

General Entomology

Lecture (10)

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Lecture Topics

- **Respiratory System**
- **Respiration in aquatic insects**

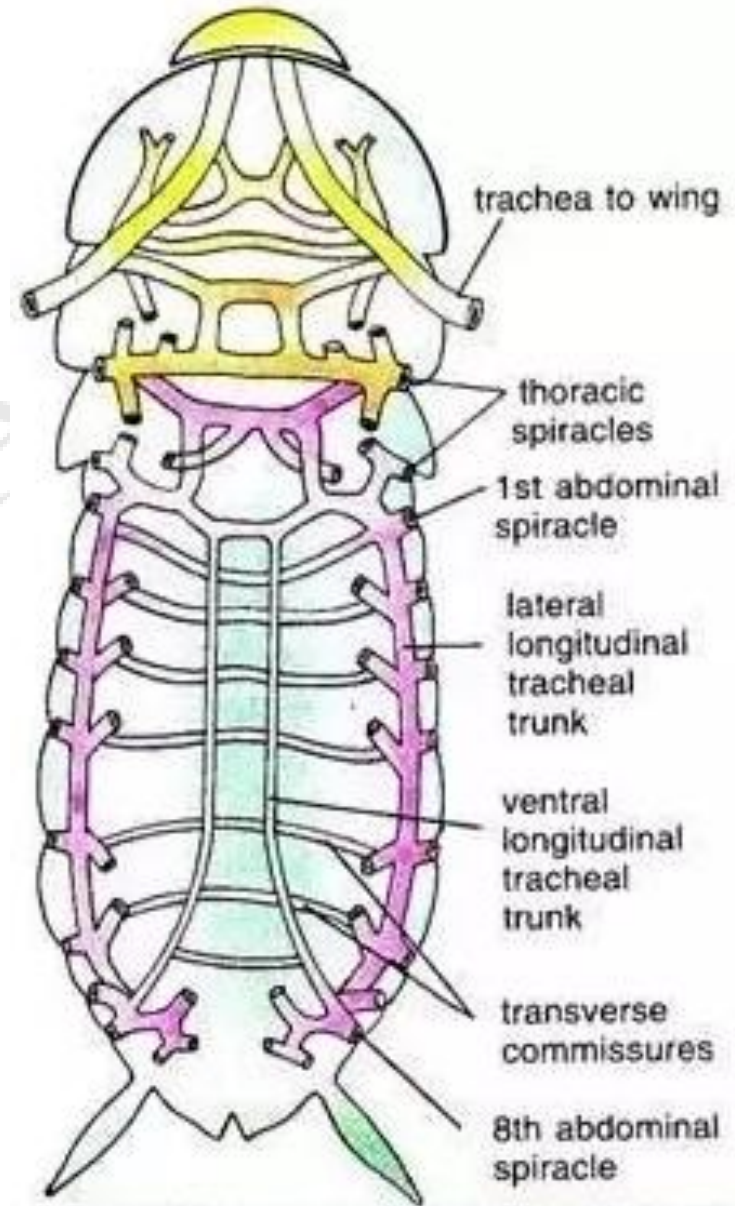


Respiratory System

- The respiratory system of insects (and many other arthropods) is separate from the circulatory system.
- All insects are aerobic organisms - they must obtain oxygen (O₂) from their environment in order to survive.
- The respiratory system is responsible for delivering sufficient oxygen to all cells of the body and for removing carbon dioxide (CO₂) that is produced as a waste product of cellular respiration.
- It is a complex network of tubes (called a tracheal system) that delivers air -containing oxygen- to every cell of the body.

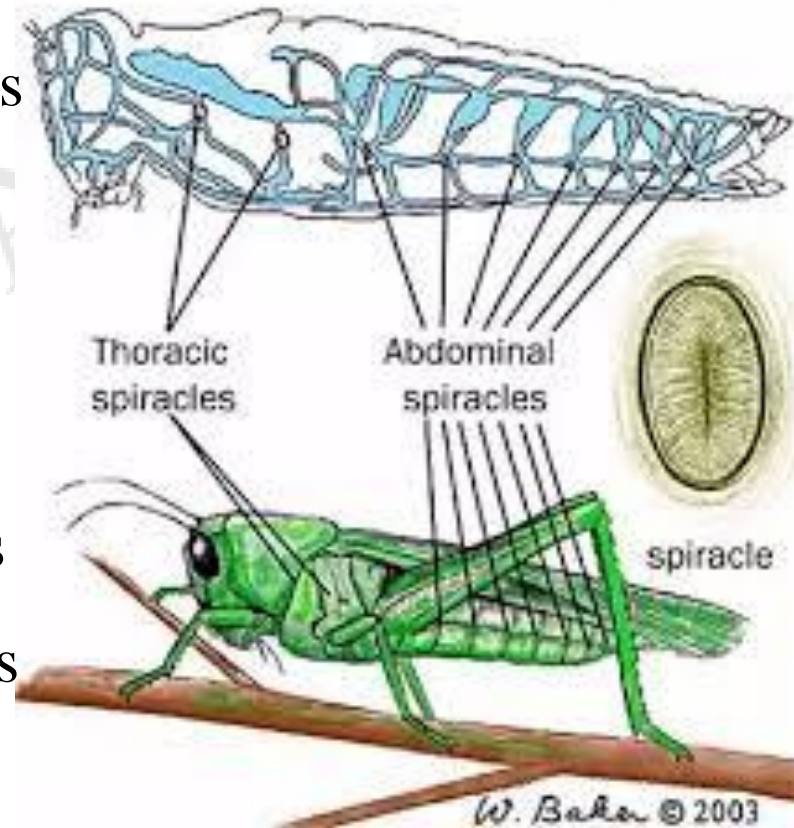
Respiratory System

- The cuticle lines the tracheae.
- There is a main pair of lateral tracheae running the length of the body, one on each side. Some insects show two such pairs, one dorsal, the other ventral.
- Air enters the insect's body through valve-like openings in the exoskeleton (called spiracles) .



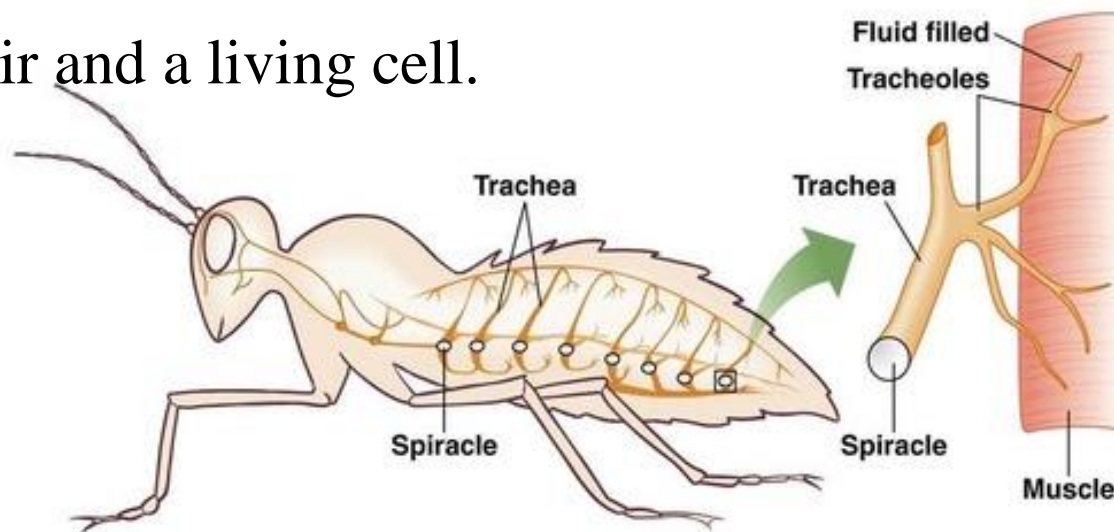
Respiratory System

- There is one pair of spiracles per segment in the thorax and abdomen.
- However, in most species the spiracles on the first segment of the thorax are missing. The pair on the ninth abdominal segment is also missing.
- Air flow is regulated by small muscles that operate one or two flap-like valves within each spiracle - contracting to close the spiracle, or relaxing to open it.



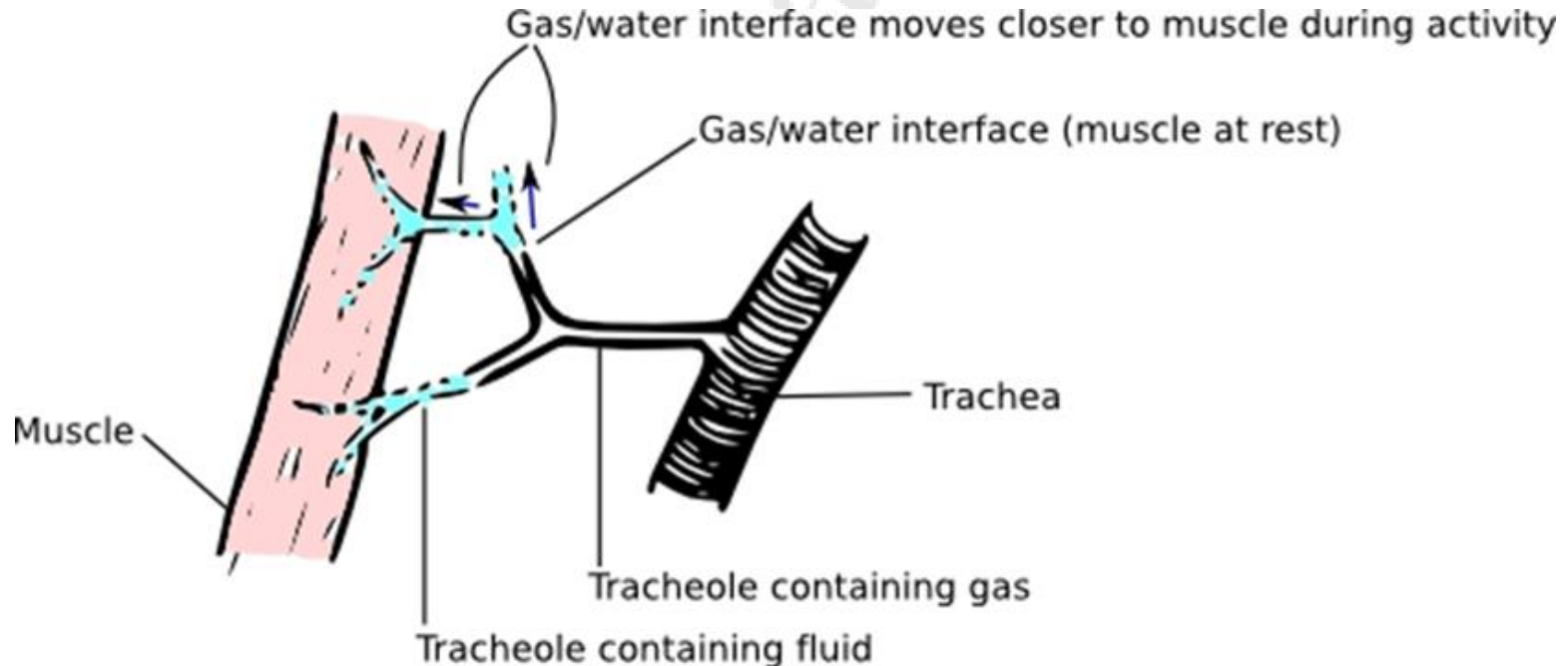
Respiratory System

- After passing through a spiracle, air enters a longitudinal tracheal trunk, eventually diffusing throughout a complex, branching network of tracheal tubes that subdivides into smaller and smaller diameters and reaches every part of the body.
- At the end of each tracheal branch, a special cell (the tracheole) provides a thin, moist interface for the exchange of gasses between atmospheric air and a living cell.



Respiratory System

- Oxygen in the tracheal tube first dissolves in the liquid of the tracheole and then diffuses into the cytoplasm of an adjacent cell. At the same time, carbon dioxide, produced as a waste product of cellular respiration, diffuses out of the cell and, eventually, out of the body through the tracheal system.



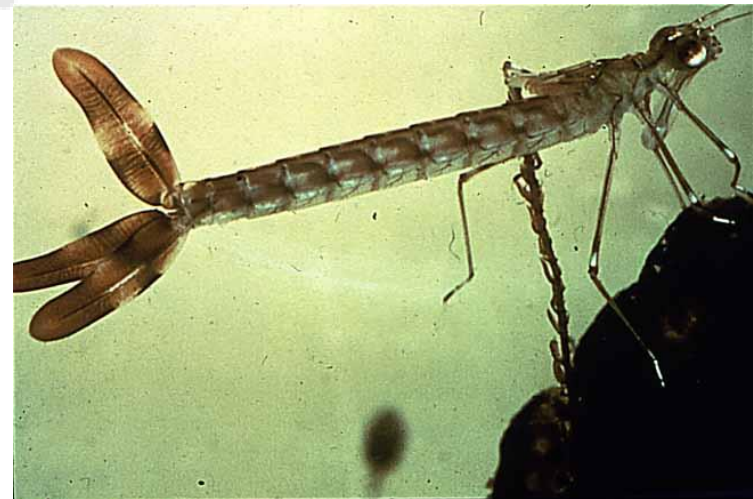
Respiratory System

➤ Respiration in Aquatic Insects

- Appendage permits liquefy oxygen from the water, Example:
Larvae of mayflies and damselflies
- Gills are situated on lateral or posterior sides of abdomen, leaf like in appearance.



Mayflies larvae



Damselflies larvae

Respiratory System

- Some aquatic insects take oxygen directly from surface by hollow tube (Siphon tube) e.g., larva of mosquito.
- Few aquatic insects have bubble of air with them.
- In diving beetles it is prominent and cover one or more spiracle to give short-term supply of oxygen.



Usfel websites

<http://www.rnlkwc.ac.in/pdf/study-material/zoology/Respiratory.pdf>

<https://www.amentsoc.org/insects/fact-files/respiration.html>

<https://genent.cals.ncsu.edu/bug-bytes/respiratory-system/>

**Thanks for
listening**

