

Respiratory System of Leech (*Hirudinaria*)

The skin forms a large respiratory surface. The cutaneous respiration is facilitated by the secretion of mucus which keeps the skin in a moist state. The skin is profusely supplied with capillaries which penetrate between the epidermal cells.

The one-layered epidermis serves as a permeable membrane through which oxygen dissolved in the water is taken in and the carbon dioxide circulating in the haemocoelomic fluid is given out.

Blood Vascular System of Leech (*Hirudinaria*)

In leech, the blood containing spaces are of two types — blood vessels proper, with muscular wall and blood sinuses, without a definite wall and valves.

Two principal vessels, lateral in position and two principal sinuses — one dorsal and the other ventral, with branches and a number of spaces constitute the blood vascular system. All the four principal channels are in communication at the posterior end of the body. The longitudinal channels run from 6 to 22 segment.

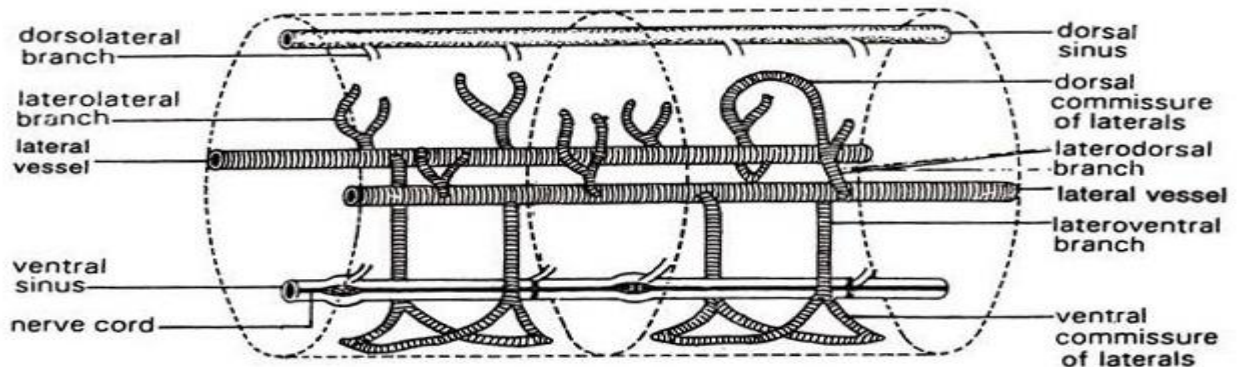


Fig. 24.31. *Hirudinaria* sp. Principal blood channels

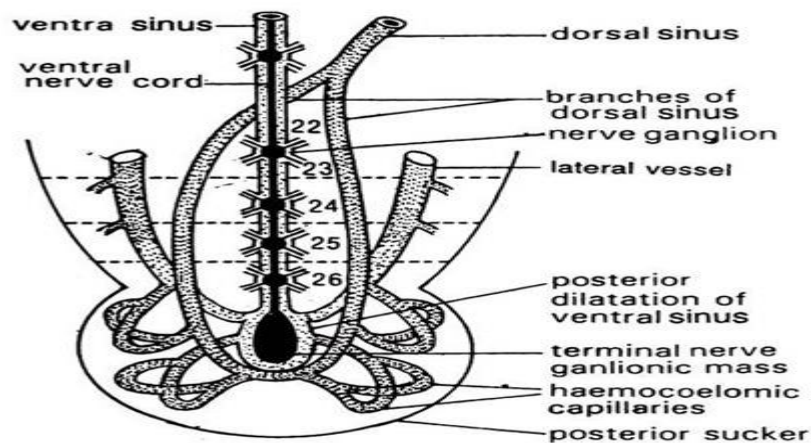


Fig. 24.32. *Hirudinaria* sp. Posterior end—union of four longitudinal sinuses

Dorsal Sinus

1. Mid-dorsal in position, runs beneath the body wall and dorsal to the alimentary canal; gives out two pairs of dorsal channels in each segment, ending in the dorsal and dorsolateral body wall and in the alimentary canal.
2. In the 6 segment, the dorsal sinus terminates in capillaries, forming plexus in the anterior five segments.
3. Posteriorly, the dorsal sinus bifurcates in the 22 segment. Running round the rectum, the branches join the posterior dilatation of the ventral sinus.
4. Haemolymph flows from posterior to anterior end.

Ventral Sinus

1. It encloses the nerve cord and runs ventral to the alimentary canal. It is largest in diameter and encloses cerebral ganglia, peripharyngeal connectives and sub-pharyngeal ganglia anteriorly and terminal ganglia posteriorly.
2. At the level of nerve ganglia in each segment arise a pair of branches, each dividing into two, the ventral branch ending in the ventrolateral wall and the anterodorsal branch in the dorsolateral body wall.
3. In segments between 6 to 22, ventral sinus gives out a pair of nephridial branches in each segment.
4. Haemolymph flows from anterior to posterior end.

Lateral vessels

One on each side of the alimentary canal.

1. In the 6 to 22 segments, a latero-ventral branch arises from each lateral vessel in each segment. The branch divides into two anterior and posterior, and join with the corresponding branch from other lateral vessel, in the mid-ventral line, below ventral sinus and form ventral commissure of the laterals. Three inter-segmental and longitudinal commissural branches connect the commissures of the successive segments.
2. 'Valves are absent at the origin of the lateroventrals but present at the origin of its branches.

3. Each lateral vessel receives slender vessels from each segment

- a. A laterolateral from the lateral body wall and nephridium.
 - b. A laterodorsal from the lateral and dorsal body wall, gut and nephridium.
4. The laterodorsals of both sides meet above the dorsal sinus and form a dorsal commissure of the lateral vessels in the segments 6 to 22.
 5. The laterodorsals and laterolaterals are joined by a lateral commissure in each segment.
 6. The laterodorsals, laterolaterals are collecting vessels and their junctions with the lateral vessels are guarded by valves. The haemolymph flow is from posterior to anterior. Anteriorly, the lateral vessels branch into capillaries in the five first segments. Posteriorly, they end in a dilatation of the ventral sinus and a direct communication of all the four channels established.

Course of Circulation

Presence of haemoglobin in the fluid gives red colour to the haemolymph.
Colourless corpuscles are less in number.

1. The dorsal and ventral sinuses are distributory, the lateral vessels are both collecting and distributory in function.
2. The dorsal, dorsolateral body wall and the gut receive haemolymph from the dorsal sinus.
3. Haemolymph from the dorsal and dorsolateral body wall passes to the lateral vessels through dorsolaterals and from the gut through the laterointestinals via dorsal commissures of the laterals.
4. The ventral, ventrolateral body wall and the nephridia receive supplies from ventral sinus and the haemolymph from there goes to lateral vessels through laterolateral and laterodorsal branches.
5. In each segment, the ventral body wall, gut, nephridia and genital organs receive supply from two lateral vessels through lateroventrals and the haemolymph returns to lateral vessels through laterodorsals and laterolaterals.

Excretory System of Leech (*Hirudinaria*)

1. The nephridia are one type, seventeen pairs, and one pair occur in each segment from 6 to 22 segments. They are, however, absent in the first five and last four segments of the body and also in the segments forming the posterior sucker.

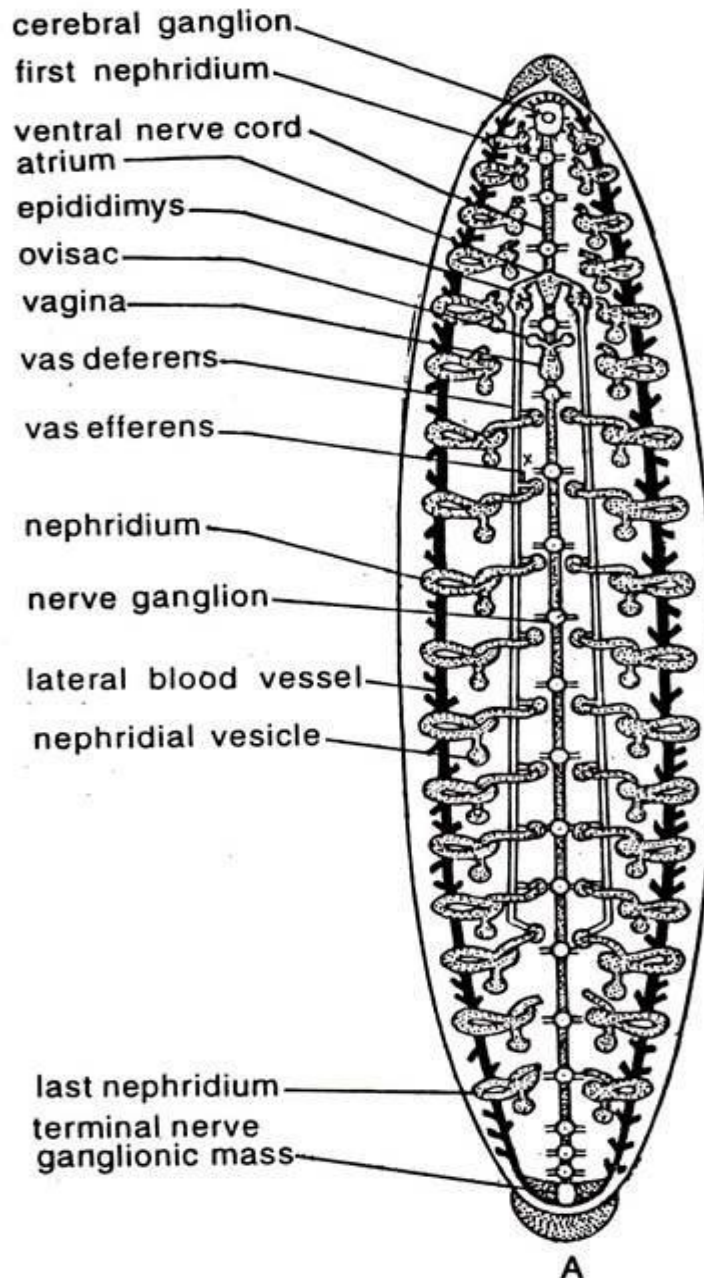


Fig. 24.33. *Hirudinaria* sp. A. Dorsal body wall and alimentary canal removed to expose lateral sinuses, nephridial, reproductive and nervous system

The nephridia may be placed under two categories:

Testicular Nephridia:

Elevon pairs, situated in 12 to 22 segments.

1. Body of the nephridium is attached to the ventral body wall and consists of a horseshoe-shaped main lobe and an inner lobe in the concavity of the main lobe (Fig. 24.33B).

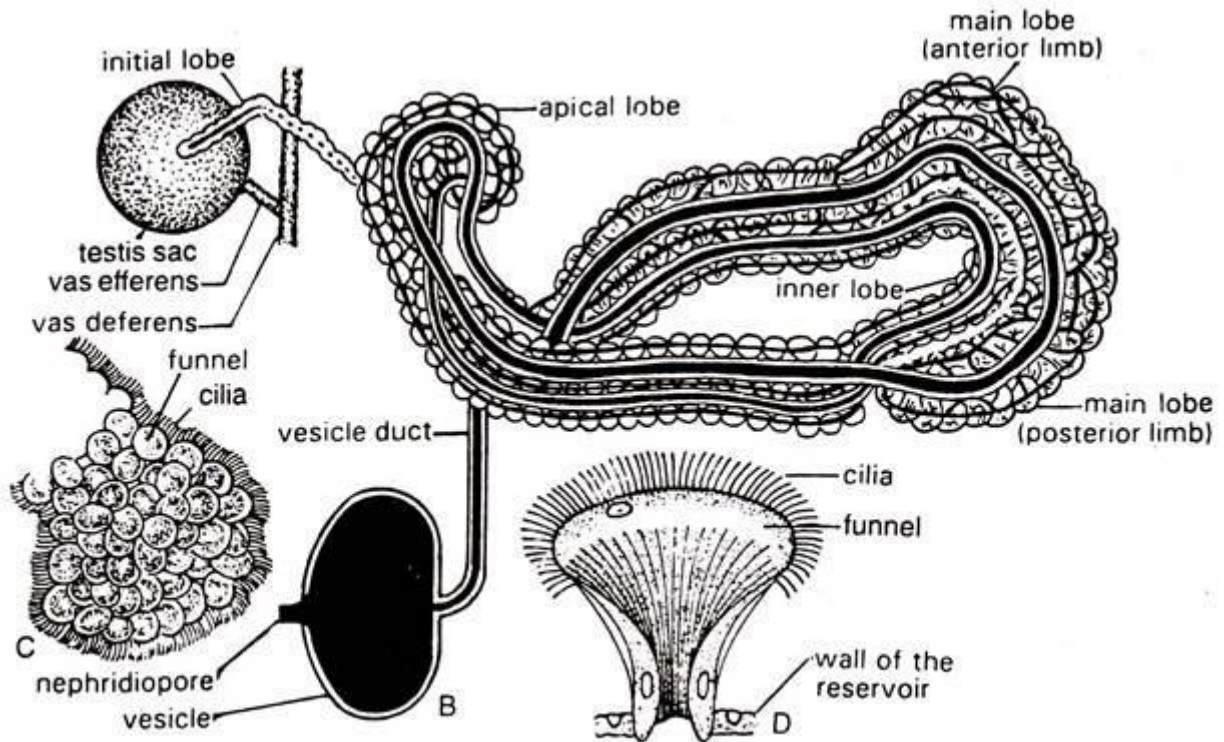


Fig. 24.33(Contd.). B. A testicular nephridium. C. A ciliated organ. D. A ciliated funnel

2. The body consists of a much coiled ciliated tubule richly supplied with blood.

3. The nephrostome is absent. The posterior limb of the main lobe runs forward as a stout apical lobe. The inner lobe runs up to the half of the apical lobe. The initial lobe is a cord of cells and coiling the apical lobe joins the main lobe posteriorly. Anteriorly, it runs towards the testis sac and ends in the ciliated organ (Fig. 24.33C) corresponding to the nephrostome.

4. The anterior limb of the main lobe turns backward and ends in a narrow vesicle duct. The duct opens in a vesicle, which in turn opens to the exterior by the nephridiopore placed on the ventral surface.

5. Waste products are temporarily stored in the vesicle and discharged to the exterior.

Pretesticular Nephridia:

The six pairs of nephridia situated in the segments 6-11, where the testes sacs are absent, are considered as pretesticular nephridia. Structurally, they resemble the testicular nephridia, but instead of ending in the ciliated funnel, the initial lobe ends loosely in the connective tissue on either side of the nerve cord.

In the adult Hirudinaria, the ciliated organ is not communicated with the body of the nephridium, although it is distinct in the embryonic stages. The ciliated organ loses its nephridial function and manufactures coelomic corpuscles, which are driven to the haemocoelomic stream.

Some workers are inclined to believe that the botryoidal tissue has got certain excretory function.