

RESPIRATION IN PRAWN

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In Prawn, respiratory system is well developed and consists of following structures.

- ① Branchiostegite or gill cover
- ② Three pairs of epipodite
- ③ Eight pairs of gills or branchiae.

① Branchiostegite :

Each gill chamber is enclosed between the Carapace of branchiostegite on the outside and by the thoracic wall on the inner side. The inner lining of branchiostegite or gill-covers are thin, membranous and highly vascularized. These are constantly bathed in fresh water, therefore, oxygen dissolved in water is taken in and CO_2 is removed. Branchiostegite perform subsidiary respiratory function.

② Epipodite :

These are three pairs of simple, highly vascularized outgrowth of the integument given out from the coxal segments of the three pairs of maxillipeds. They occupy the anterior part of the gill chambers beneath the scaphognathites of the maxillae. The epipodite of first pair are bilobed and larger than the others. The epipodite also serve as respiratory organs like primitive gills.

③ GILLS :

These are eight pairs of gills or branchiae inside the gill chamber enclosed by the gill covers but only seven of them are visible on removing the gill cover, because 8th gill is hidden below the dorsal part of second gill.

Depending upon their position and relation to the thoracic appendages there are 3 kinds of gills:

- (i) Podobranch or foot gill : This is attached to the basal podomere or coxopodite of an appendage
- (ii) Arthrobranch or joint gill : This gill is attached to the arthroidal membrane between

the body (thorax) and appendages.

(ii) Pleurobranch or Side gills. Such type of gills attached to the lateral wall of the segment to which the appendages belong.

Originally the gills were outgrowths of the basal podomeres (Procoxa and Coxa) of the appendages.

STRUCTURE OF GILL:

Gills are crescentic in shape. The gill of anterior end is small size than gill of posterior side. In its middle each is connected to the thorax by a small root like portion, called gill root. Various nerves and blood vessels innervate the gills through the gill root.

The gills in the prawn are of phyllobranch i.e. the gill filament are thin and plate like, often called gill plate and are arranged in two rows on a narrow axis like leaves of a book. There is a deep groove between the two rows on the gill plate. The groove open in the gill chamber at both the dorsal and ventral end of the gill. The gill plate is larger in the middle and become smaller in size towards the two ends.

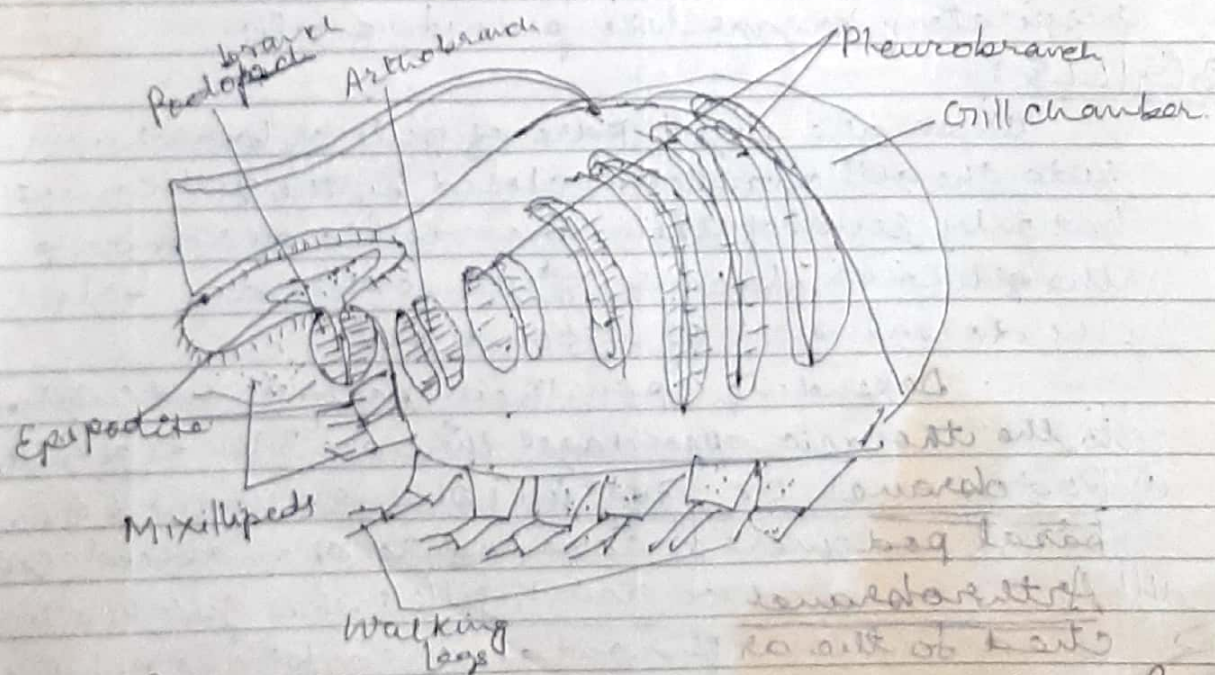


Fig - Gill chamber exposed to show gills in prawn.

Histology:

Each gill plate is made up of ^{double} ~~single~~ layers of ~~cuticle~~ cuticle enclosing a single layer of cells within. Two types of cells are present in this layer: (i) Pigmented cells ~~and~~ (ii) transparent cells. The axis or base is more or less triangular in cross section and comprises a centre core of connective tissue surrounded by a layer of epidermis.

Vascular Supply of gills:

Within the axis run three longitudinal canal - out of three two are lateral longitudinal channel while other one is median longitudinal channel. The two ^{lateral} longitudinal channel connected each other by transverse connective.

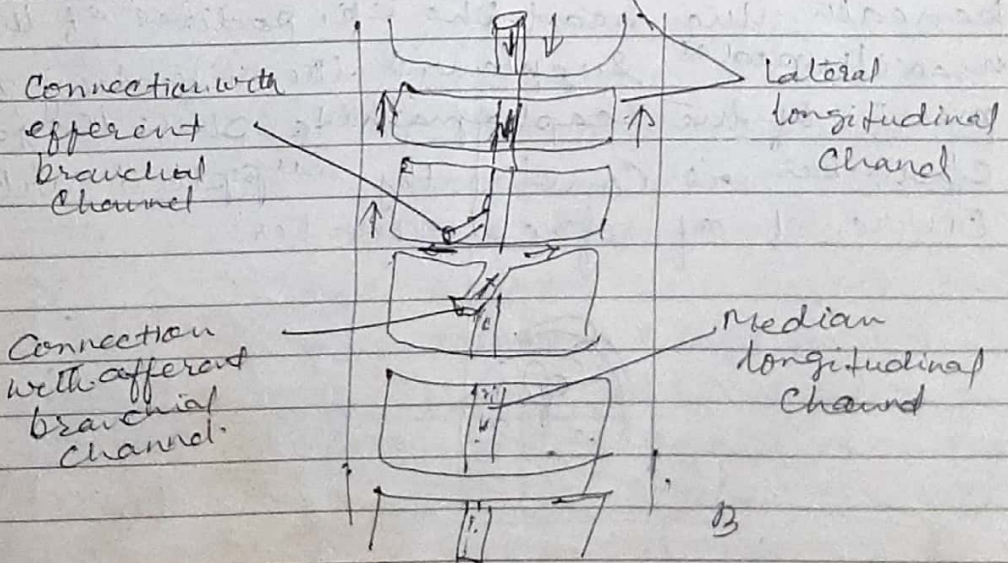
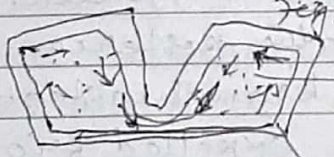
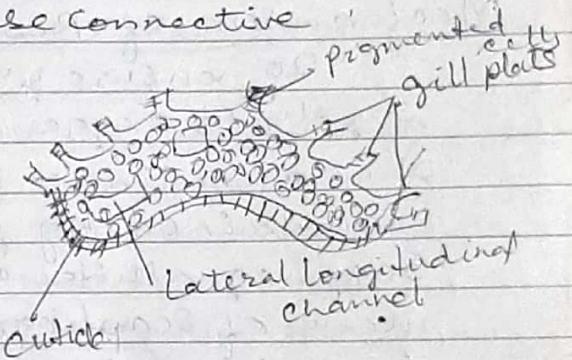
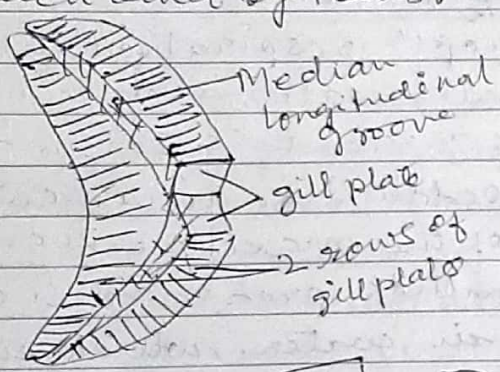


Fig - Blood supply to gill + channel in brown.

Course of Blood in Gills:-

Non-aerated blood from the body is collected by the afferent branchial channels, which opens into the transverse vessels situated against the gill root. Blood then flows through the two lateral, longitudinal channels and passes through the marginal channel and reaches the median longitudinal channel. During this course, blood becomes oxygenated. The oxygenated blood to the pericardial sinus is carried by an efferent branchial channel, which is given off from the median longitudinal channel.

Mechanism of Respiration:-

To ensure proper respiration a regular supply of oxygenated water is to be maintained. Thus a continuous current is set in and maintained by peddle like movement of Scaphognathites of the maxillae. The movement of Scaphognathite create a suction force that draws in water, which enters the chamber along the posterior and ventral margin of the branchiostegite, passes over the gills, and then expelled from the front end beneath the head. The epi podites of the maxillipedes supplement the vibratory movement of the Scaphognathite. Thus the gill chamber is constantly supplied with a current of fresh water.

