(18) Respiration in Arthropoda :

The respiration includes the intake of oxygen and release of CO_2. The oxygen is utilized for the oxidation of the food-stuff production of Energy. The energy is utilized by the living of animals.
Among the Arthropods two types of respiration take place.

(1) Aquatic Respiration :

In aquatic Arthropod the gills and book-gills are the main respiratory organs. The group of animals like including sub-Phylum chelicerata, crustacea etc. respiration by gills. In those animal how have not gills respiration through general body surface.

(A) Gills :

The gills are well-developed in crustaceans it typically associated with appendages. Gills develoked filaments or gill ~~lamm~~ lamellae which are arranged along the axis

Types of gills

(i) A/c (According to) Position of gill, ~~three~~ there are three types present in crustaceans :

(i) Dendrobranchiate gills → It is composed

of a central axis bears two series of main branches. The main branches in turn divide into a number of sub-branches dentrites. Ex- Penaeus.

(iii) Phyllobranchiate gills →

It is composed of a central axis with two series leaf like flattened gill plates. The gill plates are arranged like the leaves of book. Ex- Prawn.

(iii) Trichobranchiate gills : →

It is composed of a central axis with filamentous branches are not arranged along the central axis in several series. Ex- Crayfish.

According to (A/c) Place of origin are attachment it is of three types. →

(a) Pleurobranch or side gill →

It is attached to the lateral wall of the segment

b) Arthrobranch or joint gills : →

It is attached to the articulating membrane between the appendages and the body wall.

c) Podobranch or foot gill : → It is attached to the coxa of an appendages.

(2) Mechanism respiration :

The scaphognathite of each Maxilla Produces current of water from anterior to Posterior in throg through of the body. This water current enters in the gill chamber in different ways. The gills are highly vascular. The water current always flows over the gill filaments where the gaseous exchange takes Place.

(B) Book-gills

In xiphosurans ~~specialis~~ specialised Plate like book-gills are present. Posterior to the genital operculum five pairs of gills operculum are Present. The under surface exopodite of each gill operculum bears a leaf like folds book-gills. Each gills contains about 150 delicate highly vascular leaf like lamellae. The movement of gill lamellae maintains the circulation of water arround the gills where gaseous exchange takes Place.

(2) Aerial Respiration :

In Arthropods aerial respiration take Place through

trachea, book-lungs and Integument.

1) Trachea :

It is present in almost all aerial Arthropods but well-developed in Insects. Each trachea open outside the body by a pore called spiracle. Generally ten pairs of spiracle are present in the insect Two pairs in thoracic segments and rest in abdominal segments. Each trachea is a simple, branched tube like structure. Internally it is lined by cuticle known tenidea. The smallest sub-branch of trachea are known as tracheoles. The tracheoles further divide into the branches and reach over the cells.

Types of trachea

Three types of tracheal system are present - Polypneustic, Holopneustic, Hemipneustic.

Mechanism of respiration :

In Insects the gaseous exchange takes place through diffusion or ventilation. The opening and closing of the trachea permites the variable

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amount of gas exchange. opening and closing of spiracles depends on the activity of the insects and Temperature. The ventilation take place due to the contraction and relaxation of the walls of the trachea. In many insects the rhythmic movement of the abdomen helps in ventilation.

(B) Book-lungs :

It is well developed in scorpionids. book-lungs are modified abdominal appendages. Each book lung is divided into two chamber. The ventral chamber is known as atrial chamber which opens to the exterior through and opening known as stigmata. The dorsal or Posterior chamber is known as Pulmonary chamber which receives the Pulmonary vein. The Pulmonary chamber contains 150 lamellae which are arranged in ~~vent~~ vertical folds. The lamellae are highly vascular and the Inter lamellar air-space is always filled with air.

The air enters into the atrial chamber through the stigma and then to the Inter lamellar air-space

where gaseous exchange takes Place. The movements of lamellae or the respiratory movements are regulated by the atrial muscles.

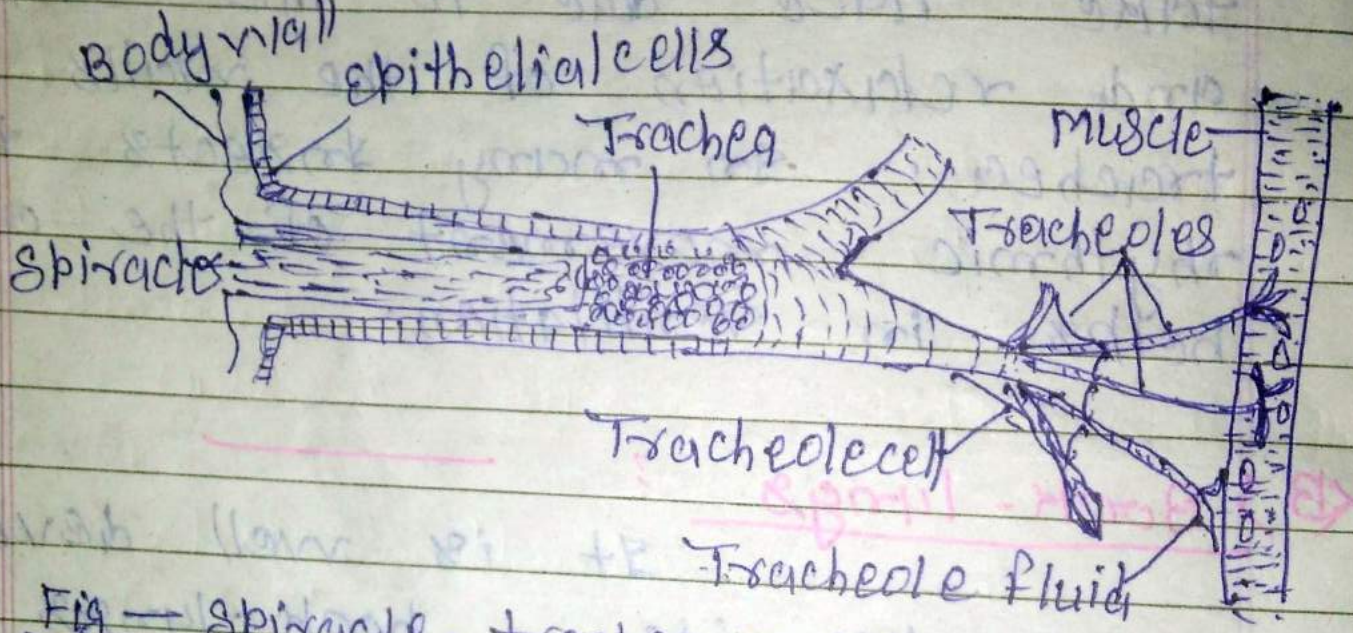

Fig — Spiracle, trachea and tracheoles.

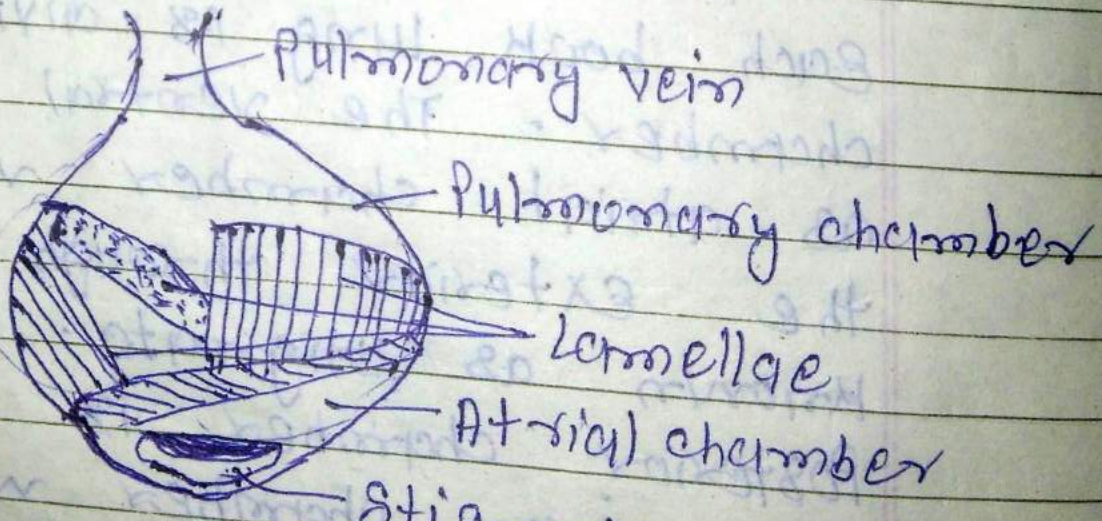

Fig — A book-lung.