Ch- 6 Life processes – (Nutrition)

A report by surinder kumar

Nutrition

Question: What do we mean by life processes?

Answer: The processes which together perform the function of maintenance

of 'life' are called as life processes. Nutrition, respiration, circulation, excretion are examples of essential life

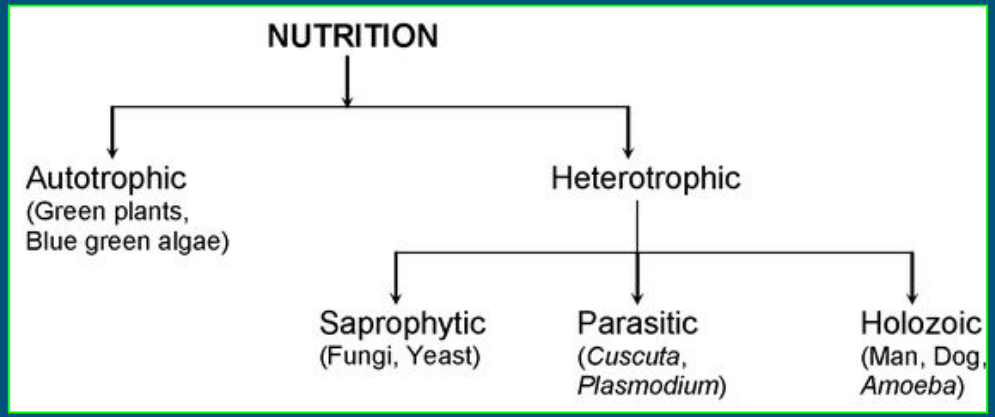
processes. In unicellular organisms, all these processes are carried out by that

single cell. In multicellular organisms, well-developed systems are present to carry

out the processes

NUTRITION

- The process of acquiring food that is needed for nourishment and sustenance of
- the organism is called nutrition.
- There are two main modes of nutrition, autotrophic and heterotrophic.
- Heterotrophic nutrition has subtypes as holozoic, saprophytic and parasitic nutrition.



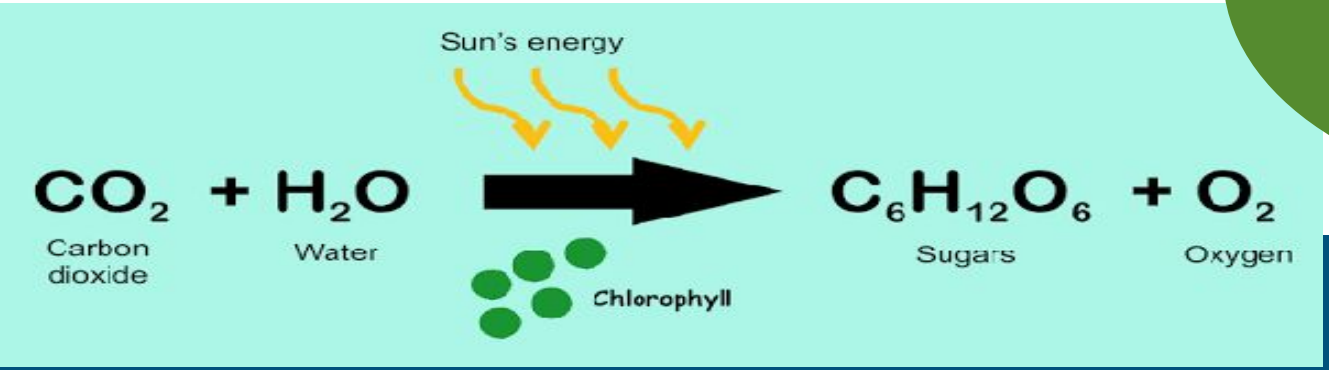
Autotrophic Nutrition

If an organism can nourish itself by making its own food using sunlight or chemicals such mode of nutrition is called as autotrophic nutrition.
Plants photosynthesize (use light energy) and are called photoautotrophs. Few bacteria use chemicals to derive energy and are called chemoautotrophs.

Photosynthesis

Plants make food using sunlight and water, which provides nourishment to other organism and themselves. Chlorophyll present in the green parts absorbs light energy.
This light energy is used to split water into hydrogen and oxygen. Hydrogen is then used to reduce carbon dioxide into carbohydrates, typically glucose.
Chlorophyll is
essential for photosynthesis and stomata to facilitate intake of carbon dioxide.

photosynthesis



Q. What are three events occur during photosynthesis?

Ans. The three events that occur during the process of photosynthesis are:
(i) Absorption of light energy by chlorophyll.
(ii) Conversion of light energy to chemical energy and splitting of water molecules into
hydrogen and oxygen.
(iii) Reduction of carbon dioxide to carbohydrates.

Q. What factor most affects the rate of photosynthesis?

Ans. The main variables which affect photosynthesis are light, water, CO_2 concentration and temperature.

Mechanism of the closing and opening of the stomata

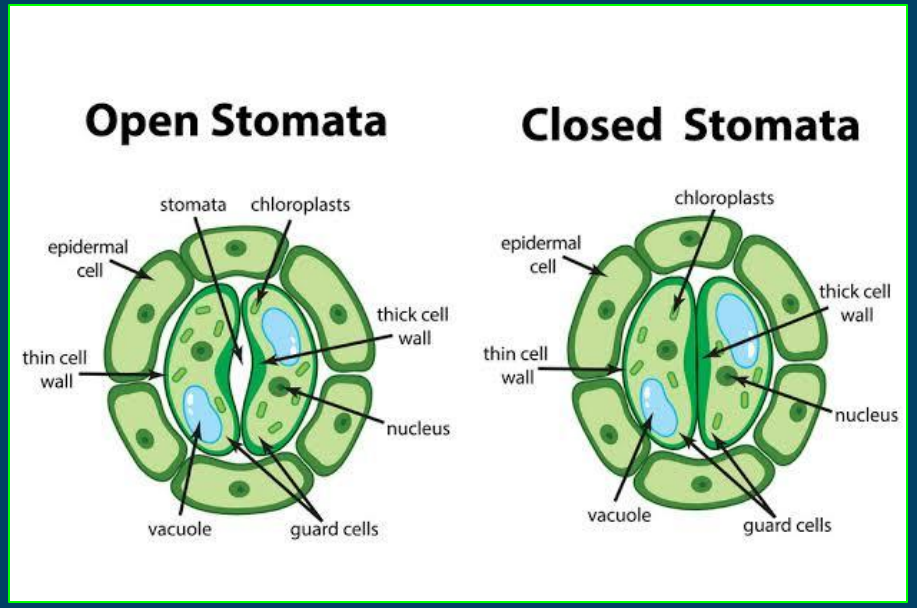
The mechanism of the closing and opening of the stomata depends upon the presence
of sugar and starch present in the guard cells.

During Day time:

- In the presence of light, the guard cells of the stomata contain sugar which is
- synthesized by their chloroplasts.
- The sugar is soluble and increases the concentration of guard cells.
- Due to higher concentration of the cytoplasm of guard cells, the water enters into
- these cells from the neighbouring cells by osmosis. Hence, the stomata remains
- open.

During Night:

- *In the absence of light the sugar present in guard cells converts into the starch.*
- *The starch is insoluble, and this way the guard cells remains in lower*
- *concentration than that of neighbouring cells.*
- *The neighbouring cells take out the water from the guard cells by osmosis*
- *making them flaccid and the stomata closed.*



Heterotrophic nutrition

Heterotrophic nutrition is a type of nutrition in which organisms depend upon other organisms for food to survive.
Heterotrophic nutrition can be one of three types-holozoic, saprophytic and parasitic.

Saprophytic Nutrition:

Some organism feed on dead and decaying organic matter.
This mode of nutrition is called saprophytic nutrition. The food is partially digested outside the body and then it is absorbed.E.g. Fungi are saprophytes.

Parasitic Nutrition:

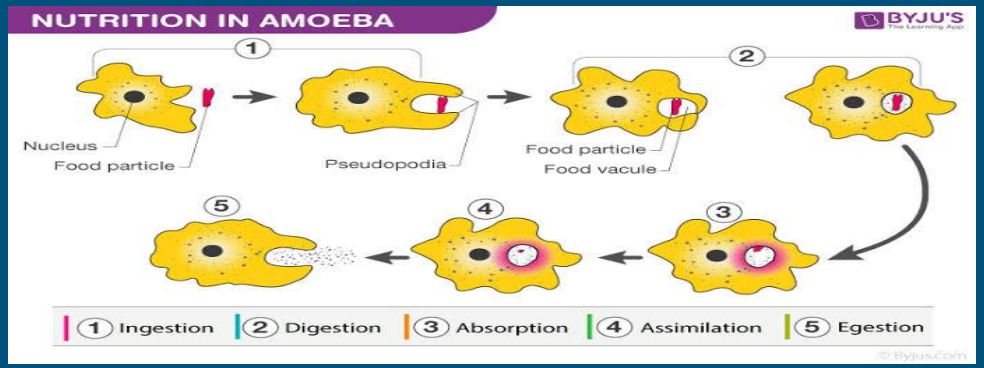
Some organisms feed on the expense of another organism and in turn causing it harm. This is called parasitic mode of nutrition. These organisms live on the body or in the body of a host organism and derive the nutrients directly from the body of the host.E.g. Leech is an ectoparasite while Ascaris is an endoparasite.
Cuscuta is a parasitic plant.

Holozoic Nutrition:

Holozoic nutrition is a method of nutrition which involves the ingestion of some complex organic substances that may be in the solid or the liquid
state.

Holozoic nutrition involves five steps – Ingestion, Digestion, Absorption, Assimilation
and Egestion.

E.g. Amoeba, Human (most of the animals).



Human Circulatory System

The human circulatory system consists of a network of arteries, veins, and capillaries, with the heart pumping blood through it.

- *To provide essential nutrients, minerals, respiratory gases (O2 and CO2) and*
- *hormones to various parts of the body.*
- *Alternatively, the circulatory system is also responsible for collecting metabolic*
- *waste and toxins from the cells and tissues to be purified or expelled from the*
- *body.*

Organs of Circulatory System

The human circulatory system comprises 4 main organs that have specific roles and functions. The vital circulatory system organs include:

- Blood (technically, blood is considered a tissue and not an organ)
- Blood Vessels
- Heart
- Lymphatic system

Blood: Blood is a connective tissue which plays the role of the carrier for various substances in the body. Blood is composed of Plasma and Blood cells.

Blood plasma:

Blood plasma is a pale coloured liquid which is mostly composed of water. Blood plasma forms the matrix of blood. It makes up ~55% of blood. It consists of salts, nutrients, water and enzymes. Blood plasma also contains important proteins and other components necessary for overall health

Bloods cells:

There are three types of blood cells, viz. Red Blood Cells (RBCs), White Blood Cells (WBCs) and Platelets.

(a) Red Blood Corpuscles (RBCs)/ (Erythrocytes)

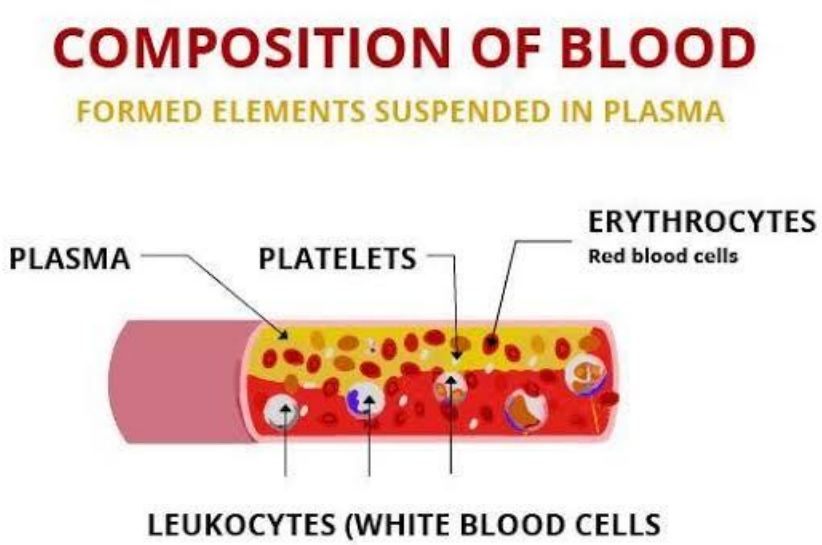
These are enucleated, biconcave and the most abundant cells of the blood. RBCs are red in colour because of the presence of haemoglobin which is a red coloured pigment. Haemoglobin readily combines with oxygen and carbon dioxide. The transport of oxygen happens through haemoglobin. Some part of carbon dioxide is also transported through haemoglobin.

(b) White Blood Corpuscles (WBCs)/ (Leucocytes):

These are of pale white coloured, nucleated cells, comparatively larger in size. They play important role in the

immunity as they are responsible for fighting foreign pathogens (such as bacteria, viruses, fungi) that enter our body.

There are five different types of White blood cells and are classified mainly based on the presence and absence of granules.



Blood Vessels:

There are different types of blood vessels in our body each carrying out
specialized functions. Three types of blood vessels are: Arteries, Veins and Capillaries.

Arteries:

These are thick-walled blood vessels which carry oxygenated blood from the
heart to different organs.

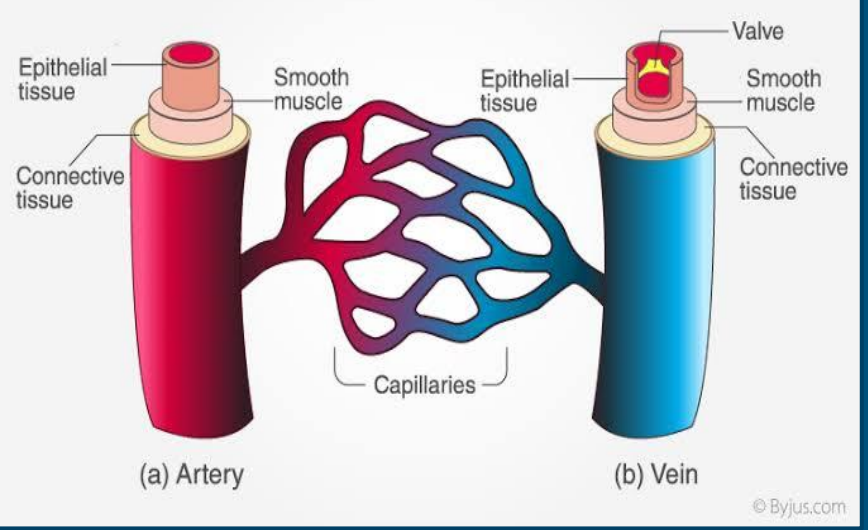
Pulmonary arteries are exceptions because they carry deoxygenated blood from the heart to lungs, where oxygenation of blood takes place.

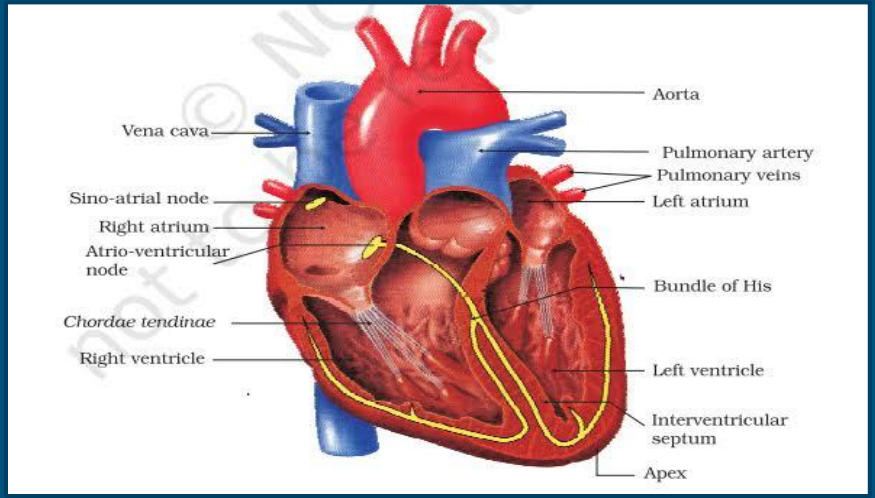
Veins:

These are thin-walled blood vessels which carry deoxygenated blood from different organs to the heart, pulmonary veins are exceptions because they carry oxygenated blood from lungs to the heart.Valves are present in veins to prevent back flow of blood.

Capillaries:

These are the blood vessels which have single-celled walls.





Heart

The heart is a muscular organ located in the chest cavity, right between the lungs. It is
positioned slightly towards the left in the thoracic region and is enveloped by the pericardium.

Vertebrate hearts can be classified based on the number of
chambers present. For instance, most fish have two chambers, reptiles and amphibians
have three chambers. Avian and mammalian hearts consists of four chambers. Humans
are mammals.

Structure of the Human Heart

The human heart is about the size of a human fist and is divided into four chambers, namely two ventricles and two atria. The ventricles are the chambers that pump blood and atrium are the chambers that receive blood. Among which both right atrium and ventricle make up the “right heart,” and the left atrium and ventricle make up the “left heart.” The structure of the heart also houses the biggest artery in the body – the aorta. The right and the left region of the heart are separated by a wall of muscle called the septum. The right ventricle pumps the blood to the lungs for re-oxygenation through the
pulmonary arteries. The right semilunar valves close and prevent the blood from flowing back into the heart. Then, the oxygenated blood is received by the left atrium from the lungs via the pulmonary veins.

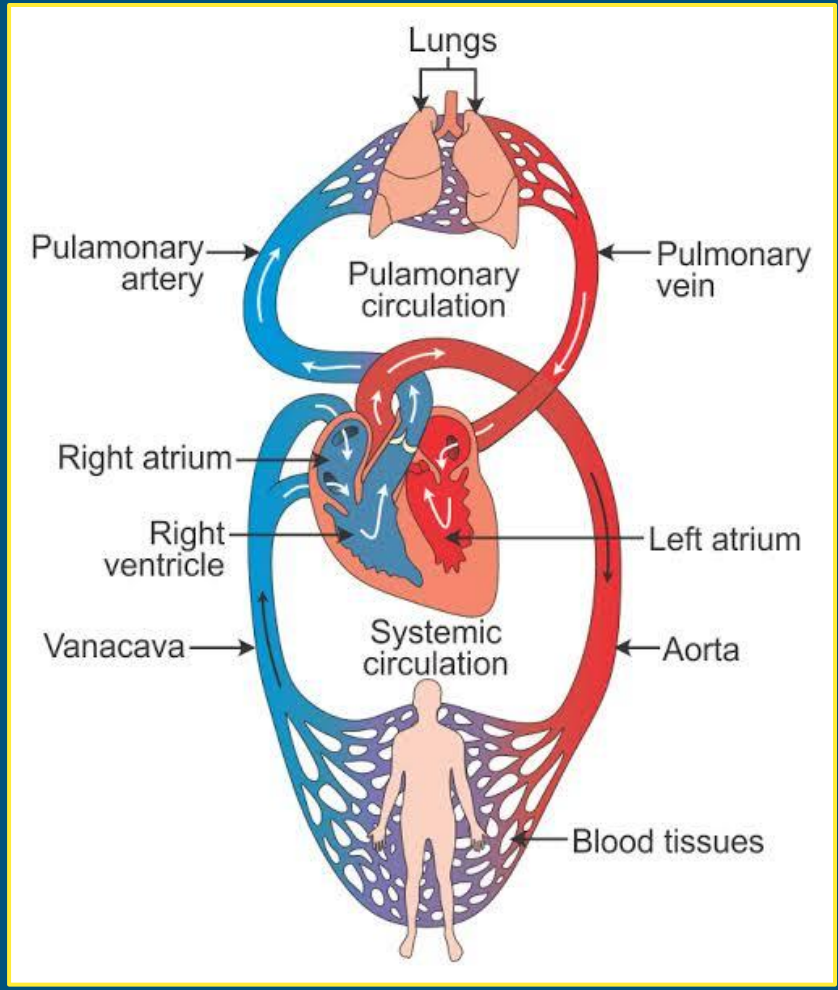
Double circulation:

In the human heart, blood passes through the heart twice in one
cardiac cycle. This type of circulation is called double circulation.

The double circulation consists of two parts namely - pulmonary circulation and systemic circulation

One complete heartbeat in which all the chambers of the heart contract and relax once is called cardiac cycle. The heart beats about 72 times per minute in a normal adult.

Advantage: Double circulation ensures complete segregation of oxygenated and deoxygenated blood which is necessary for optimum energy production in warm-blooded animals.



Lymph: *Lymph is similar to blood but RBCs are absent in lymph.*

- Lymph is formed from the fluid which leaks from blood capillaries and
- goes to the intercellular space in the tissues. This fluid is collected
- through lymph vessels and finally returns to the blood capillaries.
- Lymph also plays an important role in the immune system.
- Lymph a yellowish fluids escape from the blood capillaries into the
- intercellular spaces contain less proteins than blood.
- Lymph flows from the tissues to the heart assisting in transportation and
- destroying germs.

Blood clotting/coagulation: I

It is an important process that prevents
excessive bleeding when a blood vessel is injured. Platelets and proteins in the blood
plasma work together to stop the bleeding by forming a clot over the injury.

Blood Pressure:

Blood pressure is the force of blood against the arteries. An individual should maintain a normal blood pressure from 90 – 120 / 60 – 80 mm Hg.
The sphygmomanometer is an instrument used for measuring blood pressure and is
measured in millimetres of mercury (mmHg). Blood pressure is given by two numbers,
with one above or before the other – 120/80.120 is called systolic pressure and 80 is
called diastolic pressure.