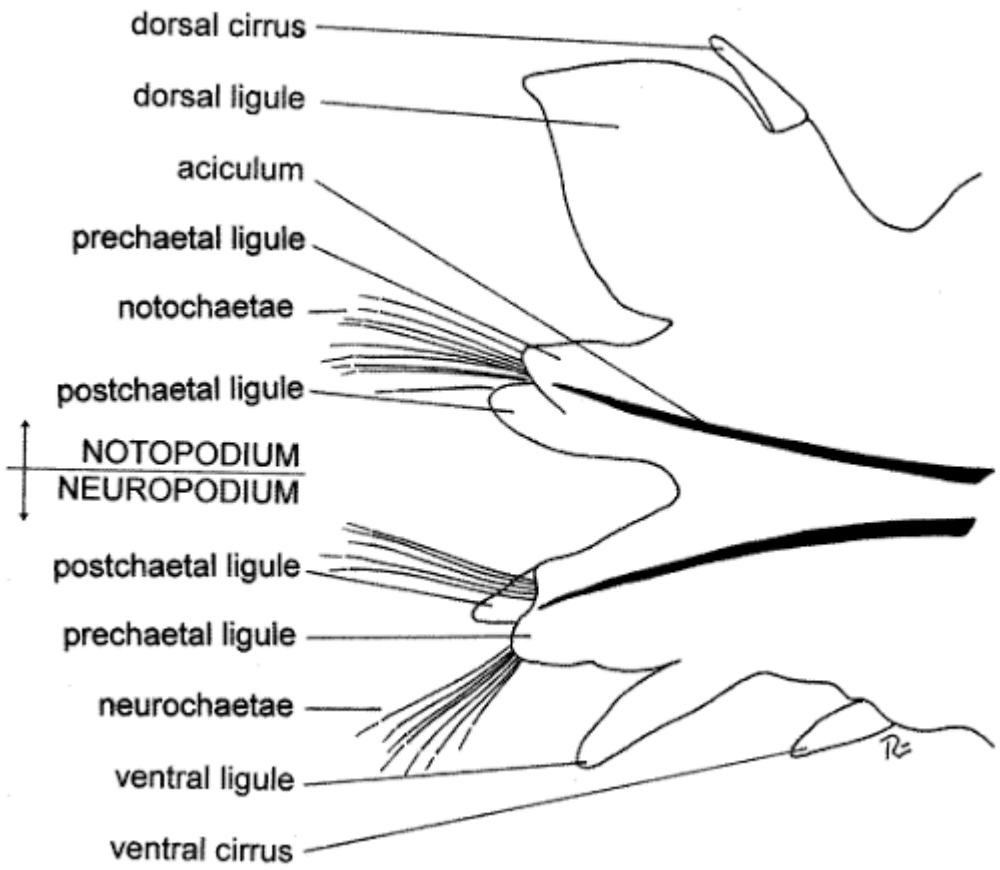
# General characters

- Locomotory organ is segmentally arranged setae or chaetae or parapodia.



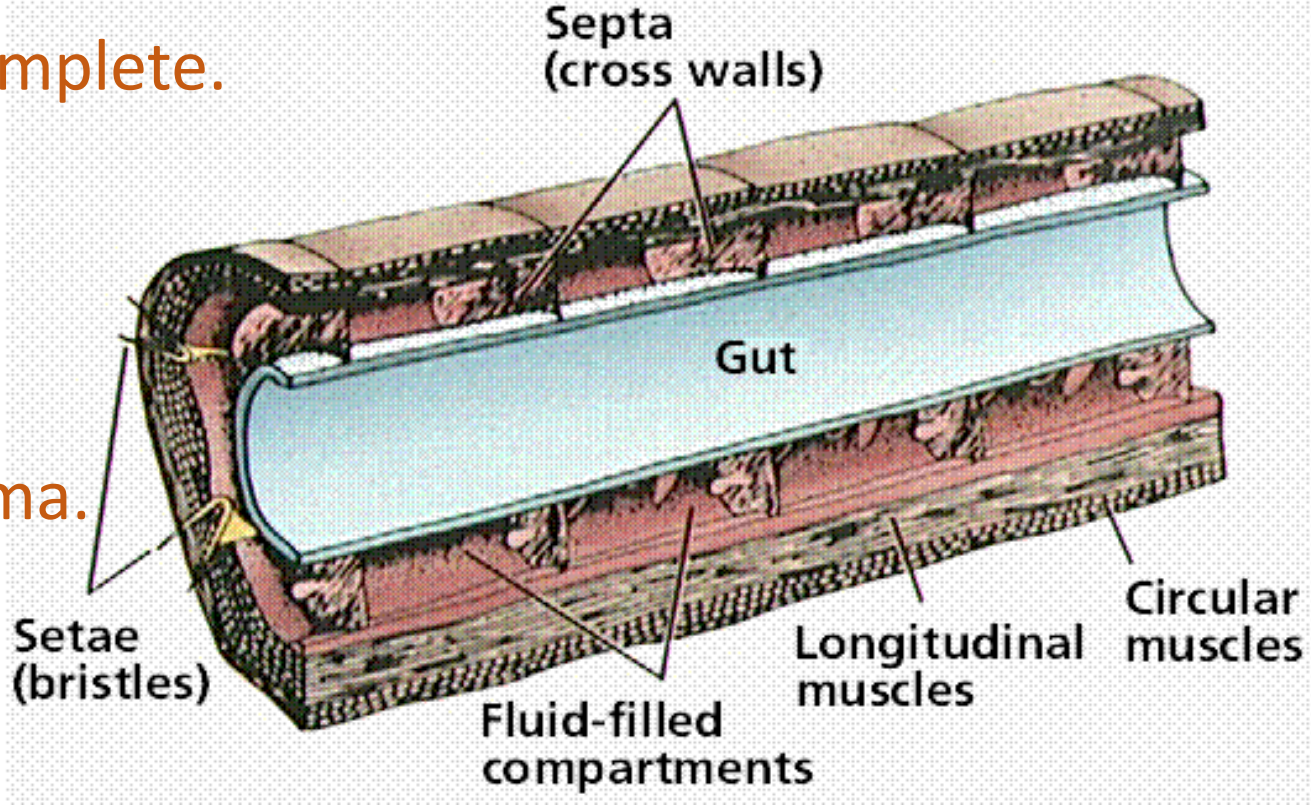

Seta with its muscle attachments showing relation to adjacent structures. Setae lost by wear are replaced by new ones, which develop from formative cells.



# General characters

- Digestive system straight and complete.
- Closed blood vascular system.
- Haemoglobin present as respiratory pigment or erythrocruorin dissolved in plasma.
- Respiration through skin or gills of parapodia.



# General characters

- Excretion through metamerically arranged nephridia.

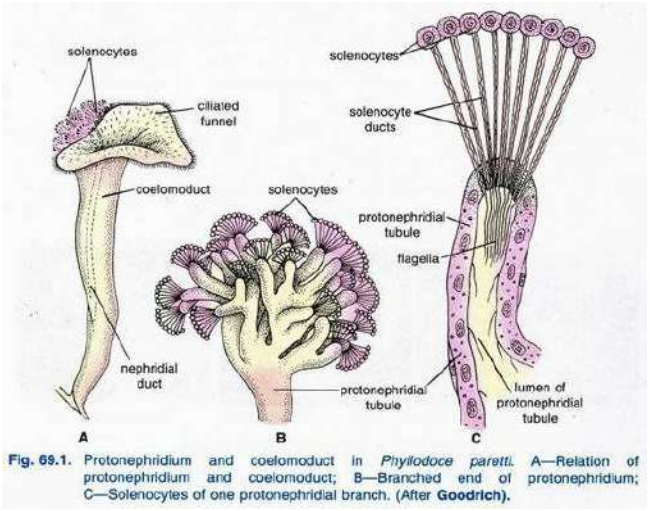
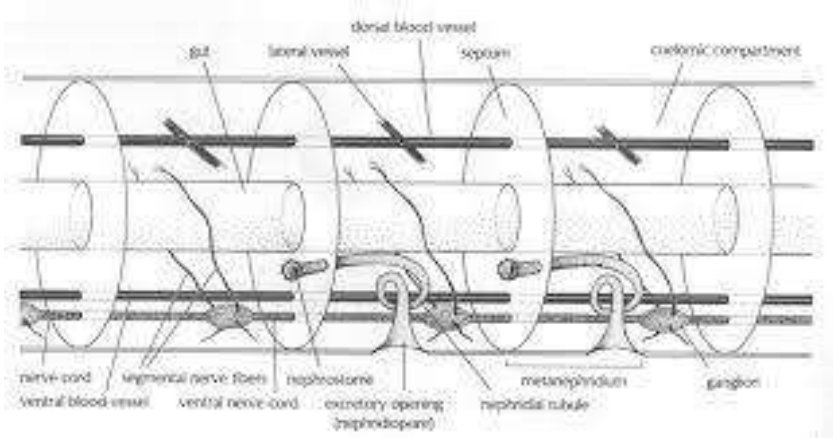
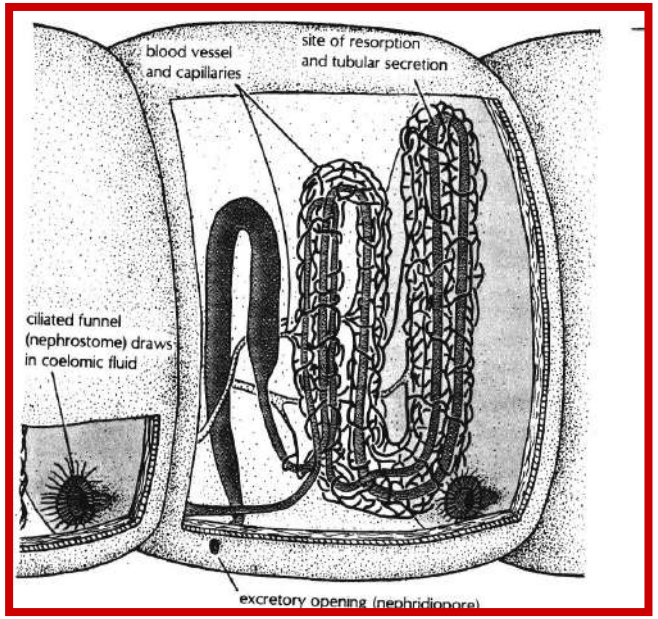


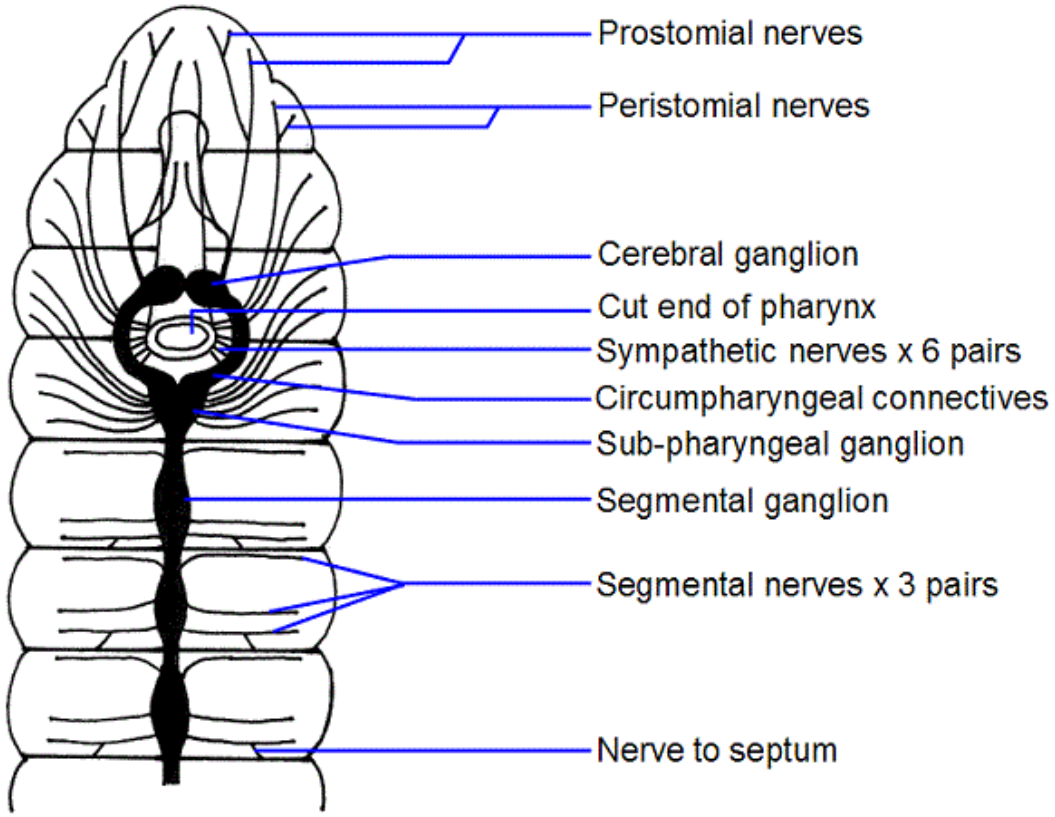
Fig. 69.1. Protonephridium and coelomoduct in *Phyllodoce paretti*. A—Relation of protonephridium and coelomoduct; B—Branched end of protonephridium; C—Solenocytes of one protonephridial branch. (After **Goodrich**).



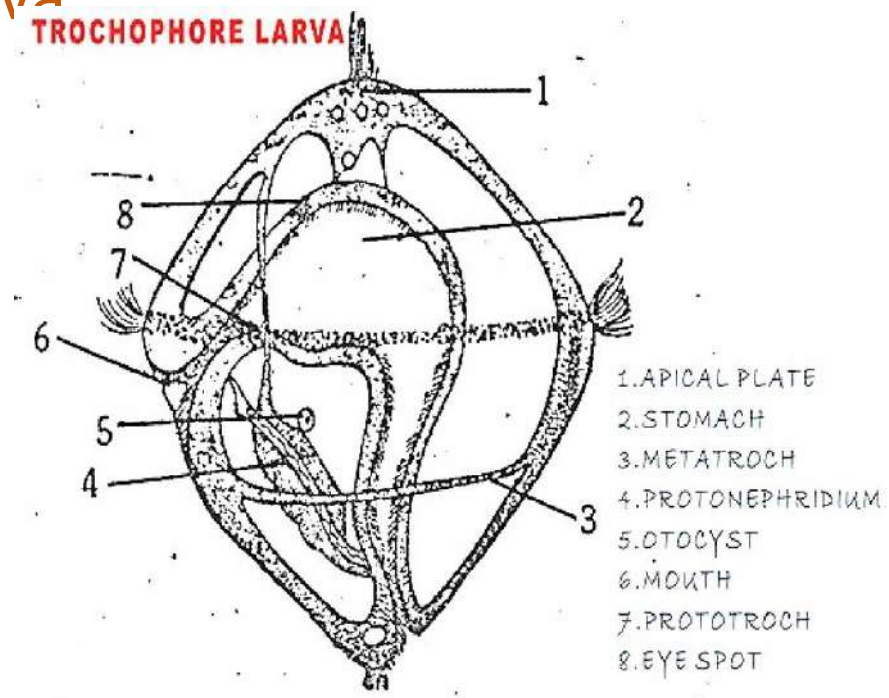
# General characters

- Nervous system with a pair of cerebral ganglia and a double ventral nerve cord.



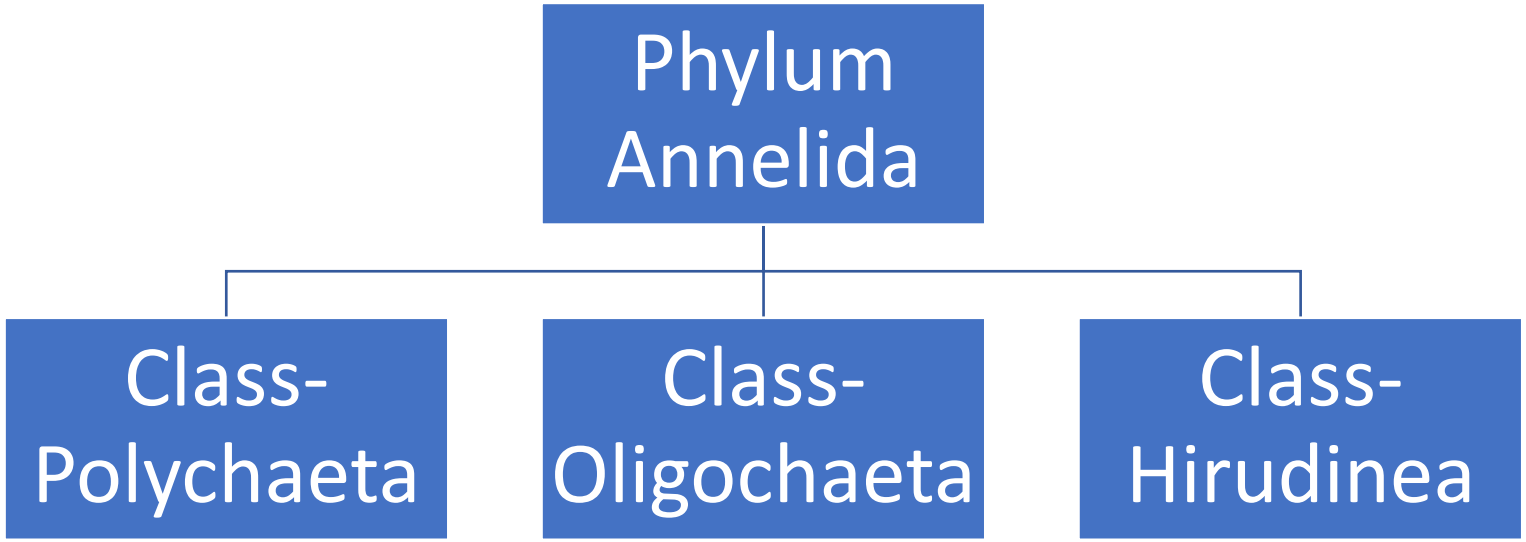
# General characters

- Sensory organs include tactile organs, photoreceptor cells and eyes.
- Sexes are separate some are hermaphrodite. Indirect development through trochophore larva



# Scheme of classification

- Phylum Annelida can be classified into three classes according to Ruppert and Barnes 1994 (6th Edition).



# Class- Polychaeta: Characteristics

- Poly: many; Chaeta: hairs.
- Habitat: marine/ fresh water.
- Habit: errant/ sedentary.
- Both internal and external segmentation present.
- Body divided into head, trunk and pygidium.

➢Head bears peristomium and prostomium.

➢Bears eyes, cirri, tentacles and palps.

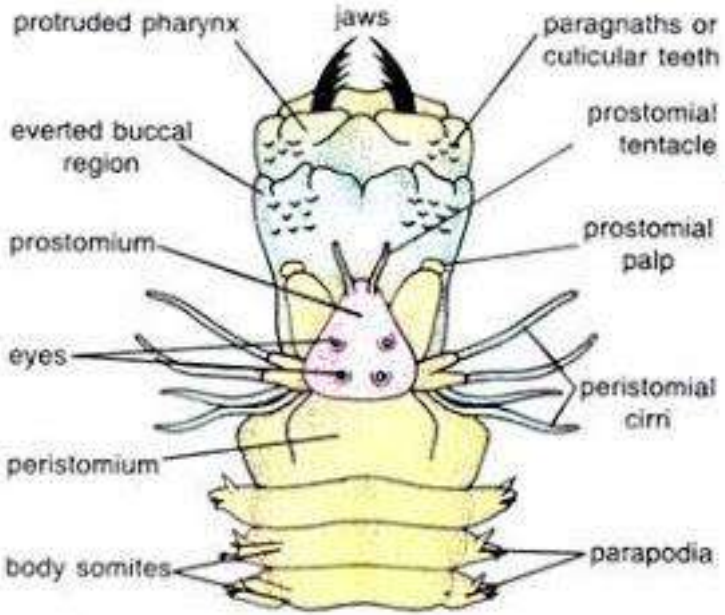



Fig. 65.2. *Neanthes*. Head in dorsal view.

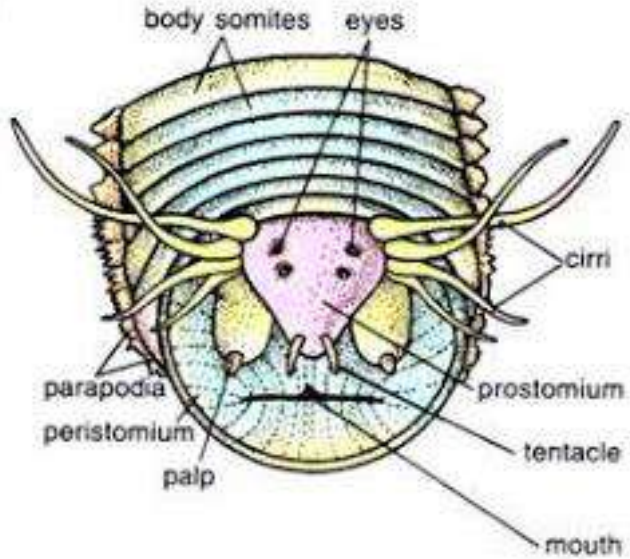



Fig. 65.3. *Neanthes*. Head in frontal view.

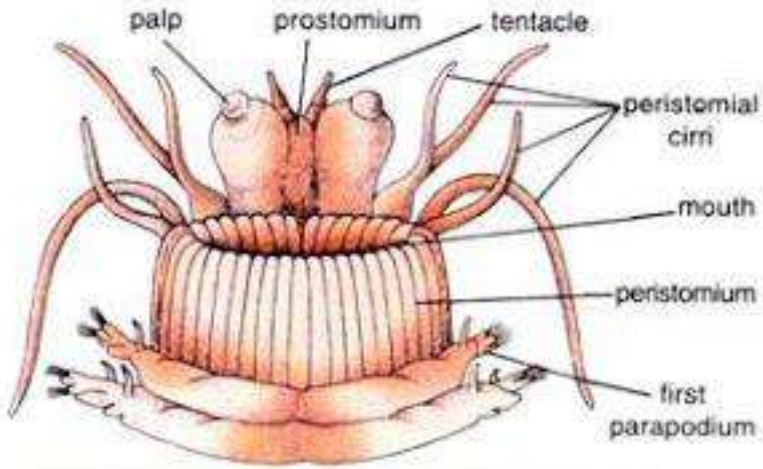



Fig. 65.4. *Neanthes*. Head in ventral view.

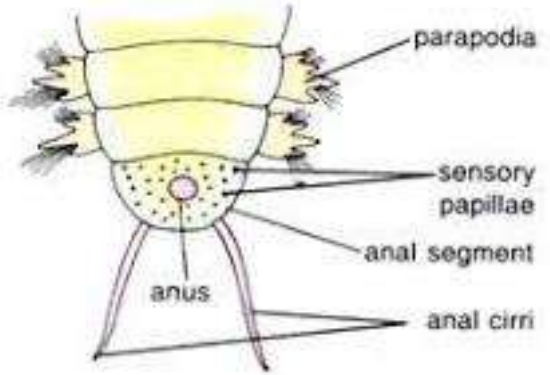



Fig. 65.5. *Neanthes*. Hind end of the body.

# Characteristics

- **Peristomium**:

✓First segment of body. Ring like, surrounds the transverse slit like mouth located ventrally.

✓Fusion of first 2 embryonic segments.

✓Lacks parapodia.

✓Bears 2 pairs of peristomial cirri.

# Characteristics

- **Prostomium:**

✓Dorsal anterior projection of peristomium.

✓Roughly triangular, fleshy, dorsoventrally flattened.

✓2 pairs of pigmented dorsal eye present.

✓1 pair of short prostomial tentacle present anteriorly.

✓1 pair of stout, fleshy, short palps present ventrolaterally.

- Pharynx with or without jaws, sometimes eversible.
- Setae numerous on lateral parapodia.

# Characteristics

- Pygidium

➢The posterior most part of the body.

➢It doesnot divide.

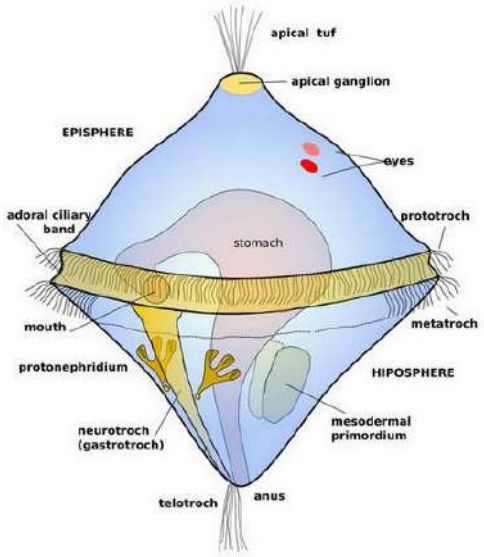
➢New segment arises just above the pygidium.

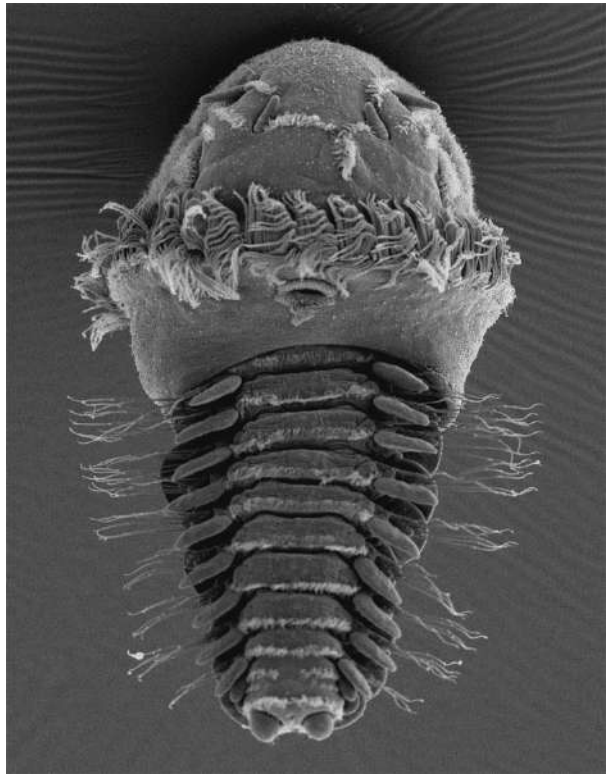
➢The oldest segment or the metamere lies just behind the prostomium.

- Setae are numerous and are borne up on the lateral prominence of the body wall known as parapodia.
- Clitellum absent.
- Cirri or branchiae may be present for respiration.
- Coelom divided by intersegmental septa.

# Characteristics

- Excretory organs are segmentally arranged nephridia.
- Sexes are separate. External fertilization. Indirect development through trochophore larval stage.

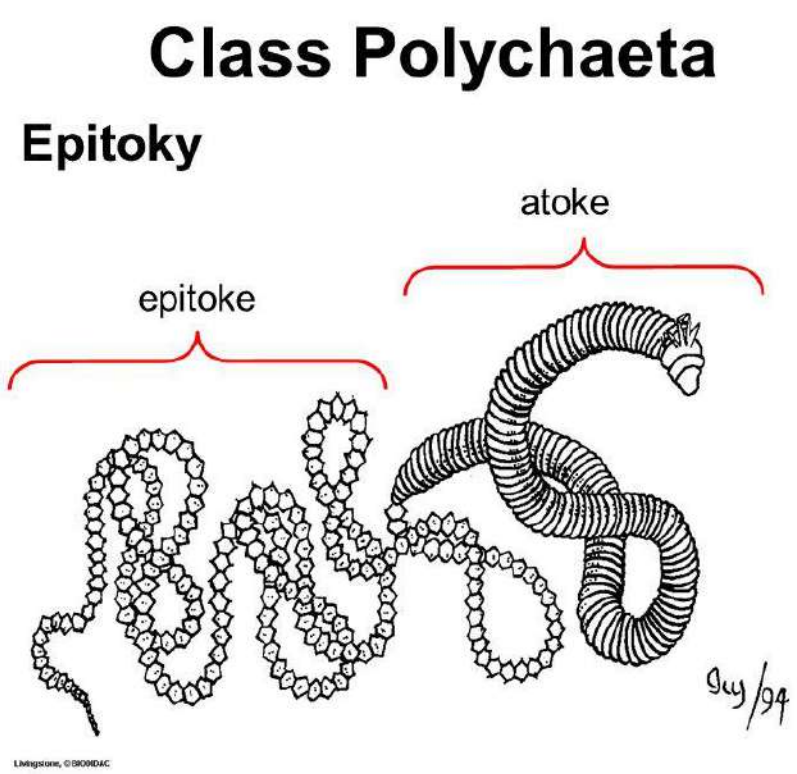


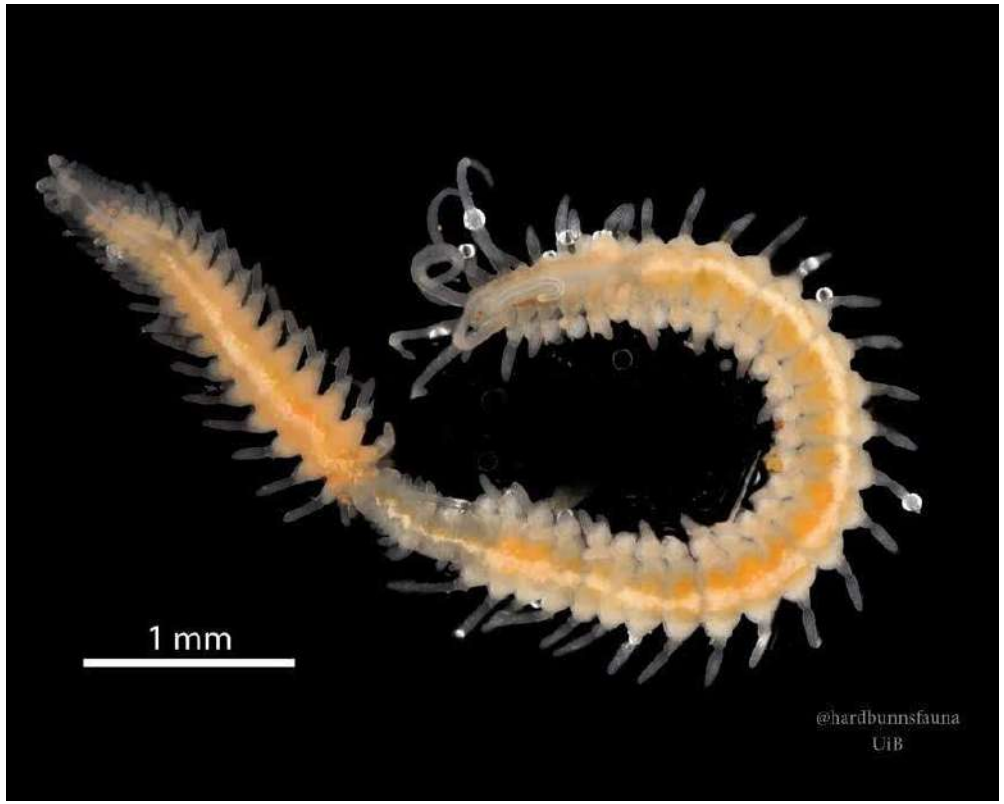



# Epitoky in polychaetes.

- In some species, the rear portion of the worm (“epitoke”: carries the eggs or sperm), breaks off from the body and swims to the surface to reproduce. The remaining benthic worm “atoke” the non-sexual individual continues to feed and grow and will eventually produce new epitokes.
- In other species, there are pelagic individuals that resemble epitokes but the entire individual swims to the surface where the body wall ruptures, filing the water with eggs and sperm.
- To synchronize these spawnings, this swarming behavior is usually triggered by the full moon.

# Epitoky in polychaetes



## Subclass Sedentaria

- Fan worms,
- Christmas-tree worms
- Spaghetti worms
- *Chaetopterus*
- lugworms

## Subclass Errantia

- Sand worms,
- Scale worms
- Fire worms
- palolo worms

# Feather duster worm & Lugworm

# *Chaetopterus* & *Aphrodite*


# Class-Oligochaeta

- Gr., oligos, few+ chaete, hair.
- Presence of both external and internal segmentation.
- Head distinct without sensory organs.
- Few setae remains embedded in the skin.
- Presence of glandular clitellum for cocoon formation.
- [a girdle like thick band of glandular tissue, completely surrounds the segments 14 to 16 in *Pheretima posthuma*.distinguishes the body into peri and post clitellar region. Secretes albumen, mucus and an egg case or cocoon.]

- Oligochaete
- Earthworm showing clitellum.

- Hermaphrodite. Earthworms are bisexual and protandrous.
- Fertilization external in cocoon. No larval stages so development is direct.

# *Tubifex* and *Chaetogaster*

# *Megascolex*

# Class- Hirudinea

- L., hirudo, leech
- Freshwater, marine or terrestrial.
- Ectoparasitic, blood sucking.
- Body with fixed number of segments- 33. each segment subdivided externally into annuli.
- The $1^{st}$ and $2^{nd}$ segments have 1 annulus each,
- the 3rd has 2 annuli, segments $4^{th}$ to $6^{th}$ have 3 annuli each,
- segments $7^{th}$ to 22nd are broad having 5 annuli each,
- segments $23^{rd}$ to $26^{th}$ have 2 annuli each, segments $27^{th}$ to $33^{rd}$ have 1 annulus each, they form the posterior sucker.

- Absence of internal septa, setae and parapodia.
- Both the ends of the body with suckers.
- Coelom reduced and filled up with **botryoidal tissue and form haemocoelomic sinuses.**

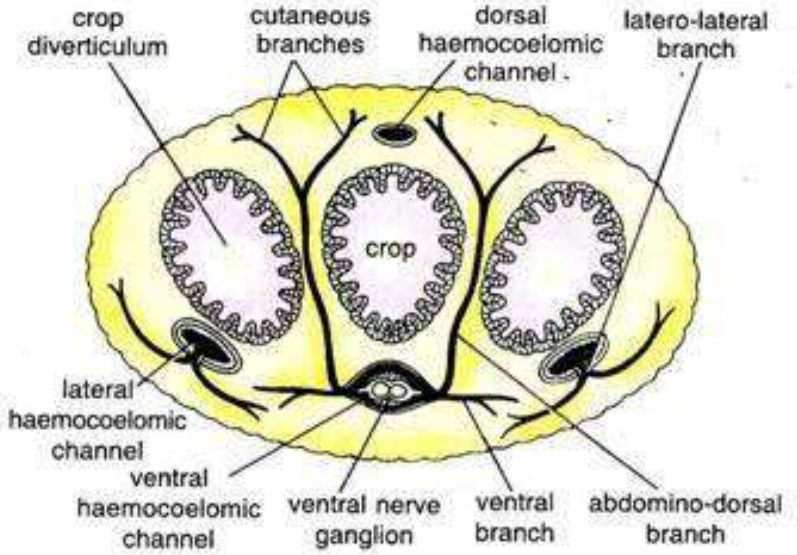



Fig. 67.13. *Hirudinaria*, T.S. body through dorso-abdominal branches.

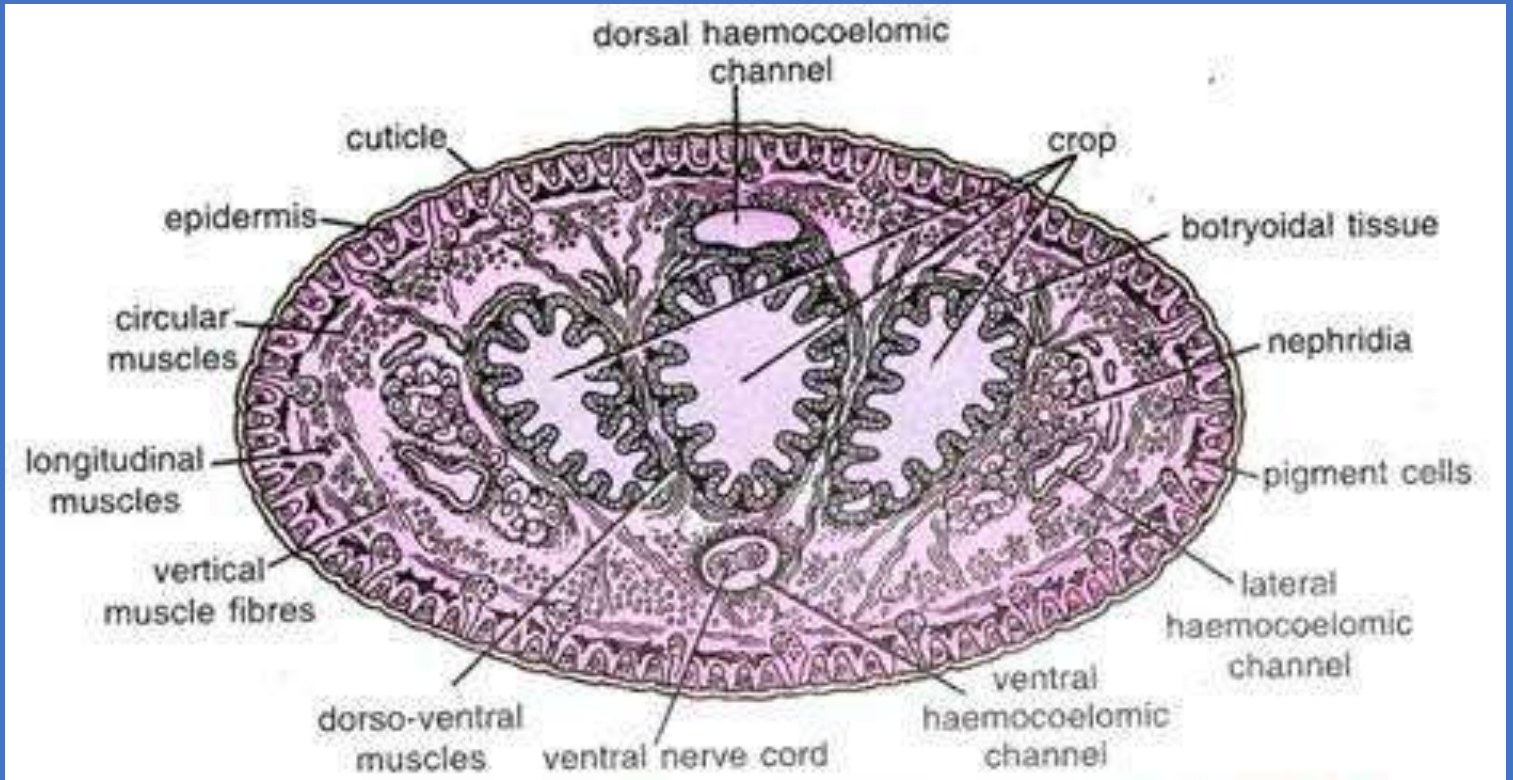



**Fig. 67.10.** *Hirudinaria.* T.S. body through crop and its diverticula.

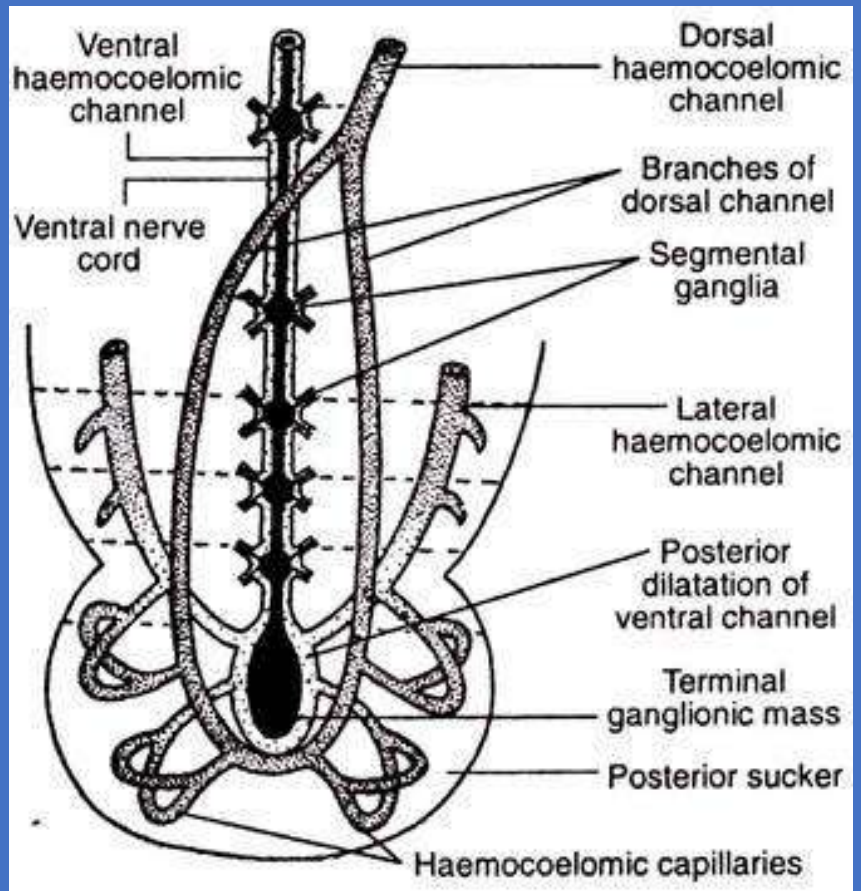



**Fig. 17.35:** Posterior end of leech showing the union of four longitudinal haemocoelomic channels.

- Hermaphrodite with one male and one female gonopore.
- Fertilization internal.
- Development through the cocoons, direct development without larval stages.
- Examples:
- *Acanthobdella, Placobdella*
- *Pontobdella, Hirudinaria, Hirudo,*


A Marine Leech
Photo by
A. Migotto

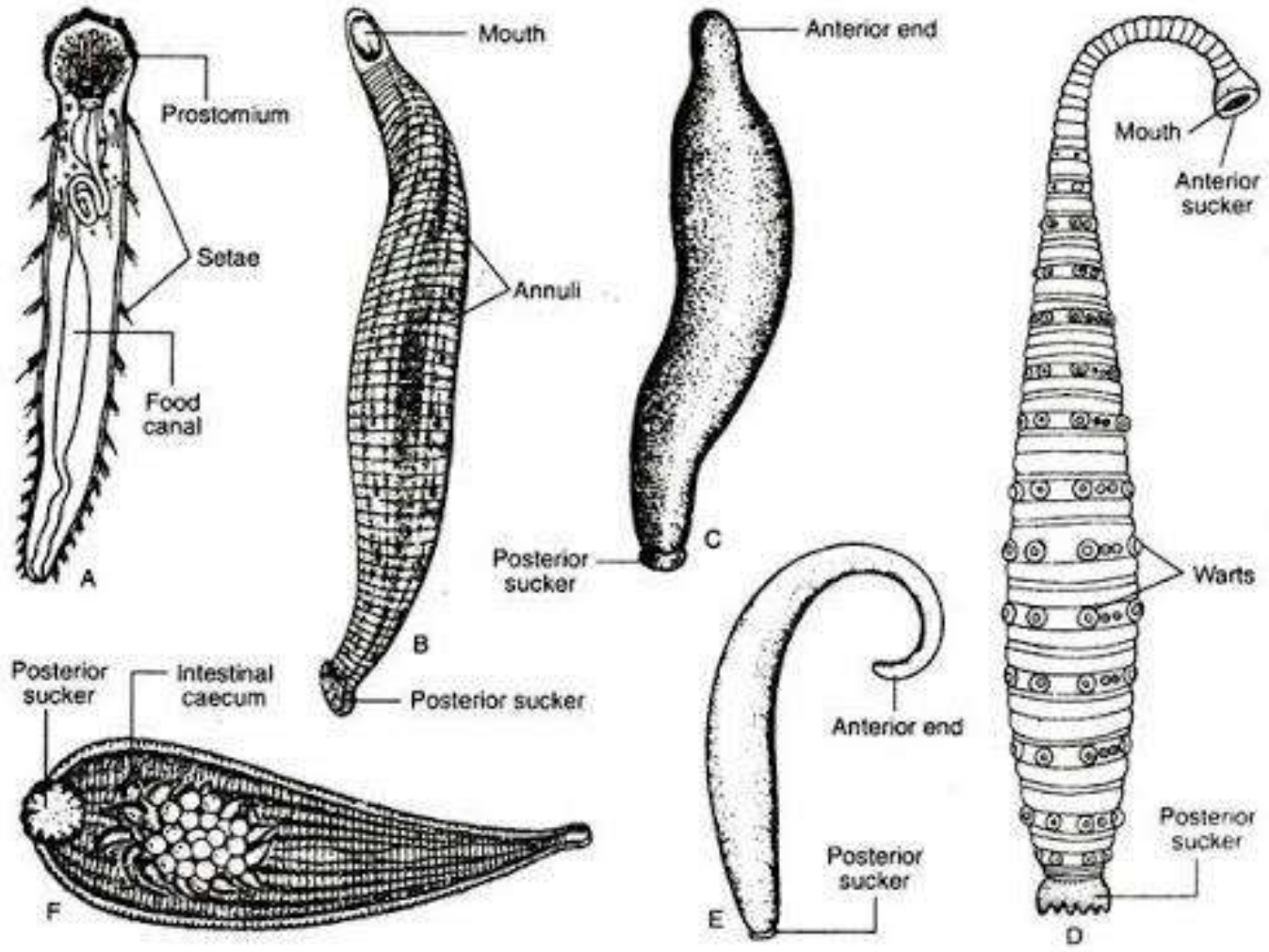



**Fig. 17.43:** Some interesting annelids (contd.) (after various sources). A. *Aeolosoma*. B. *Hirudo medicinalis*. C. *Haemopis*. D. *Pontobdella*. E. *Acanthobdella*. F. *Glossiphonia*.

# Basis of classification

- Presence or absence of distinct head.
- Presence and absence of sensory organs.
- Habit
- Type of locomotory organ- setae, parapodia or suckers.
- Segmentation in the body- the metameres.
- Presence or absence of clitellum.