

Life process:- The basic functions performed by living organisms to maintain their life on this earth are c/d life process

These are Nutrition, Respiration, Transport and ~~exte~~ Excretion, etc.

* NUTRITION *

The process of taking in food and utilising it is c/d nutrition.

Nutrition comes from the word 'nutrient' (which means substances obtain from its surrounding as Carbohydrate, fats, proteins, ~~minerals~~ minerals, vitamins and water)

⇒ There are two modes or methods of nutrition :-

- 1) Autotrophic Nutrition
- 2) Heterotrophic Nutrition

01. Autotrophic Mode of Nutrition

Autotrophic nutrition means 'self nutrition'

Autotrophic nutrition is that nutrition in which an organism makes its own food.

Example :- Green plants & some bacteria

The autotrophic Organism (or autotrophs) contains the green pigment called chlorophyll which is capable of trapping Sunlight energy.

02. Heterotrophic Mode of Nutrition

heteros means other and Trophic refers to nutrition.

Heterotrophic nutrition is that mode of nutrition in which an organism depends on other organisms for its food.

Examples:- Animals, Non-Green plants like yeasts, Most bacteria, etc.

There are three types of heterotrophic nutrition:

- i> Saprotrophic Nutrition
- ii> Parasitic "
- iii> Holozoic "

Ques:- Why is diffusion insufficient to meet the oxygen requirements of multicellular organisms like humans?

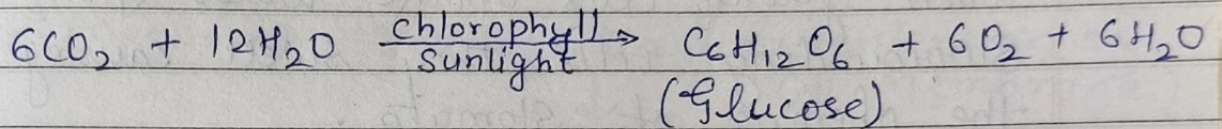
Ans:- In multi-cellular organisms all the cells may not be in direct contact with the surrounding environment. Thus, simple diffusion will not meet the requirements of all the cells. Therefore, diffusion is insufficient to meet the oxygen requirements of multicellular organism.

NUTRITION IN PLANTS

Green plants prepare their own food by the process of Photosynthesis.

Photosynthesis :-

The process by which green plants make their own food from carbon dioxide and water by using sunlight in the presence of chlorophyll.



- During photosynthesis, solar energy is converted into chemical energy and carbohydrates are formed.
- Green leaves are the main site of photosynthesis.

Note → The steps of photosynthesis need not to take place one after the other immediately.

Chlorophyll :- The green pigment present in chloroplast is known as chlorophyll.

- Oxygen is the by-product of photosynthesis.

Stomata :- The tiny pores present in the epidermis of leaf or stem through which gaseous exchange & transpiration occurs.

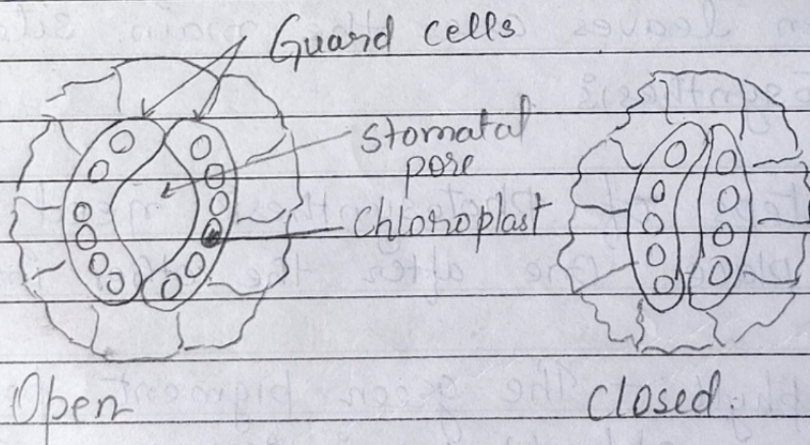
"Let us always meet each other with smile, for the smile is the beginning of love." - Mother Teresa

Functions of stomata :-

- * Exchange of gases (O_2 and CO_2)
- * Losses of a large amount of water (in form of water & vapor) during transpiration

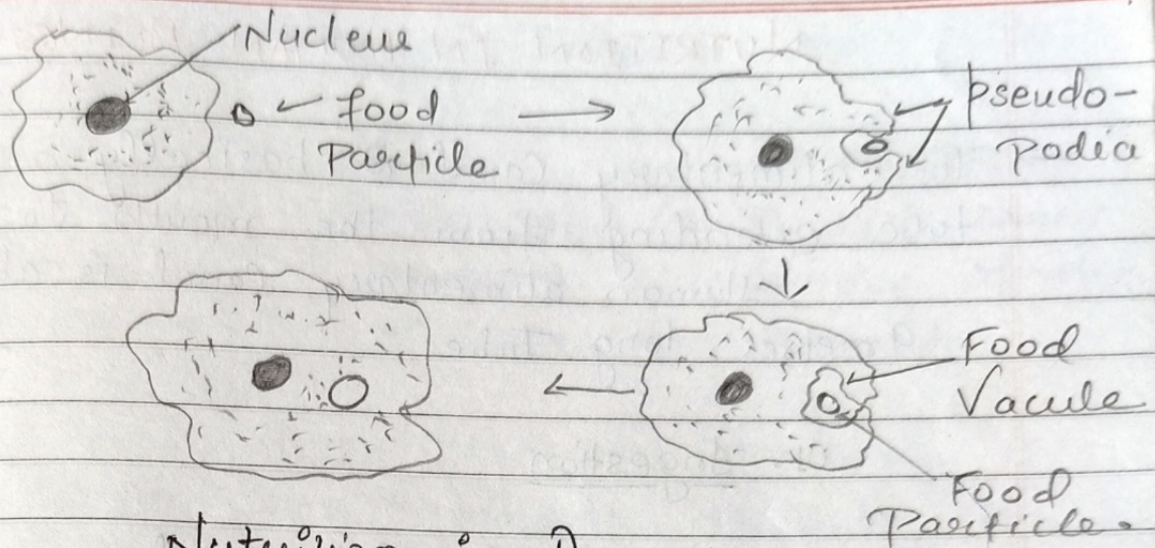
Opening and closing of stomatal pores :-

- ⇒ The opening and closing of stomatal pores are controlled by guard cells
- ⇒ When guard cells uptake water from surrounding cells, they swell causing for the opening of stomata.
- ⇒ When guard cells are released, they become shrinking cause to closing the stomatal pores.



How Organisms obtain their food

- Unicellular / single celled organisms :- Food is taken up through entire surface
Example :- Amoeba, Paramecium.



Nutrition in Amoeba

Amoeba → Pseudopodia (extension of cell membrane)
 ↓
 Capture food.

↓
 Take in (Food ~~vacuole~~ ^{Vacuole})

↓
 Digestion (of simple substance in cytoplasm) ← Digestion of food in food vacuole

↓
 move to surface ← Undigested food of cell and is thrown out.

Paramecium :- Cilia (Present all over body) → Take in food → At a specific spot.

Nutrition

It involve :-

01. Ingestion → Intake of food
02. Digestion → Breakdown of complex food
03. Absorption → Movement of digested food
04. Assimilation → Utilisation " " "
05. Egestion → Removal of waste

NUTRITION IN HUMAN BEINGS

- The alimentary canal is basically a long tube extending from the mouth to the anus.
Human alimentary canal is about 9 metres long tube.

01. Ingestion

Mouth : Intake of whole food.

02. Digestion

Teeth :- chewing / Grinding of food help in physical digestion.

Salivary Glands :- secrete saliva
→ Saliva contain an enzyme called Salivary amylase that break down (or convert) Starch into glucose.

Tongue :- Mix saliva and make food Swallowing and push down the food

Food pipe Or Oesophagus

→ Taking food from mouth to stomach by peristaltic movements (Contraction & Expansion of wall)

Stomach :-

Gastric glands present in stomach's wall secrete gastric juice.

Gastric Juice

<u>Pepsin</u>	<u>HCl</u>	<u>Mucus</u>
Enzyme that breaks down proteins.	Make the medium acidic.	Protects inner lining of the stomach.

→ The exit of food from the stomach is regulated by a sphincter muscle which releases it in small amounts into the small intestine.

Note :- The digesting enzyme pepsin is active only in the presence of an acid.

Small Intestine :-

- Longest part of alimentary canal.
 - About 6.5 metre long in an adult man.
 - The small intestine is the site of complete digestion in human ~~be~~ beings.
- ⇒ Herbivores eating grass need a longer small intestine to digest cellulose and Carnivores like tiger have a shorter small intestine.

* Small intestine receives the secretions of two glands :

- Liver :- Secretes bile juice (greenish yellow)
- Pancreas :- Secretes pancreatic juice which contain digestive enzymes like amylase, trypsin & lipase

Imp Bile juice is stored in the gall bladder.

- Bile juice performs two functions :-
- make acidic food ~~is~~ coming from stomach alkaline so that pancreatic enzymes can act.
 - Break the fats present in the food into smaller globules making it easy for the enzymes to act & digest them.

The digestive enzymes present in pancreatic juice digest as :-

Amylase → digest / break down the starch
trypsin digest protein
lipase breakdown the emulsified fats

* The wall of small intestine contain glands which secrete intestinal juice which convert

- ⇒ Carbohydrate into glucose
- ⇒ fats into fatty acid & glycerol
- ⇒ proteins into amino acids

03. ABSORPTION

Small intestine :-

- The finger-like projection present in the inner surface of small intestine called villi.
- Digested food absorbed through villi which connect with blood vessel.
- Main absorption site.

Large intestine
→ Absorb excess of water

04. ASSIMILATION

Blood carries digested food to all parts of the body cell for obtaining energy which is used in repair of the body, and growth.

Note :- The digested food which is not used by our body immediately is stored in the liver in the form of a carbohydrate called "Glycogen".

05. EGESTION

- The rest of the material is removed from the body via the anus.
- The exit of the faeces is controlled by the "anal sphincter".

Ques:- What is the role of the acid in our stomach?

Ans:- The role of the acid in our stomach are :-
i) It makes the food acidic which cause to the active of pepsin
ii) It kill the germs present in food.

RESPIRATION

Respiration:- The process of releasing energy from food is c/d respiration.
or, oxidation of food is c/d respiration.

Food + Oxygen $\longrightarrow$ Carbon dioxide + water + Energy.

The process of respiration which releases energy takes place inside the cells in the body. So, it is also known as cellular respiration.

- Breathing is just intake of oxygen and release of carbon dioxide, while respiration is the process of releasing of energy.
- The first step is the break-down of glucose (6-carbon molecule) into three-carbon molecule c/d pyruvate which takes place in the Cytoplasm.
- The Oxidation of glucose to pyruvic acid (or pyruvate) is c/d glycolysis.

Types of Respiration

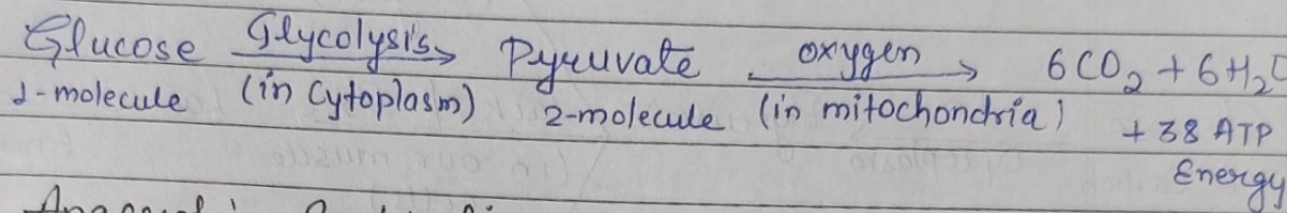
01. Aerobic

02. Anaerobic

01. Aerobic Respiration:-

- Aerobic means with air.
- Respiration Occurs in presence of Oxygen.

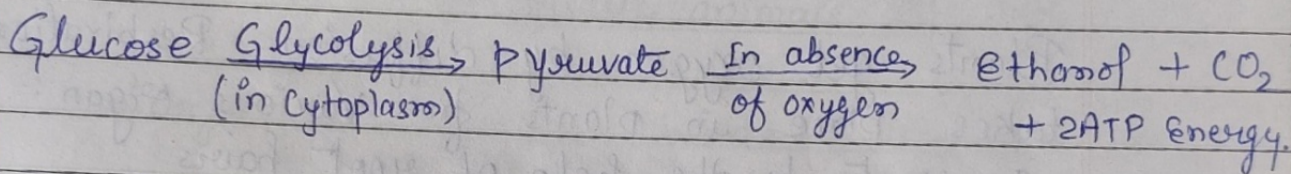
→ Site of aerobic respiration is mitochondria in cells.



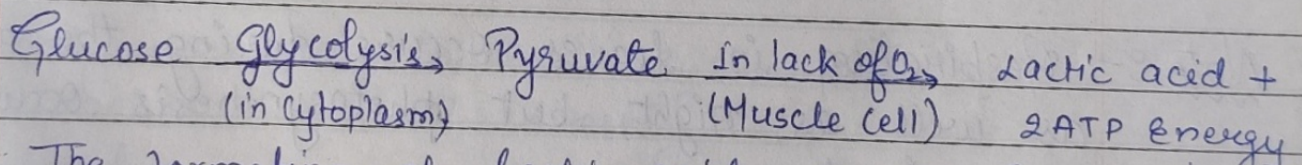
02. Anaerobic Respiration :-

→ Respiration Occurs without oxygen. eg yeast.

→ The whole process of anaerobic respiration takes place in cytoplasm of cells.



In human, during vigorous physical exercise, in lack of oxygen muscle cell respire as :-



→ The formation of lactic acid causes Cramps (pain)

Aerobic Respiration Anaerobic Respiration

i> Takes place in the presence of O_2

ii> Occurs in mitochondria

iii> End products are CO_2 and H_2O

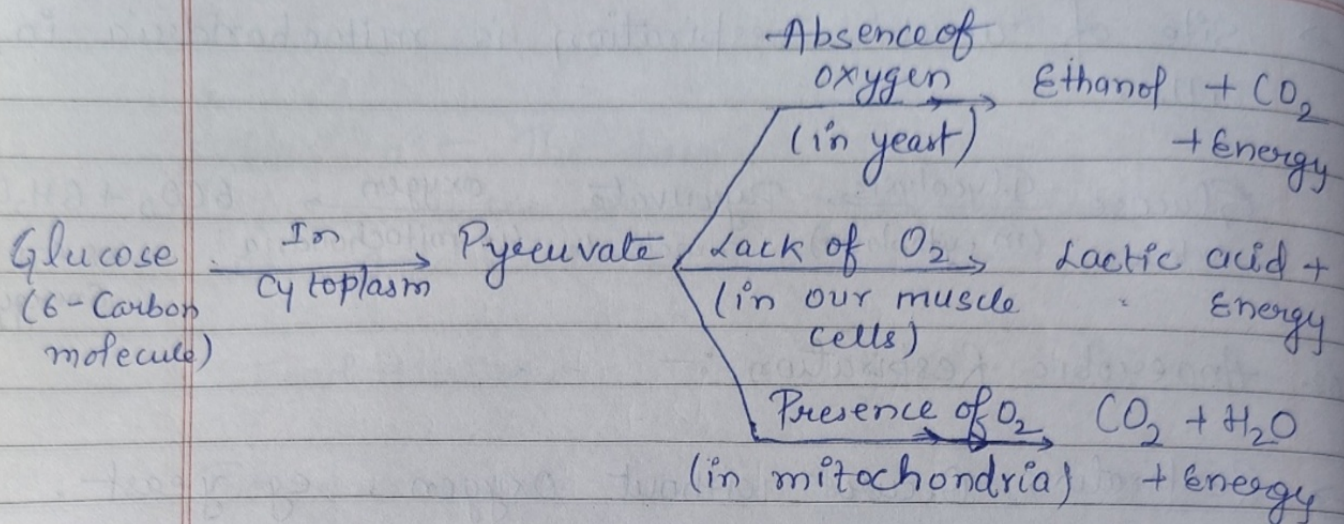
iv> More energy released

i> Takes place in the absence of O_2

ii> Occurs in cytoplasm

iii> End products are alcohol or lactic acid.

iv> Less amount of energy is released



RESPIRATION IN PLANTS

Plants get oxygen by diffusion. Respiration takes place in plants from various organs:-

01. In roots by the help of root hairs
02. In stems by lenticel (present in bark of stem)
03. In leaves by stomata.

Note :- Respiration in leaves occurs during the day as well as night but photosynthesis occurs only in day.

O_2 and CO_2 is known as respiratory gases.

RESPIRATION IN ANIMALS

$\rightarrow$ The rate of breathing in aquatic animals is much faster than in ~~terrestrial~~ ^{terrestrial} animals to get more oxygen.

The tiny holes on insects body c/d Spiracles and air tube c/d tracheae.

Different animals have different mode of respiration

Respiratory Organ	Animals
Cell membrane	Amoeba, Planaria, Paramecium
Skin	Earthworms, Frog, leech.
Gills	Aquatic animals like fish, prawns and mussels.
Lungs	Man, birds, lizard, dog and frog, etc.

Note: * Frog can use both ~~side~~ skin & lungs for respiration.

* Only in the tracheal system of respiration, air reaches the cell directly. And, in other, reach blood.

* Fish has no lungs as human for respiration.

HUMAN RESPIRATORY SYSTEM

The main Organs of human respiratory system are:—

- | | |
|---------------------------------------|-----------------|
| (i) Nose | (iv) Bronchi |
| (ii) Nasal passage (or, Nasal cavity) | (v) Lungs |
| (iii) Trachea (Wind pipe) | (vi) Diaphragm. |

Nose:- Two holes in it c/d nostrils
→ Air enter through it.

Nasal Cavity:- The passage behind the nostrils in nose c/d nasal cavity or passage.
→ Separated from mouth cavity. So, we can breathe during eating food.
→ Contain lined with fine hair and mucus which absorbed impurities of air.
→ Air from nasal cavity enters into pharynx and then goes into trachea.

Pharynx:- The part of throat b/w the mouth & windpipe is c/d pharynx.

Larynx:- Upper end of ~~voice box~~ trachea contain voice box c/d larynx.

Trachea:- Commonly known as ~~wide~~ windpipe
→ It does not collapse ~~wherever~~ there is no air because of presence of ring of soft bone around it c/d Cartilage.
→ At its lower end, trachea divide into two parts c/d bronchi.

Lungs:-
→ covered by two thin membrane c/d Pleura.
→ Each bronchus divides into the lungs to form a large number of still smaller tubes c/d bronchioles.
→ The pouch-like air sacs at the ends of the smallest bronchioles are c/d alveoli (singular alveolus).

- Alveoli is surrounded by very thin blood capillaries.
- Alveoli is site of gaseous exchange.

Note:- In human beings, the respiratory pigment is haemoglobin which has a very high affinity for oxygen.

* CO_2 is more soluble in water than O_2 , so it mostly ~~trans~~ transported in the dissolved form in our blood.

* The deficiency of haemoglobin in the blood of a person reduces the oxygen-carrying capacity of blood resulting in breathing problems, tiredness and lack of energy.

Normal haemoglobin level in adult is 12-18 g/dl

TRANSPORT

Transport is a life process in which a substance absorbed (or made) in one part of the body of an organism is carried to other parts of its body.

Transportation in Human Beings

Human beings like other multicellular organism need regular supply of food, oxygen etc. This function is performed by circulatory system.

- The Circulatory System in human beings consists of :-
- i) Heart (pumping organ)
 - ii) Arteries & veins (blood vessels)
 - iii) Blood and lymph (circulatory medium)

Circulatory System in human

- The lungs supply oxygen-rich blood (old oxygenated blood) left atrium of the heart through pulmonary vein.
- The left atrium relaxes when it is collecting the blood and contracts when blood is transferred to the left ventricle. The left ventricle expands when it receives blood. Blood pumps to blood by aorta.
- De-oxygenated blood (CO_2 -rich blood) comes from the body to the upper chamber on the right i.e. the right atrium when it expands.

- The corresponding lower chamber i.e. the right ventricle expands when right atrium contracts. It transfers the blood to right ventricle which in turn pumps it to the lungs for oxygenation through pulmonary arteries.
- Right ventricles have thicker muscular walls so that they pump blood into various organs.
- Valves ensure that blood does not flow backwards when the atria or ventricles contract.

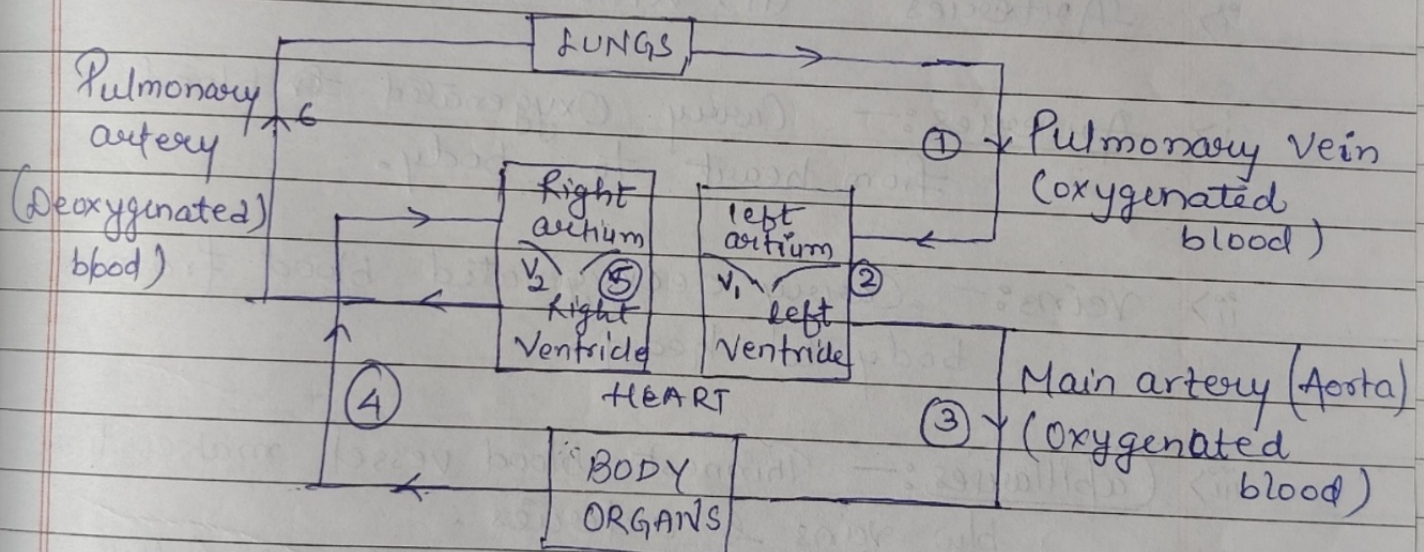


Diagram to show blood circulation in human

- Septum :- Dividing wall which divides heart to avoid intermixing of oxygenated & deoxygenated blood.
- The amphibian (like frogs) and reptiles (like lizards) have a three-chambered heart.

which consists of two atria & one ventricle.

- The fish has a two-chambered heart which consists of one atrium & one ventricle. Oxygenation of blood takes place in the gills.
- Double circulation:- If blood travels twice through the heart in one complete cycle of the body (as in human).

Blood vessels

There are three types of blood vessels:-

i) Arteries ii) Veins iii) Capillaries

i) Arteries:- Carry oxygenated blood from heart to body.

ii) Veins:- Carry deoxygenated blood from body to heart.

iii) Capillaries:- Thinnest blood vessel makes link b/w veins & arteries. Body cells receive blood through capillaries.

Difference b/w Arteries & Vein

Arteries	Veins
→ Carry oxygenated blood from heart to body parts except pulmonary artery.	→ Carry deoxygenated blood from body part to heart except pulmonary vein.

Date ____/____/____

- | | |
|---------------------|--|
| → Thick & elastic | Thin & less elastic |
| → Far from the skin | → near to the skin as compared to arteries |

BLOOD

- Blood is a Connective tissue which is fluid in nature.
- Solid components of blood c/d blood Corpuscles.
- i> RBCs :- RBC stands for Red blood cells.
 - Carries O_2 & CO_2 and also contain Haemoglobin
- (ii) WBCs :- WBCs stands for White blood cell.
 - Fight against germs & produces antibodies
- (iii) Blood Platelets :- It helps in blood clotting during injury.

LYMPH

- It is a yellowish fluid which escapes from the blood Capillaries into the Intercellular Spaces.
- It contains less proteins than blood.
- It flows from the tissues to the heart

which helps in transportation and destroying germs.

- It carries digested and absorbed fat from small intestine and drains excess fluid from extra cellular space back into the blood.

Transportation in Plants

There are two main conducting pathways in a plant.

i> xylem

ii> Phloem.

xylem	Phloem
→ carries water & minerals from the roots to other parts of the plants	→ carries product of photosynthesis from leaves to the other parts of the plants
→ No energy is used	→ Energy is used from ATP.

Transpiration:-

It is the process of loss of water as vapour from aerial parts of the plant.

Its Function:-

- a> Absorption & upward movement of water and minerals by creating Pull.
- b> Helps in temperature regulation in plants.

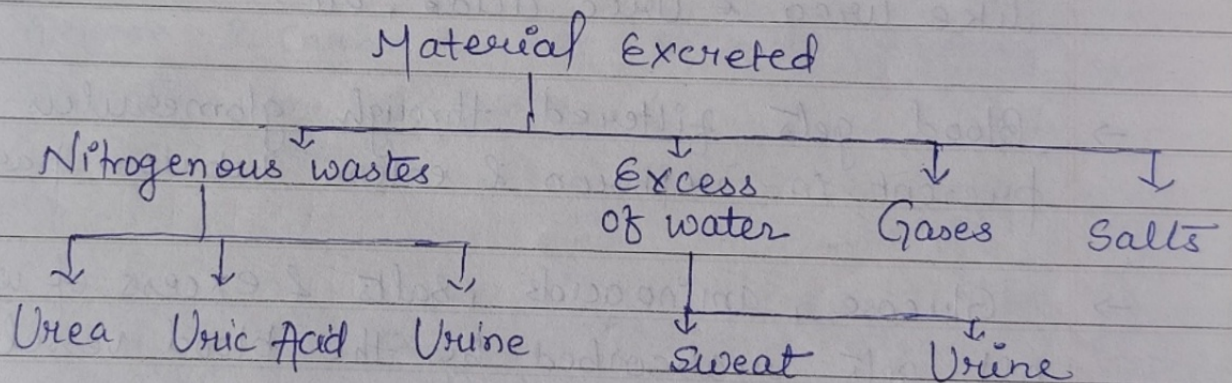
Translocation:- Transport of food from leaves (food factory) to different part of the plants is c/d translocation.

EXCRETION

The body generates many kinds of wastes including nitrogenous wastes which are harmful for the body and hence needed to be removed.

⇒ Excretion is a process by which ~~the~~ the wastes are removed from our body

Unicellular Organisms remove these wastes by diffusion.



Excretion system in Human Beings

Excretory/urinary system consists of:-

1. The kidneys:- The excretory organ.
2. The ureters:- The ducts which drain out urine from the kidney.
3. The urinary bladder:- The urinary reservoir.

04. The urethra:— The channel to the exterior.

Functions of Organs Involved in Excretory Systems

- Each kidney contains many filtration units called nephrons.
- Nephrons are made up of a cluster of thin walled capillaries called glomerulus which is associated with a cup like structure called as Bowman's capsule and the long tube which terminates through this capsule.
- The renal artery brings oxygenated blood to the kidneys along with nitrogenous wastes like urea & uric acids, etc.
- Blood gets filtered through glomerulus present in nephron & enters tubular parts.
- Glucose, amino acids, salts & excess of water all gets reabsorbed by the blood vessels surrounding these tubules.
- so the fluid now ~~flowing~~ flowing in the tubular part is urine which gets collected in collecting duct of nephrons and then pass to ureter that pass urine to urinary bladder where store for some time.

- This ~~blad~~ bladder is a muscular structure which is under nervous control. Urine gets excrete from urethra.

Excretion in Plants

- Oxygen & Carbondioxide excrete through stomata ✓ by diffusion and lenticel.
- Excess water is removed by transpiration.
- Plants can even loose some of their old parts like leaves and bark of tree.
- Other waste products like resins & gums especially in old xylem cells which also can also be lost by plants.
- Plants also secrete some waste substance into the soil around them.