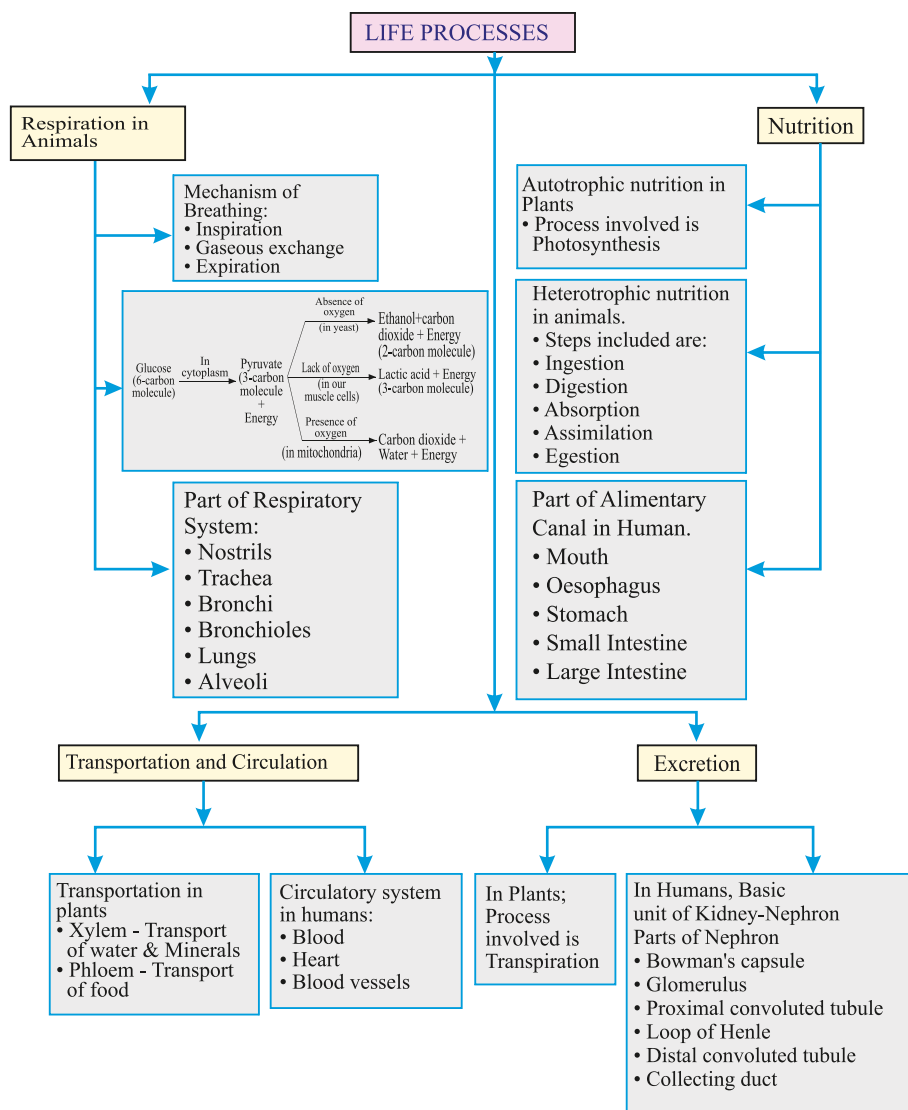


Chapter - 5

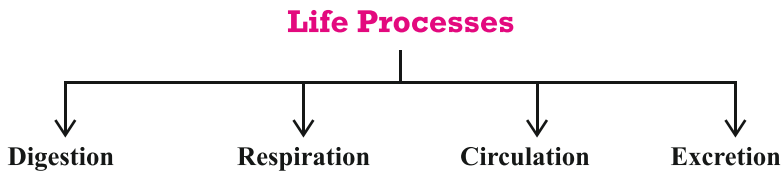
Life Processes



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 obtains its food)

Nutrition in Plants

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

Nutrition in Animals

↓
Animals are hetotrophs.
↓
Depend on plants or other animals for their food

Modes of Nutrition

Autotrophic

Kind of nutrition in which inorganic materials like CO_2 , water etc. are utilized to prepare organic food by the process of photosynthesis.
E.g., Green plants.

Heterotrophic

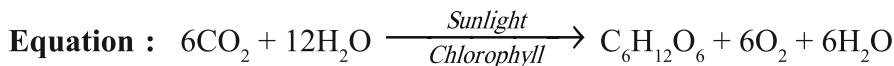
Kind of nutrition in which organisms do not possess the ability to synthesize their own food. They depend on autotrophs for their food supply directly or indirectly.
E.g., Animals, fungi.

Autotrophic Nutrition :

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

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

Autotrophic nutrition is the mode of nutrition by which autotrophs take in CO_2 and H_2O and convert these into carbohydrates in the presence of chlorophyll, sunlight and this process is called **Photosynthesis**.



Raw Material for Photosynthesis :

- Sunlight
- Chlorophyll \rightarrow Sunlight absorbed by chlorophyll
- $\text{CO}_2 \rightarrow$ Enters through stomata and oxygen (O_2) is released as by-product through stomata on leaf.
- Water \rightarrow 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 :

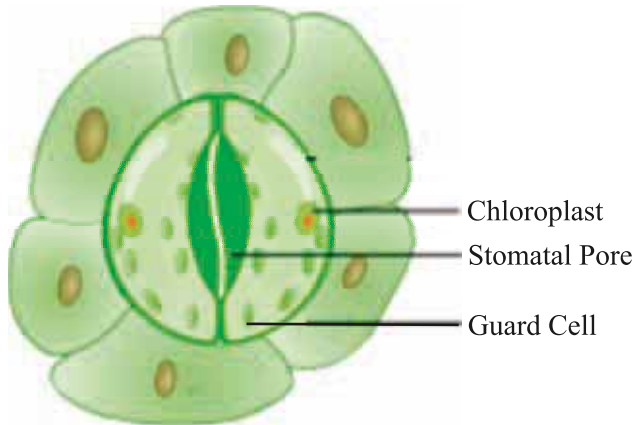
- Absorption of light energy by chlorophyll

- 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

Animals take in solid food and break it down inside the body.

E.g., Amoeba, animals.

Saprophytic

Organisms feed on dead, decaying matter.

E.g., Fungi.

Parasitic

Parasites live inside or outside other organism (host) and derive nutrition from it.

E.g., Cuscuta (plant parasites), Ticks leech etc

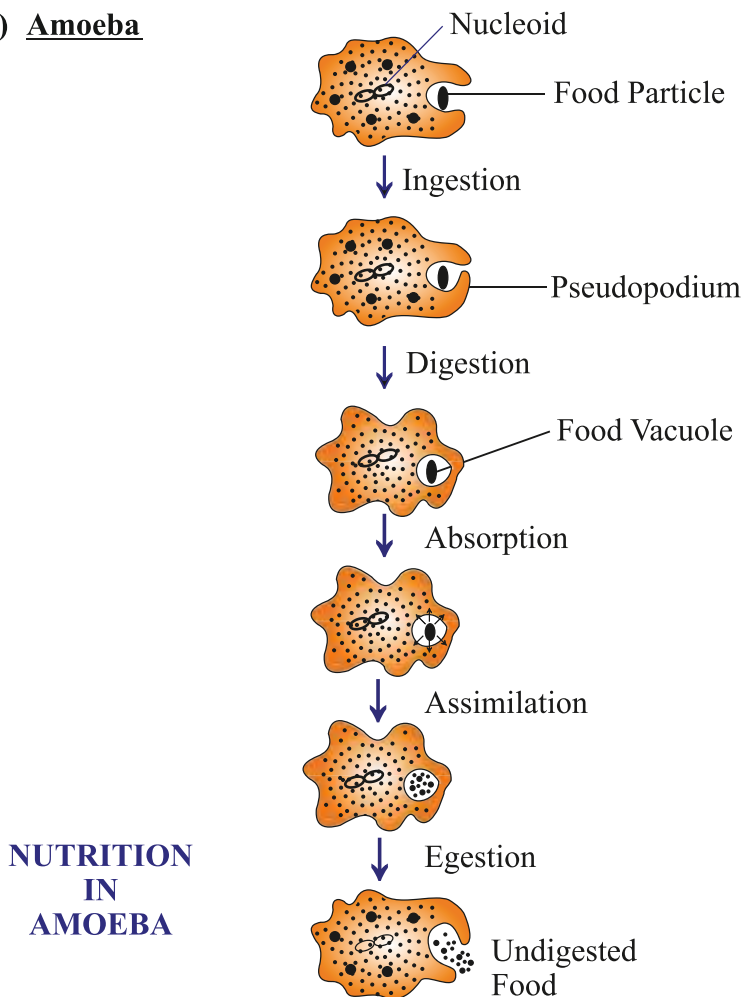
How do organisms obtain their food

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

Example : (i) Amoeba

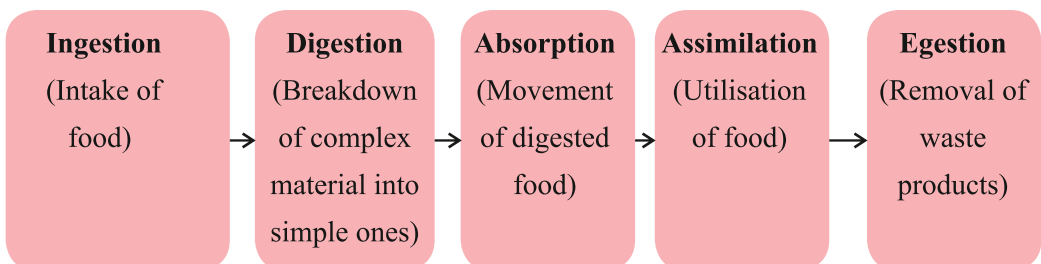
(ii) Paramecium

(i) Amoeba



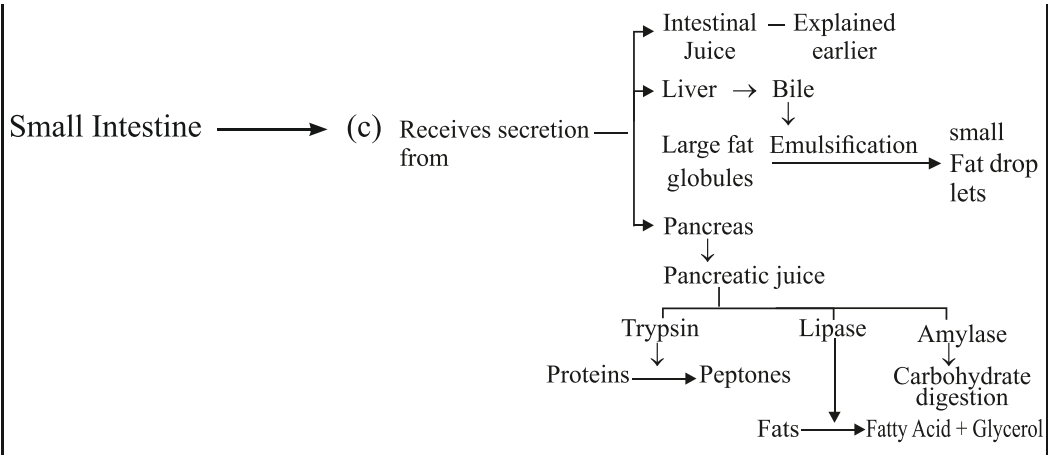
(ii) Paramecium: Which is a unicellular organism takes in food at a specific spot which is moved there by cilia (small hair present all over the body).

Steps of Nutrition : (In Heterotrophs)

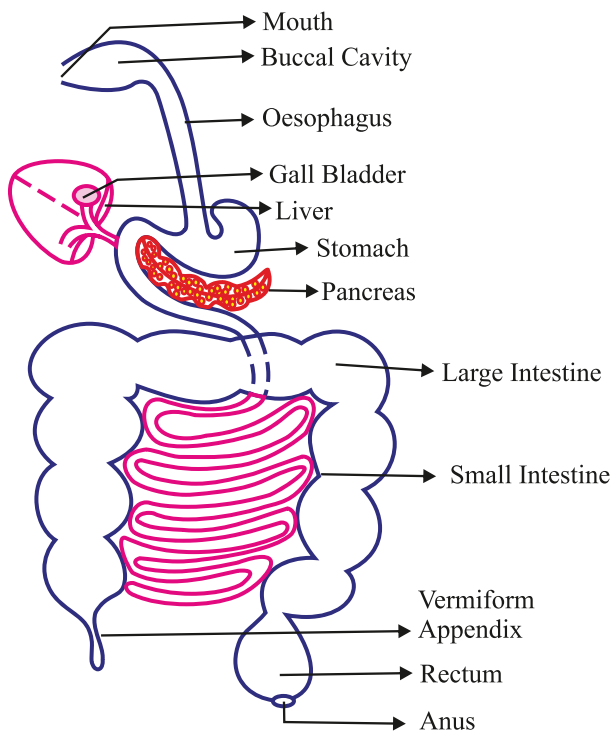


Nutrition in Human Beings

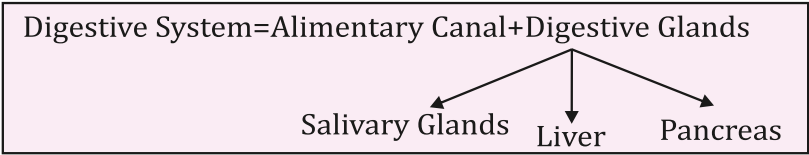
1.	Mouth	—————→	Intake of whole food.
	Teeth	—————→	Chewing/grinding of food.
	Tongue	—————→	Rolling of food + Tasting of food + Swallowing/Pushing down of the food.
	Salivary Glands	—————→	Secrete saliva + Mucus
			<div style="text-align: center;"> $\text{Starch} \xrightarrow[\text{[Saliva]}]{\text{Salivary amylase}} \text{Sugar}$ </div>
2.	Oesophagus	—————→	Taking food from mouth to stomach by Peristaltic movements. [Contraction and expansion of muscles of the oesophagus]
3.	Stomach	—————→	<div style="display: flex; align-items: center; justify-content: space-between;"> Gastric glands → <div style="text-align: center;"> <i>Secrete</i> Gastric Juice </div> Gastric juice </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> PEPSIN (Enzyme that breaks down proteins) </div> <div style="text-align: center;"> HCl (Makes medium acidic) </div> <div style="text-align: center;"> MUCUS (Protects inner lining of the stomach) </div> </div>
4.	Small Intestine	—————→	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="text-align: center;"> (a) Intestinal enzyme ↓ convert <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> Carbohydrate ↓ <div style="border: 1px solid black; padding: 2px;">Glucose</div> </div> <div style="text-align: center;"> Fats ↓ <div style="border: 1px solid black; padding: 2px;">Fatty acid + Glycerol</div> </div> <div style="text-align: center;"> Proteins ↓ <div style="border: 1px solid black; padding: 2px;">Amino acids</div> </div> </div> </div> </div>
5.	Small Intestine	—————→	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="text-align: center;"> (b) Villi (finger like projections) </div> <div style="text-align: center;"> → </div> <div style="text-align: center;"> Helps in absorption of digested food into the blood </div> </div>



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



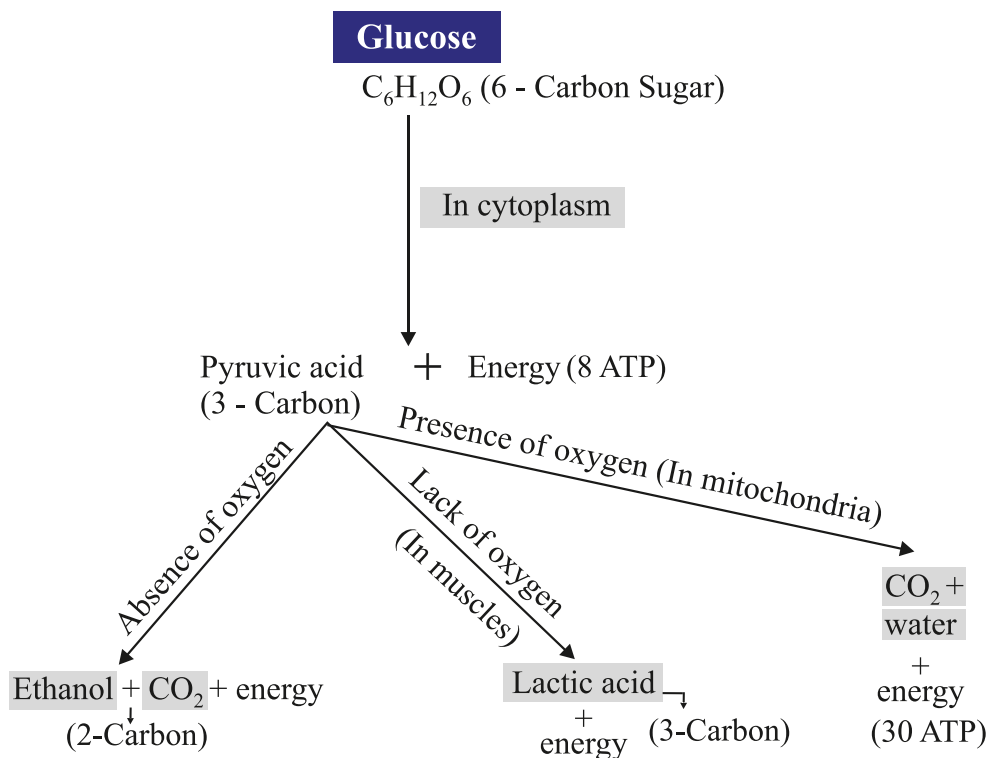
Human Digestive System



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

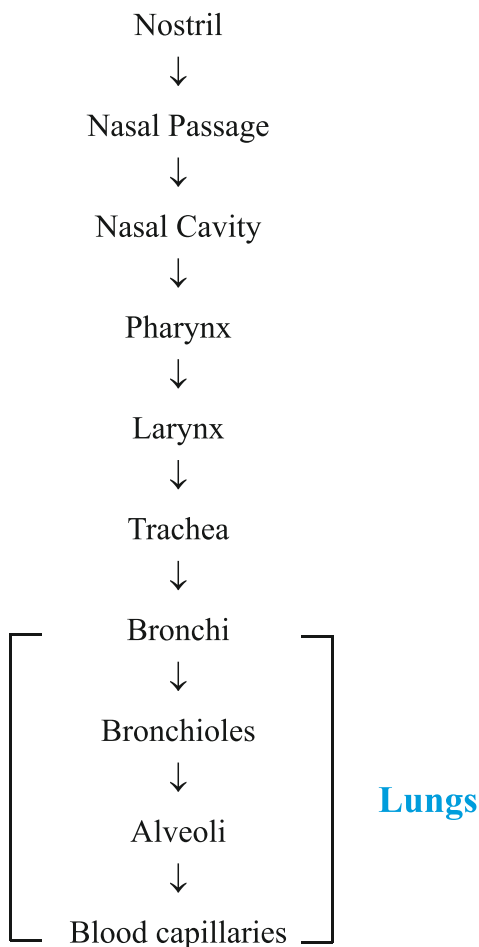
- Takes place in the presence of oxygen
- Occurs in mitochondria
- End products are CO_2 and H_2O
- More amount of energy is released

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 :



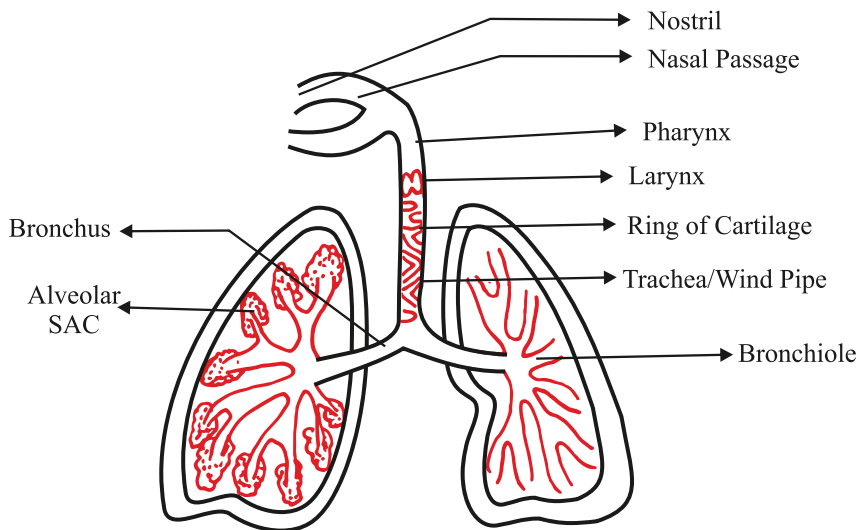
Mechanism of Breathing

Inhalation

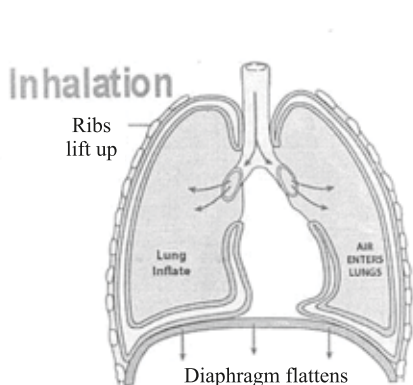
- During inhalation the thoracic cavity (chest cavity) expands.
- Ribs lift up.
- Diaphragm become flat in shape.
- Volume of lungs increases and air enters the lungs

Exhalation

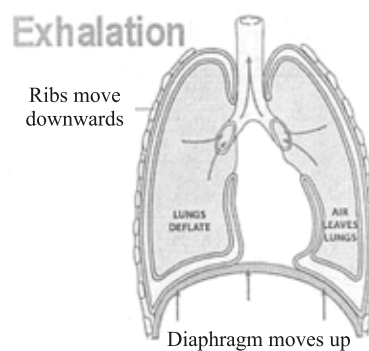
- Thoracic cavity contracts.
- Ribs move downwards.
- Diaphragm becomes dome shaped.
- Volume of lungs decreases and air exits from the lungs.



Human Respiratory System



(a) Inhalation



(b) Exhalation

Exchange of gases between alveolus, blood and tissues

- (I) Air rich in O_2 (in alveolus) → Enters in blood (through blood vessels) → O_2 Binds with haemoglobin in RBC → O_2 released in tissues → Glucose Breakdown → CO_2 Production (in tissues)
- (ii) CO_2 from tissues released in blood and gets dissolved → Carried through blood vessels → Released in Alveolar sac → Sent out through nostrils

Terrestrial organisms : Use atmospheric oxygen for respiration

Aquatic organisms : Use dissolved oxygen for respiration

Respiration in plants

Respiration in plants is simpler than the respiration in animals. Gaseous exchange occurs through :

- (a) Stomata in leaves
- (b) Lenticels in stems
- (c) General surface of the root

Transportation

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

The circulatory system in human beings consists of

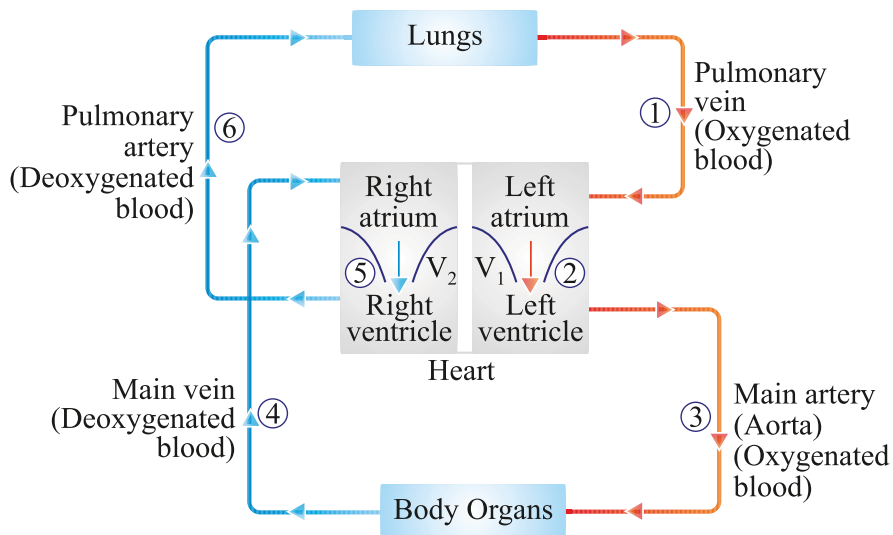
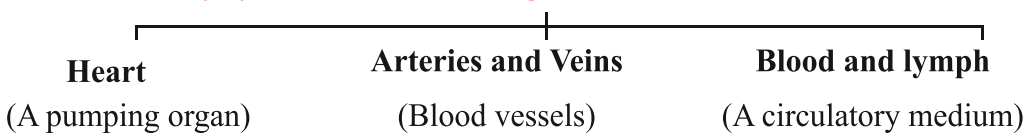
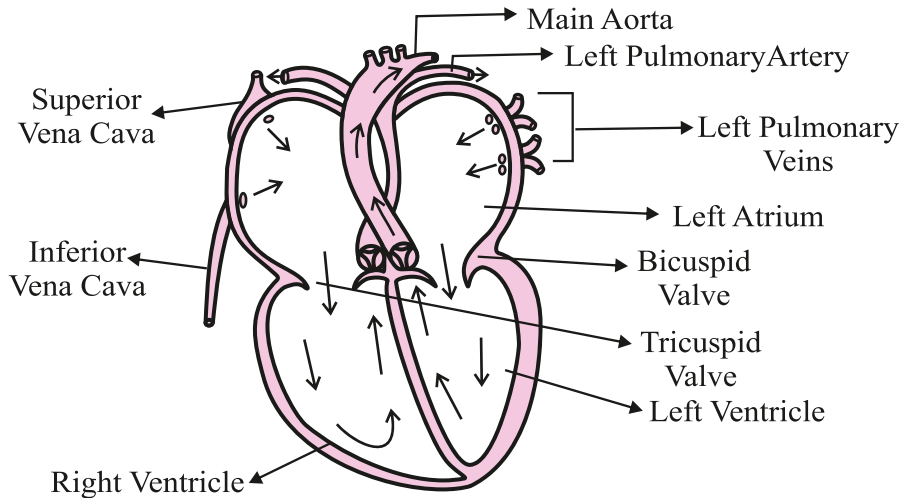


Diagram to show blood circulation in human body

Double circulation

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

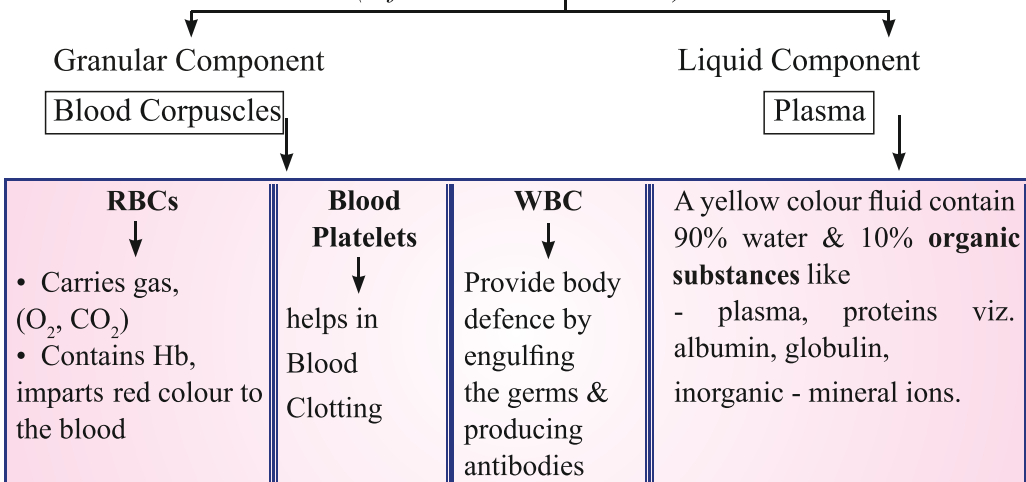


**Sectional View of Human Heart
Showing Direction of Blood Flow**

- **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.

Blood

(A fluid connective tissue)



Lymph : A yellowish fluid escapes from the blood capillaries into the intercellular spaces, contains 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. Deep Seated

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.

Role of Transpiration

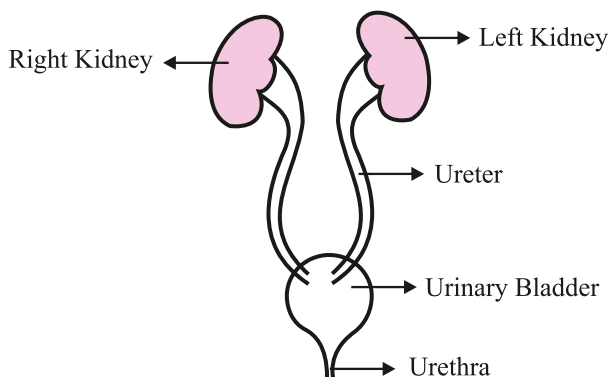
- (a) Absorption and upward movement of water and minerals by creating osmotic pressure pull.
- (b) Helps in temperature regulation in plant.

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

EXCRETORY SYSTEM IN HUMAN

Excretory/urinary system consists of :

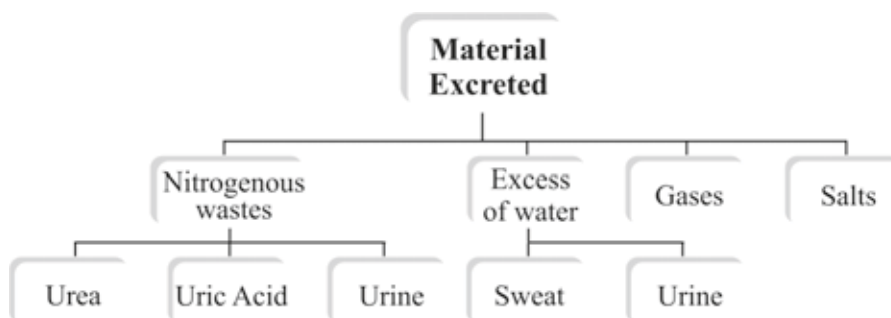
- (1) The kidneys : The excretory organ
- (2) The ureters : The ducts which drain out urine from the kidneys
- (3) The urinary bladder : The urine reservoir
- (4) The urethra : The channel to the exterior



Excretory System in Human Beings

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

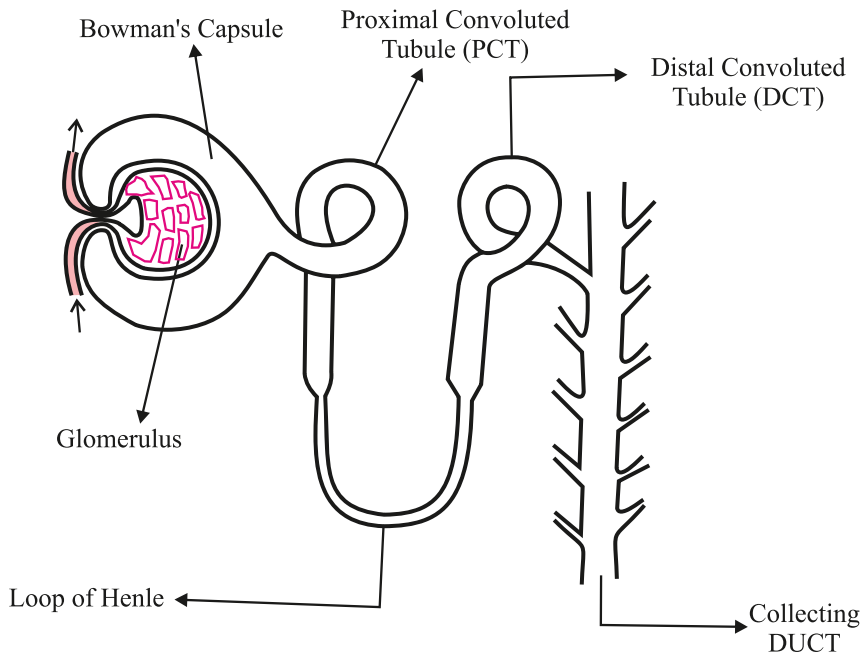
1. It maintains water equilibrium, pH equilibrium, ionic equilibrium of the blood and osmotic equilibrium.
2. It helps to excrete out waste product urea in the dissolved form from the blood.
3. It excretes poisonous substance like drugs, toxins etc. from the body.
4. It regulates blood pressure by controlling The fluid balance in the body.

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).



Structure of a Nephron

The urine formation involves three steps :

1. **Glomerular filtration** : Nitrogenous wastes, glucose water, amino acid filtered 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.

Excretion in Plants

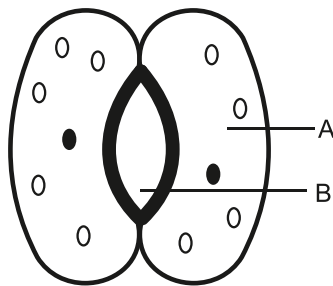
Plants use different strategies for excretion of different products :

- Oxygen and carbon dioxide is diffused through stomata.
- Excess water is removed by transpiration.
- Plants can even loose some of their old parts like old leaves and bark of tree.
- Other waste products like resins and gums especially in old xylem cells can also be lost by plants.
- Plants also excrete some waste substances into the soil around them.

VERY SHORT ANSWER TYPE QUESTIONS (1 MARK)

(A) Multiple Choice Questions (MCQ's)

1. Which is the first enzyme that gets mixed with food in the digestive tract?
(a) Pepsin (b) Cellulose
(c) Trypsin (d) Amylase
2. The opening and closing of the stomatal pore depends upon.
(a) Temperature (b) Oxygen
(c) Concentration of CO_2 in stomata (d) Water in guard cells
3. The parts A and B Shown in the given diagram are:



- (a) Guard cell and stomatal pore
- (b) Epidermal cell and stomatal pore
- (c) Epidermal cell and guard cell
- (d) Guard cell and epidermal cell

4. Complete the following reactions:
$$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow[\text{?}]{\text{Sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$$

(a) Mitochondria (b) Plastid
(c) Iodine (d) Chlorophyll
5. The energy currency of the cell is:
(a) ATP (b) AMP
(c) CO_2 (d) ADP
6. The blood leaving the tissues becomes richer in
(a) Carbon-di-oxide (b) Water
(c) Haemoglobin (d) Oxygen
7. The internal (cellular) energy reserve in autotrophs is
(a) Glycogen (b) Protein
(c) Starch (d) Fatty acid
8. During deficiency of oxygen in tissues of human beings, pyruvic acid is converted into lactic acid in the
(a) Cytoplasm (b) Chloroplast
(c) Mitochondria (d) Golgibody
9. What prevents backflow of blood inside the heart during contraction-
(a) Thin walls of atria
(b) Valves in heart
(c) Thick muscular walls of ventricles
(d) All of the above
10. Which of the following enzyme needs an acidic medium to be active
(a) Trypsin (b) Pepsin
(c) Lipase (d) None of the above
11. An organism which breaks down the food material outside the body and then absorbs it is (CBSE, 2022)
(a) a plant parasite, Cuscuta (b) an animal parasite, Tapeworm
(c) a bacteria, Rhizobium (d) a fungus, Rhizopus

12. Name a circulatory fluid in the human body other than blood
 - (a) Platelets
 - (b) RBC
 - (c) Lymph
 - (d) Plasma
13. The respiratory pigment in human beings is
 - (a) carotene
 - (b) chlorophyll
 - (c) haemoglobin
 - (d) mitochondria
14. Roots of the plant absorb water from the soil through the process of:
 - (a) diffusion
 - (b) transpiration
 - (c) osmosis
 - (d) none of these
15. During respiration, exchange of gases takes place in
 - (a) trachea and larynx
 - (b) alveoli of lungs
 - (c) alveoli and throat
 - (d) throat and larynx

Answers-

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (d) | 2. (d) | 3. (a) | 4. (d) | 5. (a) |
| 6. (a) | 7. (c) | 8. (a) | 9. (b) | 10. (b) |
| 11. (d) | 12. (C) | 13. (C) | 14. (C) | 15. (b) |
16. Name the tissue that transports water and minerals in plants.
 17. What is the role of acid in our stomach ?
 18. What is emulsification ?
 19. Name the cell organelle in which photosynthesis occurs.
 20. Name the largest artery in the human body.
 21. Define transpiration.
 22. What is the structural and functional unit of kidney called ?
 23. In following questions two statements are given one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:
 - (a) Both A and R are true, and R is correct explanation of the Assertion (A).
 - (b) Both A and R are true, but R is not the correct explanation of the Assertion (A).
 - (c) A is true, but R is false.
 - (d) A is false, but R is true.

1. Assertion: Rate of breathing in aquatic organisms is slower than terrestrial organisms.
Reason: The amount of dissolved oxygen is fairly low as compared to amount of oxygen in air.
2. Assertion: The effect of root pressure in transport of water is more important at night.
Reason: During the day the transpiration pull acts as major driving force in the movement of water in the system.
3. Assertion: The opening and closing of the pore of stomata is a function of the guard cell.
Reason: The stomatal pore opens when water comes out of guard cells causing their shrinkage.
4. Assertion: Carnivores have a shorter small intestine.
Reason: Meat is easier to digest.
5. Assertion: Plasma of blood transports food, carbon dioxide and nitrogenous wastes.
Reason: Red blood corpuscles carry oxygen.

Answer:

1. (d) 2. (a) 3. (c) 4. (a) 5. (b)
- 24 Read the following and answer questions given below:
There is a progressive change in structure of heart between vertebrates like fishes to birds & mammals. Fish have a simple two chambered heart. Amphibians possess three chambered heart with two atria and a single ventricle. Reptiles have a septum (wall) that partially divides the ventricle. Birds and mammals have the four chambered design.
1. In fishes blood flows from heart to gills to body and back to heart. This is example of
(a) Single circulation (b) double circulation
(c) Triple circulation (d) circulation
 2. Which of the following organisms shows mixing of oxygenated and deoxygenated blood-
(a) Pigeon (b) Fish
(c) Frog (d) Crocodile
 3. Birds and mammals have four-chambered hearts as it leads to separation of oxygenated and deoxygenated blood. Such a separation allows-
(i) Highly efficient supply of oxygen to the body

- Now choose the right option-

4. In which of the following vertebrate group/groups heart does not pump oxygenated blood to different parts of the body-
 - (a) Pisces and Amphibians
 - (b) Amphibians and reptiles
 - (c) Amphibians only
 - (d) Pisces only
5. Which chamber of human heart receives deoxygenated blood from tissues of the body.
 - (a) Left atrium
 - (b) Right atrium
 - (c) Left ventricle
 - (d) Right ventricle

Answer:

- ### SHORT ANSWER TYPE QUESTION (2 and 3 MARKS)

1. Name the organs which perform the following functions in human beings
 - i) Absorption of digested food
 - ii) Absorption of water
 - iii) Secretion of Bile juice.
2. Diagrammatically illustrate the process of utilization and digestion of food in Amoeba.
3. Give two examples each of organisms which perform the following types of nutrition.
 - a) Saprotrophic
 - b) Parasitic
 - c) Holozoic
4. What will happen if green plants disappear from earth?
5. Mention three major events that occur during photosynthesis?
6. Name the energy currency in the living organisms. When and where it is produced?
7. How do carbohydrates, proteins and fats get digested in human beings?

8. Explain the three pathways of breakdown of glucose in living organisms.
9. How is small intestine designed to absorb digested food.
10. Describe the process of double circulation in human beings.
11. Define the term transpiration. Design an experiment to demonstrate this process. (CBSE 2018-19)

LONG ANSWER TYPE QUESTION (5 MARKS)

1. i) Write three types of blood vessels. Give one important feature of each (CBSE, Delhi 2018-19)
ii) How are CO_2 and O_2 transported in human beings? (CBSE 2018-19)
2. Write the function of the following in the human alimentary canal. (CBSE 2018-19)
i) Saliva ii) HCl in Stomach iii) Bile juice iv) Villi
3. Write one function of each of the following enzymes.
i) Pepsin ii) Lipase
4. Draw a well labelled diagram of Nephron. Explain the process of formation of urine in the human kidney.
5. Why energy needs in plants are very less as compared to animals? Explain.
6. Draw the diagram showing Human Respiratory System. Label the following parts.
a) Alveolus
b) Trachea
c) Bronchus
d) Lungs