

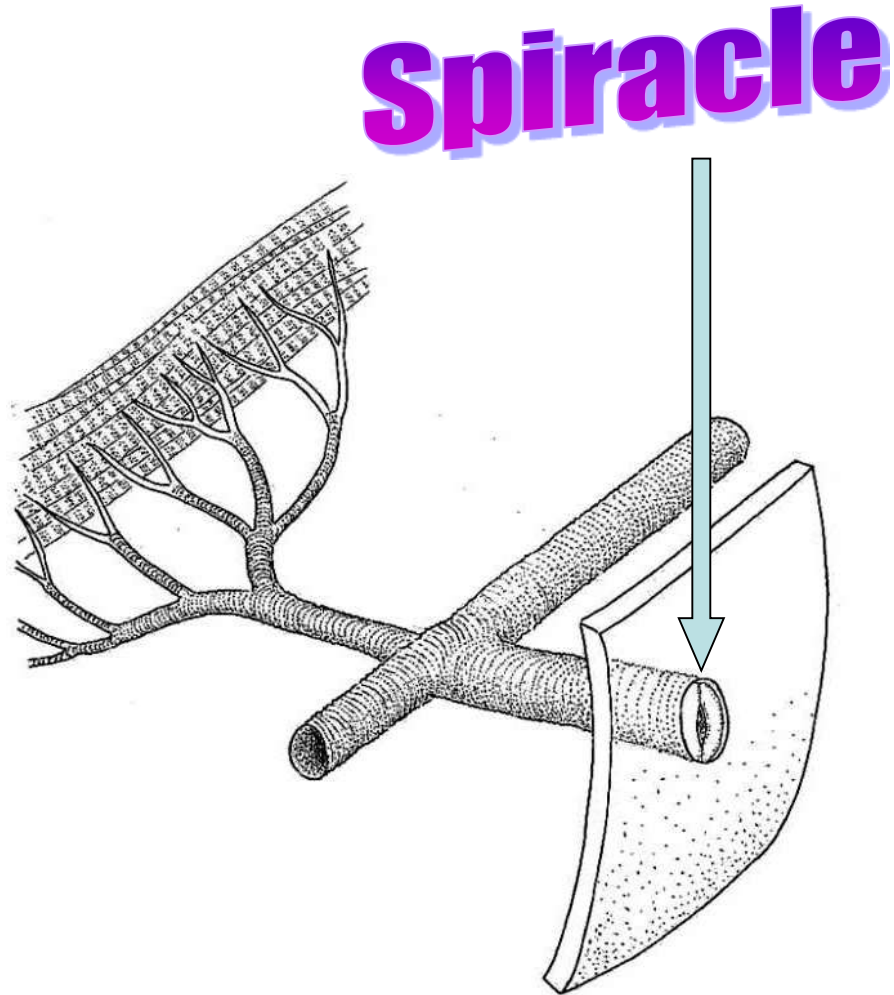
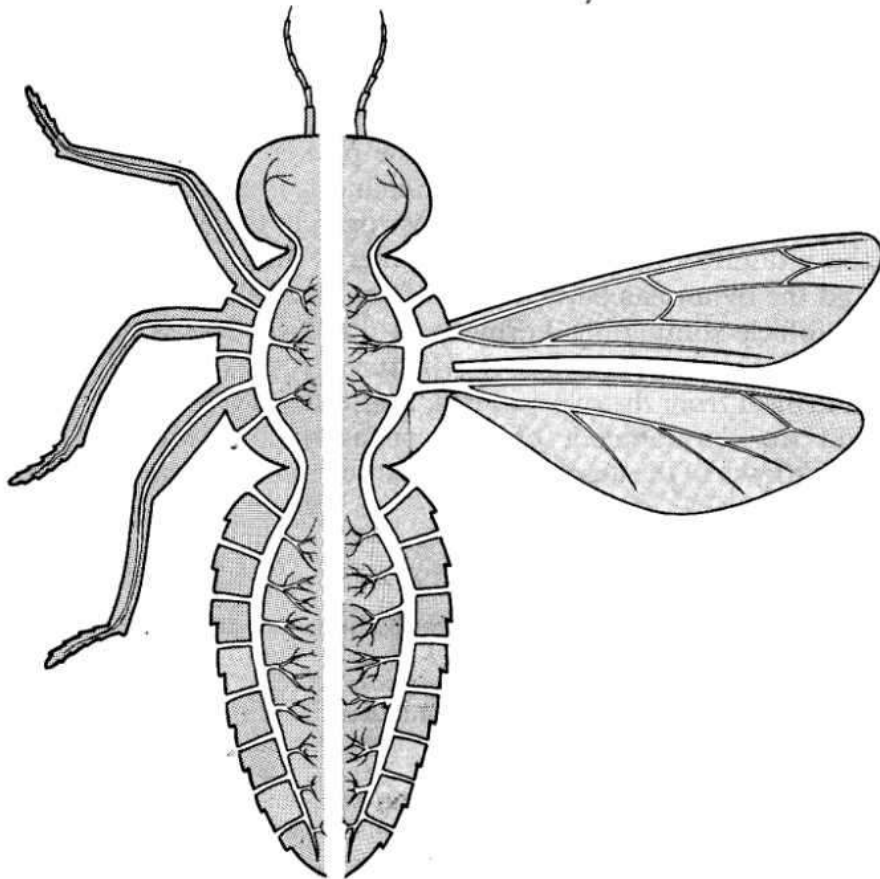
# INSECT TRACHEAL SYSTEM

Level 2 Bio

# INSECT TRACHEAL SYSTEM

- This is completely different to humans
- The insect's gas exchange system is completely separate from their blood system.

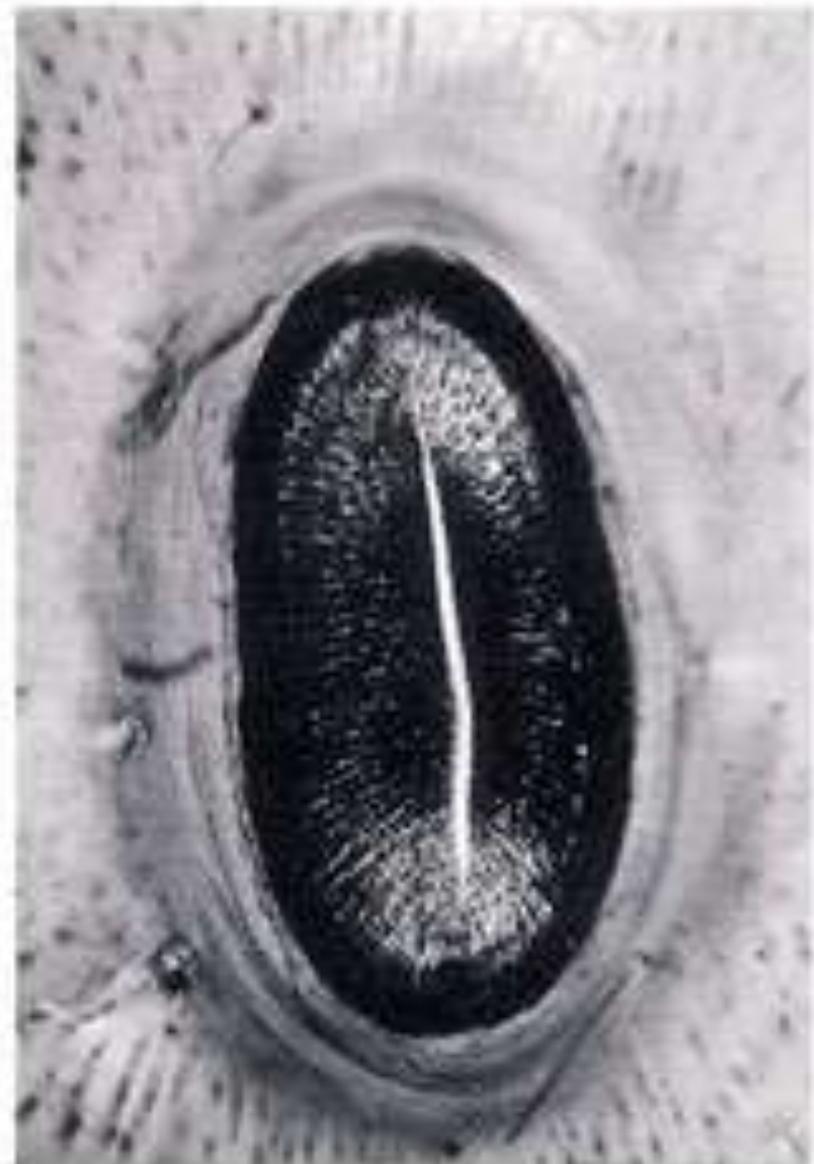
- Air tubules (trachea & tracheoles) throughout the body which open to the environment via ***spiracles***





**A**

10 μm

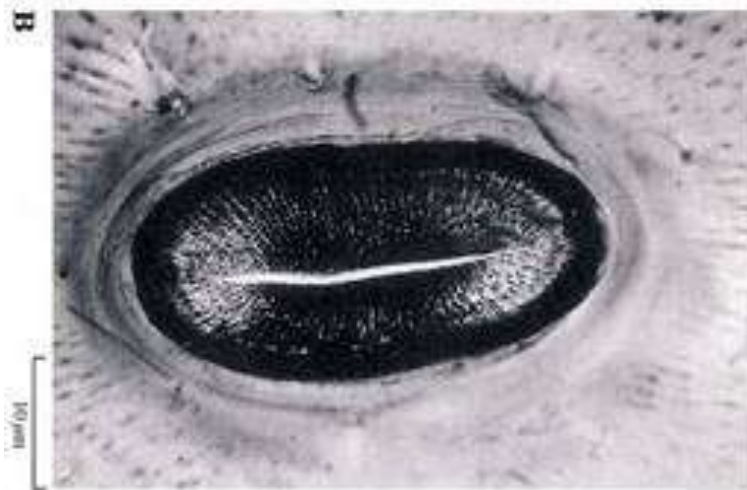
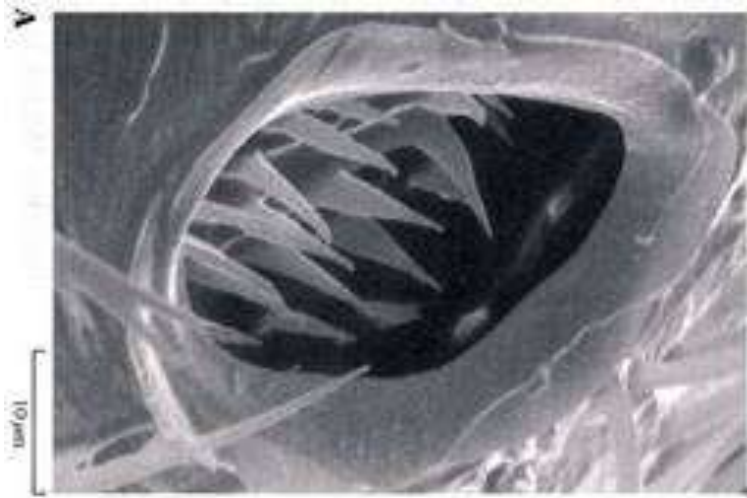


**B**

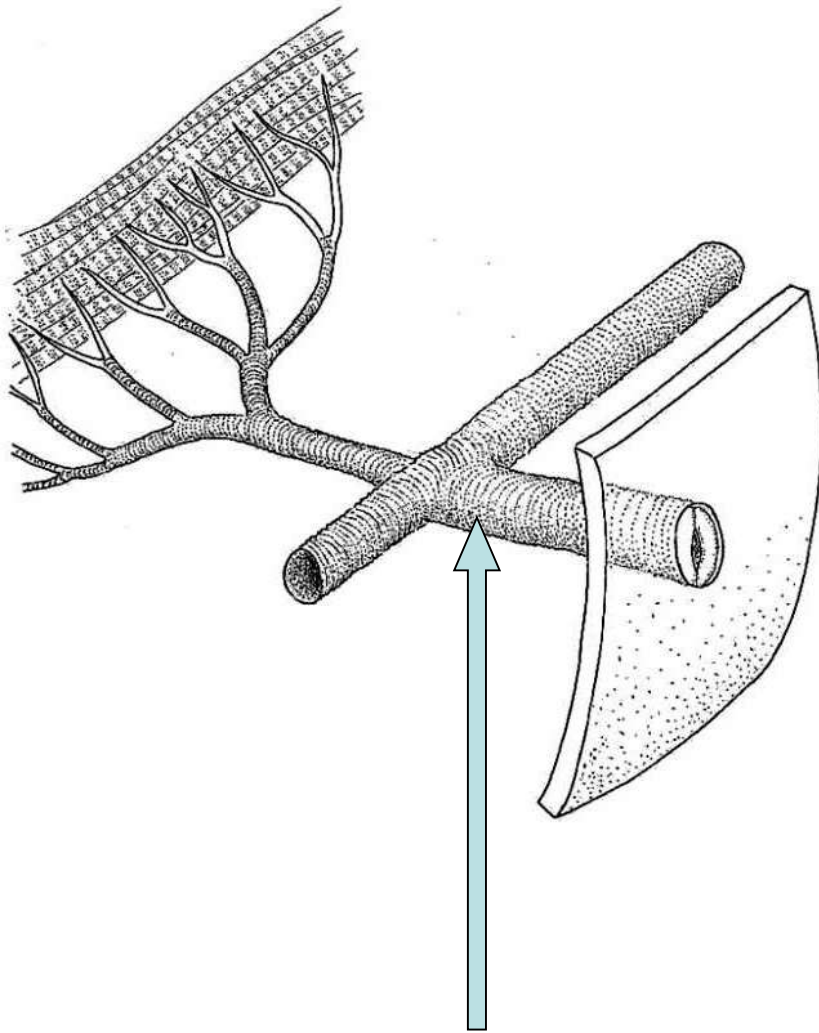
10 μm

# SPIRACLE

- Air is taken in through the spiracles during inspiration and expelled through expiration.
- Each spiracle is protected by hairs and two lip-like structures that can be closed to reduce water loss, allowing insects to live in dry areas.
- A rise in carbon dioxide causes the spiracles to open.

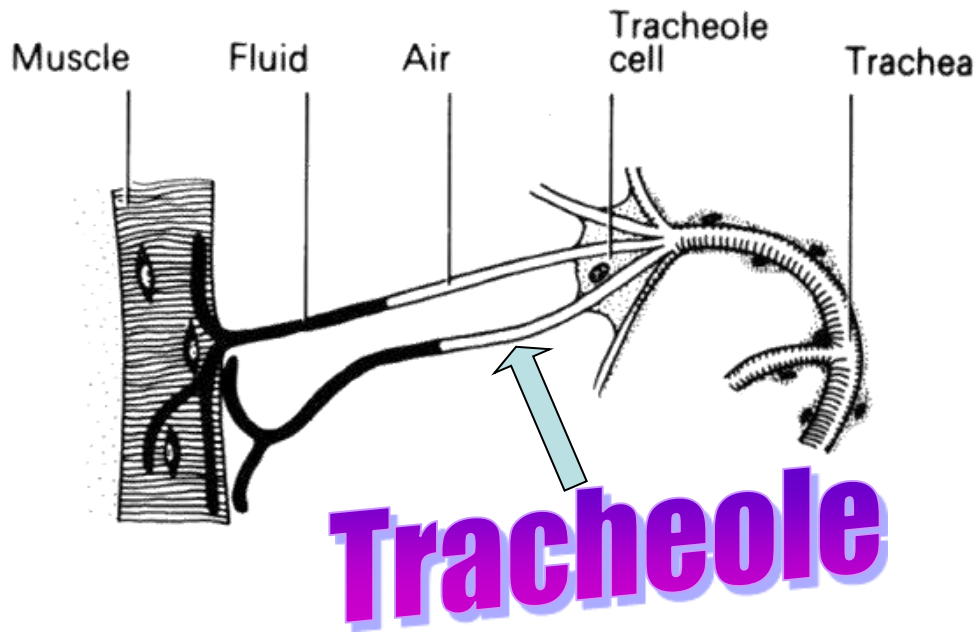


# TRACHEA



**Trachea**

- Air then passes into tubes called trachea.
- Each trachea is prevented from collapse by a spiral of chitin



# TRACHEOLES

- Each trachea ends in microscopic tubes called **tracheoles**.
- Tracheoles lie within individual cells and sit in a pool of fluid which allows rapid diffusion of oxygen and carbon dioxide in and out of the cells.



# N.B.

- In insects oxygen is delivered ***directly to the cells*** (i.e. the site of respiration).
- Insect blood does not carry oxygen





- In larger insects, muscular movement of the abdomen and air sacs assist air movement.
- This system will not function well in animals whose body size is greater than 5cm.
- Insects can regulate their gas exchange according to their metabolic rate.
- If an insect is resting and the metabolic rate is low, the spiracles close.
- When the insect has a high metabolic requirement, such as in flying, spiracles are open to allow efficient gas exchange between the tracheoles and cells.