

Pila globosa

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Introduction to Pila

- Apple snail, *Pila*, is a freshwater snail and is quite abundant in fresh-water ponds and lakes. They are distributed in the Oriental and Ethiopian regions of the world. A few species of this genus is found in India, of which the most common species is *Pila globosa*. It is one of the largest freshwater molluscs.

Habit and Habitat of Pila

- *Pila globosa* is abundantly found in ponds, pools, tanks, lakes and rice fields. They may also be found in fresh water streams, rivers and even in brackish water of low salinity. They are herbivorous and therefore, quite abundant in waters, having succulent aquatic vegetation. They are amphibious form being adapted for life in water as well as on land.
- For this they are provided with two fold respiratory adaptations. They respire in water by ctenidium and on land by pulmonary sac. Therefore, they possess double mode of respiration. During prolonged drought they undergo aestivation for a long time and during rains they return to normalcy. When disturbed it withdraws itself into its spirally coiled shell and seals the Opening with its operculum.

Structure of Pila

- The body of Pila is enclosed in a thick spirally-coiled globular univalve shell. The shell has the form of an elongated cone coiled around a central axis in a spiral manner. A single revolution of the shell around the axis is called a whorl.
- The extreme top of the shell is called the apex , which is regarded as the oldest part of the body. Starting from the apex the other whorls - the penultimate whorl and body whorl are large so as to enclose the greater part of the body. The first whorl is smallest and the last one is largest

Structure of the shell

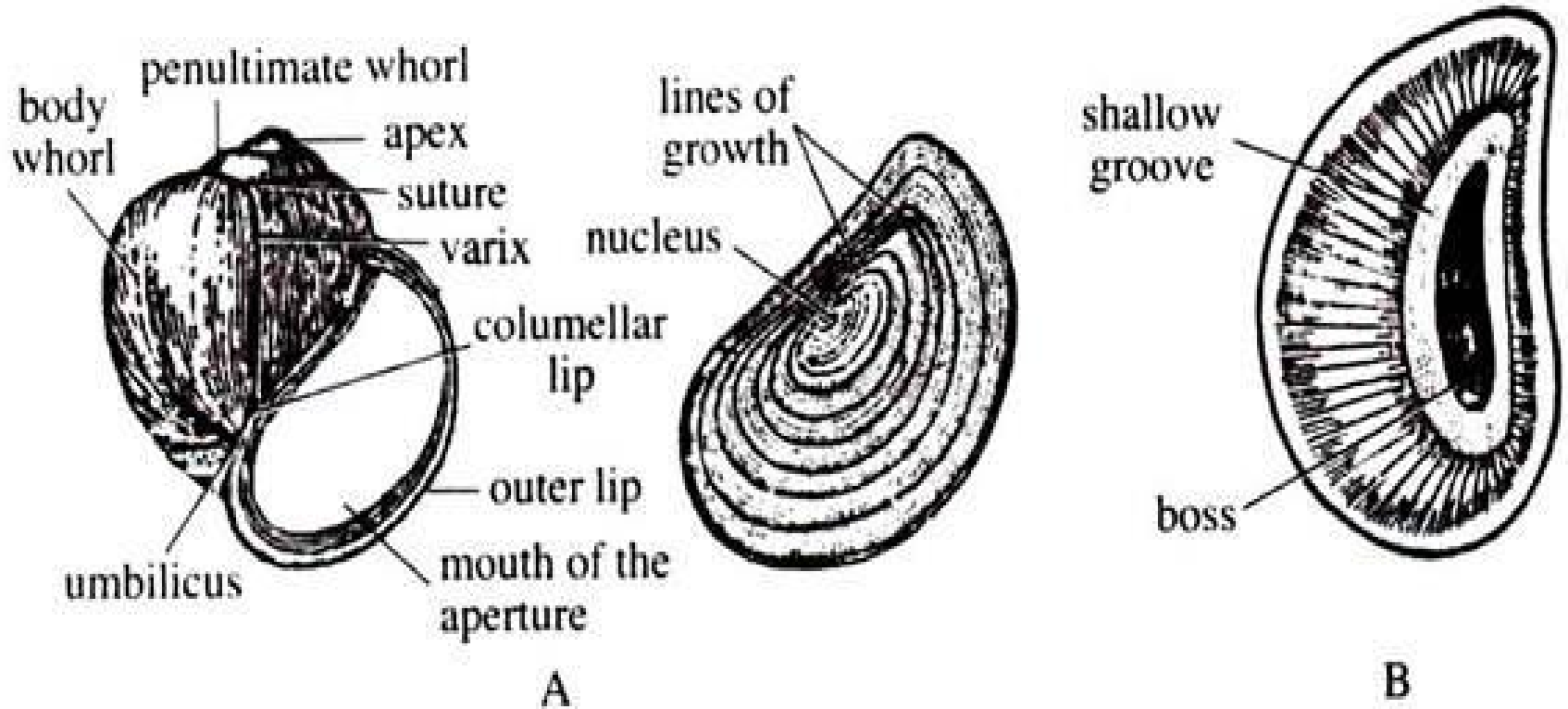


Fig. 1.80 : A. Showing the structure of shell, B. Operculum, of *Pila*.

External features of Pila

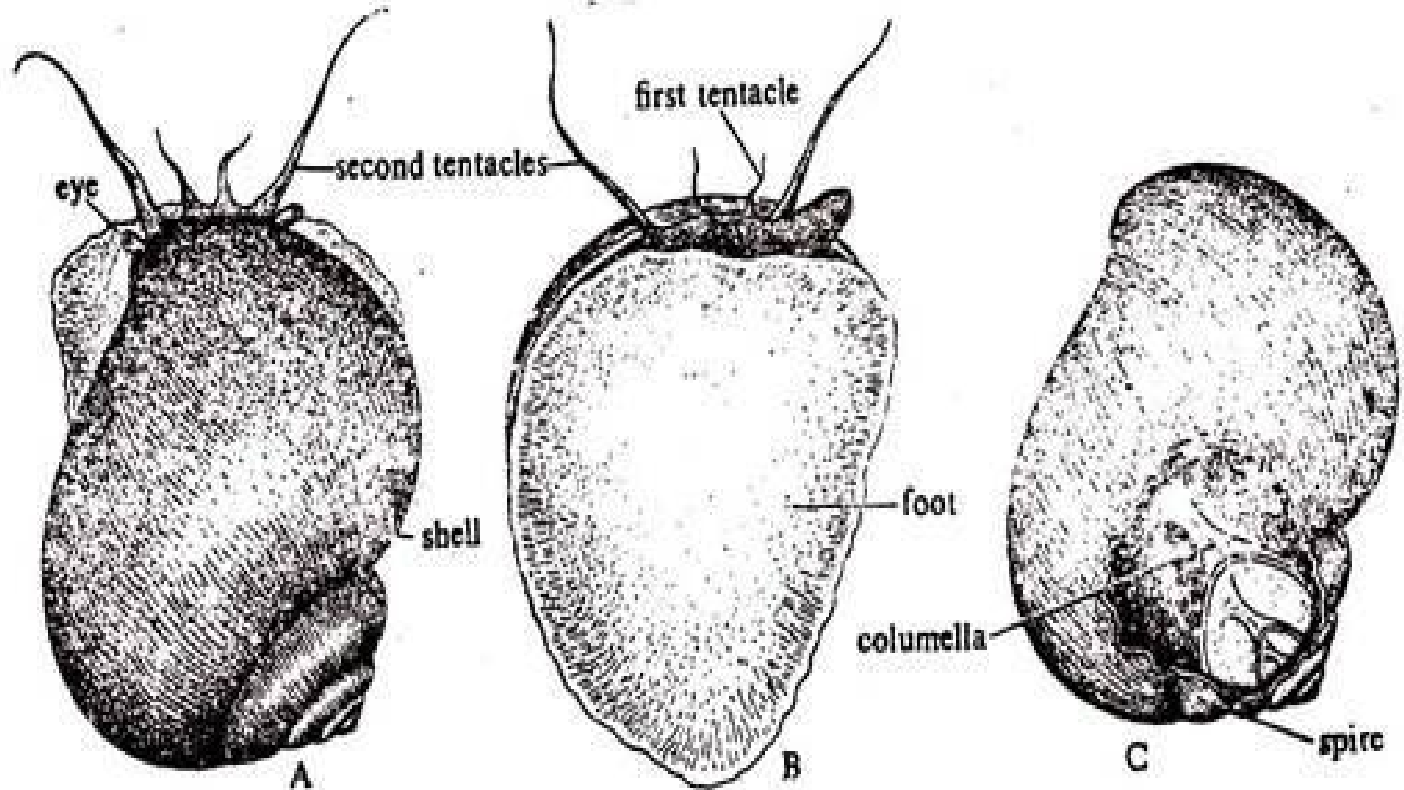


Fig. 1.81 : External features of *Pila*. A. Dorsal view, B. Ventral view, C. A portion of shell is broken to show the columella.

Structure of the shell

- The last whorl contains a large aperture, which can be closed by a lid called operculum , which is attached to the posterior side of the foot. The operculum is a flat calcareous plate, formed as a cuticular secretion of a group of cells from the foot. The operculum has a lunate oblong outline which corresponds to the aperture of the shell. It shows numerous concentric ring of growth around a well-marked nucleus.
- The type of coiling seen in *Pila globosa* is right handed and is called dextral, which is in contrast to the other rare type of left-handed coiling, called sinistral.

Circulatory System of Pila

- The circulatory system of Pila is well developed and has attained great complexity due to its double mode of respiration, involving a gill as well as a lung. The circulatory system consists of the heart, the pericardium, the arteries, the veins and the sinuses.
- The pericardium is a thin-walled roughly ovoidal chamber lying dorsally on the left side of the body and extending anteriorly up to the stomach and the digestive gland.
- The pericardial chamber encloses the heart and the aortic ampulla.

Circulatory System of Pila

- The heart is situated in the left-hand side of the visceral whorl very near to the posterior end of the ctenidium. As the ctenidium lies in front of the heart, the animals are included under Prosobranchia. The heart consists of two chambers, an auricle and a ventricle.
- The auricle is a thin walled, highly contractile and roughly triangular sac situated in the dorsal part of the pericardium. The dorsal part of the auricle receives blood from three main veins ctenidial vein, branchio-renal vein and pulmonary vein. Ventrally the auricle communicates with the ventricle through the auriculo-ventricular aperture.

Circulatory System of Pila

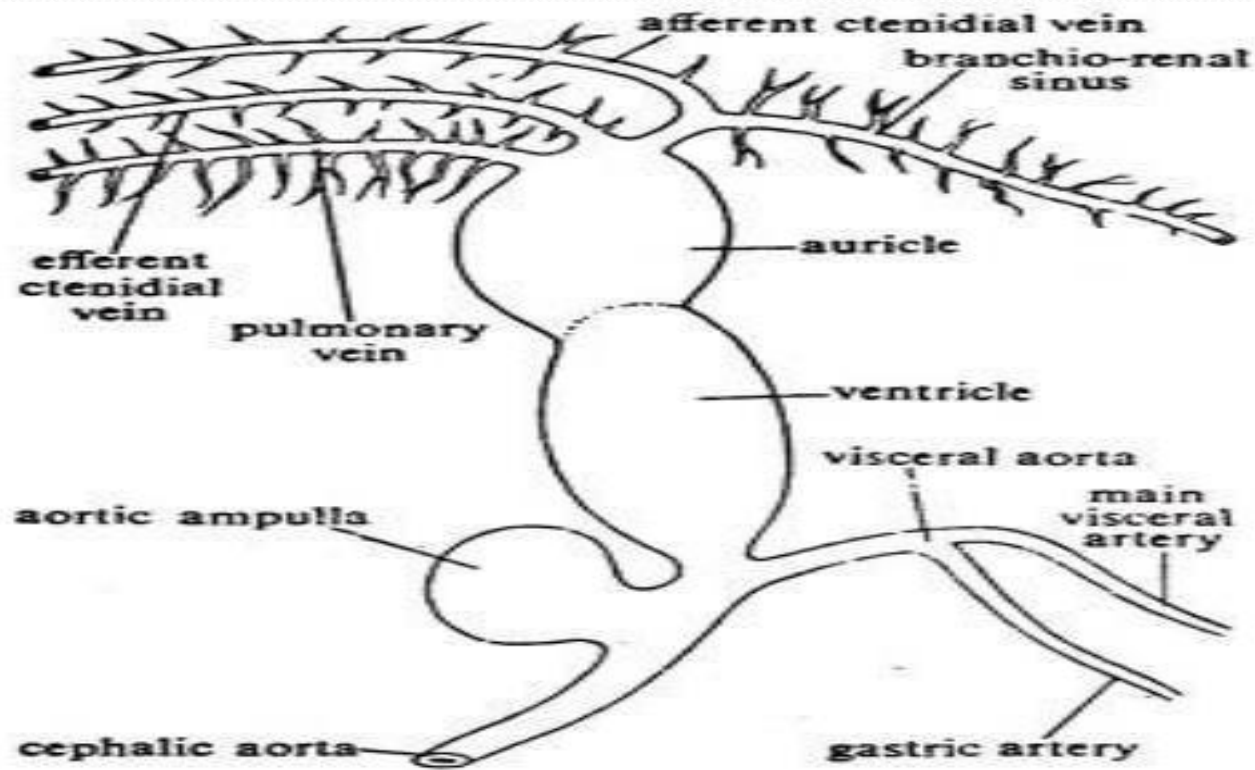


Fig. 1.85 : Heart and the main blood vessels in *Pila*.

Circulatory System of Pila

- The auriculo-ventricular aperture is guarded by semilunar valves which prevent regurgitation of blood from the ventricle to the auricle. The ventricle is an ovoidal sac lying below the auricle. Its wall is thick, spongy and muscular. The auricle receives oxygenated blood from the ctenidium and pulmonary sac through efferent ctenidial and pulmonary vein, respectively.
- The lower end of the ventricle gives rise to a large artery, the aortic trunk.
- The root of the aorta is provided with two semilunar valves which do not allow the backflow of blood into the ventricle. The aorta immediately bifurcates into two arteries, the anterior one is called cephalic aorta, supplying blood to the head region and the posterior or visceral aorta which supplies blood to the posterior part of the body.

Circulatory System of Pila

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Circulatory System of Pila

- The cephalic aorta, along its outer side, gives off three arteries:
 - (i) An artery to the skin,
 - (ii) An artery to the oesophagus and
 - (iii) An artery to the left part of the mantle, the osphradium and left siphon.
- The cephalic artery on its inner side gives off a pericardial artery that supplies to the pericardium and then enters into the posterior renal chamber. The main trunk of the cephalic artery enters into the perivisceral sinus and then crosses beneath the oesophagus.

Circulatory System of Pila

- There are four main sinuses:
 - (i) Peri-visceral sinus,
 - (ii) Peri-intestinal sinus,
 - (iii) Branchio-renal sinus and
 - (iv) Pulmonary sinus.
- The perivisceral sinus sends blood to the ctenidium and pulmonary sac. The peri-intestinal sinus passes blood to the kidney for eliminating metabolic waste.
- The veins carry blood to the auricle from different parts of the body either directly or through the gill, mantle and kidneys.

Circulatory System of Pila

- The main veins are:
- (i) Afferent ctenidial vein,
- (ii) Efferent ctenidial vein,
- (iii) Afferent renal vein,
- (iv) Efferent renal vein and
- (v) Pulmonary vein.

Blood

- The blood of Pila contains some colourless amoeboid cells and a blue, copper containing respiratory pigment, called haemocyanin.
- The amoeboid cells are phagocytic in nature.

Circulation of Blood

- The ventricle of the heart pumps blood through the branches of cephalic aorta and visceral aorta. The cephalic and visceral aortae supply blood to the different parts of the body. The cephalic aorta supplies blood to the head, mantle, buccal mass, oesophagus, copulatory organ, columellar muscle and associated structures.
- The visceral aorta supplies blood to the visceral mass. Although there are four main sinuses, the blood is collected into the perivisceral and peri-intestinal sinuses. From these sinuses blood is conveyed either into the pulmonary sac, ctenidium or into the kidney.

Circulation in Pila

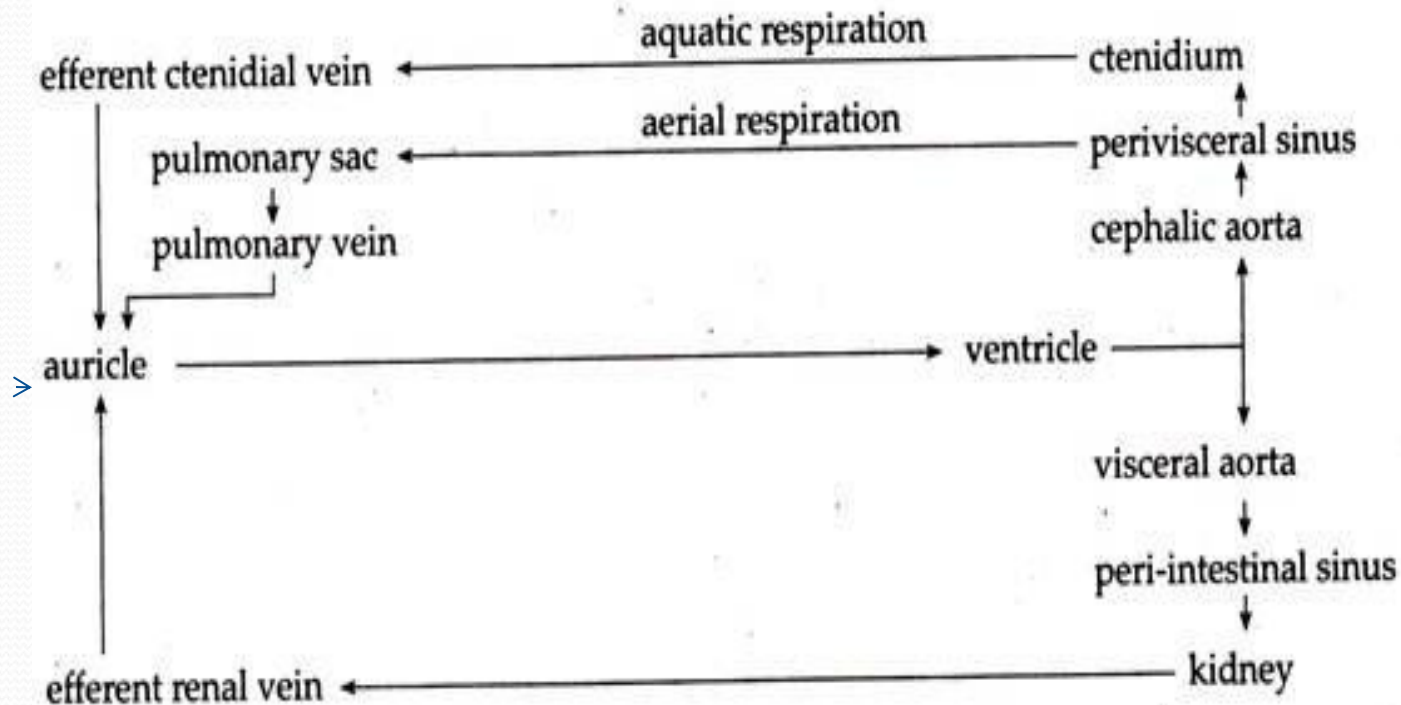


Fig. 1.87 : Flow chart of circulation in *Pila*.

Circulation of Blood

- During aerial respiration, blood flows into the pulmonary sac, while in aquatic respiration most of the blood from the perivisceral sinus goes to the ctenidium .
- After purification, the blood comes to the auricle by the pulmonary vein or by the efferent ctenidial vein.

Circulation of Blood

- On its way through the anterior renal chamber, the blood gets rid of nitrogenous waste and flows either into the ctenidium or into the posterior renal chamber. The posterior renal chamber gets blood either from the peri-intestinal sinus or from the anterior renal chamber.
- The blood gets rid of its excretory product but without being aerated. Thus mixed blood goes to the auricle for distribution via the ventricle.

References

- Website: www.google.com.
- Wikipedia.

Thank you!

