

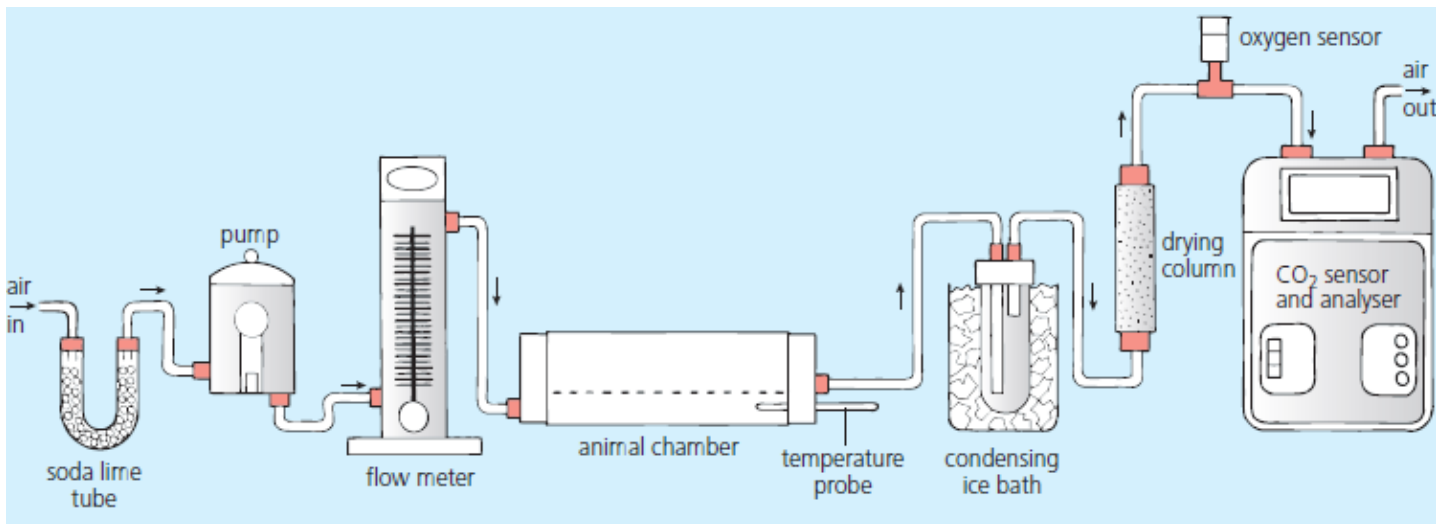
Unit 2 Metabolism & Survival

Key Area 3 : Metabolic Rate

Metabolic rate can be measured either by measuring the rate of:

- **Oxygen Consumption**
- **Carbon Dioxide Production**
- **Heat Production**

This involves the use of **respirometers, oxygen probes, carbon dioxide probes & calorimeters.**



Organisms with High Metabolic Rates

Organisms with high metabolic rates require more efficient delivery of oxygen to cells.

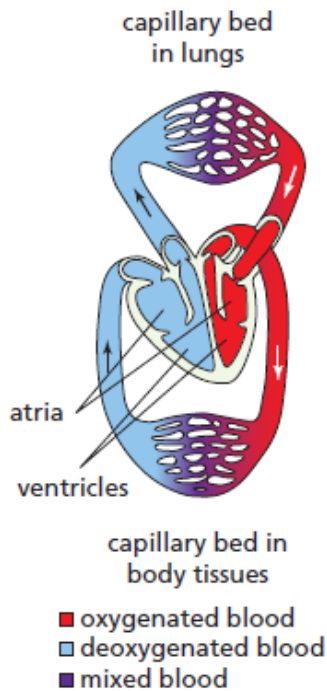
Birds and Mammals have **higher metabolic rates** than **Reptiles and Amphibians**, which in turn have higher metabolic rates than **Fish**.

(Birds & Mammals > Reptiles & Amphibians > Fish)

Circulatory Systems

Birds & Mammals

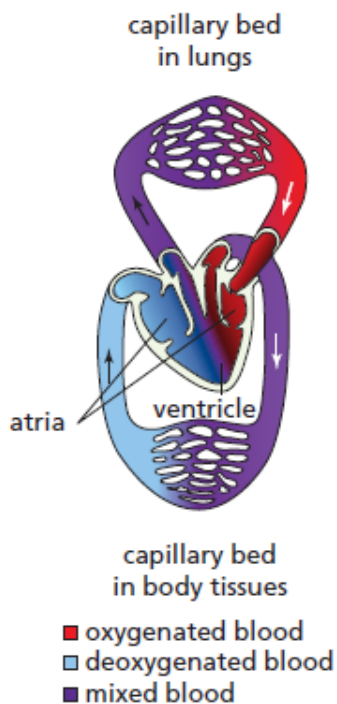
Birds & Mammals have a **Complete Double** circulatory system consisting of **2 Atria & 2 Ventricles**.



Complete Double circulatory systems enable **higher metabolic rates** to be maintained. There is **no mixing of oxygenated & deoxygenated blood** and the oxygenated blood can be pumped out at a **higher pressure**. This enables more **efficient Oxygen delivery to cells**.

Amphibians & Reptiles

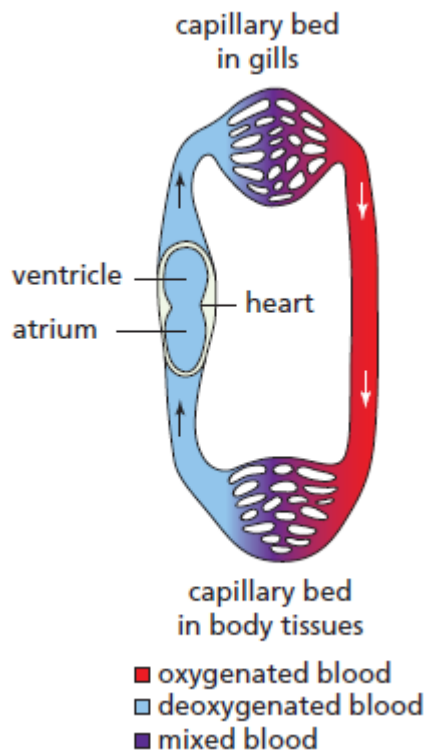
Amphibians & most reptiles have an **Incomplete Double** circulatory system consisting of **2 Atria & 1 Ventricle**.



Incomplete Double circulatory systems are less efficient in the delivery of oxygen to cells since there is **mixing of oxygenated and deoxygenated blood** in the single ventricle present.

Fish

Fish have a **single circulatory system** consisting of **1 Atrium & 1 Ventricle**. It is called a single circulatory system because the blood only passes through the heart **ONCE** in each complete circuit around the body.



As blood passes through a capillary bed (e.g. at the gills), there is drop in blood pressure. This means that blood is delivered to the capillary bed in the body tissues at **LOW PRESSURE**.