

2/15 Biology Notes

Respiration:

What do you need for gas exchange at the cellular level?

- Wet cell membrane
 - the gases must be in a liquid solution
- Sufficient surface area
 - exchange is by diffusion
- Thin membrane
 - only a few cell layers thick

Do small aquatic organisms need special structures?

- No (surface area/volume ratio great)

Do large aquatic organisms need special structures?

- Yes (surface area/volume ratio problem)

Do small terrestrial organisms need special structures?

- depends on the environments around them (so yes and no)

Do large terrestrial organisms need special structures?

- Yes (fighting ratio and water loss problem)

What adaptations have organisms developed to deal with these problems?

- Terrestrial plants:
 - Waxy substance on leaves prevents water loss and all gas exchange
 - so have small holes (openings [Stomata]) on leaves with guard cells to allow gas exchange
 - A leaf is not solid, spongy mesophyll
 - Exchange surface is internal
 - Fig 43.6 , 43.22
- Large Aquatic organisms:
 - Large thin respiratory surface, gills
 - Integration with circulatory system
 - Respiratory pigments (hemoglobin) in blood
 - Fig E33-2
- Large and small Terrestrial organisms:
 - Internal respiratory surface
 - Integration with circulatory system
 - Respiratory Pigments (hemoglobin) in blood

Animals have ___ openings to their respiratory system?

- 1 opening

Insects have ___ openings to their respiratory system?

- many

- Lungs (small amount, mainly one opening, close to circulatory system) vs. Spiracles (many different openings, not close to circulatory system)

Steps in Human Respiration: (not a determined starting place, all work together)

- A. Diffusion of oxygen out of the capillaries (4)
- B. Diffusion of carbon dioxide out of the capillaries (2)(6)
- C. Diffusion of oxygen into the capillaries (2)(6)
- D. Inhalation of air (1)
- E. Diffusion of carbon dioxide into the capillaries (4)
- F. Transport of blood from the lungs (3)
- G. Transport of blood to the lungs (5)
- H. Exhalation of air (7)