

NEPHRIDIA

STRUCTURE, TYPES & FUNCTION

NEPHRIDIA

- Main excretory organ of *Pheretima* & other annelids
- ectodermal in origin
- Occur in all segments except first three & last segments
- Excrete water

TYPES OF NEPHRIDIA

- On the basis of location
- Septal nephridia
- Integumentary nephridia
- Pharyngeal nephridia

SEPTAL NEPHRIDIA

◎ Location-

- ◎ occur from 15 segments backward that means in the first 14 segments they are absent
- ◎ Each septum bears 40-50 nephridia in average in its anterior & posterior face

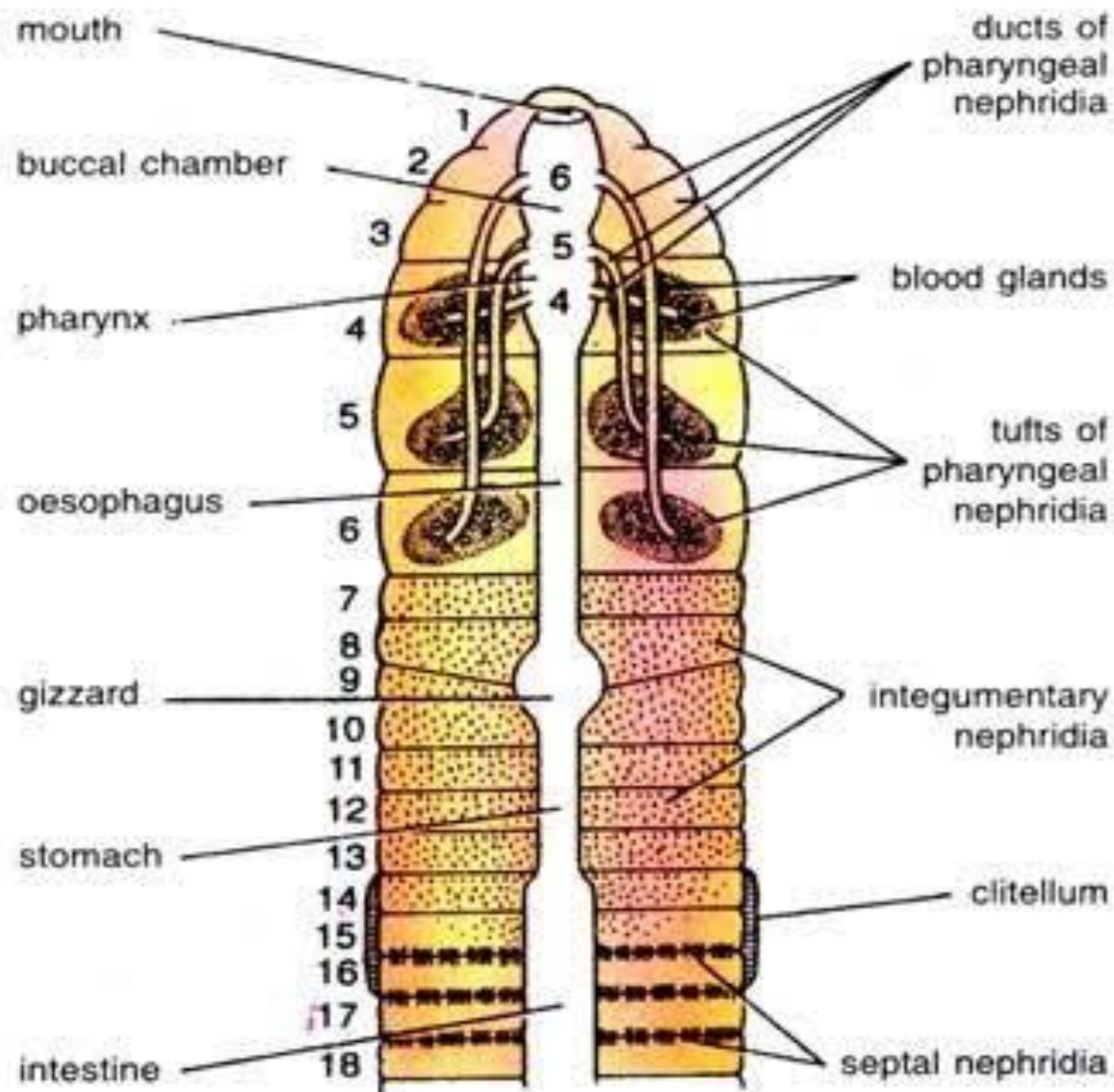


Fig. 66.21. *Pheretima*. Different types of nephridia and general plan of their distribution.

STRUCTURE

◉ Nephrostome

- ◉ i. flattened funnel shaped structure lying in coelom.
- ◉ It has an elliptical mouth like opening leading in to central canal
- ◉ Surrounded by a large upper lip & small lower lip
- ◉ The lips provided with several rows of small ciliated marginal cells.
- ◉ The central canal is also ciliated

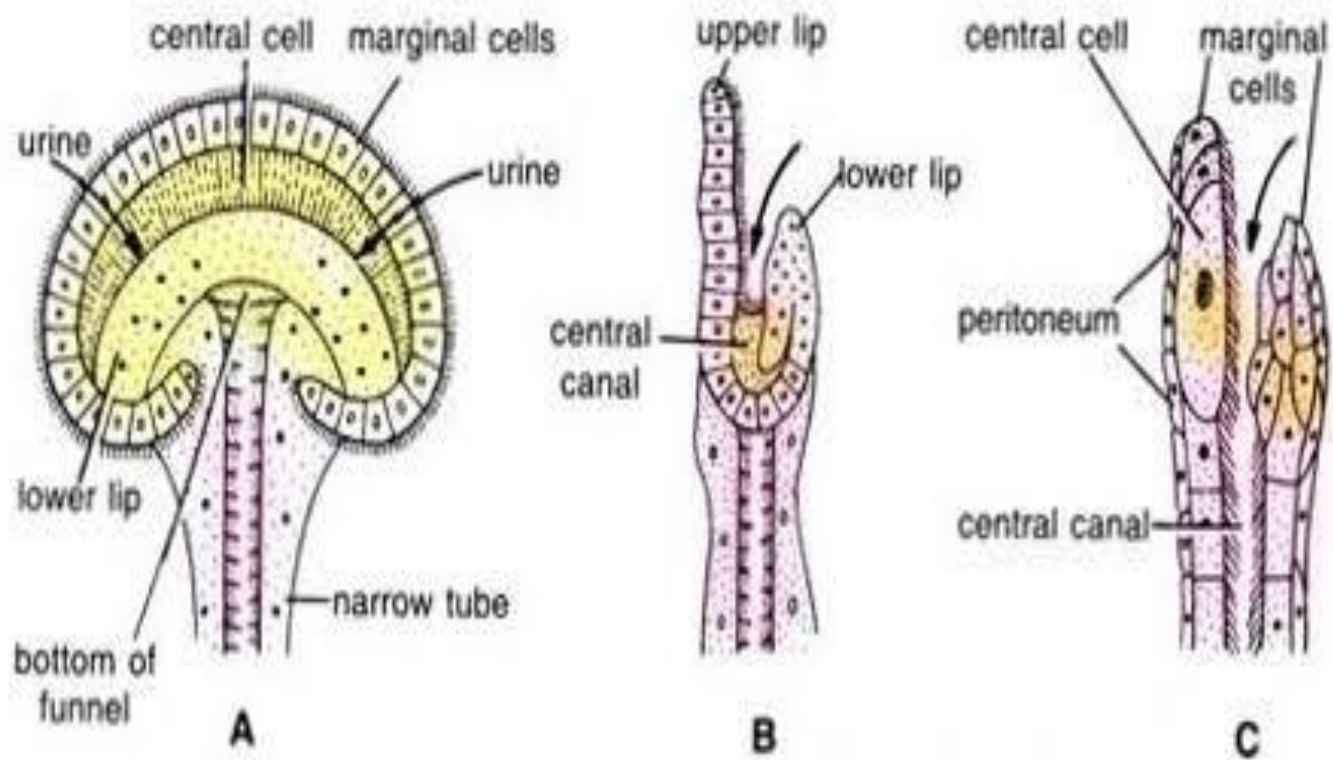


Fig. 66.23. A—Nephrostome of earthworm; B and C—L.S of nephrostome.

○ Neck:

- i. the nephrostome leads in to short & narrow ciliated canal.
- Joins the nephrostome to the body of nephridium.

- ◉ Body of nephridium:
- ◉ it has two parts- a short straight lobe & a long twisted lobe
- ◉ The loop is formed by two limbs- the proximal & distal limbs
- ◉ Both limb are spirally twisted around each other
- ◉ The neck of nephridium & the terminal duct joined together & remain connected with proximal limb.

- Terminal duct:
- It is a short narrow with a terminal excretory duct
- Joins the nephridium with a septal excretory canal

INTEGUMENTARY NEPHRIDIA

- ◉ Location: 7th to the last segments are found inside the lining of body wall.
- ◉ They occur 200-250 in each segment but in 14th, 15th & 16th segments numbers are many more.
- ◉ Also known as exonephric nephridia (discharge the excretory wastes directly outside)

- Small sized nephridia without nephrostome & without any opening in to coelom
- Close type of nephridia
- Presence of V shaped with a straight & twisted loop

PHARYNGEAL NEPHRIDIA

- ◉ Location: located in 4th ,5th & 6th segments
- ◉ Structure:
- ◉ Nephrostome absent.
- ◉ Lie in three pairs of tufts.
- ◉ In each bunch, the terminal duct of nephridia join together to form of a slender duct.
- ◉ The slender duct unite in each segments & form a thick walled duct opens into alimentary canal.

- The septal & pharyngeal nephridia opens in to alimentary canal are also called enteronephric nephridia.

TYPES OF NEPHRIDIA

- Protonephridia(closed)
- Metanephridia(opened)
- Mega and micronephridia
- Exo and enteronephridia

Protonephridia

- Closed type- seems to be more primitive type
- Terminates in the coelom as a blind tube
- Closed pre-septal end provided with peculiar specialized excretory TUBE CELLS / SOLENOCYTES.
- Found in Vanadis, Phyllodoce, Tomopteris, etc.

METANEPHRIDIA

- Opened type- far advanced
- Absence of solenocytes, its inner pre-septal end opens into coelom by a ciliated funnel called NEPHROSTOME.
- Thus open at both ends
- Exc. Wastes diffuse from coelomic fluid/ blood into the lumen of the nephridial tubule & discharged to the outside through NEPHRIDIOPORE.
- Found in- polychaeta(Neanthes), oligochatea (Lumbricus) & leeches

EXO & ENTERO NEPHRIDIA

Exo/ecto nephridia

- Directly open to the exterior
- Nephridiopores present
- Such as-

Meganephridia of Nereis,
Hirudinaria & Lumbricus

Integumentary micronephridia
of Pheretima.

Entero nephridia

- Open into the excretory
canals / alimentary canals
- Nephridiopores absent
- Such as-

Septal & pharyngeal nephridia
of Pheretima.

PHYSIOLOGY

- Gland cells extract- excess water + urea + ammonia + creatinine –from blood.
- Septal nephridia eliminate solid part. From coelomic fluid through nephrostomes.
- Integumentary neph(**exonephric**)- discharge wastes directly to the exterior.
- Septal & pharyngeal neph- forms **enteronephric nephridial sys**- discharge into the lumen of the gut

- Special enteronephric nephridial arrangement also serves for conservation of water / osmo-regulation.
- SELECTIVE RESORPTION- excretory fluid discharged into pharynx moisten the food, as the faeces become compacted water is reabsorbed by intestine to be re-used by the body. Reabsorption of salts also occurs during fluid through the nephridia, this process is called S.R.

Another means of excr.:

CHLORAGOGEN CELLS

- Yellow cells called chloragogen cells.
- Found in intestine & the dorsal blood vessel in large no.
- Derived from the peritoneum/coelomic epithelium of the alimentary canal.
- Take up nitrogenous waste products from the blood capillaries of the gut & deposited as yellow granules(guanin) in their cytoplasm.

- These cells are also concerned with
 - deamination of proteins
 - formation of ammonia
 - synthesis of urea

Therefore, they are as the vital intermediary in metabolism of earthworms as the liver in vertebrates.