

# IGCSE Biology Notes

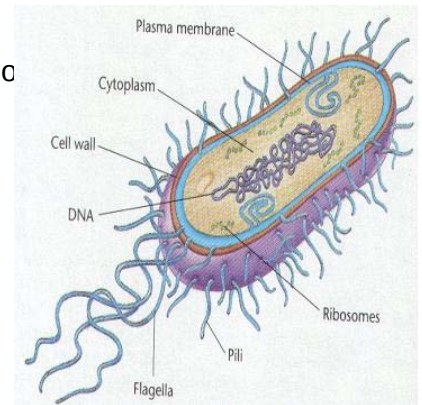
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Page 1 of 50

Refined by KmQ

**Unit 1 : *Characteristics of living things***

- No chloroplast in most of them
- They are either saprophytes or parasites
- cell wall (not made of cellulose)

Bacteria reproduce asexually by binary fission every 20 min's (if conditions are not well some species can form spores for survival).

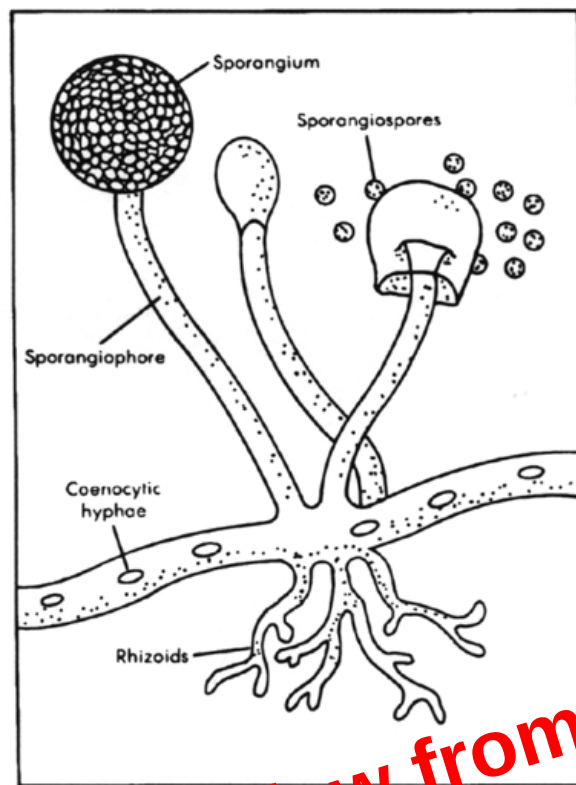


Preview from Notesale.co.uk  
Page 4 of 50

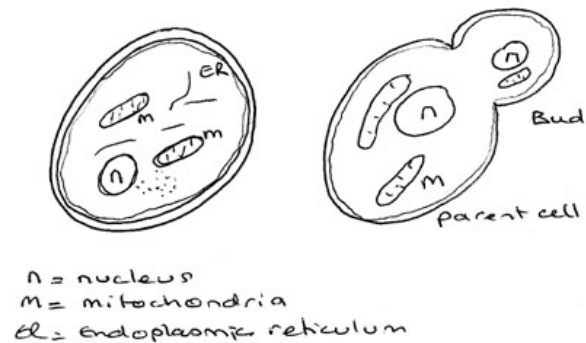
## Fungi

- Mostly multicellular (many cells) (yeast is an exception)
- Cell wall made of chitin
- IT has cytoplasm & it may be a saprophyte or a parasite

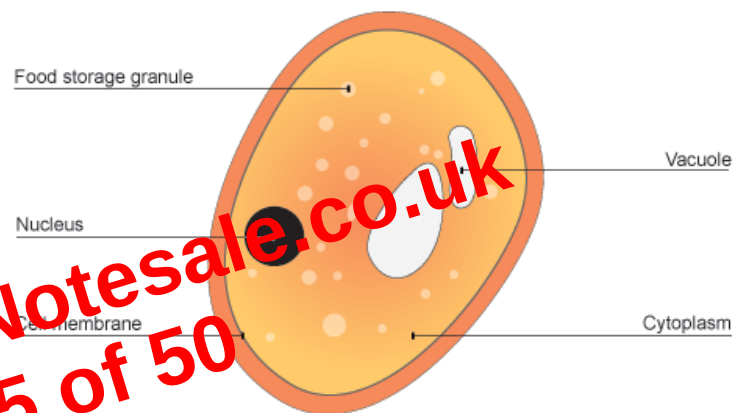
- It reproduces asexually by spore formation or by budding (in yeast) but in bad conditions it reproduces sexually for survival



Structure of a mould fungus



Yeast budding



Single fungi cell

Budding is when a yeast cell splits into two cells and it keeps happening over and over again numbers can get up to millions in just a day.

A mushroom is an example of a parasitic fungus.

## Plants

## Unit 4 : *Diffusion, active transport and osmosis*

All the chemicals reacting in the cells need to get in and out either by a **Passive process**: This doesn't need energy e.g. osmosis and diffusion or an **active process**: one that requires energy e.g. *active transport*.

### 1. Diffusion:

It is the movement of a molecule from a region of high concentration to a region of low concentration down the concentration gradient which is the difference in concentration of the substance, the greater the difference the higher the rate of diffusion.

The rate of diffusion depends on :

- Concentration gradient
- Temperature
- Size of molecule
- Surface area
- Permeability of membrane

### 2. Osmosis:

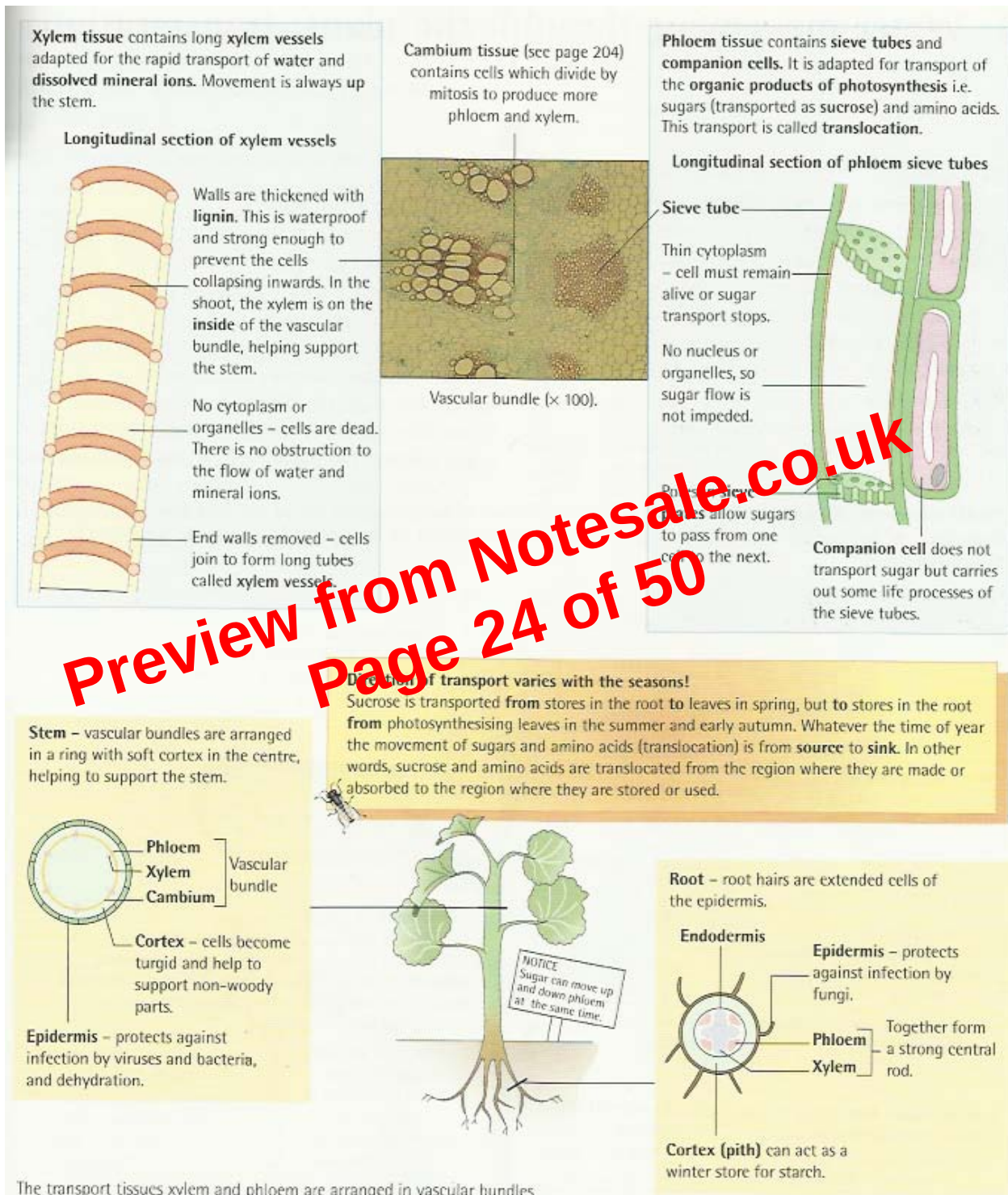
It is the movement of water from a region of high concentration (a dilute solution) to a region of low concentration (a concentrated solution) down the concentration gradient through a semi permeable membrane. A hypertonic solution has higher concentration of salt; a hypotonic solution has a higher concentration of water and an isotonic solution has an equal concentration of water and salt.

### 3. Active transport:

It is the uptake of substances from a region of low concentration to a region of high concentration, against the concentration gradient requiring protein carriers.

| <i>Diffusion</i>                                | <i>Osmosis</i>                                                     | <i>Active transport</i>                                       |
|-------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------|
| Not selective                                   | Not selective                                                      | Selective, cells absorb what they need                        |
| Substances move down a concentration gradient   | Water move down concentration gradients                            | Substances move against concentration gradient.               |
| Do not need energy                              | Doesn't need energy                                                | Needs energy                                                  |
| A partially permeable membrane is not necessary | A partially permeable membrane is necessary (living or non living) | A partially permeable membrane is essential (must be living). |

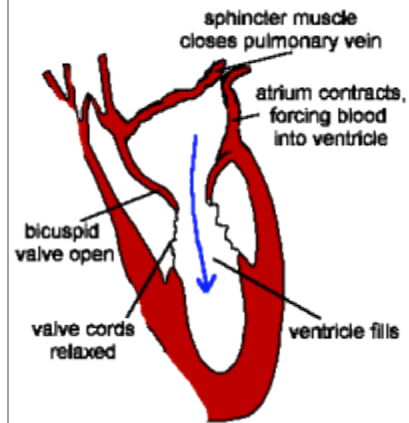
The xylem vessels themselves are very thin tubes, like capillary tubes. They have very hard and waterproof walls. The cells which made the xylem vessels died to produce a continuous column or tube.



### ATRIAL

- 1) The atria contract, forcing blood into the ventricles, which fill.
- 2) Sphincter (ring) muscles closing off the venae cavae and the pulmonary veins prevents backflow from the atria into the main veins.

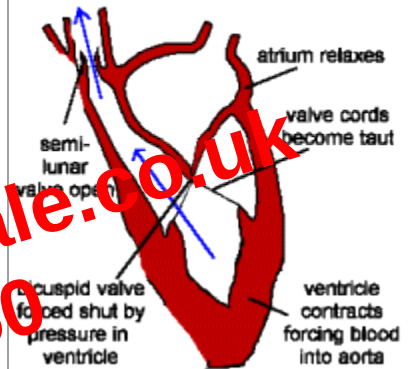
### SYSTOLE



### VENTRICULAR

- 1) The ventricles contract, forcing blood into the aorta & pulmonary artery.
- 2) The main heart valves (tricuspid & bicuspid) are forced shut, so preventing backflow into the atria. This happens because the pressure of blood in the ventricles is higher than the pressure in the atria. The valve cords prevent the valve being pushed back too far.
- 3) The walls of the aorta & pulmonary artery expand.

### SYSTOLE



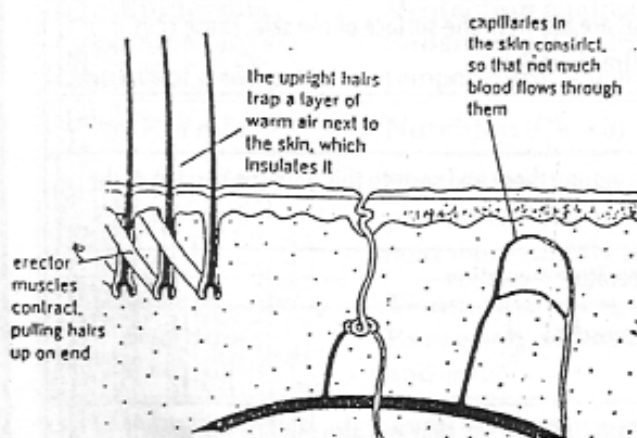
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Page 29 of 50

| Phase               | Atria       | Ventricles  | Cuspid valves | Semi-lunar valves |
|---------------------|-------------|-------------|---------------|-------------------|
| Diastole            | Relaxed     | Relaxed     | Closed        | Closed            |
| Atrial systole      | Contracting | Relaxed     | Open          | Closed            |
| Ventricular systole | Relaxed     | Contracting | Closed        | Open              |

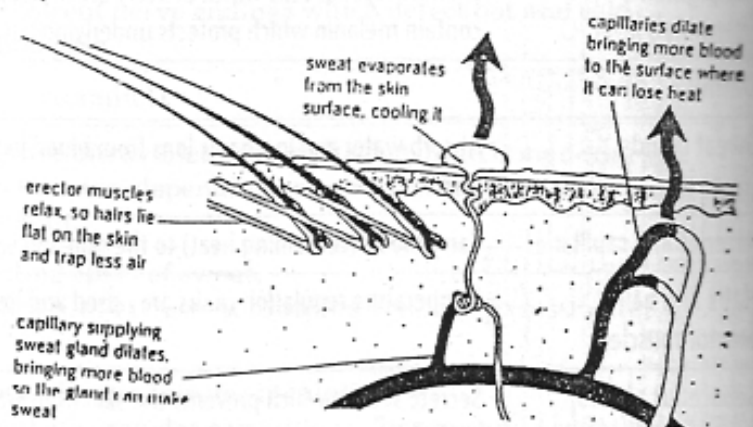
The heart rate can be measured by measuring the heart pace. There are muscles in the wall of the heart that receive hormones from the brain telling it to speed up or slow down e.g. adrenaline.

The vessel supplying the heart with blood is called the coronary artery. This is one of the most important arteries in the body because it supplies the heart with all the nutrients it needs. If this artery is blocked then the heart will slow down then stop causing a heart attack. This is how coronary heart diseases (CHD) happen by the buildup of fats on the inside of the vessel. The more fats build up the slower the heart is and the more the heart gets tired and the person is unhealthy.

|                                                            | On a cold day                                                                                                                         | On a warm day                                                                                                                                                        |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-Detection by skin receptor and hypothalamus in the brain | Messages are immediately sent out in nerves to switch on the warming mechanism.                                                       | Messages are immediately sent out in nerves to switch on the cooling mechanism.                                                                                      |
| 2- Blood vessels (arterioles)                              | Vasoconstriction – arterioles become narrower so that less blood flows through the capillaries                                        | Vasodilation – arterioles dilate so that more blood flows through the capillaries close to the skin surface, more heat lost from the skin                            |
| 3- Hairs                                                   | Hair erector muscles <b>contract</b> causing hairs to stand on. Thick trapped layer of air between the hairs. "thick insulator layer" | Hair erector muscles <b>relax</b> causing hairs to become flat. The layer of air trapped is very thin. Heat is easily lost from the body by radiation and convection |
| 4- sweat glands                                            | Less active so that latent heat is not lost from the body                                                                             | Very active more water is brought to the sweat glands during vasodilation, thus more sweat is secreted and more latent heat is lost when sweat evaporates            |
| 5- Metabolic rate                                          | Increases<br>More heat is produced.<br>Shivering due to involuntary contraction of the muscles                                        | Decreases<br>Less heat produced                                                                                                                                      |

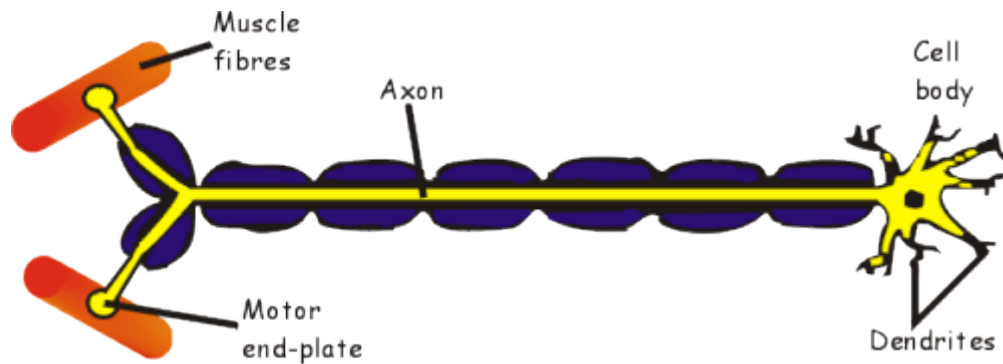


When the body is too cold



When the body is too hot

### Motor neuron



These neurons carry impulses away from the CNS towards effector organs like muscles or glands. These cells have very long axons at the end of which are motor end plates where the nerve cell can stimulate the effector organ.

### The reflex arc

A reflex action is usually quick passive action it is usually for protection. The spinal reflex does not need to pass through the brain but pass through a relay neuron. So a stimulus happens and a receptor (the sensory organ) passes the impulse to the sensory neuron and then to the relay neuron and then to the motor neuron.

