

**College Name: Ramsaday College, Amta, Howrah**

**Content Type: pdf**

**Department: Zoology**

**Name of the Teacher: Dr. Paramita Basu Mukherjee**

**Caption: Respiratory System in Cockroach (SEM 2 Hons.)**

## Respiratory System in Cockroach

In cockroach respiratory system is well developed and is known as tracheal system. Tracheal system consists of :

- a) Stigmata or spiracles
- b) Air tubes or Trachea
- c) Tracheoles

### a) Stigmata or Spiracle

- Stigmata are segmentally arranged external openings, through which the air enter into the tracheal system.
- Cockroach possesses 10 pairs of spiracles among which 2 are thoracic spiracle and 8 are abdominal spiracles. The arrangement of stigmata in cockroach is holopneustic arrangement.
- The first thoracic spiracles are located at the mesothoracic segment, termed as Mesothoracic spiracle and are the largest spiracles. Prothoracic region is devoid of spiracles.
- First pair of Abdominal Spiracles are located dorso-laterally over the first abdominal tergum. The remainings are located on the successive lateral plates or pleurae of 2<sup>nd</sup> to 8<sup>th</sup> abdominal segments. 9<sup>th</sup> and 10<sup>th</sup> abdominal segments are devoid of any spiracles.
- Each spiracle is slit like aperture surrounded by annular sclerite called peritreme.
- The inner margin bears minute bristles or hairs to prevent the entry of dust particles into tracheal system.
- Each spiracle is guarded by specific valves and the valves are regulated by sphincter or spiracular muscle. Valves prevent the undue loss of water through the spiracle and also regulate the air flow.
- Stigmata leads internally into a short chamber called atrium and the atrium leads to tracheal trunk.

### b) Trachea

- Cockroach contains a network of silvery white (in color) closed respiratory tubes which are elastic in nature, called Tracheae. The trachea play a vital role in the transport of respiratory gases.

- Trachea are ectodermal in origin and its wall consists of three layers-
  1. The outer Basement membrane
  2. The middle Epithelium and
  3. The innermost Taenidia or Intima which is chitinous in nature, form ring like thickenings to prevent the trachea from collapsing.
- Tracheal system of a Cockroach consists of three pairs of large longitudinal tracheal trunks namely, lateral trunk, dorsal trunk and ventral trunk. They are connected by a number of commissures and branch of tracheae that are running in different directions.
- Tracheae are constantly dividing and re-dividing and the ultimate branches of trachea end in tracheole cell.

### **Tracheoles**

- The tracheoles are very fine tubules, originate from the tracheole cell, and terminate blindly in the tissue cell.
- Tracheoles have thin cuticle lining and are devoid of taenidia.
- The terminal parts of tracheoles are filled with tissue fluid called tracheolar fluid and the level of the tracheolar fluid varies with metabolic activity of the cockroach. When the insect is in resting condition, the respiratory activity is not so high, the tracheoles are completely filled up with the fluid and it is completely reabsorbed into the tissues when insect is active.