

protonephridia are considered as the most primitive forms of nephridia basically these are ^{the} excretory organs of larvae and other adult polychaetes.

They have a tubular arrangement that open outside the body by Nephridiopore. They have tubes with blind ends where cilia mediated filtration occurs. They have terminal or captures which can be more or multi ciliated that support in filtration process. Protonephridia

are divided into two types based on their termination. These are flame cells ~~or~~ tubule cell and Solenocytes.

- (i) Flame cells: - The protonephridia ~~with~~ whose blind ends terminate in ~~from~~ flame cells. These cells are bulb-like in appearance hence called flame bulb. These cells bears a cluster of cilia with a cup like projection whose beating is like a candle flame. A flame cell is a specialized cell. It consists of the cytoplasmic processes, ciliary flame and intercellular duct with certain secretory materials. The intercellular duct joins with the excretory duct.
- (ii) SOLENOCYTES - The second type of protonephridia are the Solenocytes.

Each nephridia bears about 500 Solenocytes. These are flagellated, ~~top~~ tiny rounded nucleated cell body and a long hollow stalk or

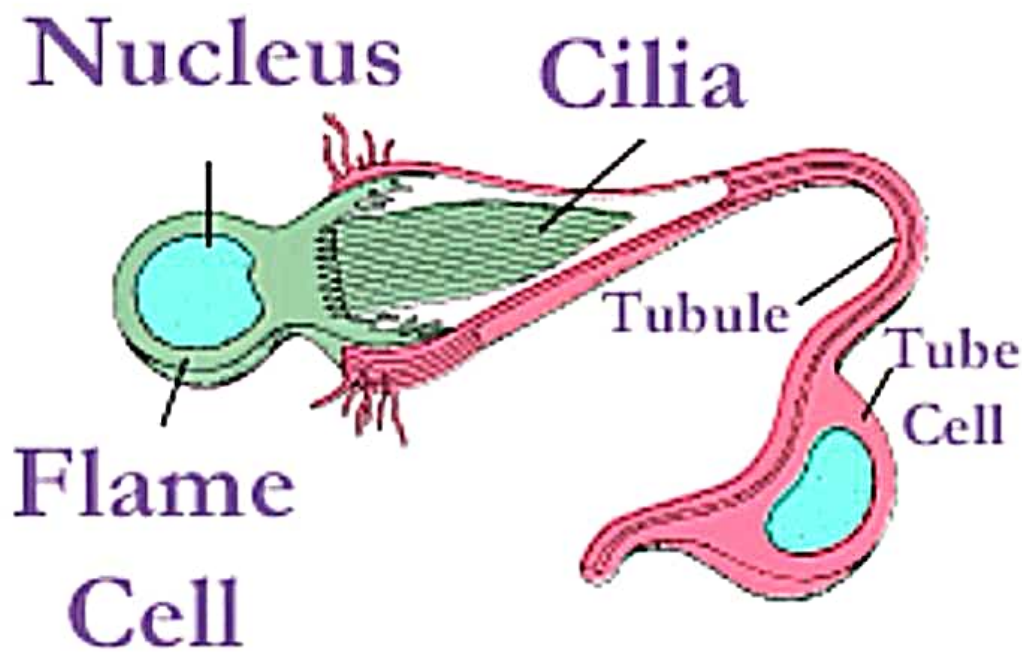
tubules. Solenocytes can be distinguished from flame cell as the former is usually flagellated whereas the latter is ciliated. The Solenocyte bear a flagella whereas the flame cell bears a part of cilia. The Solenocytes associated with excretion, osmoregulation and ionoregulation in many annelids. These are found in Phyllodoce and other members of Annelids.

Metanephridia — These are far advanced nephridia found in vast majority of Annelids. It is a nephridia that ~~originated~~ originated in a ciliated coelomic funnel.

In metanephridia the inner of the tube is open and remain in the form of a nephrostome.

A typical metanephridia consist of a nephrostome a short ~~canal~~

^ Protonephridia



Flatworm flame cell

A **protonephridium** (*proto* = "first") is a network of dead-end **tubules** lacking internal openings, found in the phyla **Platyhelminthes**, **Nemertea**, **Rotifera** and **Chordata** (lancelets). The ends are called *flame cells* (if ciliated) or *solenocytes* (if flagellated); they function in **osmoregulation** (ionoregulation). The terminal cells are located at the blind end of the

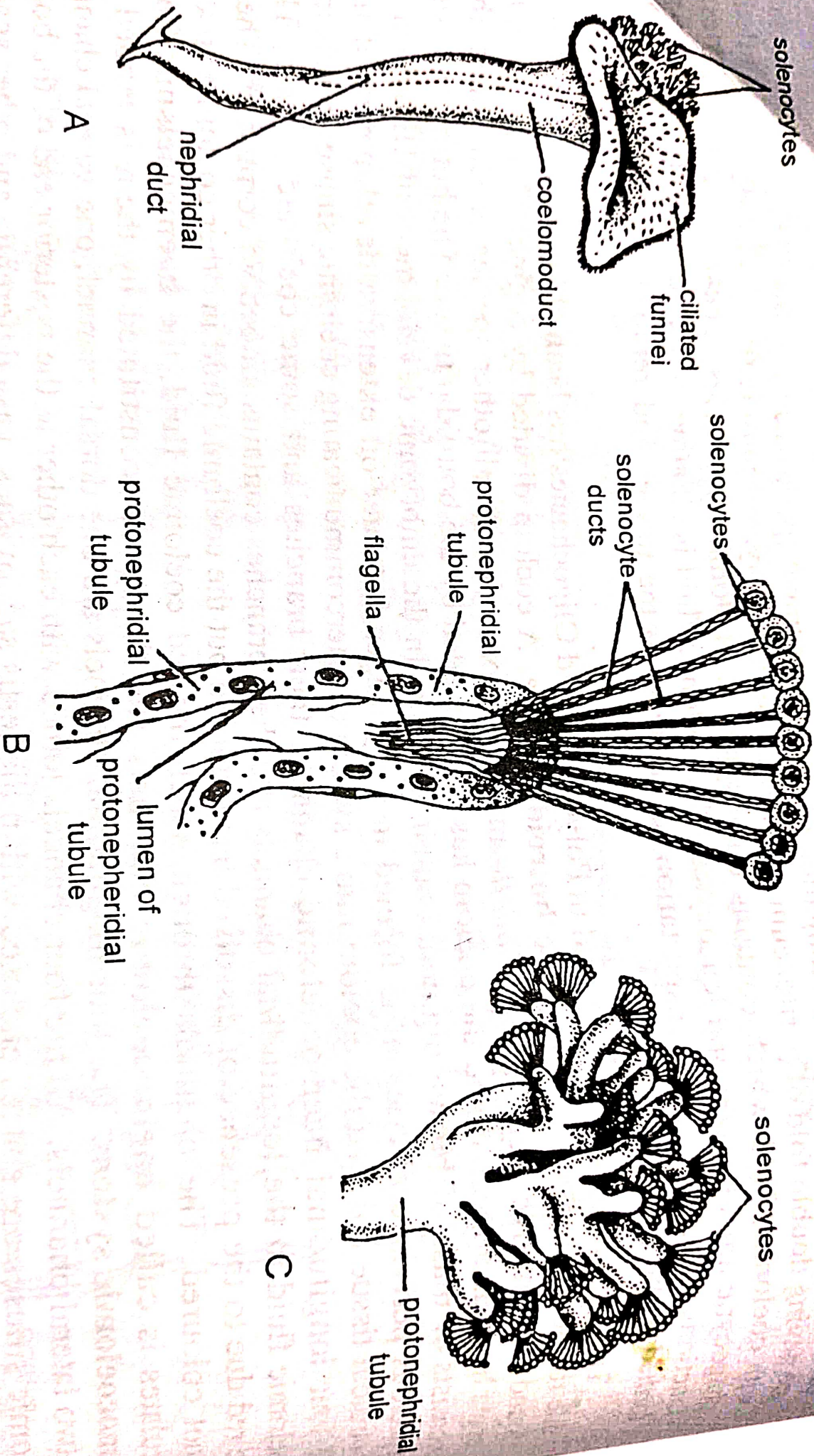


Fig. 8.36. Protonephridium and coelomoduct in *Phyllodoce*. **A**—Protonephridium with coelomoduct, **B**—Solenocytes of one protonephridium, **C**—Group of solenocytes.

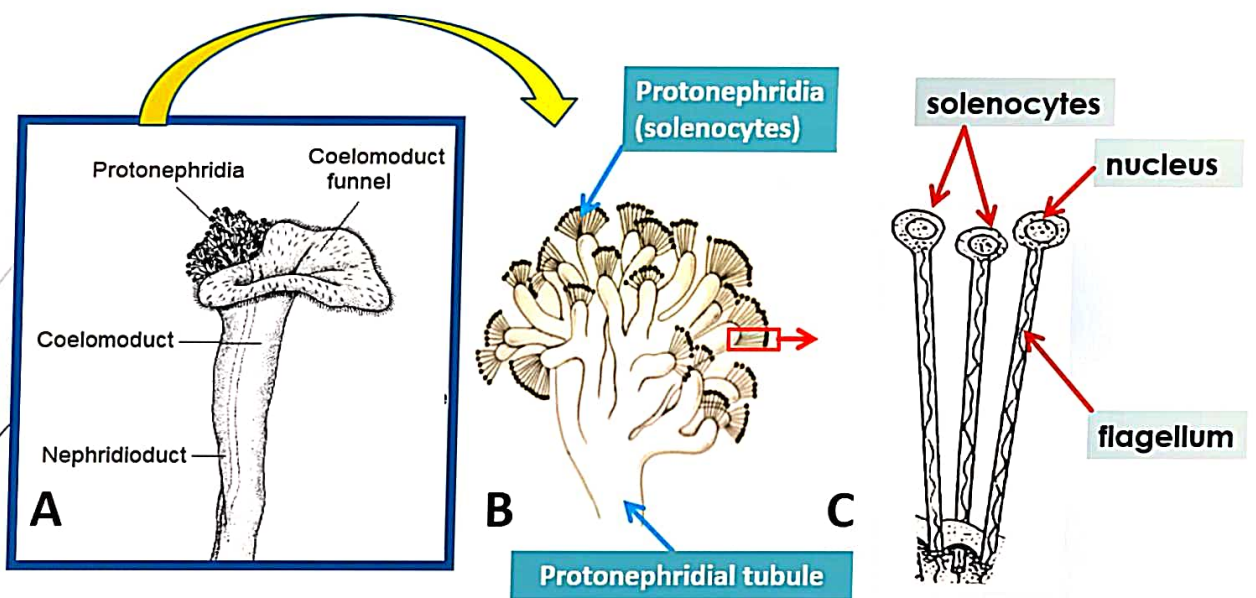


Fig.- Showing Protonephridium of *Phyllodoce paretii* (From M.Raj & Hazarika (2020); Barnes (1987))

cells

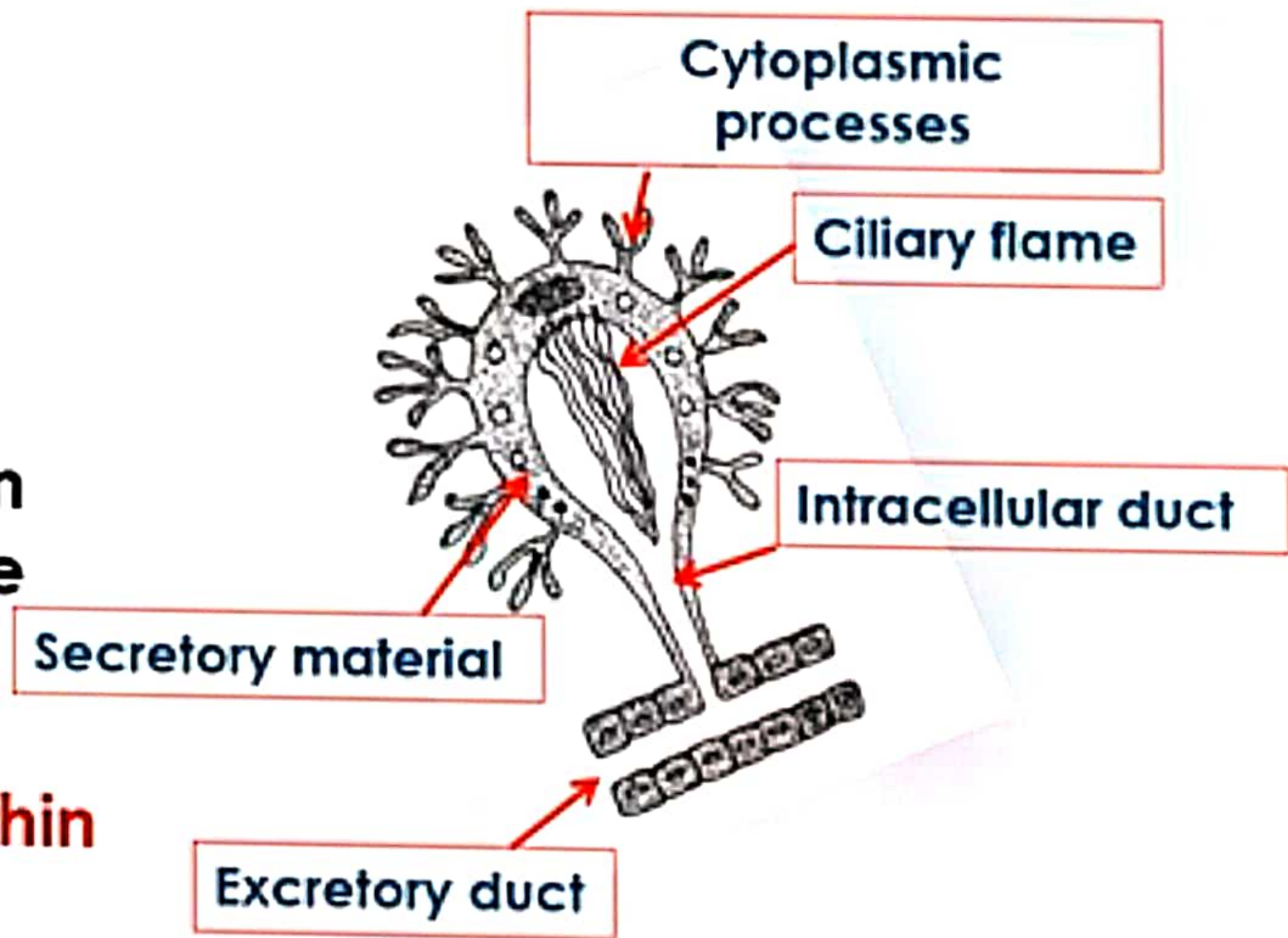


Fig : A Flame Cell
(From <https://seunojo.blogspot.com>)

Cammel and a nephri duct and opens through a nephridiopore to the exterior. Metanephridia found in oligochates (Lumbricus), polycates (Nearthemus), Leeches etc.

(B) Based on size and ^{number} of

Nephridia :- The Second category

of nephridia are based on the ~~number~~ number of nephridia per segment are categorized into (1) Micro nephridia and ~~Meganephridia~~ or Mesonephridia and (2) Mega nephridia or Hollow nephridia.

(1) Micro nephridia - Smaller in size, but numerous per segment. The network of fine tubes lie lying on the body wall and septa in each segment. The nephridia of Pheretima postuma are micro nephridia type.

The

(2) Meganephridia - The meganephridia are larger in size, but generally one pair per segment. ~~at each~~

Usually they extend over two segments and their nephrostomes open into the next segment.

The Nephridia of Hirudinea are the examples of Mega nephridia

(c) Based on site of opening :-

The third category of Nephridia are based on site of opening. Based on the site of opening of the Nephridiopore the nephridia are classified in two types:

(i) Exo-nephridia or Ectonephridia

(ii) Entero nephridia

(i) Exonephridia - The Exonephridia directly ~~open~~ opens to the exterior. Nephridiopore are present.

In case of Exonephridia. The integumentary micro nephridia in ~~the~~ Pherotima postuma, ~~the~~ meganephridia of ~~the~~ leech, Hirudinaria Lumbricus etc. are the example of Exonephridia.

(ii) Entero nephridia - Entero nephridia opens to the excretory Canal or alimentary Canals. Nephridiopore absent. The Septal and pherangial nephridia of Pherotima postuma are the example of Entero nephridia

Chloragogen cells :- These cells are

Star-shaped and are also called as γ -cells. These are derived from

inner Coelomic ~~epi~~ epithelium with excretory function. These cells

are found in earth worms. They are yellowish in colour due to

yellow granules chloragosomes.

The cell stores glycogen and

~~nutre~~ ~~nut~~ neutralize toxins ^{Rest} and are present in the Coelomic

fluid of some Annelids. These

cell function as liver in annelids

~~But~~ they stored and transport

metagenous waste like urea

ridia

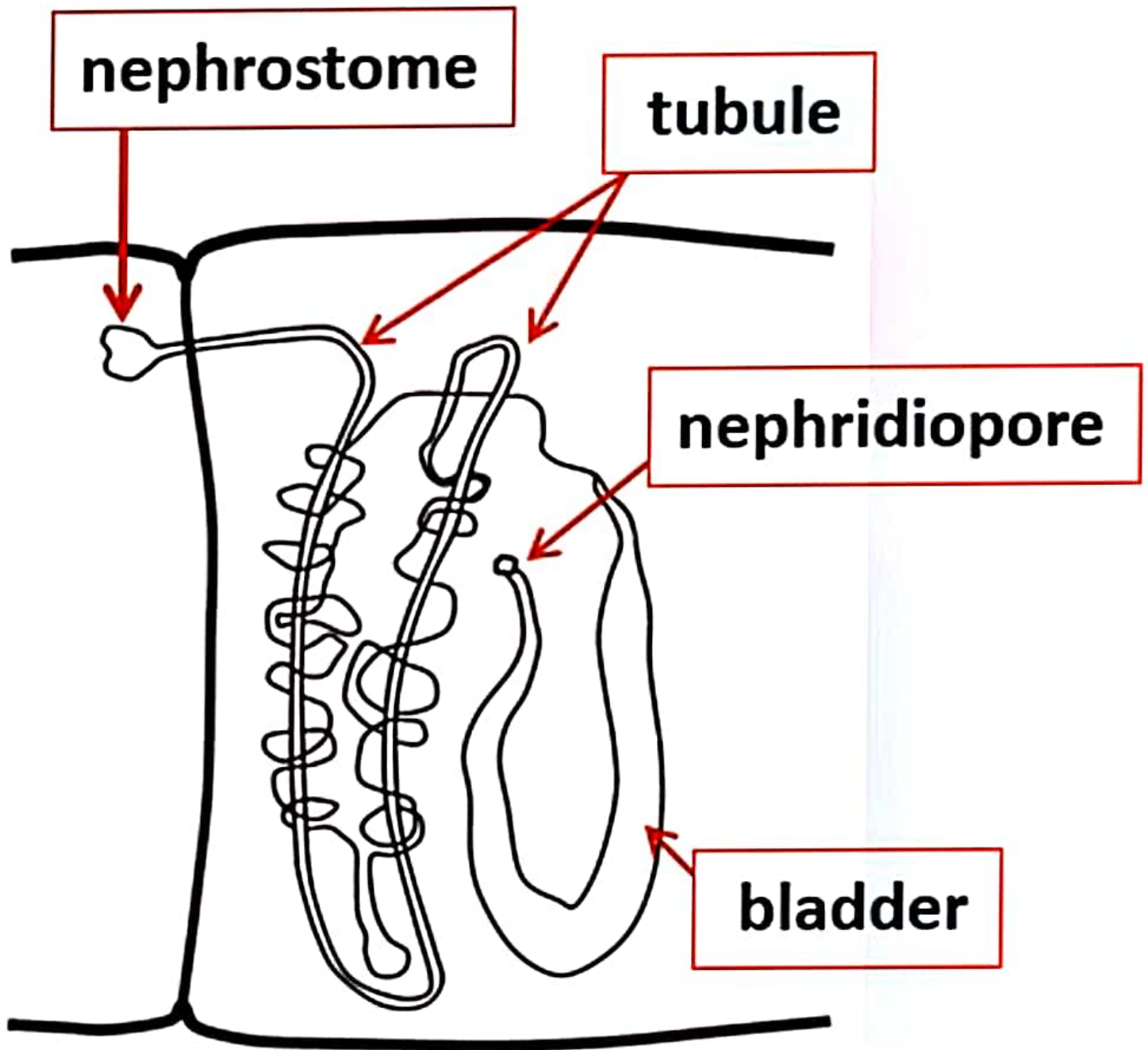


Fig : Metanephridium of the night-crawler earthworm *Lumbricus*