Life Processes: Reading material

All the processes such as respiration, nutrition, circulation, excretion etc. that are necessary for the survival of the living organisms are known as life processes.

Modes of Nutrition

The two most common type of nutrition are autotrophic nutrition and heterotrophic nutrition.

Autotrophic Nutrition

It is a type of nutrition in which inorganic materials such as carbon-dioxide, is used up to synthesize organic food by a process known as photosynthesis. For example, green plants use autotrophic mode of nutrition. Organisms which uses autotrophic mode of nutrition are known as autotrophs.

photosynthesis to occur, carbon-dioxide, water, sunlight and chlorophyll are the required raw materials. Sunlight provides energy, chlorophyll is used to absorb the sunlight, carbon-dioxide is reduced to carbohydrates and water is oxidized to release the oxygen. Water is taken up from the soil through the roots.

The site where the photosynthesis occurs in known as chloroplast. They contain green colour pigment known as chlorophyll that traps sunlight for photosynthesis.

Steps of the photosynthesis are as follows-

- Absorption of light by chlorophyll.
- Conversion of light energy into chemical energy.
- Splitting of water into hydrogen and oxygen.
- Finally, reduction of carbon-dioxide into carbohydrates.

Leaves contain small openings known as **stomata** which helps in exchange of gases. Stomata/stoma is surrounded by **guard cell** which guards the opening and closing of stomata. Guard cells also contain chloroplast.

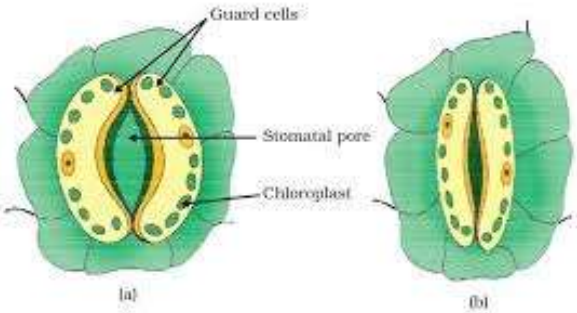


Figure 6.3 (a) Open and (b) closed stomatal pore

Heterotrophic Nutrition

In this mode of nutrition, an organism is unable to synthesize its own food. It is of following types-

1. **Holozoic nutrition** is a type of nutrition where an organism takes in whole food and break it inside the body. For example, Amoeba.
2. **Saprophytic nutrition** is a nutrition in which organisms feed on dead and decaying matter. For example, fungi.
3. **Parasitic nutrition** is a nutrition in which organism feed on living host. For example, Cuscutta.

Nutrition in Human Beings

Humans consists of alimentary canal which starts from mouth and ends at anus. The parts of the alimentary canal are as follows-

1. Mouth
2. Pharynx
3. Oesophagus/food pipe
4. Stomach
5. Small intestine
6. Large intestine
7. Rectum
8. Anus

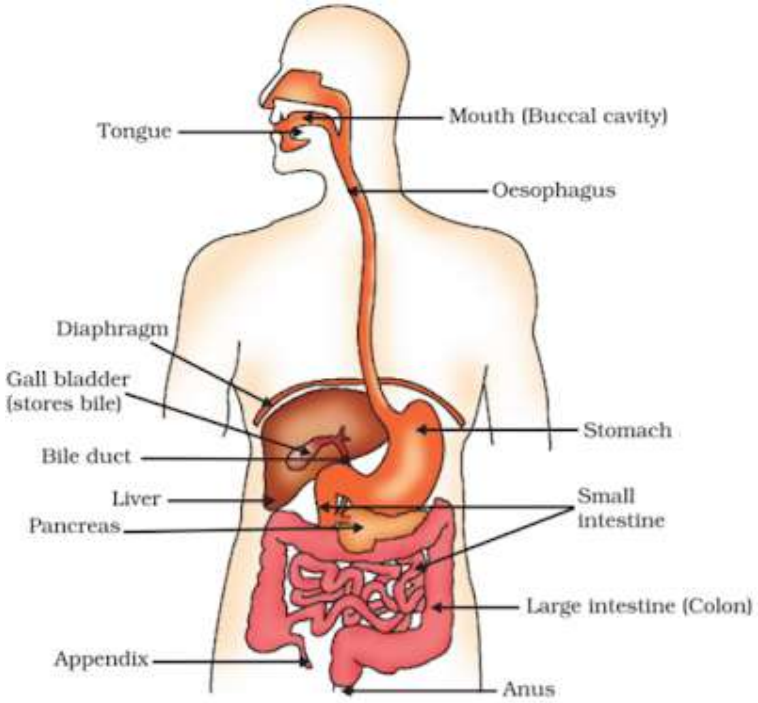


Fig.3. Human Digestive System

Mouth is the first portion of the alimentary canal. mouth consists of muscular tongue and teeth's. cavity inside the mouth is known as oral cavity.

Mechanism of Digestion of Food

- Food digestion process begins in the mouth. Food is complex in nature.

- To breakdown food and absorb it, we need biological catalyst known as enzymes.
- Mouth contains salivary glands that secrete saliva. Saliva contains an important enzyme known as **salivary enzymes** that breaks down starch into simple sugars.
- The food then passes via oesophagus into the stomach. The movement of the food inside the oesophagus occurs via rhythmic contraction of muscles, this is known as **peristalsis**.
- Stomach contains **gastric glands** that secrete **mucus, hydrochloric acid and pepsin**. Pepsin is a protein digesting enzyme.
- After stomach, food then enters into small intestine. **Small intestine is larger in herbivores due to cellulose digestion compared to carnivores**.
- Complete digestion of carbohydrates, proteins and fats occurs in small intestine.
- Small intestine receives secretions **from pancreas and bile from the liver**. Bile helps in **emulsification of fats** whereas pancreas secrete enzymes such as **trypsin** for protein digestion. Intestinal wall also contains glands that secrete intestinal juice.
- Small intestine has **villi** that increases the surface area for the absorption of food.
- The unabsorbed food is then transferred to large intestine where water is absorbed.
- Undigested food is then expelled out from the anus.

Respiration

- It is a metabolic process which involves breakdown of food to release energy is known as respiration.

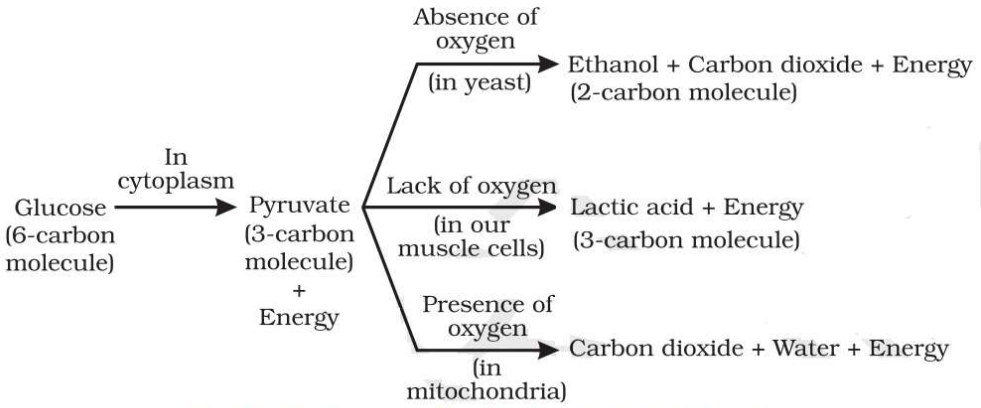
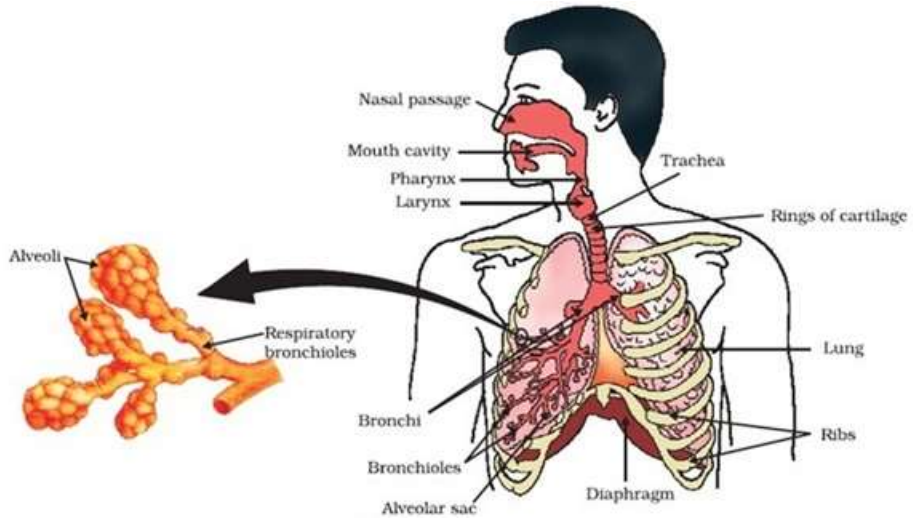


Fig: Break-down of glucose by various pathways

- The breakdown of pyruvate into ethanol and carbon-dioxide is absence of oxygen is known as fermentation. As this process occurs in absence of oxygen, it is known as anaerobic respiration. When the pyruvate is broken down in carbon-dioxide and water in presence of oxygen it is known as aerobic respiration.
- The energy released during the process is used up to synthesize the ATP (adenosine triphosphate).
- Compared to animals, plants used stomata to exchange carbon-dioxide and oxygen. This exchange occurs through **diffusion.**

Respiration in Human Beings

Human respiratory system starts consists of nostrils, nasal cavity, pharynx, trachea, bronchi, bronchioles and then lungs. In lungs, alveoli are present, where exchange between the oxygen and carbon-dioxide takes place.

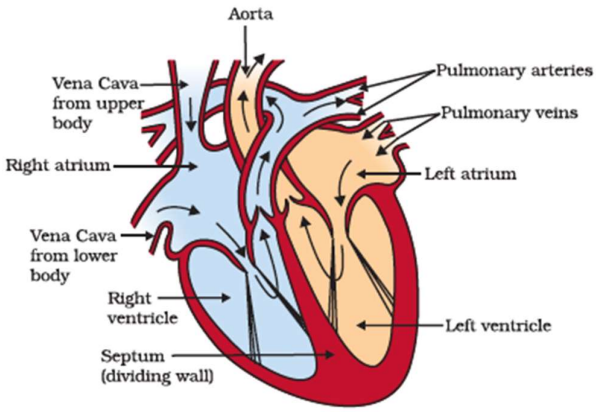


Humans have a respiratory pigment known as haemoglobin to carry the oxygen to different parts of the body and to remove carbon-dioxide from the body. Compared to oxygen, carbon-dioxide is more soluble in water, so it is usually transported in dissolved form.

Transportation in Human Beings

Blood is a fluid connective tissue that transport food, oxygen, carbon-dioxide, nitrogenous waste etc. Blood contains plasma and blood cells. Red blood cells carry oxygen throughout the body. Heart is the pumping organ in the body.

- Human heart is 4 chambered, with two atrium and two ventricles.
- Left atrium receives the oxygen rich blood from the lungs. While receiving blood it relaxes.
- Left ventricle pumps oxygen rich blood throughout the body.
- De-oxygenated blood comes from the body to the upper right atrium. It contracts to pump the blood to right ventricle.
- Right ventricle pumps the blood to the lungs for oxygenation.

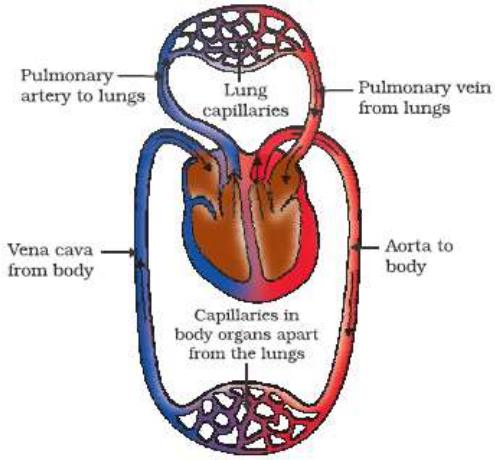


Structure of Human Heart

Note: Fishes have two chambered heart, amphibians and reptiles have three chambered heart except crocodile which possess 4 chambered heart. Birds and mammals have 4 chambered heart.

Double Circulation

The right side and left side of the heart are separated to prevent the mixing of oxygenated and deoxygenated blood. In vertebrates, blood goes through the heart twice during each cycle. This is defined as double circulation. (NTSE)



Double Circulation

The force that the blood exerts against the wall of the vessel is known as blood pressure. Pressure of blood inside the artery during ventricular contraction is known as systolic pressure whereas the pressure in the artery during ventricular relaxation is known as diastolic pressure. The normal blood pressure is 120/80 mm of Hg.

- Platelets are blood cells that helps in blood clotting.
- Lymph also known as interstitial fluid is a fluid that that leak out from the pores of the capillaries.

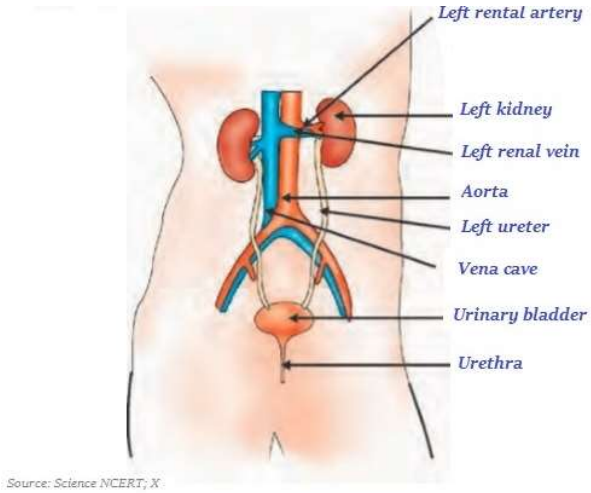
Transport in Plants

- Plants have xylem for the transportation of water. Xylem transports water from the roots to different parts of the plants. Xylem tissue consists of vessels and tracheids.

- Loss of water in the form of water vapour from the aerial parts of the plants is known as transpiration. The transpiration creates a suction which pulls the water up to the higher plants.
- Similarly, transport of food in plants occurs via phloem. It transports food from the leaves to different parts of the plants.

Excretion

- The process involved in the removal of nitrogenous waste from the body is known as excretion.
- Excretory system of humans consists of a pair of kidneys, a pair of ureters, urinary bladder and urethra.
- The basic filtration unit of the kidneys is known as nephrons.
- Nephron are the structural and functional unit of kidneys.
- They consist of bowman's capsule and renal tubule.
- For the formation of urine, some substances such as glucose, amino acids are selectively reabsorbed.
- Amount of water reabsorbed depends on how much water is there in the body.
- Urinary bladder is a muscular structure and it is under nervous control



Source: Science NCERT; X

Human Excretory System

Note: plants excrete their waste through transpiration. Plants also produce other excretory waste in the form of gums, resins etc.