

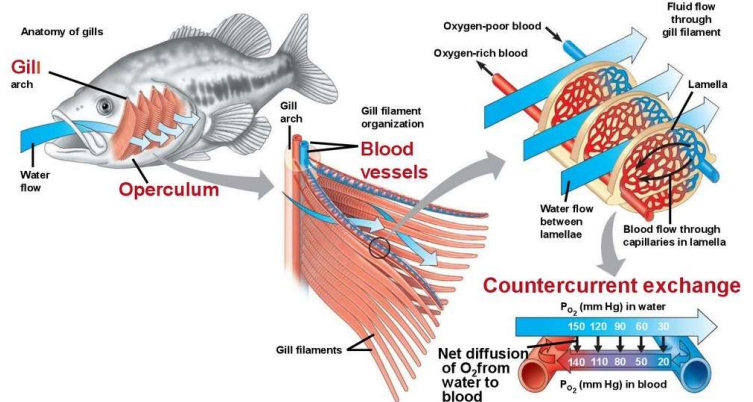
## VENTILATION IN FISH AND INSECTS:

**Lower concentration** of oxygen in water than in air so fish are adapted to get enough of it.

Counter-current system for gas exchange:

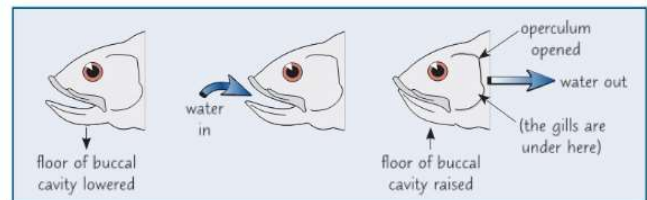
### Structure and function of fish gills

- **Gill arch and filaments** create a **large SA:V ratio**- each filament has a large number of Lamellae.
- All **surfaces** are constantly **moist**.
- **Highly vascularised**- good blood supply
- **Short diffusion** path between water and blood- epithelium is one cell thick
- Blood and water **flow in opposite directions** to keep diffusion gradient (**counter current**)



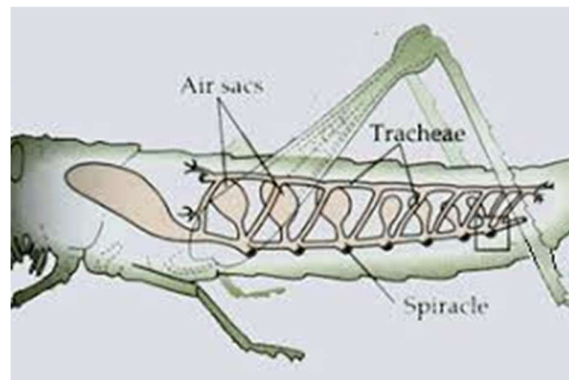
Ventilation for fish gills:

- **↓ pressure in cavity** when buccal cavity floor lowers
- Water is **sucked into** cavity
- When **buccal cavity floor is raised**, cavity **volume ↓** so **pressure ↑** increases.
- Water is **forced out** over gills
- **↑ in pressure** forces **operculum open** to let water out.



Insects use Tracheae to exchange gases:

- Tracheae are **microscopic air-filled pipes**
- **Air moves into them** through pores called **spiracles**.
- **Oxygen moves ↓ conc gradient** towards cells.
- Trachea have **smaller branches** called **tracheoles** that **go to individual cells**.



Features:

- **Very high SA:V ratio**
- Trachea have **short diffusion path**
- **Maintain diffusion gradient:** blood allows diffusion gradient throughout body cavity. Well ventilated by insect movement
- **Tracheoles** (smaller branches) contain/secrete a **liquid to help dissolve gases easily**.