

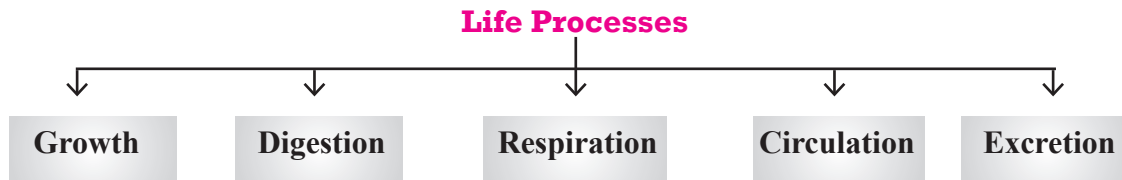
Chapter - 6

Life Processes

All living things perform certain life processes like growth, excretion, respiration, circulation etc.

All the processes like respiration, digestion, which together keep the living organisms alive and perform the job of body maintenance are called life processes.

Examples :



I. Nutrition

(The whole process by which an organism obtain its food)

Nutrition in Plants

↓
Plants are autotrophs.
↓
Can make their own food.
↓
animals for their food.

Nutrition in Animals

↓
Animals are hetrotrophs.
↓
Depends on plants or other

Modes of Nutrition

Autotrophic

Kind of nutrition in which inorganic materials like CO₂, water etc. are utilized to prepare organic food by the process of photosynthesis.
E.g., Green plants.

Heterotrophic

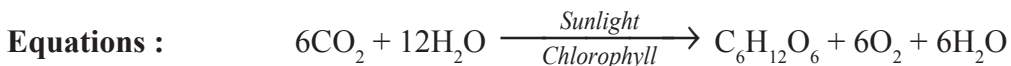
Kind of nutrition in which organisms do not possess the ability to synthesize their own food. They depend on autotrophs for their food supply directly or indirectly.
E.g., Animals, fungi.

Autotrophic Nutrition :

The organisms which carry out autotrophic nutrition are called autotrophs (green plants).

Autotrophs $\xrightarrow{\text{Use}}$ Simple inorganic material $\xrightarrow[\text{ino}]{\text{Convert}}$ Complex high energy molecules
(Carbohydrates)

Autotrophic nutrition is fulfilled by the process by which autotrophs take in CO₂ and H₂O and convert these into carbohydrates in the presence of chlorophyll, sunlight is called **Photosynthesis**.



Raw Materials for Photosynthesis :

- Sunlight
- Chlorophyll ☒ Sunlight absorbed by chlorophyll
- CO₂ ☒ Enters through stomata and oxygen (O₂) is released as by-product through stomata on leaf.
- Water ☒ Water + dissolved minerals like nitrogen, phosphorus etc. are taken up by the roots of the soil.

Site of Photosynthesis :

Chloroplast in the leaf, chloroplast contain chlorophyll (green pigment).

Main Events of Photosynthesis :

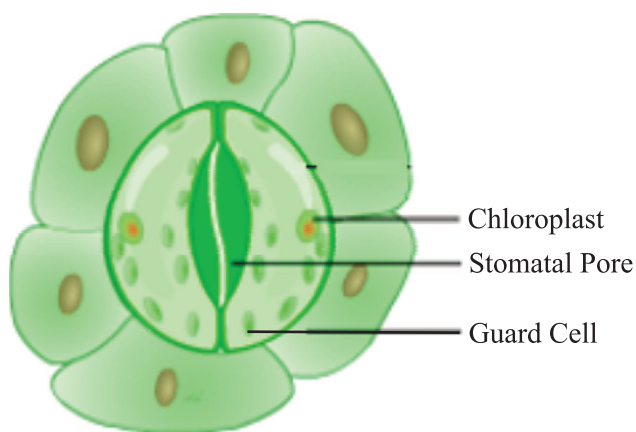
- Absorption of light energy by chlorophyll

- Conversion of light energy into chemical energy + splitting (breaking) of water into hydrogen and oxygen
- Reduction of CO_2 to carbohydrates

Stomata : Tiny pores present on the surface of the leaves.

Functions :

- Exchange of gases O_2/CO_2 .
- Loses large amount of water (water vapour) during transpiration.



Heterotrophic Nutrition

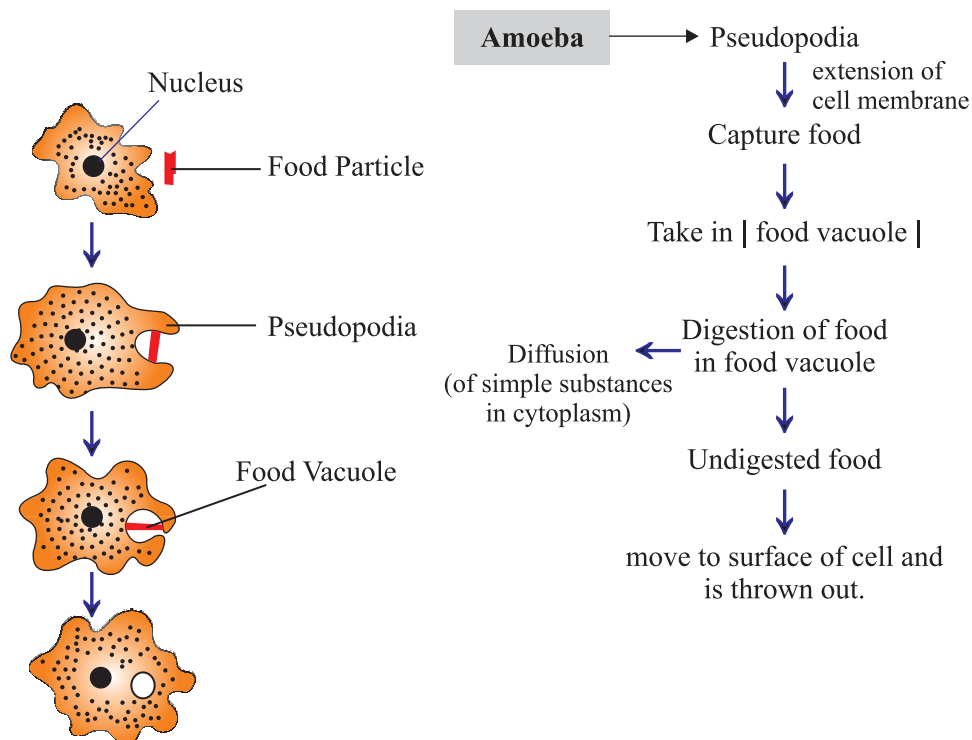
Holozoic	Saprophytic	Parasitic
Animals take in solid food and breakdown inside the body. <i>E.g., Amoeba, animals.</i>	Organisms feed on dead, decaying matter. <i>E.g., Fungi.</i>	Parasites live inside or outside other organism (host) and derive nutrition from it. <i>E.g., Cuscuta (plant parasites), Ticks etc.</i>

How do organisms obtain their food

Unicellular/Single celled organisms : Food is taken up through entire surface.

- Example : (i) Amoeba
(ii) Paramecium

(i) Amoeba

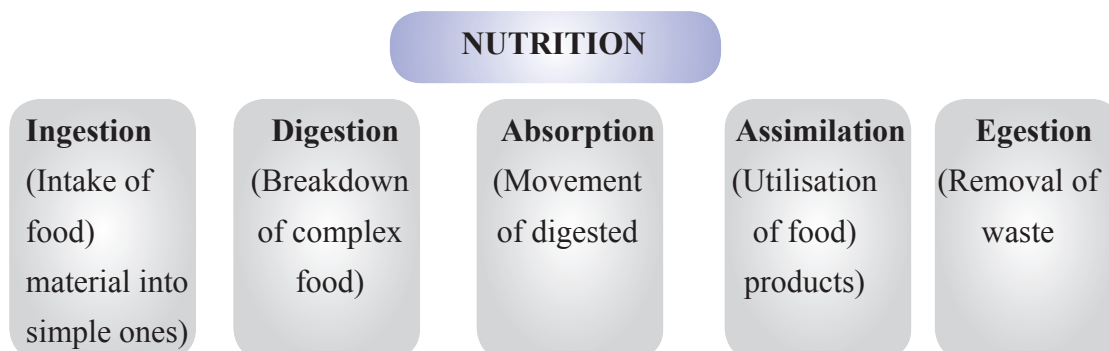


Nutrition in Amoeba

(ii) Paramecium

Paramecium ☒ Cilia ☒ Take in food ☒ At a specific spot
(Present all over the body)

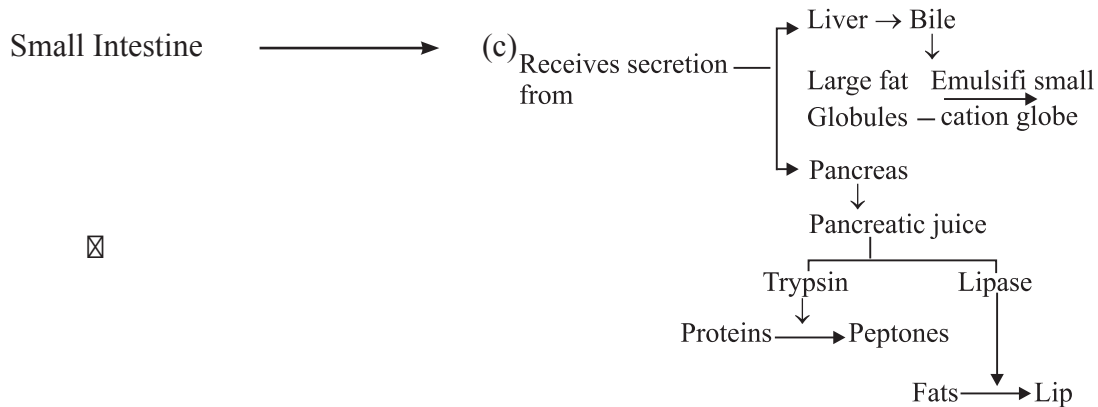
I. NUTRITION



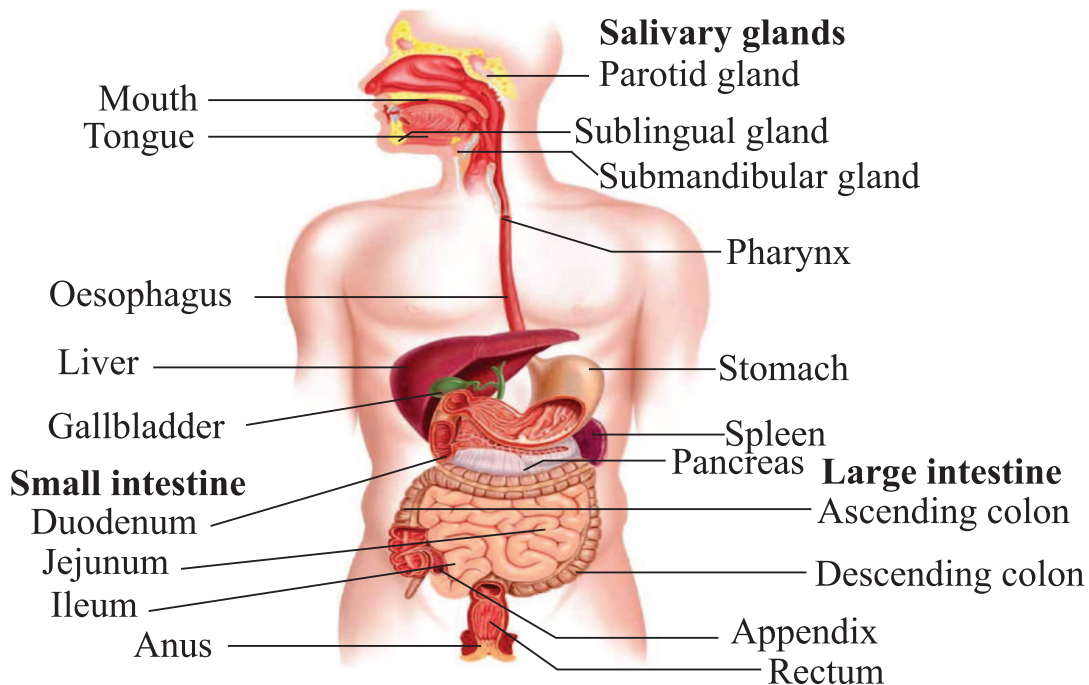
Different organisms utilize different nutritional processes as it depends upon the source of carbon from where the food is taken.

Nutrition in Human Beings

Mouth	→	Intake of whole food.									
☒											
Teeth	→	Chewing/grinding of food.									
☒											
Tongue	→	Rolling of food + Tasting of food + Swallowing/Pushing down of the food.									
☒											
Salivary Glands	→	Secrete saliva + Mucus									
☒		$\text{Starch} \xrightarrow[\text{[Saliva]}]{\text{Salivary amylase}} \text{Sugar}$									
Oesophagus	→	Taking food from mouth to stomach by Peristaltic movements. [Contraction and expansion of muscles of the oesophagus]									
☒											
Stomach	→	Gastric glands $\xrightarrow{\text{Secrete}}$ Gastric juice									
		Gastric Juice <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">PEPSIN</td> <td style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">HCl</td> <td style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">MUCUS</td> </tr> <tr> <td style="text-align: center;">(Enzyme that breaks down proteins)</td> <td style="text-align: center;">(Makes medium acidic)</td> <td style="text-align: center;">(Protects inner lining of the stomach)</td> </tr> </table>	PEPSIN	HCl	MUCUS	(Enzyme that breaks down proteins)	(Makes medium acidic)	(Protects inner lining of the stomach)			
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(Enzyme that breaks down proteins)	(Makes medium acidic)	(Protects inner lining of the stomach)									
☒											
Small Intestine	→	(a) Intestinal enzyme									
		☒ convert									
		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Carbohydrate</td> <td style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Fats</td> <td style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Proteins</td> </tr> <tr> <td style="text-align: center;">☒</td> <td style="text-align: center;">☒</td> <td style="text-align: center;">☒</td> </tr> <tr> <td style="text-align: center;">Glucose</td> <td style="text-align: center;">Fatty acid + Glycerol</td> <td style="text-align: center;">Amino acids</td> </tr> </table>	Carbohydrate	Fats	Proteins	☒	☒	☒	Glucose	Fatty acid + Glycerol	Amino acids
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☒	☒	☒									
Glucose	Fatty acid + Glycerol	Amino acids									
Small Intestine	→	(b) Villi ☒ Helps in absorption of food into the blood									
		(finger like projections)									



- Large Intestine
- ☒ Absorb excess of water
 - ☒ The rest of the material is removed from the body via the anus.



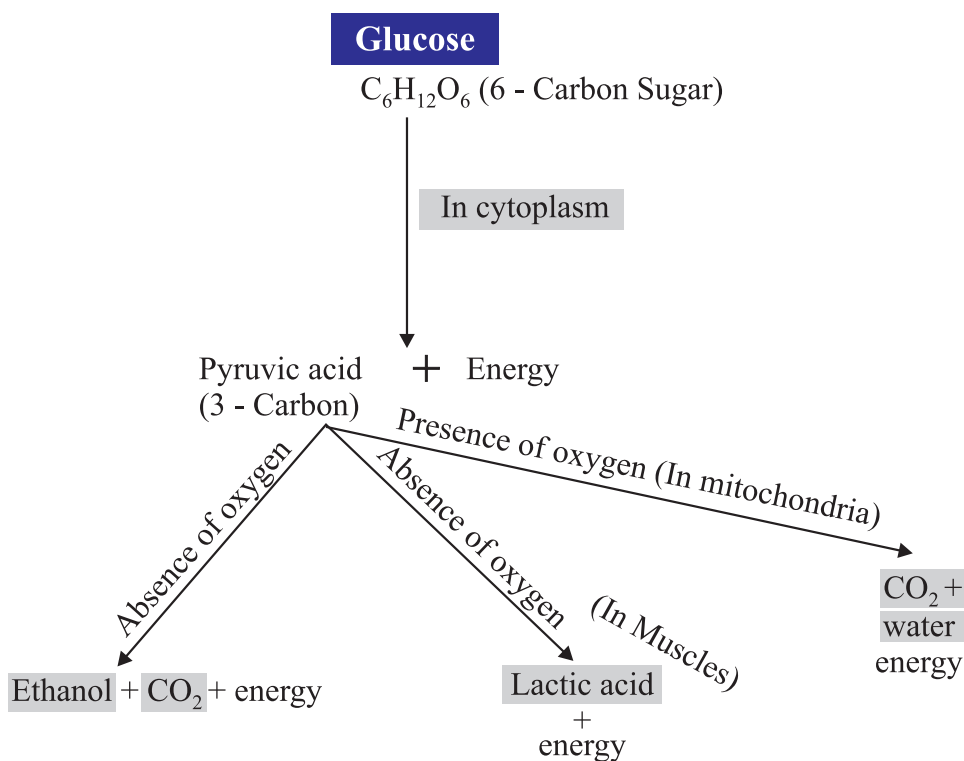
Human Digestive System

RESPIRATION

Respiration involves :

- (i) Gaseous exchange : Intake of oxygen from the atmosphere and release of CO_2 ☐ Breathing
- (ii) Breakdown of simple food in order to release energy inside the cell ☐ Cellular respiration

Breakdown of Glucose by Various Pathways



Respiration

Aerobic

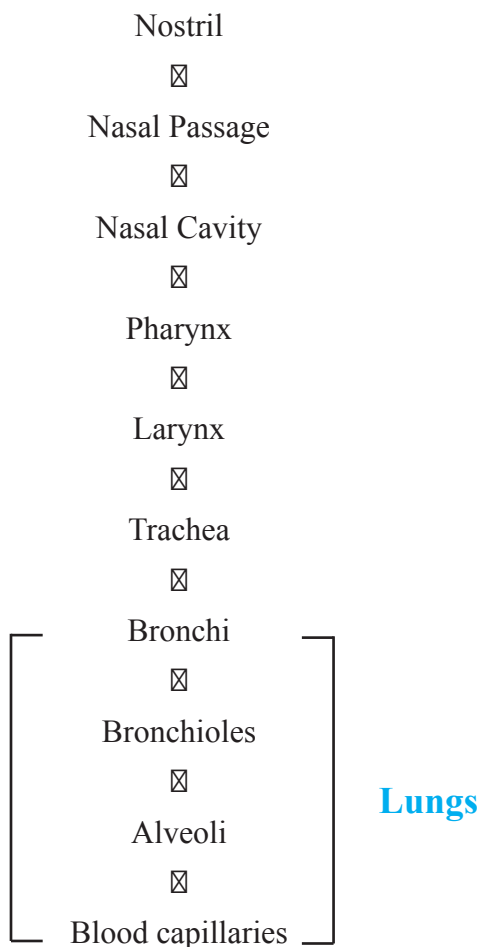
- Takes place in the presence of oxygen
- Occurs in mitochondria
- End products are CO_2 and H_2O
- More amount of energy is released

Anaerobic

- Takes place in the absence of oxygen
- Occurs in cytoplasm
- End products are alcohol or lactic acid
- Less amount of energy is released

Human Respiratory System

Passage of air through the respiratory system :



Mechanism of Breathing

Inhalation	Exhalation
- During inhalation the thoracic cavity (chest cavity) expands. - Ribs lift up. - Diaphragm become flat in shape. - Volume of lungs increases and air enters the lungs	- Thoracic cavity contracts. - Ribs move downwards. - Diaphragm becomes dome shaped. - Volume of lungs decreases and air exits from the lungs.

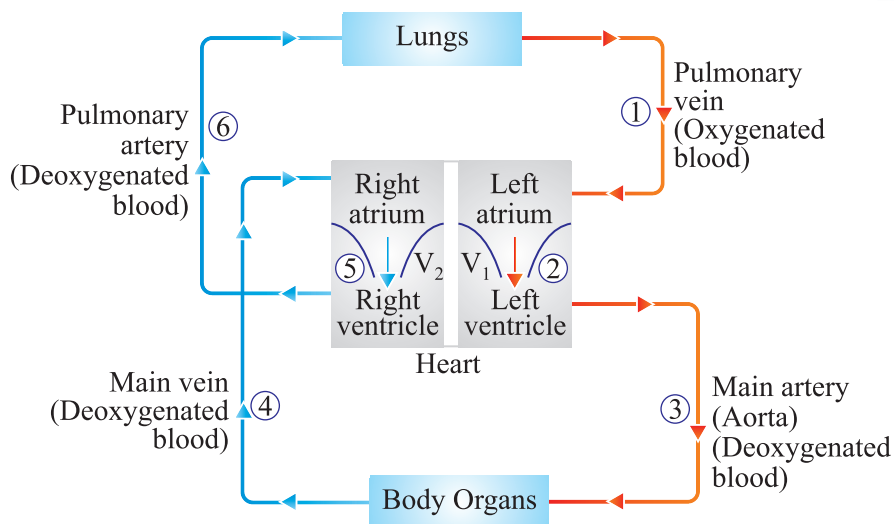
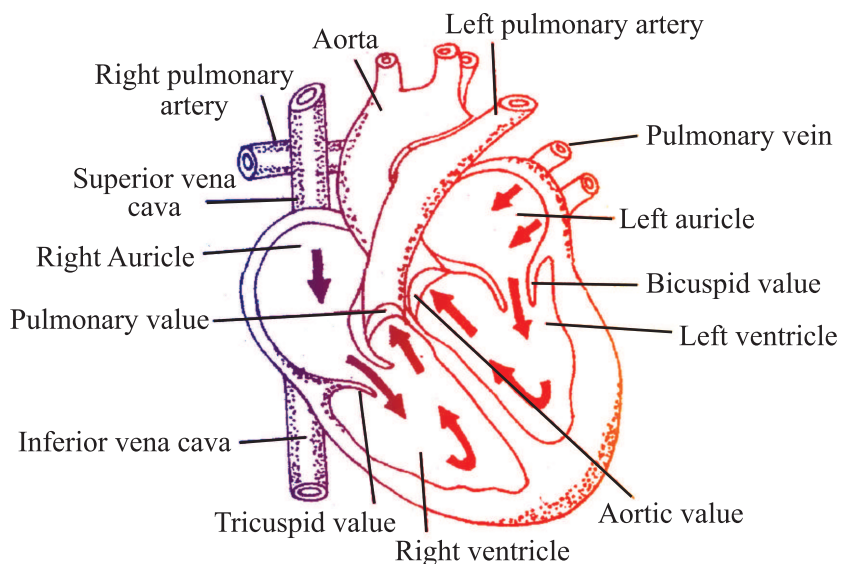


Diagram to show blood circulation in human body

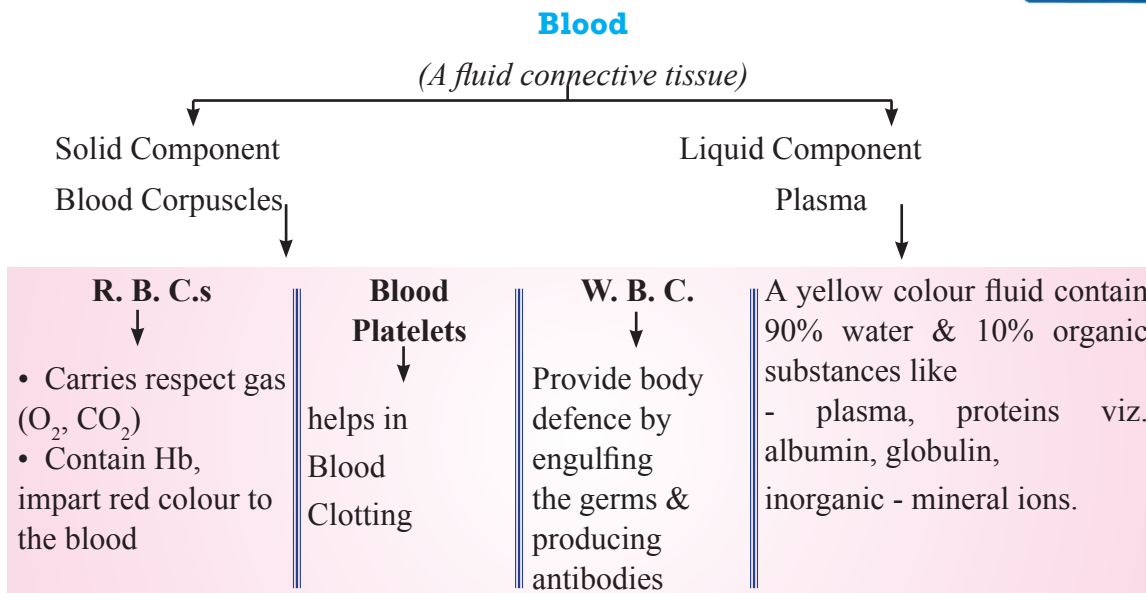
Double circulation

Blood travels twice through the heart in one complete cycle of the body.



Direction of blood flow through human heart

- **Pulmonary Circulation :** Blood moves from the heart to the lungs and back to the heart.
- **Systemic Circulation :** Blood moves from the heart to rest of the body and back to the heart.



Lymph : A yellowish fluid escapes 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 Vessels

Arteries

1. Carry oxygenated blood from heart to body parts except pulmonary artery.
2. Also called distributing vessel.
3. Thick and elastic.
4. Deepseated

Veins

1. Carry deoxygenated blood from body parts to heart except pulmonary vein.
2. Also called collecting vessel.
3. Thin and less elastic.
4. Superficial as compared to arteries

Transportation in Plants

There are two main conducting pathways in a plant.

Xylem

1. Carries water & minerals from the roots to other parts of the plant.
2. No energy is used.

Phloem

1. Carries product of photosynthesis from leaves to the other parts of the plant.
2. Energy is used from ATP.

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

Function :

(a) Absorption and upward movement of water and minerals by creating PULL.

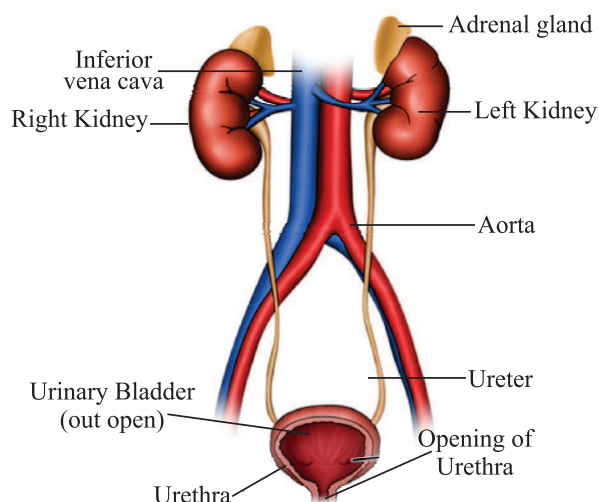
(b) Helps in temperature regulation in plant.

Transport of food from leaves (food factory) to different part of the plant is called **Translocation**.

EXCRETORY SYSTEM IN MAN

Excretory/urinary system consists of :

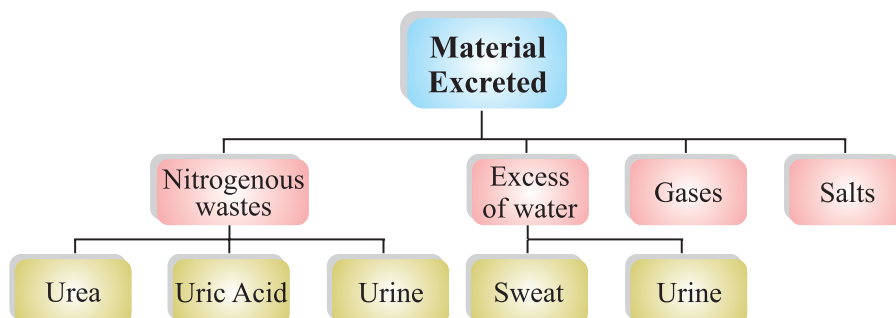
- (1) The kidneys : The excretory organ
- (2) The ureters : The ducts which drain out urine from the kidneys
- (3) The urinary bladder : The urinary reservoir
- (4) The urethra : The channel to the exterior



The human excretory system

EXCRETION

1. The metabolic activities in 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 these wastes are removed from our body.



2. Unicellular organisms remove these wastes by simple diffusion.

Human Excretory System

Formation of Urine

- Each kidney contains many filtration units called as 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 the nitrogenous wastes like urea and uric acid and many other substances.
- The blood gets filtered through the glomerulus and this filtrate enters the tubular part of nephron.
- As this filtrate moves down the tubular part, glucose, amino acids, salts and excess of water gets selectively reabsorbed by the blood vessels surrounding these tubules.
- The amount of water reabsorbed depends upon :
 - * How much excess of water is there in the body and,
 - * How much nitrogenous wastes need to be excreted out.
- So the fluid now flowing in the tubular part is urine which gets collected in collecting ducts of nephrons.
- These collecting ducts together leave the kidney at a common point by forming the ureter.
- Each ureter drains the urine in the urinary bladder where it is stored until the pressure of expanded bladder leads to an urge to pass it out through urethra.
- This bladder is a muscular structure which is under nervous control.
- 180 litres of filtrate is formed daily but only 2 litres is excreted out as urine so the rest is reabsorbed in the body.

Functions of Nephron

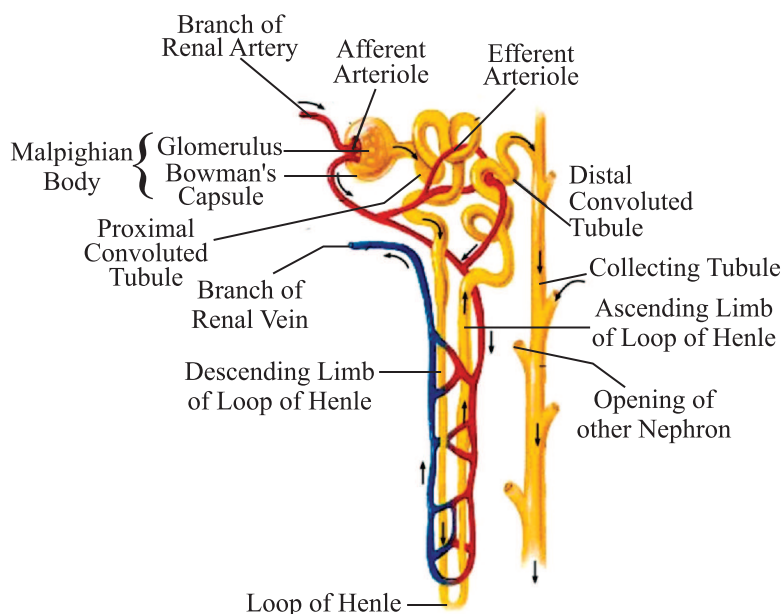
- Excretion of nitrogenous wastes.
- To maintain the water and ionic balance (osmotic regulation).

Excretion in Plants

Plants use different strategies for excretion of different products :

- Oxygen and carbon dioxide is diffused through stomata.
- Excess water is removed by transpiration.

- Plants can even lose some of their old parts like old leaves and bark of tree.
- Other waste products like raisins and gums especially in old xylem cells which can also be lost by plants.
- Plants also secrete some waste substances into the soil around them.



Structure of a Nephron

The urine formation involves three steps :

1. **Glomerular filtration** : Nitrogenous wastes, glucose water, amino acid filter from the blood into Bowman Capsule of the nephron.
2. **Tubular reabsorption** : Now, useful substances from the filtrate are reabsorbed back by capillaries surrounding the nephron.
3. **Secretion** : Urea, extra water and salts are secreted into the tubule which open up into the collecting duct & then into the ureter.

Artificial Kidney

Haemodialysis : The process of purifying blood by an artificial kidney. It is meant for kidney failure patients.