used in photosynthesis. At night when the rate of photosynthesis eases there will be an excess of carbon dioxide produced. Therefore, plants must have a way to gain carbon dioxide and release oxygen in the day, and release carbon dioxide and gain oxygen at nights.
Plants do this by way of diffusion through pores in the leaves call the stomata.

Animals

Animals exchange gases through diffusion across membranes as well however, in most cases such as mammals, the mechanism is a lot more complex and involves the circulatory system. Less complex animals such as earthworms can survive with diffusion across the skin into their tiny blood vessels. In more complex animals such as warm blooded mammals a constant supply of oxygen is needed to keep up with the large demand. This is accomplished by breathing. During the process of breathing carbon dioxide diffuses out and is exhaled; while inhaled air that is rich in oxygen diffuses across the moist cells of the **alveoli**.

Mechanism Of Breathing

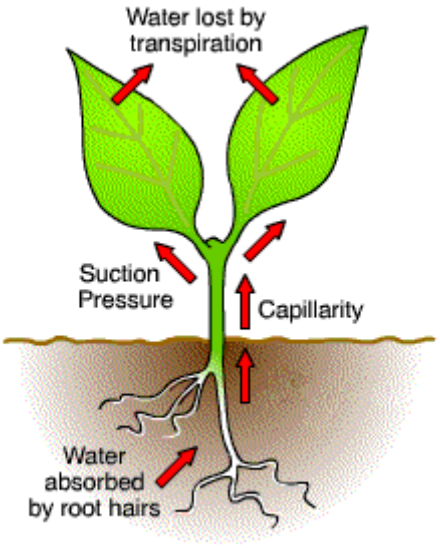
Inhaling

The contraction of the external intercostal muscles of the rib cage causes it to move upwards. The muscles of the diaphragm then contract so that it flattens from its original domed shape. These muscle contractions result in an increased space in the lungs and a reduction in pressure of the thoracic cavity. Inhalation then occurs because the pressure in the thoracic cavity is less than the atmospheric pressure, resulting in air rushing into the lungs.

Exhalation

This is the opposite of inhaling and occurs by the relaxing of the external intercostal muscles and the relaxing of the diaphragm into a domed shape. As a result, there is less space in the lungs and an increase in pressure of the thoracic cavity. Exhalation occurs because there is more pressure in the thoracic cavity than the atmosphere, resulting in air rushing into the lungs.

Introduction To Transport In Plants



Factors Affecting Transpiration

Light intensity

Light intensity stimulates stomata opening. This is because an increase in light intensity results in an increase of rate of photosynthesis. Photosynthesis requires gaseous exchange and the stomata is therefore in which gaseous exchange takes place. *Therefore an increase in photosynthesis results in an increase in stomata opening (increased gaseous exchange).*

Evaporation of water from the plant occurs primarily through the stomata, so as you can understand, an increase in light intensity results in an increase in transpiration due to an increase stomata opening.

has to be regulated. Plant cells are protected from bursting by their cell walls. Animals do not have cell walls, and will burst if they have too much water. Excess water is lost from the surface of gaseous exchange in both plants and animals. In mammals, water is also lost through sweat and through osmo-regulation controlled by the kidneys.

Urea

This is a compound produced in mammals from the breakdown of excess amino acids. Amino acids cannot be stored because their accumulation is toxic. They are therefore converted into a less toxic substance. This process occurs in the liver and is called de-aminiation.
De-amination results in the amino acid being broken down into 2 parts. One is a carbohydrate or fat where it is used for respiration or stored for later energy use. The other part of the broken amino acid contains ammonia and is highly toxic. Ammonia is converted to urea by the liver. Urea is transported by blood to the kidneys where they are excreted.
The kidneys are also used to remove uric acid, water, excess salts, excess hormones and bile pigments.

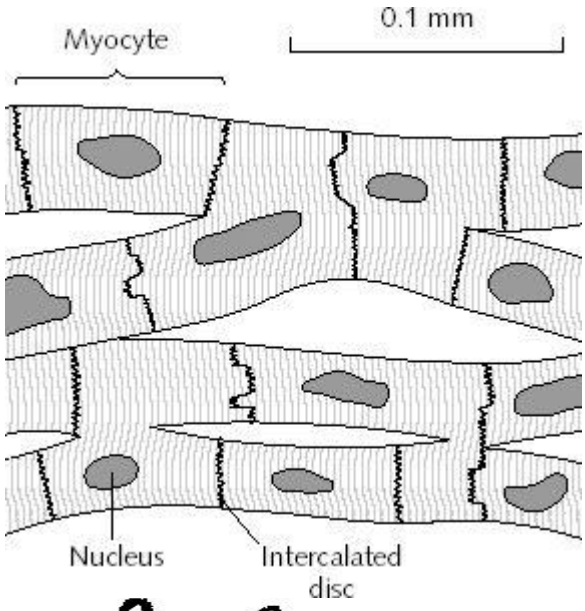
Calcium oxalate

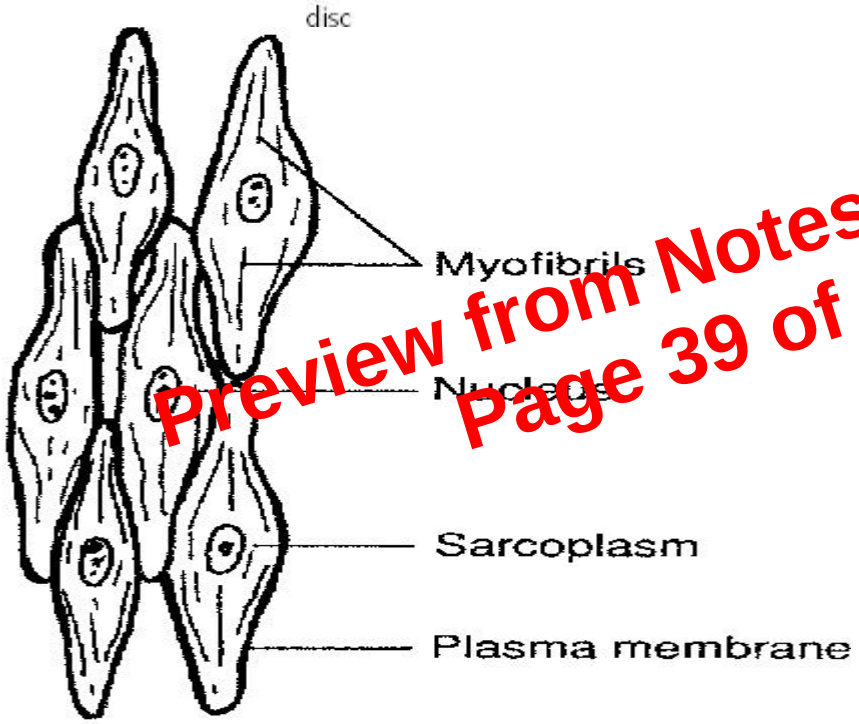
This is a waste material produced by plants and is stored as an insoluble crystalline structure in the cells. Calcium oxalate is stored in aging leaves, stems and roots, flowers or fruits.

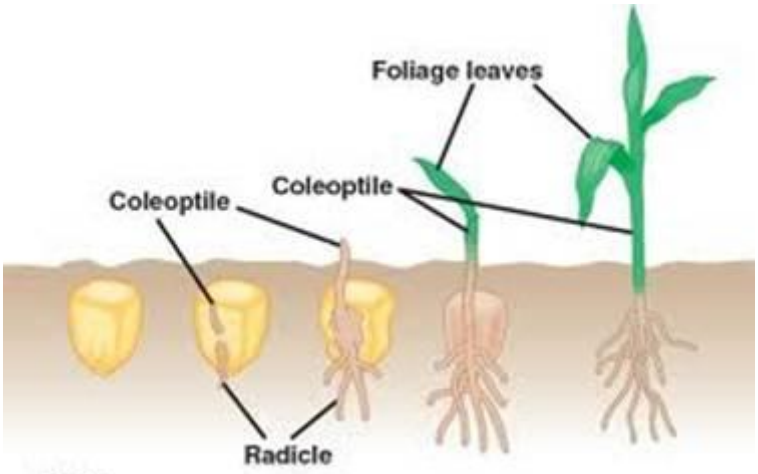
Oxygen

Through the process of photosynthesis, oxygen is produced as a by-product. Some of the oxygen is used for respiration, and the remainder is excreted through the stomata of the leaves.

In plants, some waste substances are stored in parts of the plant that are dead. Examples of this are the tannin in the bark of trees such as mangroves and the dyes in the heartwood of







The diagram above shows the germination of monocotyledon seeds. Notice that the germination is **epigeal** as the cotyledon does not stay below the surface of the soil. Also the shoot does not grow bent but straight up as it is protected by a special sheath - **coleoptile**.

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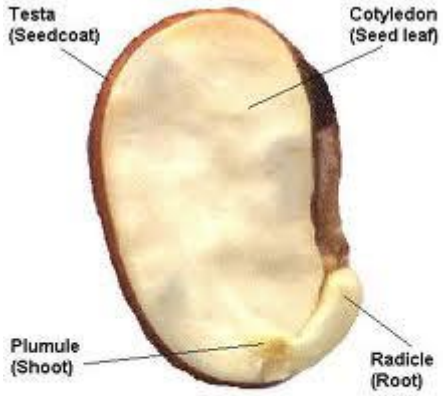
Seed Structure

Flowering plants may be monocotyledon or dicotyledon in nature. This will influence their seed structure and also the way the seed germinates. Monocotyledons have one cotyledon as the name suggests while dicotyledons have 2.

The structure of these two types of seeds may be seen before.



Structure of a red pea seed (monocotyledon)

helps in ensuring that too many of the same plants are not in the same place. If too many plants of the same type are too close together, there will be too much competition for essential substances needed by the plants.

Fruits and seeds may also be dispersed by wind and wate

Introduction To The Human Transport System

For simple unicellular organisms only the cell membrane separates the cell from its surroundings. This means that only diffusion is needed to access the materials they require to support life.

When living organisms get more complex, simple diffusion is no longer sufficient and more elaborate ways of transporting oxygen and material is needed. It is because of this why plants and animals have developed transport systems. In plants, the transport systems are known as the phloem and xylem (vascular system). In humans and other animals, the transport system is made up of blood, blood vessels and a muscular pump (the heart).

Types of materials transported in humans

-Hormones are transported to their target from the glands they are produced

-Oxygen and other nutrients

-Carbon dioxide- waste from respiration

-Nitrogenous waste (urea and uric acids) from the breakdown of protein

The waste products (carbon dioxide and nitrogenous waste) are transported to organs which will remove them from the body. If they are allowed to build up, they are potentially toxic. Materials taken in excess are also expelled from the body.

Blood

Blood is a rich red liquid that is transported through the body. The average human has about 5 litres of blood in his/her body. Blood can be considered to be made of 2 parts, plasma and blood cells (red and white blood cells). This may not be noticeable on the first analysis, however after spinning a capsule of blood in a centrifuge, the blood cells and platelets settle at the bottom and a straw-coloured clear liquid is left on top. The straw coloured liquid is called plasma.

Red blood cells are made very quickly as they do not live for very long (approximately 4 months). Of course, their short life span is due to a lack of nucleus. Old red blood cells are broken down in the liver, spleen and bone marrow. The haemoglobin present in old red blood cells may be reused or turned into bile and excreted.

Red blood cell

Leukocytes (White blood cells)

These are the body's defence mechanism and are produced in the bone marrow as well as the lymph nodes. These cells are used to destroy and eliminate germs that enter the human body. How? They can 'squeeze' out through the walls of blood capillaries into all parts of the body. There are about 10 thousand of these cells for every 1mm3 of blood. They are irregular in shape and have a large nucleus which is sometimes lobed.

The diagram below shows a comparison between the white blood cells and the red blood cells.

Lymphocytes- These are responsible for the formation of anti-bodies

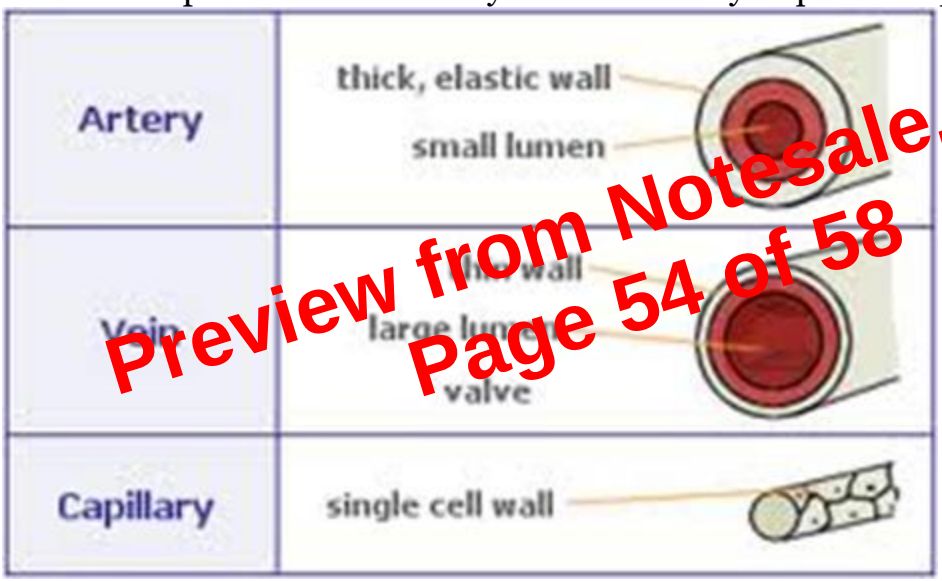
Granulocytes-These are responsible for engulfing germs

Monocytes- These have many functions such as replenishing Macrophages and response to inflammation.

The platelets also play a part in defence through the clotting mechanism.

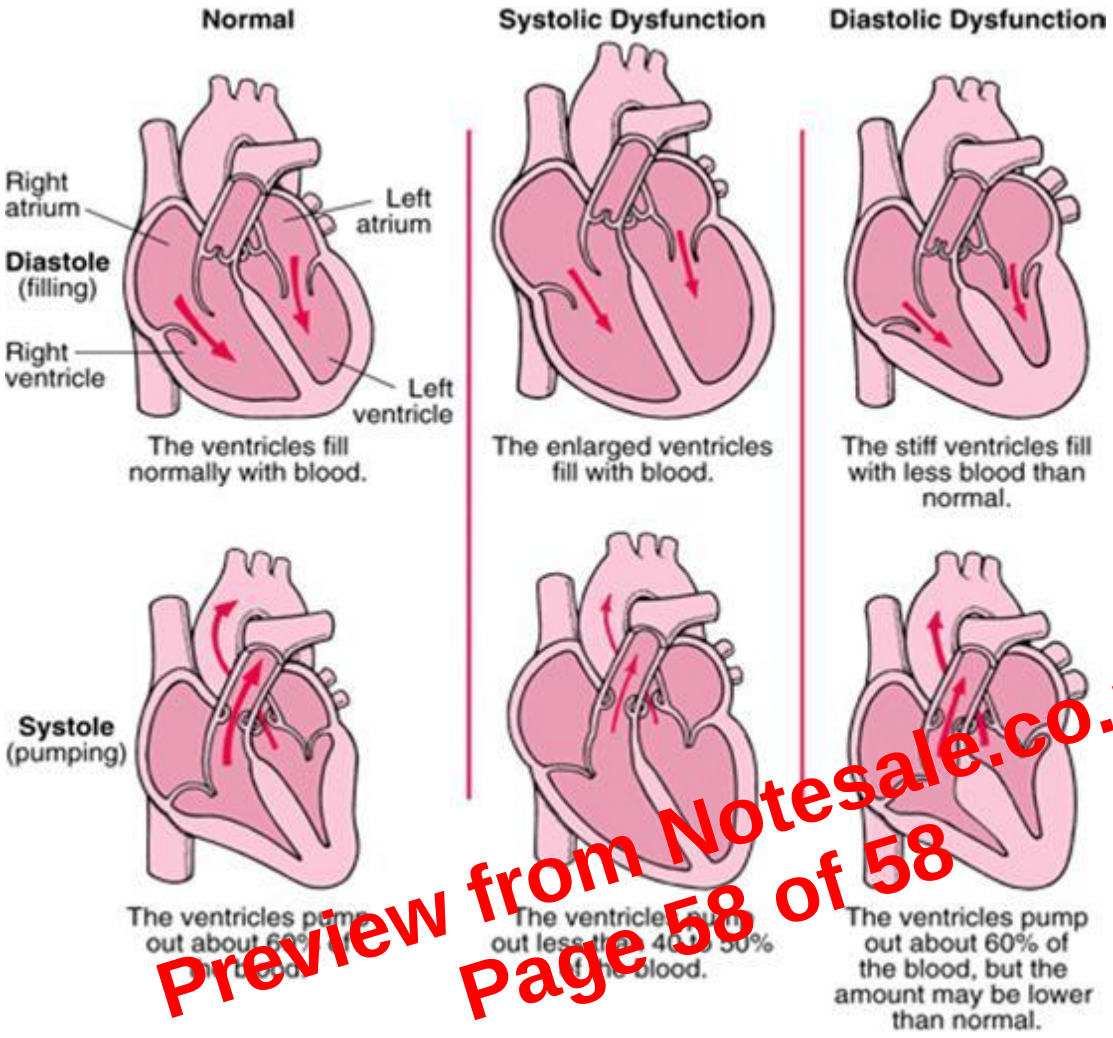
3. Transport heat around the body

Metabolic activities produce heat. This heat is transported through the body through blood flow. This is important because enzymes in the body require an optimal temperature.



Circulation In Man

Arteries take blood rich in oxygen (oxygenated blood) to the capillary network, which intern feeds the cells in the body. Deoxygenated blood (blood with very little oxygen) is taken back to the heart through veins. It then goes to the lungs where gas exchange occurs so the carbon dioxide can exit the body. There are however exceptions to this, as the hepatic portal vein transport blood rich in nutrients from the small intestine to the liver. A portal vein is a special type of vein which links capillary networks.



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