



Class 10<sup>th</sup>

## BIOLOGY

### LIFE PROCESSES

1. Life processes are the basic processes in living organisms which are necessary for maintaining their life.
  2. The basic life processes are – nutrition, respiration, transportation, and excretion.
  3. Life processes require energy which is provided by nutrition.
- A. **Nutrition:** It is the process of taking food by an organism and its utilization by the body for life processes.

#### I. Modes of Nutrition

(i) **Autotrophic:** It is a type of nutrition in which organisms can synthesize their own food.

E.g. Green Plants

(ii) **Heterotrophic:** It is a type 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.

Eg. Animals, Fungi

#### (iii) Types of heterotrophic nutrition:

There are three main types of heterotrophic nutrition. They are saprophytic, parasitic, and holozoic nutrition.

##### a) **Saprophytic nutrition:**

In this type of nutrition organisms secrete some digestive enzymes to digest the dead organic food and get nourishment from organic remains like excreta, dead organisms, etc.

e.g. Fungi, yeast, and mushrooms

##### b) **Parasitic nutrition:**

In this type of nutrition, one organism resides on or inside the body of another organism and derives its food without killing other organisms. Parasites are those organisms which obtain shelter & food from another organism.

e.g. Cuscuta, orchids, ticks, lice, leeches, roundworms, tapeworms, plasmodium, etc.

##### c) **Holozoic nutrition:**

In this mode of nutrition, the organism involves the intake of solid pieces of food. This food is subsequently digested and absorbed.

e.g. *Amoeba*, *Paramecium*, birds, fishes, humans, etc.

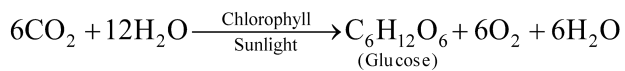


It involves the following steps: ingestion, digestion, absorption, assimilation, and egestion.

## II. Nutrition in Plants:

a) **Photosynthesis:** It is the process by which plants prepare food by using carbon dioxide and water in the presence of sunlight and chlorophyll. The food prepared is carbohydrate which is stored in the form of starch. Oxygen is released in this process.

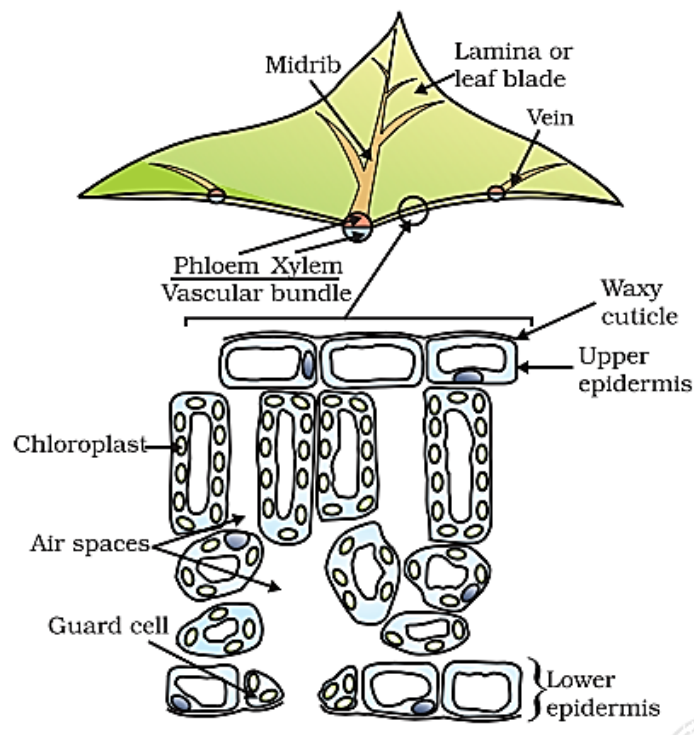
b) **Equation of photosynthesis:**



c) **Raw materials required in photosynthesis**

1. Carbohydrate
2. Photosynthetic pigment
3. Sunlight
4. Water

d) **Site of Photosynthesis:** Photosynthesis occurs in the chloroplast or kitchen of the cell in green tissues inside and young stem.



e) **Mechanism of photosynthesis:**

Photosynthesis takes place in three main steps.

- i) Absorption of light energy by chlorophyll.



ii) Conversion of light energy into chemical energy and splitting up of water molecules into hydrogen and oxygen.

iii) Reduction of carbon dioxide by hydrogen to form carbohydrates.

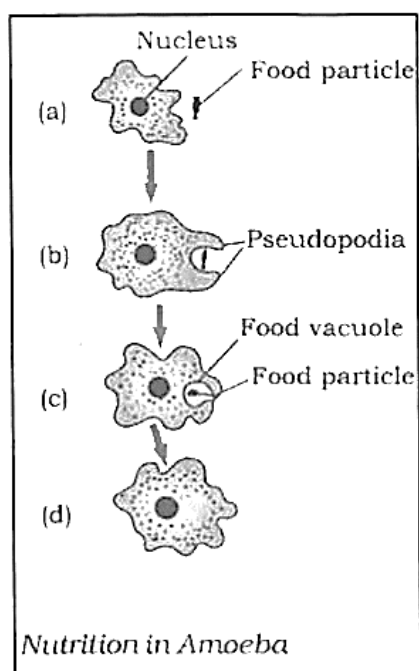
**f) Importance of photosynthesis**

Photosynthesis is an anabolic process which provides food to the living organisms.

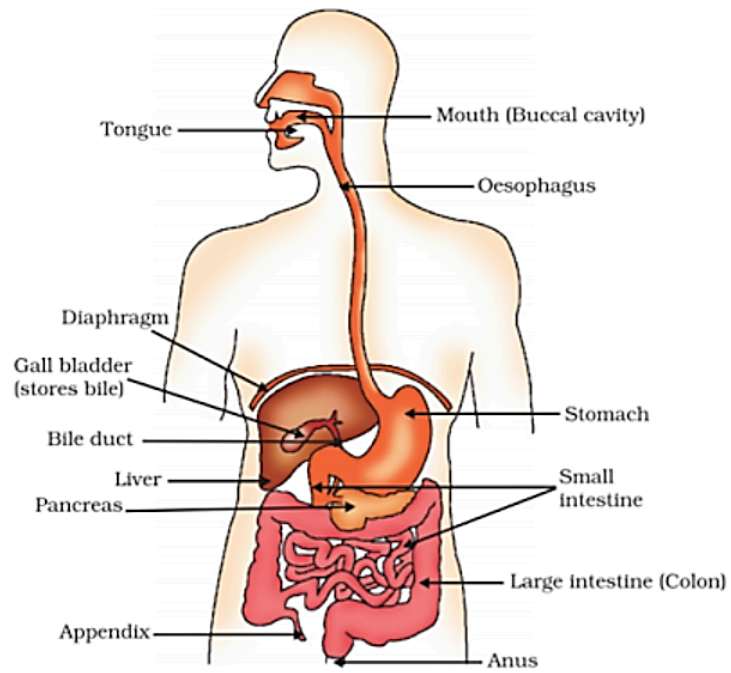
It purifies the atmospheric air by consuming  $\text{CO}_2$ , and evolving oxygen. It transforms light energy into chemical energy.

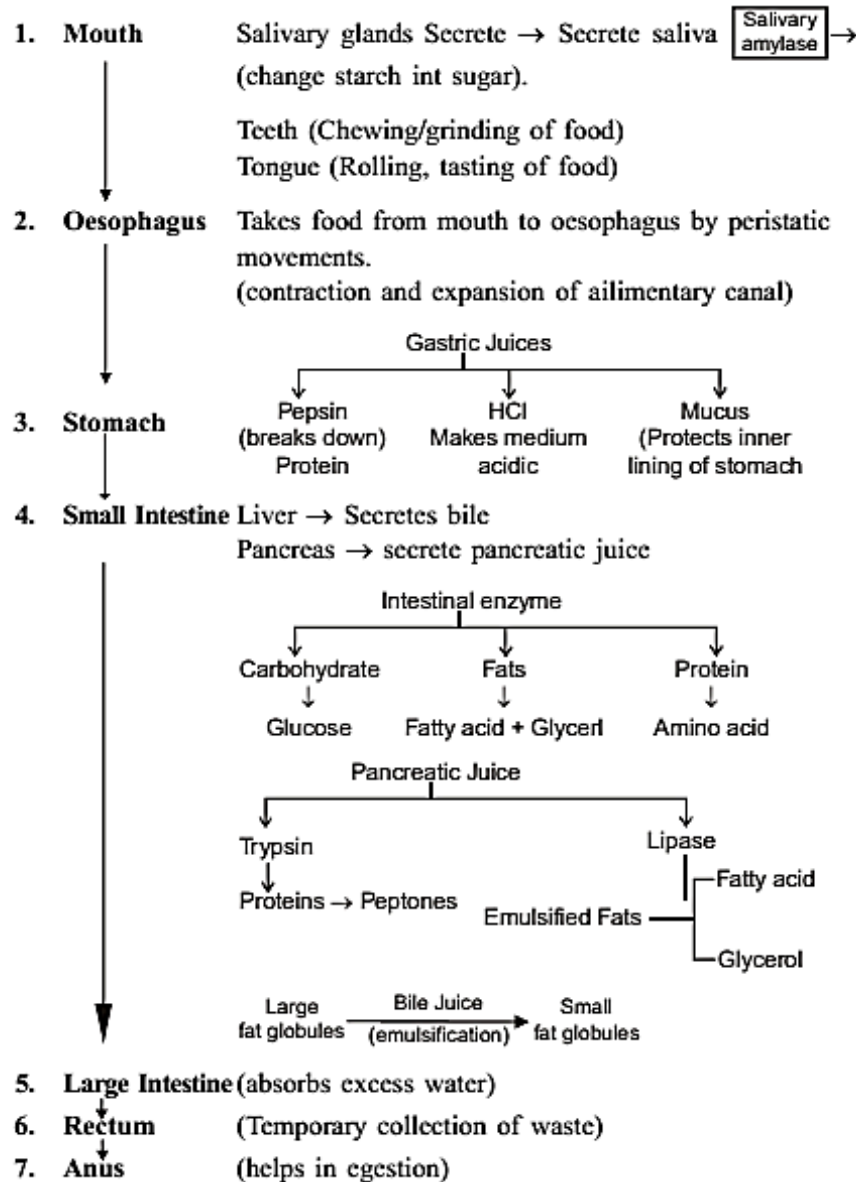
**III. Nutrition in animals:**

a) **Nutrition in Amoeba:** Amoeba is a unicellular animal living in water. It takes in food by forming finger-like projections called pseudopodia and forms a food vacuole. Inside the food vacuole, the food is digested and absorbed. The undigested food is then sent out through the surface of the cell.



**Nutrition in Humans:** The human digestive system comprises of alimentary canal and associated digestive glands.





- As shown in the flow chart, digestion begins from the mouth. In the mouth, it is broken down by salivary amylase.
- The food moves to the stomach through the oesophagus which performs peristaltic movement.
- Enzymes and various digestion juices from the liver, gall bladder, and pancreas act on the chunks from the stomach in the small intestine.
- In the large intestine, the remaining nutrients are absorbed and the leftover is removed from the body through the rectum and anus.

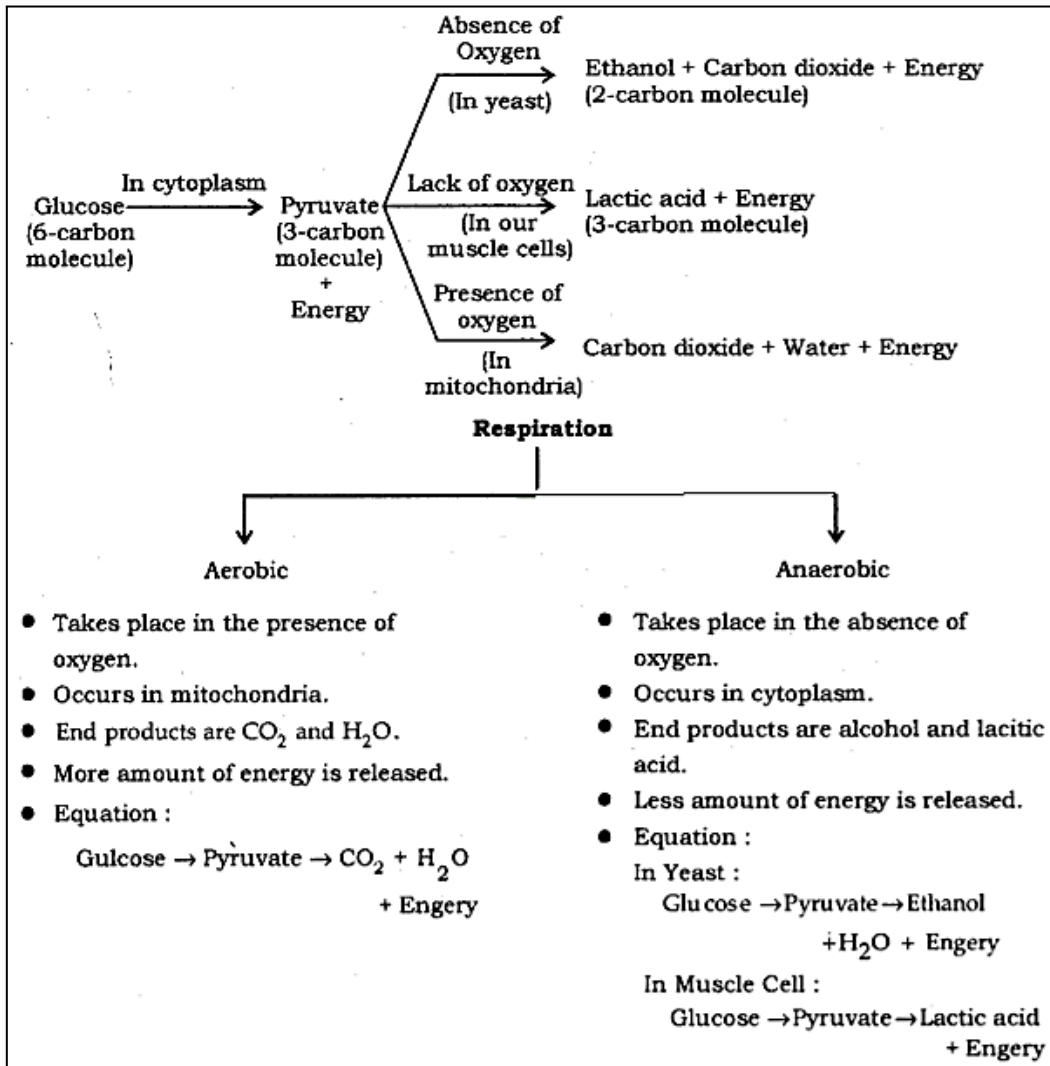
**B. Respiration:** It is a process in living organisms involving the production of energy, typically with the intake of oxygen and the release of carbon dioxide from the oxidation of complex organic substances.



**a) Respiration involves:**

- (i) Gaseous exchange (Breathing): Intake of oxygen from the atmosphere and release of  $\text{CO}_2$ .
- (ii) Cellular respiration: Breakdown of simple food in order to release energy inside the cell.

**b) Breakdown of Glucose by various pathways**



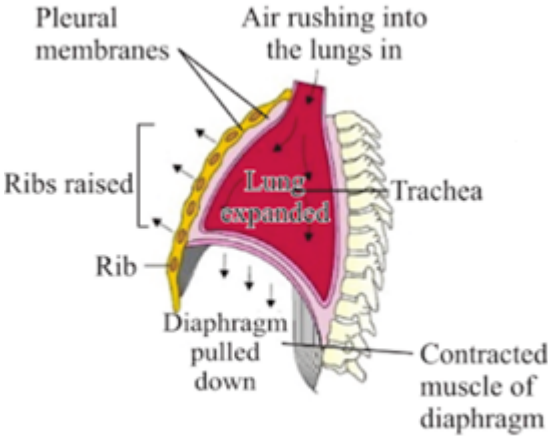
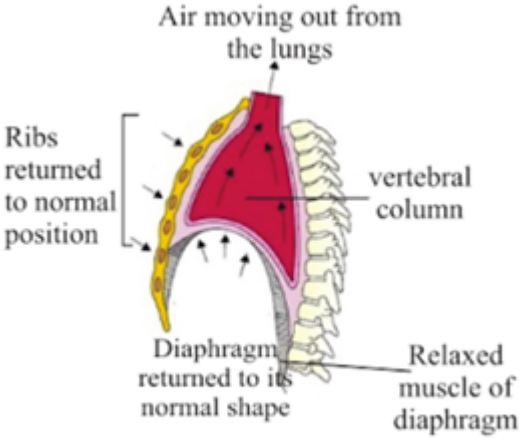
**c) Passage of air through the respiratory system:**

- Nostril: Air is taken into the body.
- Nasal Passage: It is a channel for airflow through the nose.
- Nasal Cavity: It is lined with hairs and mucus membranes. It warms, moisturizes, and filters air as it reaches the lungs.
- Pharynx: It contains rings of cartilage which ensure that the air passage does not collapse.



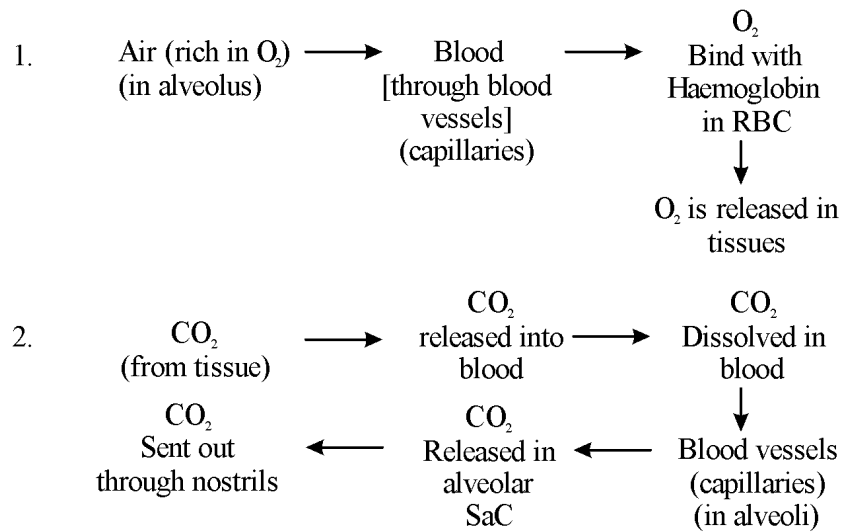
- Larynx: It houses the vocal cords and manipulates pitch and volume, which is essential for phonation. It is also known as the voice box.
- Trachea: The pharynx splits into the trachea and esophagus. It connects the larynx (or voice box) to the bronchi of the lungs. It provides airflow to and from the lungs for respiration
- Bronchi: They are the main passageway into the lungs. They are the extensions of the windpipe that shuttle air to and from the lungs. The oxygen goes to the lungs and carbon dioxide leaves the lungs through them.
- Bronchioles: Bronchi get smaller when they reach closer to lung tissues and are called Bronchioles. They are the passageways by which air passes through the nose or mouth to the alveoli of the lungs.
- Alveoli: They are smaller tubes that finally terminate in balloon-like structures which are called alveoli. They allow oxygen and carbon dioxide to move between the lungs and the bloodstream.
- Blood capillaries: These are the sites of transferring oxygen and other nutrients from the bloodstream to other tissues in the body. They also collect carbon dioxide and waste materials and return it to the veins.

#### IV. Mechanism of breathing

Inhalation	Exhalation
1. During inhalation, the volume of the thoracic cavity expands.	1. Thoracic cavity contracts.
2. Ribs move upwards.	2. Ribs move downwards
3. The diaphragm becomes flat in shape.	3. The diaphragm relaxes and becomes dome-shaped.
4. The volume of the lungs increases, pressure decreases and air enters the lungs.	4. The volume of the lungs decreases, pressure increases, and air exits from the lungs.
 <p>(a) Inhalation</p>	 <p>(b) Exhalation</p>



## V. Exchange of Gases between alveolus, blood and tissues.



**Terrestrial Organisms:**– use atmospheric oxygen for respiration

**Aquatic Organisms:** – use oxygen dissolved in water.

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

1. Stomata in leaves
2. Lenticels in stem
3. The general surface of the roots.

## C. Transportation:

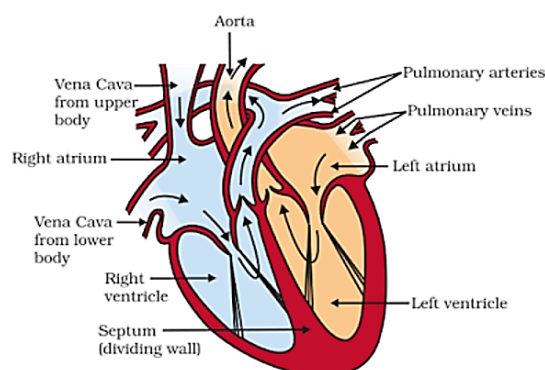
### I. Transportation in Human beings:

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

The circulatory system in humans consists of

- (i) The Heart (Pumping organ)
- (ii) Arteries and veins(Blood vessels)
- (iii) Blood and lymph

### II. The circulatory system in human







III. **Heart:** is a muscular organ which pumps blood to all parts of the body.

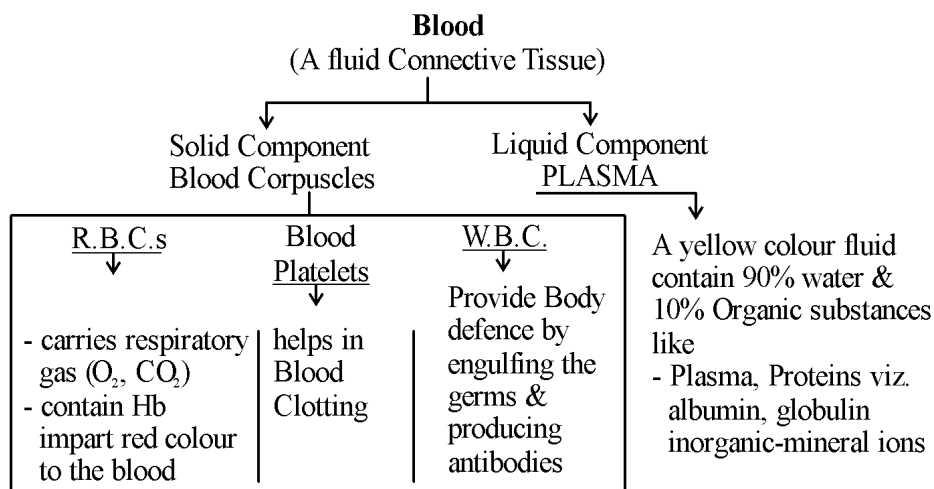
- It has four chambers. The upper chambers are called atria and the lower chambers are called ventricles.
- Since the ventricles pump the blood to the different organs, their walls are thicker than the atria.
- The right and left chambers are separated by a septum. It prevents the mixing of oxygenated and deoxygenated blood.
- The atria and ventricles have valves between them to prevent blood from flowing backward.

IV. **Arteries:** carry pure blood from the heart to all parts of the body. They are thick-walled and do not have valves.

V. **Veins:** carry impure blood from all parts of the body to the heart. They are thin-walled and have valves.

VI. **Capillaries:** are very narrow blood vessels which connect arteries and veins together. The exchange of food, water, oxygen, carbon dioxide, etc. between the blood and cells takes place through the capillaries.

VII. **Blood:** transports food, oxygen, and waste products. It consists of plasma, red blood cells (RBC), white blood cells (WBC), and platelets. Plasma transports food, water, carbon dioxide, nitrogenous waste, etc. Red blood cells transport oxygen. White blood cells kill harmful microbes and protect the body. Platelets help in the clotting of blood and prevent loss of blood during injury.



VIII. **Lymph:**

- It is a yellowish fluid which escapes from the blood capillaries into the intercellular spaces. It contains fewer proteins than blood.
- It carries digested and absorbed fat from the intestine and drains excess fluid from extracellular space back into the blood.

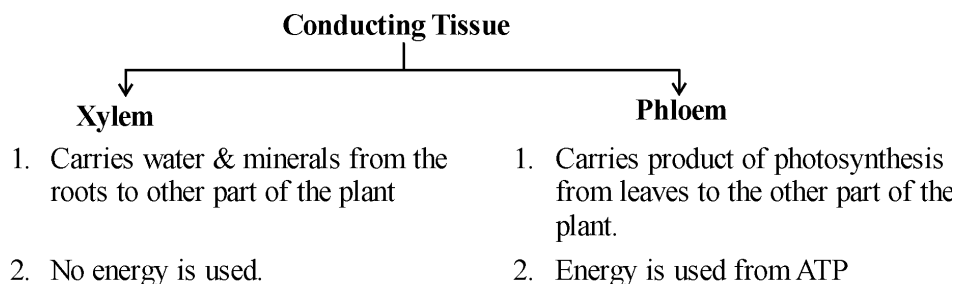
IX. **Double Circulation:** Blood travels twice through the heart in one complete cycle of the body.

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



**X. Transportation in Plants :** There are two main conducting tissues in a plant.

(a) Xylem (b) Phloem.



- Transpiration is the process by which plants lose water in the form of vapours.

- Role of Transpiration

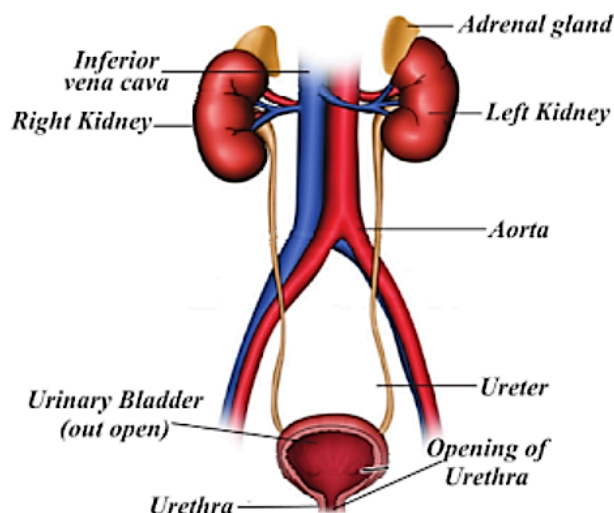
1. Absorption and upward movement of water and minerals by creating PULL.
2. Helps in temperature regulation in plants.

**XI. Translocation:** The transport of food from leaves (food factory) to different parts of the plant is called translocation.

**D. Excretion system in human beings.**

The excretory system consists of:

1. A pair of kidneys.
2. A urinary bladder
3. A pair of ureters.
4. A urethra



**I. Process of Excretion**

1. The renal artery brings in blood containing waste substances to the kidneys. The kidney filters blood.

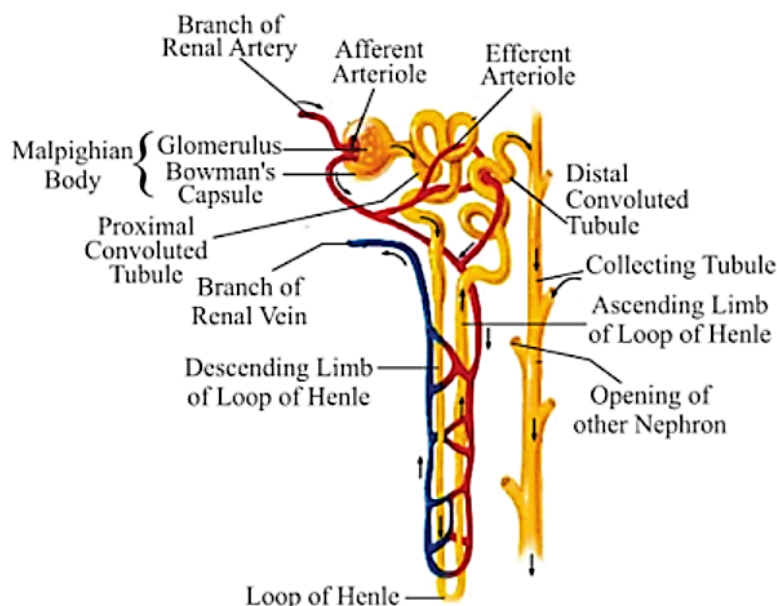


2. Urine produced in the kidneys passes through the ureters into the urinary bladder where it is stored until it is released through the urethra.

II. **Function of Kidney:** It removes the waste product from the blood i.e. urea which is produced in the liver.

III. **Nephron:** Each kidney has a large number of filtration units called nephrons.

The nephron is the structural and functional unit of the Kidney.



#### IV. The mechanism of Urine Formation involves three steps:

1. **Glomerular Filtration:** Blood is filtered from the glomerulus into the Bowman Capsule of the nephron. This filtrate passes through the tubules of the nephron.
2. **Tubular re-absorption:** Now, useful substances from the filtrate Like  $\text{Na}^+$ ,  $\text{K}^+$ , glucose, amino acids, etc. are reabsorbed by the capillaries surrounding the nephron into the blood.
3. **Secretion:** Urea, extra water, and salts are secreted into the tubule which opens up into the collecting duct & then into the ureter.

#### V. Artificial kidney

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

#### VI. Excretion in Plants:

1. Oxygen is released during photosynthesis.
2.  $\text{H}_2\text{O}$  by transpiration
3. Wastes may be stored in leaves, bark, etc. which fall off from the plant.
4. Waste products stored as gums, and resin in old Xylem
5. Plants excrete some waste into the soil around them.