

10th NCERT Solutions

Chapter - 01

BIOLOGY

Life Processes ✓

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TOPICS

to be covered

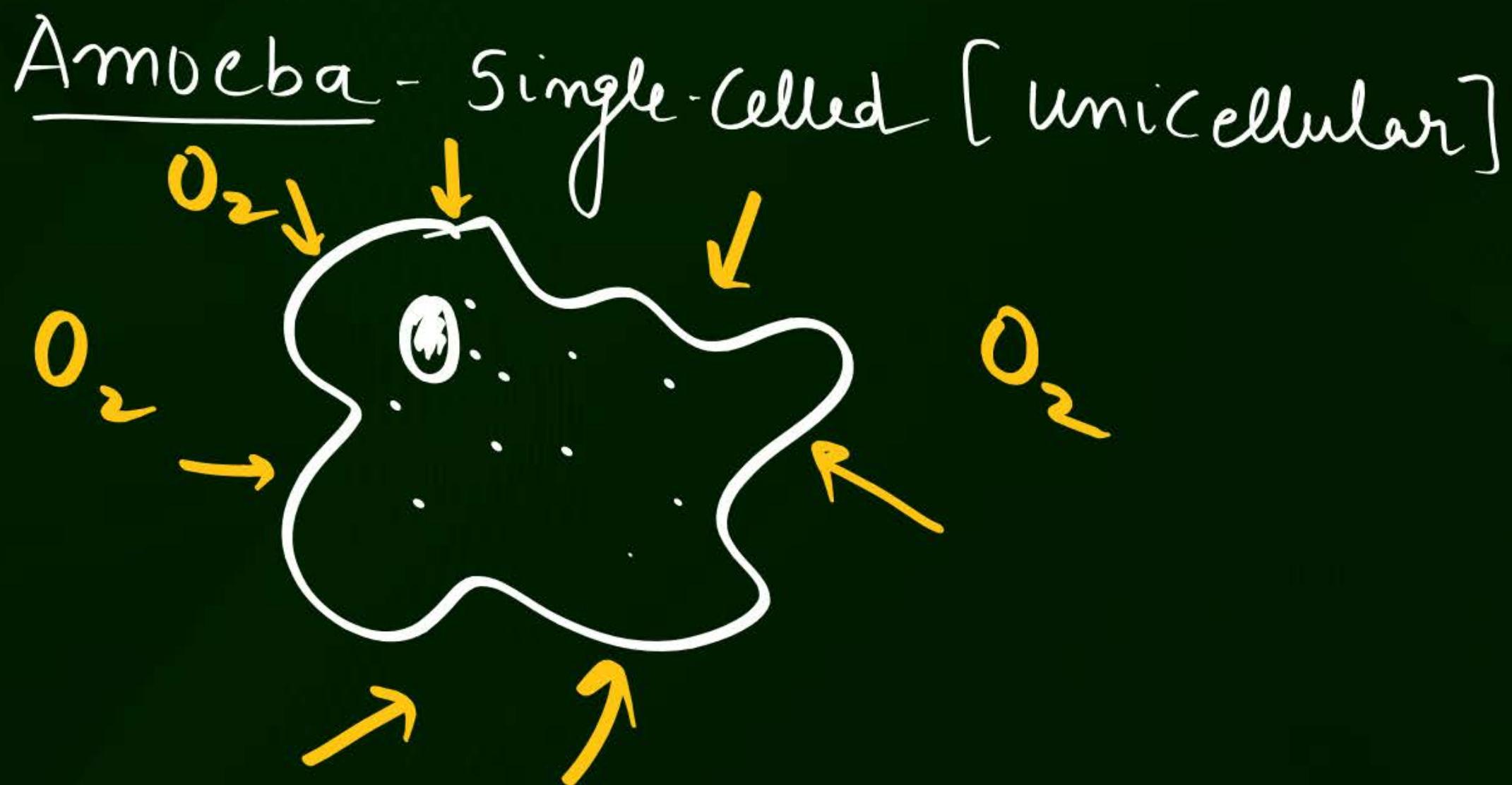


- 1 Life Processes
- 2 NCERT Questions Discussion
 - ① InText
 - ② Exercise

QUESTION-

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

Multi-cellular



Amoeba

In the case of a single-celled organism, no specific organs for exchange of gases are needed because the entire surface of the organism is in contact with the environment. But in multicellular organism, all the cells may not be in direct contact with the surrounding environment.

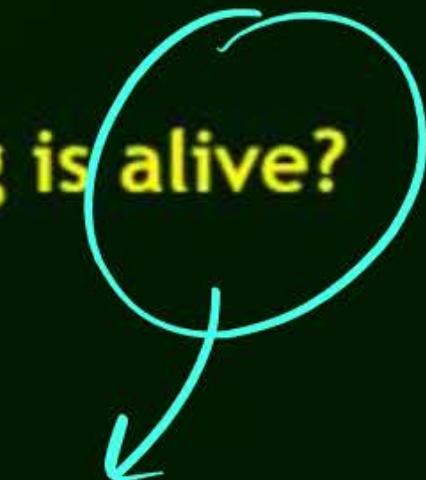
Thus, diffusion is insufficient to meet the oxygen requirements of large multicellular organisms (human beings) because the size/volume of human body is so big that oxygen cannot diffuse into all the cells of the human body quickly enough.



Slow process

QUESTION-

What criteria do we use to decide whether something is alive?



living

Following are the standards that decide whether something is alive:

(i) The major criterion is movement. Movement may be incurred through locomotion (running, walking, etc.), action of body parts (e.g., chewing of cud by cow), breathing, **growth** (in plants), maintenance and repair of cellular structures and molecular movement in metabolic reactions.

(ii) Requirement of food for performing life processes. (*Nutrition*)

(iii) Respiration → Energy (ATP)

(iv) Display of growth and development.

(v) Expulsion of metabolic wastes (excretion).

↳ Removal

QUESTION-

What are outside raw materials used for by an organism?



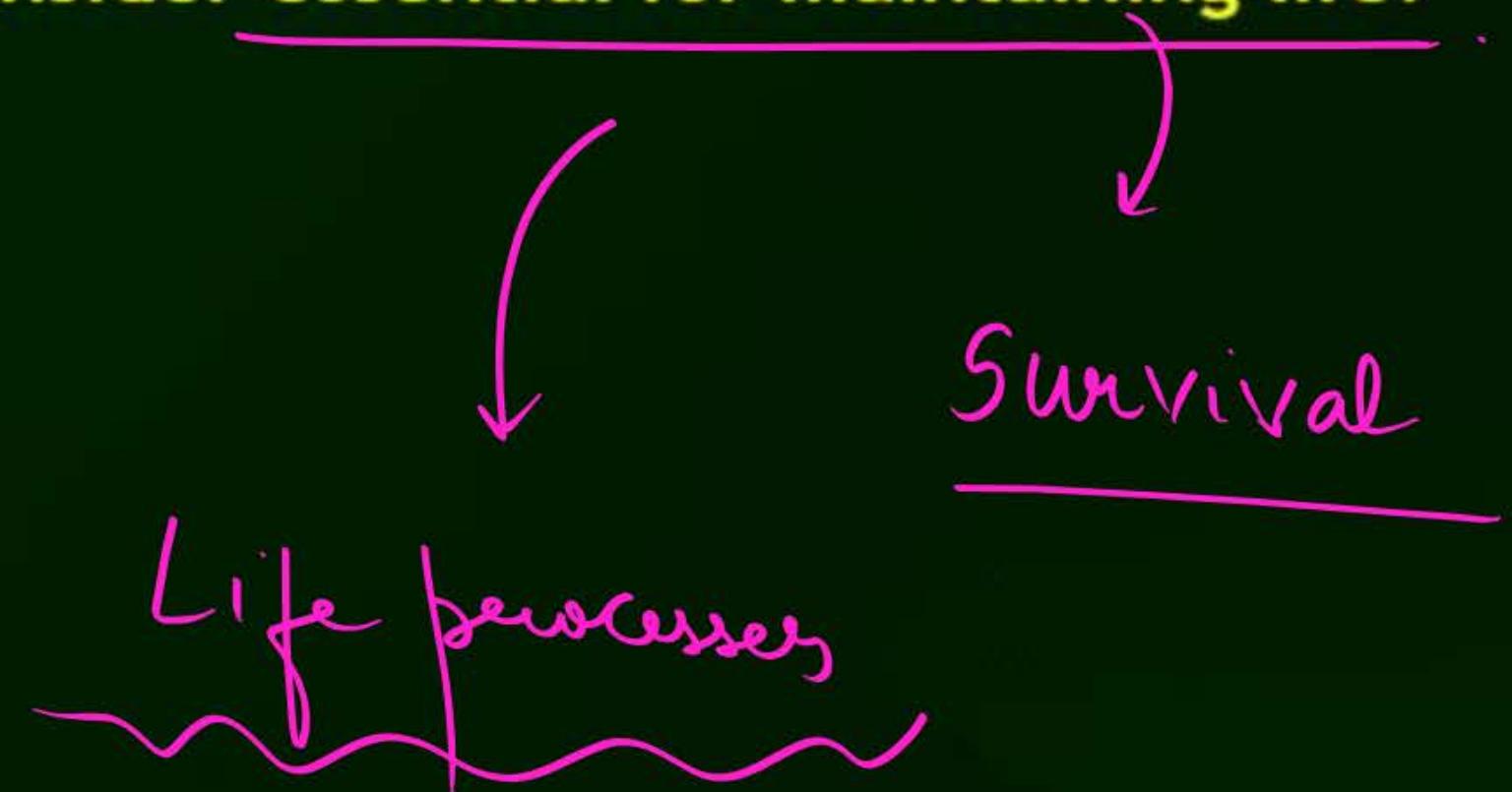
Answer

- (i) Food as a source of supplying energy and materials.
- (ii) Oxygen for the breakdown of the food to obtain energy.

ATP

QUESTION-

What processes would you consider essential for maintaining life?



There are various life processes which are essential for maintaining life. Some of them are:

- (i) Nutrition ✓
- (ii) Respiration ✓
- (iii) Excretion ✓
- (iv) Transportation ✓

QUESTION-

What are the differences between **autotrophic nutrition** and **heterotrophic nutrition?**

autotrophic nutrition

heterotrophic

[CBSE 2019(31/2/1)]

Ex - Green plants
Gymnobacteria

Human
Fungi

Autotrophic Nutrition	Heterotrophic Nutrition
<ul style="list-style-type: none">1. They can prepare their own food.2. They require raw materials like <u>CO₂</u>, <u>H₂O</u> in the presence of <u>sunlight</u> and <u>chlorophyll</u> to prepare their food.3. They store the <u>food</u> in the form of starch.	<ul style="list-style-type: none">1. They cannot prepare their own food.2. They depend on other <u>plants</u> and <u>animals</u> for their food.3. They store the food in the form of <u>glycogen</u>. <i>humans</i>

glucose → Starch



QUESTION-

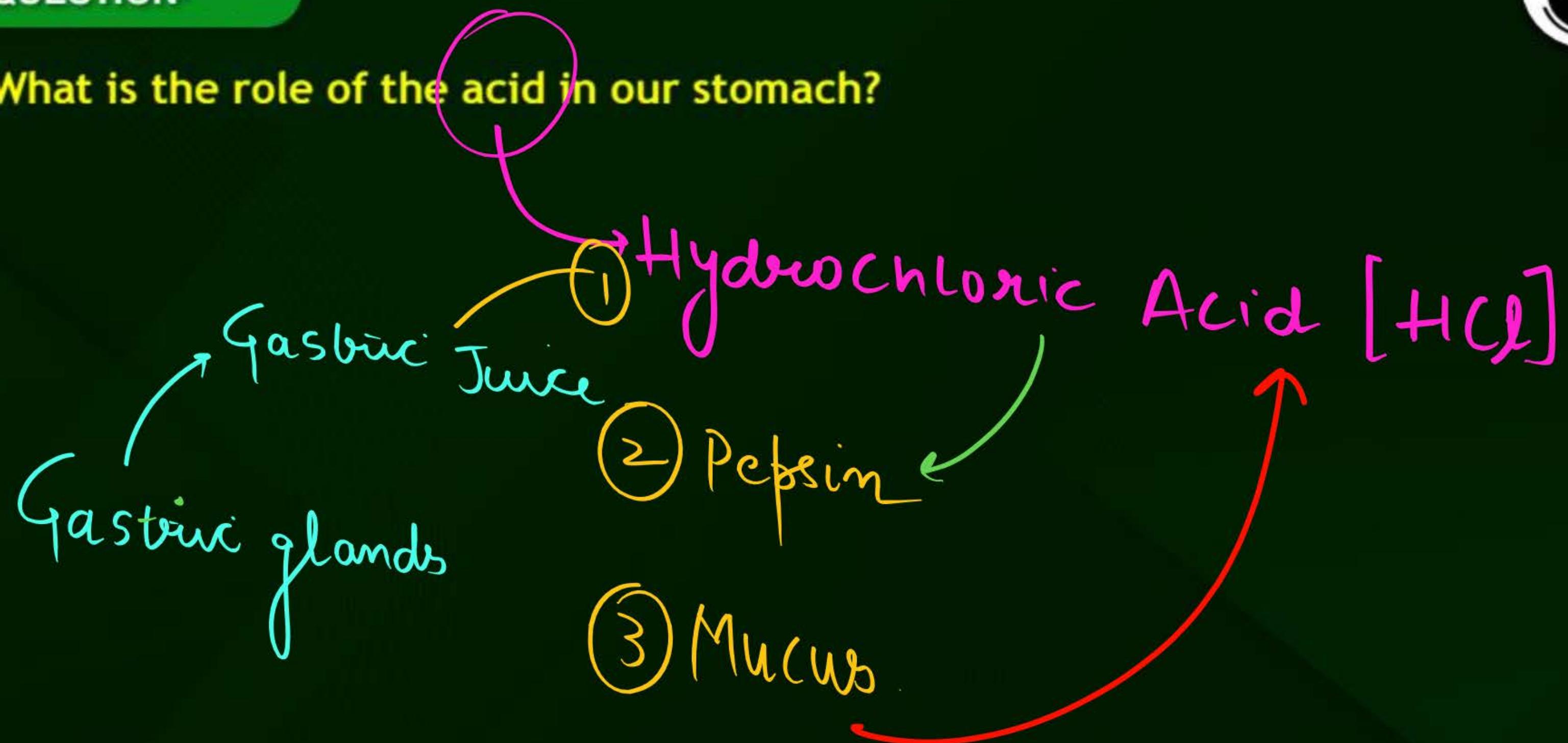
Where do plants get each of the raw materials required for photosynthesis?

Answer

The raw materials required for photosynthesis are carbon dioxide and water. Terrestrial plants get carbon dioxide from atmosphere and water from the soil. Aquatic plants take up CO_2 , that is present in dissolved form in water. Water is simply absorbed by the parts of the aquatic plant submerged in water.

QUESTION-

What is the role of the acid in our stomach?



- (i) The acid (hydrochloric acid) secreted inside the stomach makes the medium acidic (low pH) which is necessary for the activation of the enzyme pepsin.
- (ii) Hydrochloric acid kills any bacteria or other germs which may enter the stomach along with food.

QUESTION-



What is the function of digestive enzymes?

Digestive enzymes convert the complex, large and insoluble food molecules into simpler, small water soluble molecules in the process of digestion for their absorption into the cell.

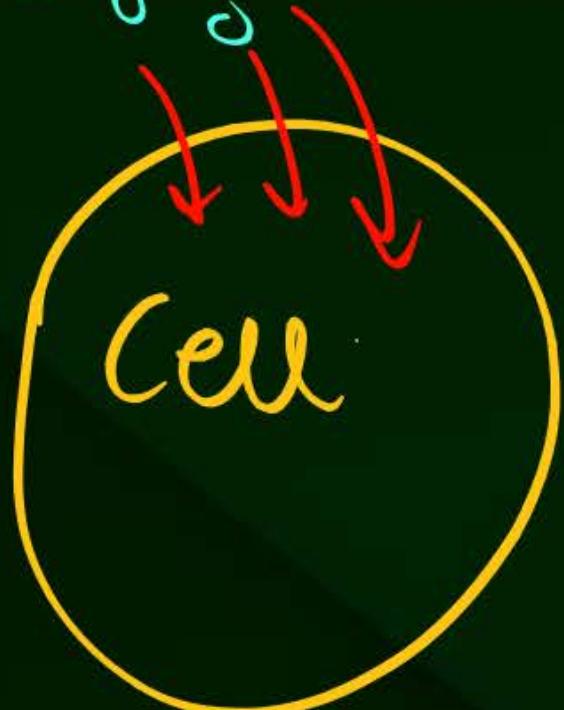
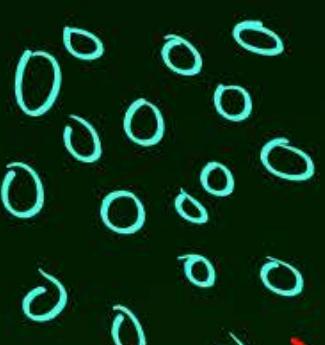
For example:

Salivary Amylase

Starch
(Complex Sugar)

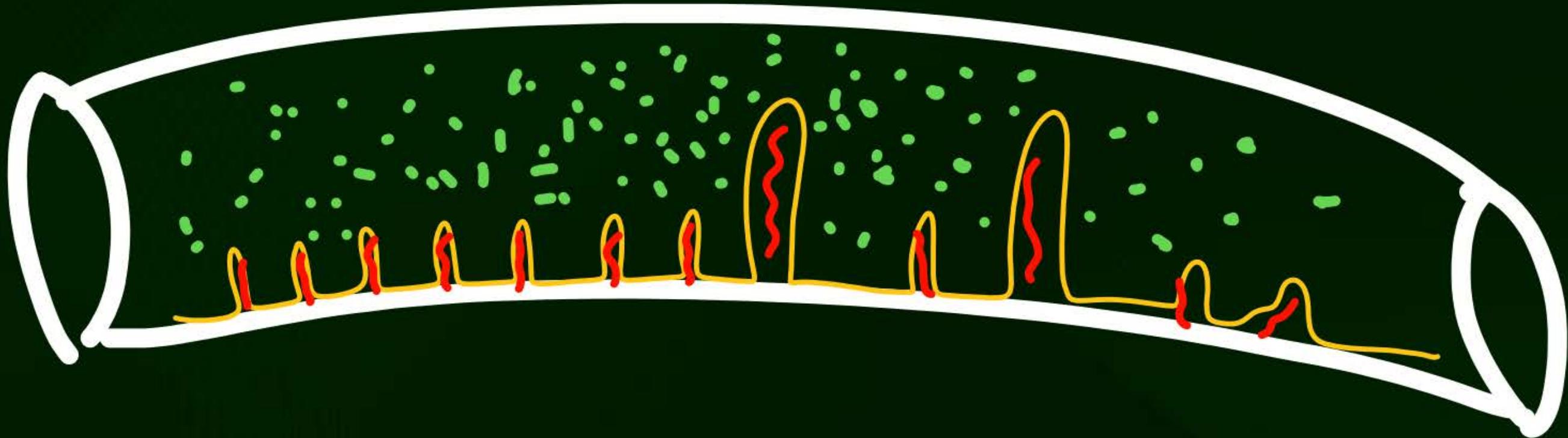
Maltose
(Simple Sugar)

Digestive Enzymes



QUESTION-

How is the small intestine designed to **absorb** digested food?



The small intestine is the main region for the absorption of digested food.

The inner lining of small intestine has millions of tiny finger-like projections called villi. The presence of villi gives the inner walls of the small intestine a very large surface area for absorption of digested food. The villi are richly supplied with blood vessels which take the absorbed food to each and every cell of the body.

QUESTION-



What advantage over an aquatic organism does a terrestrial organism have with regard to obtaining oxygen for respiration?

Answer

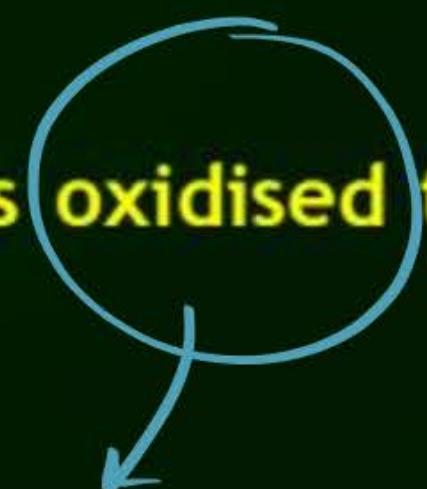


The organism that lives in water such as a fish obtains oxygen for respiration which is dissolved in water whereas the terrestrial organisms take in oxygen directly from the air.

Since, the amount of oxygen dissolved in water is fairly low as compared to the amount of oxygen in the air, breathing rate in aquatic organisms is much faster than terrestrial organisms.

QUESTION-

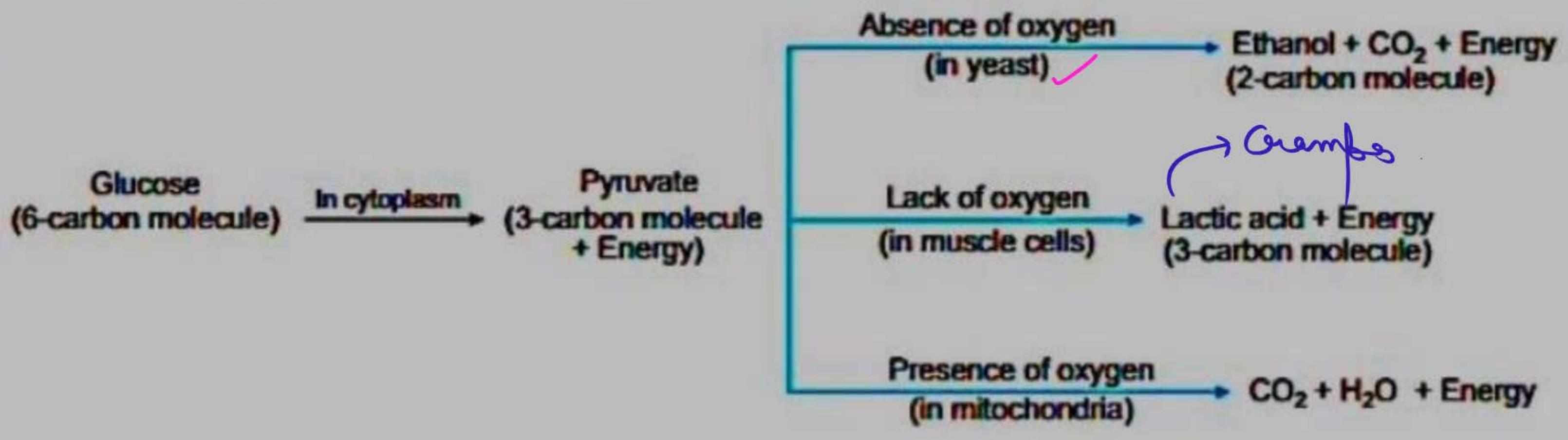
What are the different ways in which glucose is oxidised to provide energy in various organisms?



breakdown

Respiration

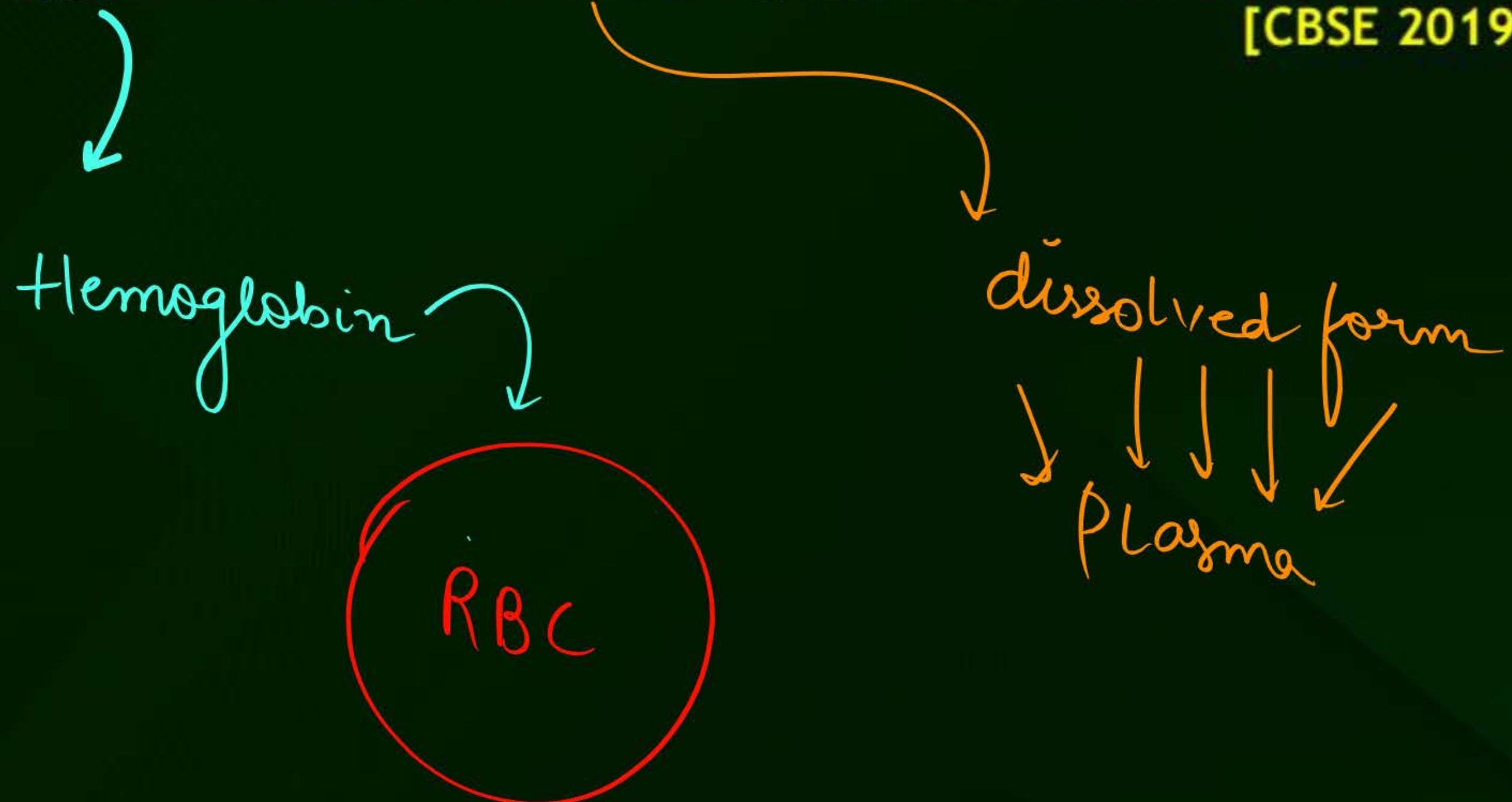
Breakdown of glucose takes place by various pathways as given below:



QUESTION-

How is oxygen and carbon dioxide transported in human beings?

[CBSE 2019(31/1/2)]



Answer

- (a) **Transport of oxygen:** The respiratory pigments (haemoglobin) present in the red blood cells takes up the oxygen from the air to the lungs. They carry the oxygen to tissues which are deficient in oxygen.
- (b) **Transport of carbon dioxide:** Carbon dioxide is more soluble in water. Hence, it is mostly transported from body tissues in the dissolved form in our blood plasma to lungs where it diffuses from blood to air in the lungs and then expelled out through nostrils.

QUESTION-



How are the lungs designed in human beings to maximise the area for exchange of gases?

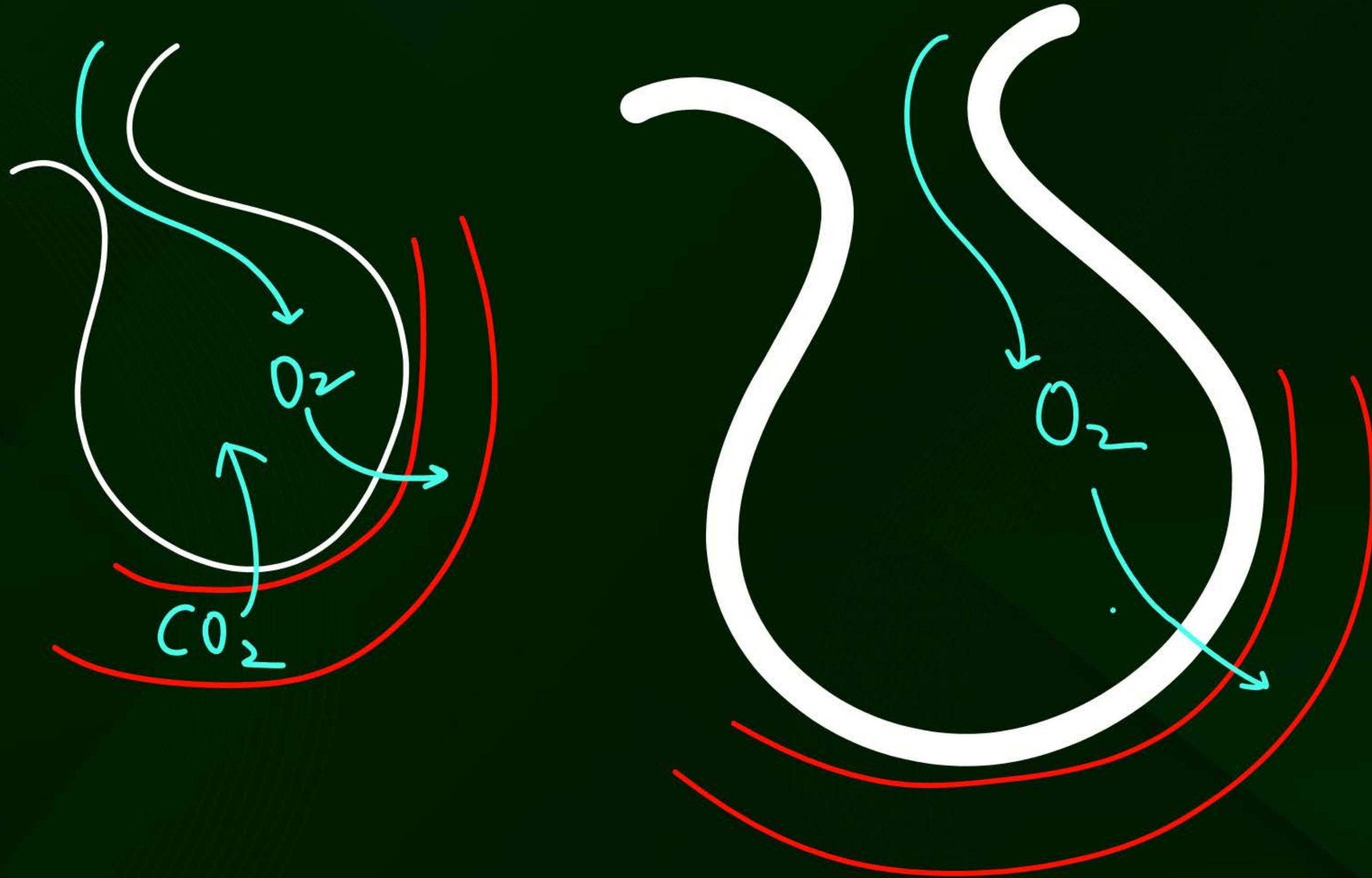


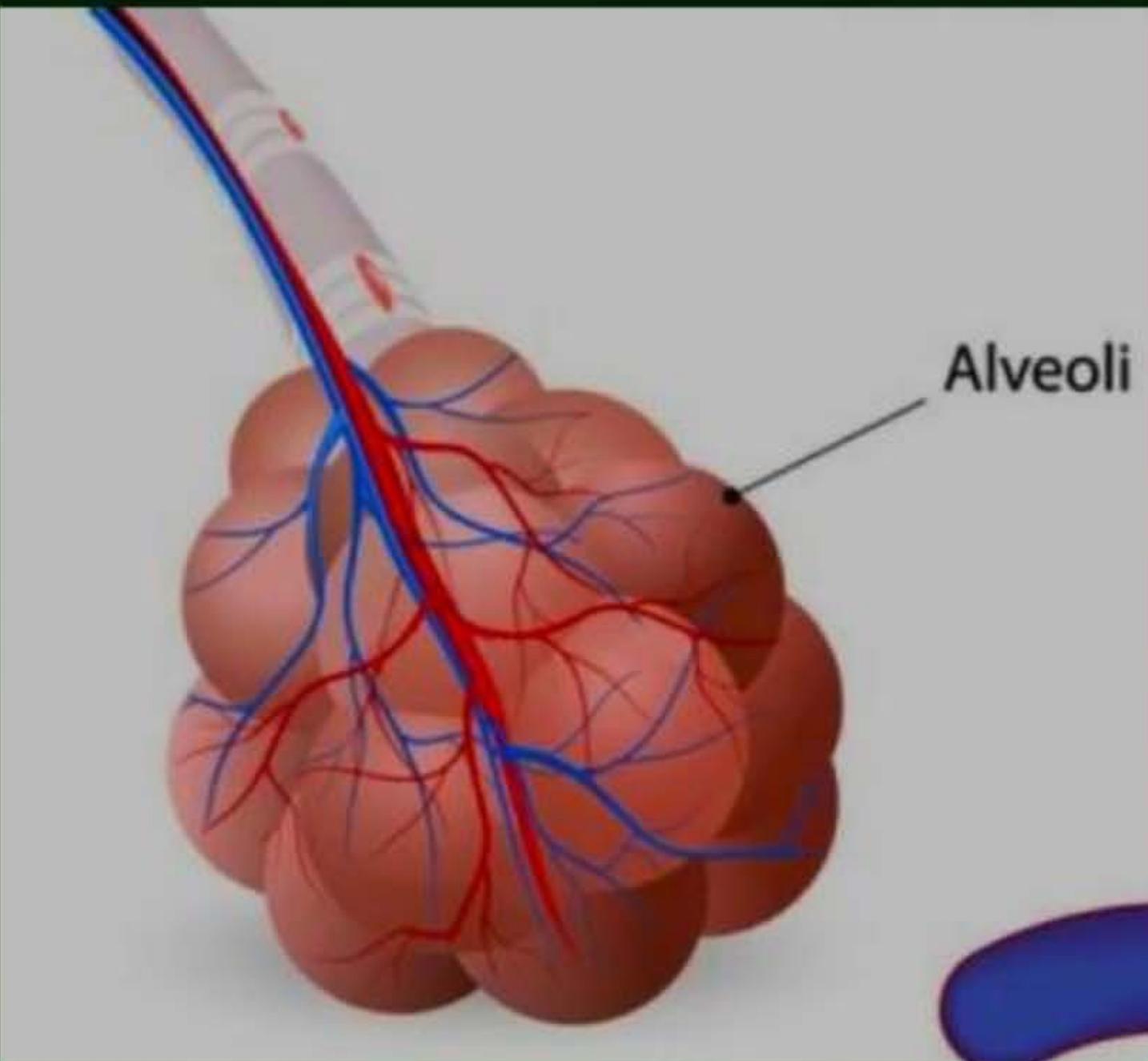
alveoli

Lungs have balloon-like structures known as alveoli. These balloons can expand and relax according to the amount of gases necessary for respiration.

Alveoli in the lungs provides a very large area for the exchange of gases which maximises the exchange of gases.

The alveoli have very thin walls and contain an extensive network of blood vessels to facilitate exchange of gases.





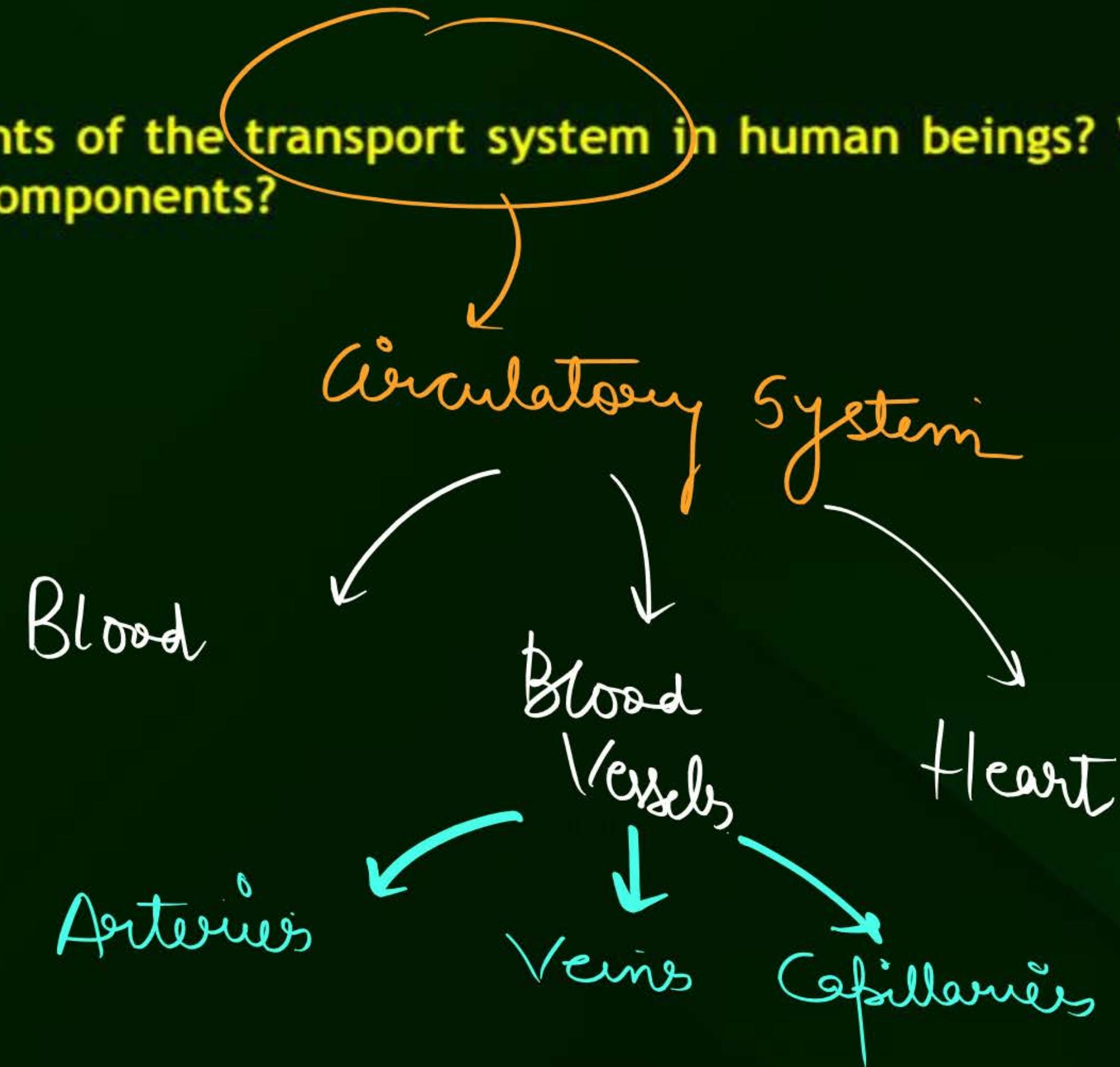
1. Balloon-like or sac like structure structure

2. Walls of alveoli are only one celled thick and provide a surface where the exchange of gases can take place.

3. Contain an extensive network of blood-vessels which helps in exchange of gases.

QUESTION-

What are the components of the **transport system** in human beings? What are the functions of these components?



Transport system in human being consists of heart, blood and blood vessels.

- (i) **Heart:** Heart is a pumping organ to push and pull blood around the body. It receives the deoxygenated blood from various parts of the body and pumps oxygenated blood throughout the body.
- (ii) **Blood:** It is a fluid connective tissue. It consists of (a) plasma, (b) RBC, (c) WBC and (d) blood platelets. Plasma transports food, CO_2 and nitrogenous wastes in dissolved form. RBC transports O_2  WBC protects the body from infections and platelets prevent the loss of blood at the time of injury by forming blood clots.
- (iii) **Blood vessels:** There is a network of vessels. They help in the circulation of blood throughout the body.

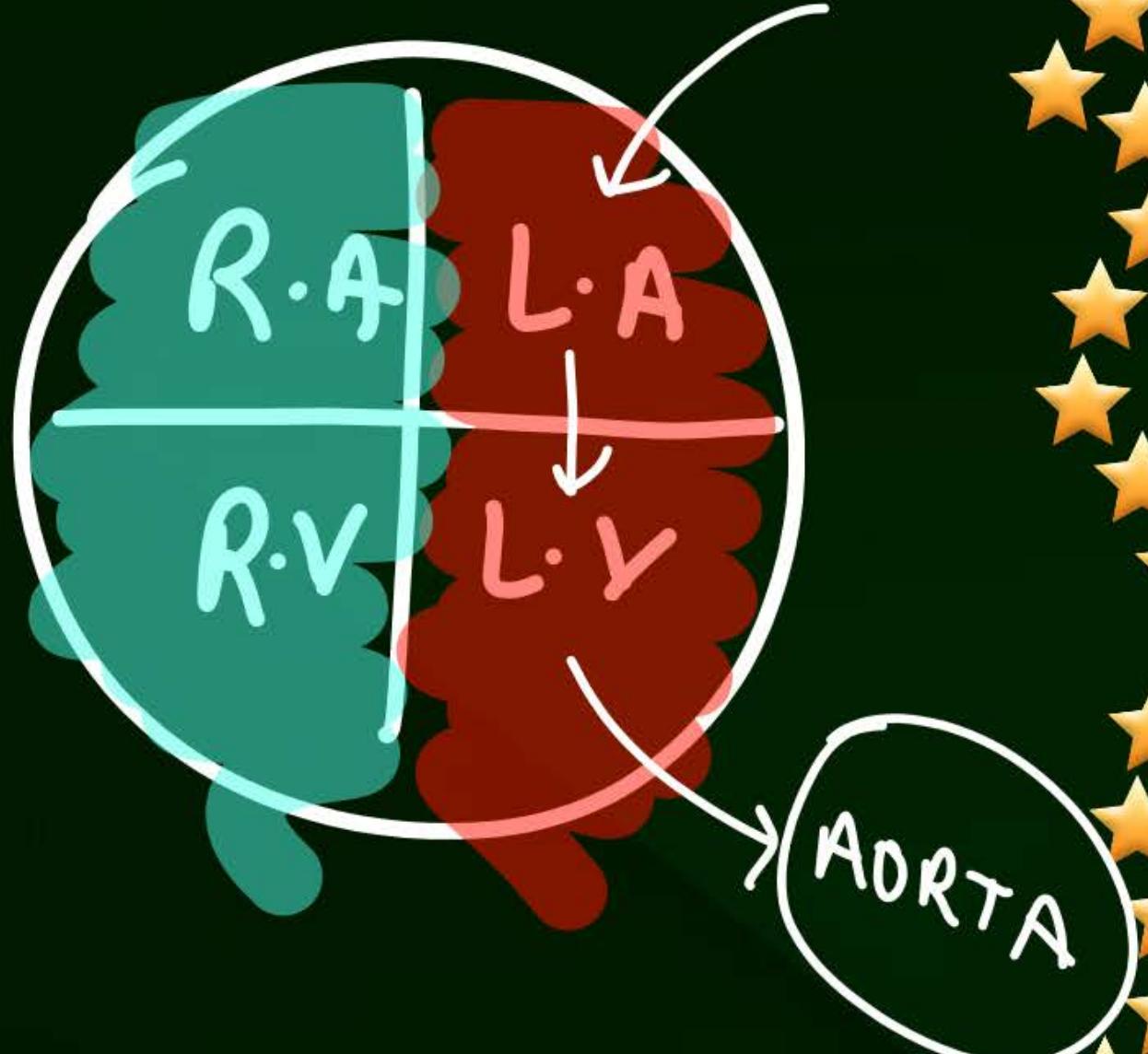
- (a) **Arteries:** Carries blood from heart to different body parts.
- (b) **Veins:** Transport blood towards heart from various body parts.
- (c) **Capillaries:** helps in exchange of materials between blood and tissues.

QUESTION-

Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?



4-Chambered Hearts



It is necessary to separate the oxygenated and deoxygenated blood to maintain efficient supply of oxygen into the body. This system is essential in animals that have high energy need. Mammals and birds require constant supply of oxygen to obtain energy.

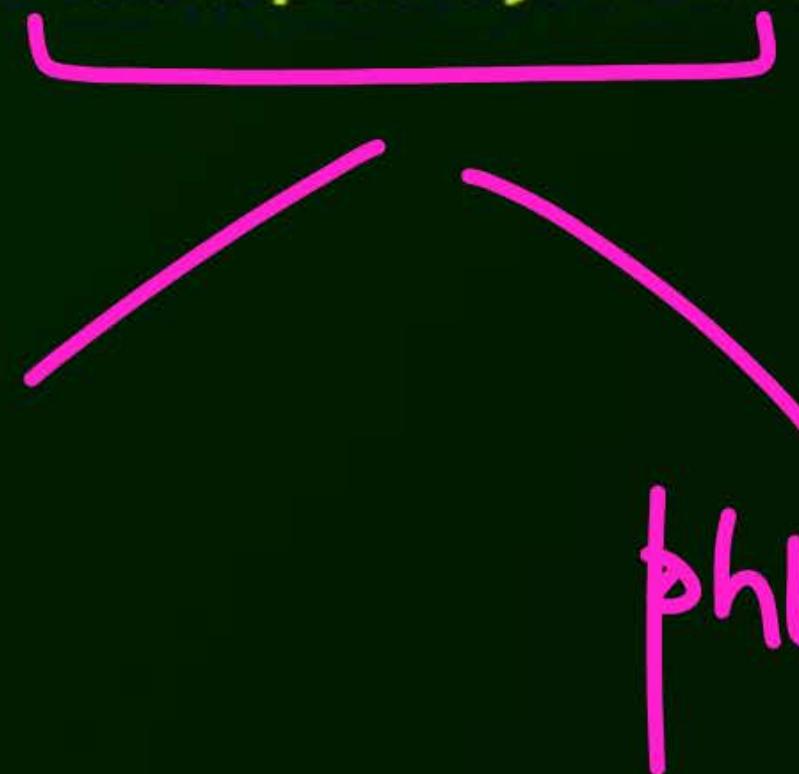
4-Chambered

Temp. maintain

What are the components of the transport system in highly organized plants?

Xylem

Phloem



Answer

Water & Minerals

Food



The main components of transport system in plants are : (i) Xylem, (ii) Phloem.

Xylem → Dead tissue

- ① Vessels
 - ② Tracheides
 - ③ Xylem fibres
 - ④ Xylem parenchyma
- Dead
- Living

Phloem → Living tissue

- ① Sieve tubes
 - ② Companion Cells
 - ③ Phloem parenchyma
 - ④ Phloem fibre
- Living
- Dead

QUESTION-

How are water and minerals transported in plants?

Xylem



(Ascent of Sap) .

Water and minerals are transported through xylem tissue from soil to the leaves.

Main components of xylem tissue involved in the process of transportation of water and minerals are vessels and tracheids

Movement of water and minerals is always unidirectional and take place only in upward direction.

Transpirational pull (Suction pull) and root pressures aids in the movement of water and mineral via xylem tissue

QUESTION-



How is food transported in plants?

phloem

The transport of food from the leaves to other parts of the plant is called translocation. The food manufactured by the leaves of a plant is transported to its other parts with the help of phloem. Sieve tubes and companion cells are the main components which are involved in the process of translocation.

The translocation in phloem is achieved by utilizing energy i.e ATP

Material like sucrose is transferred into phloem tissue using energy from ATP. This increases the osmotic pressure of the tissue causing water to move into it. This pressure moves the material in the phloem to tissues which have less pressure. This allows the phloem to move material according to plant's need.

QUESTION-

Describe the structure and functioning of nephrons.

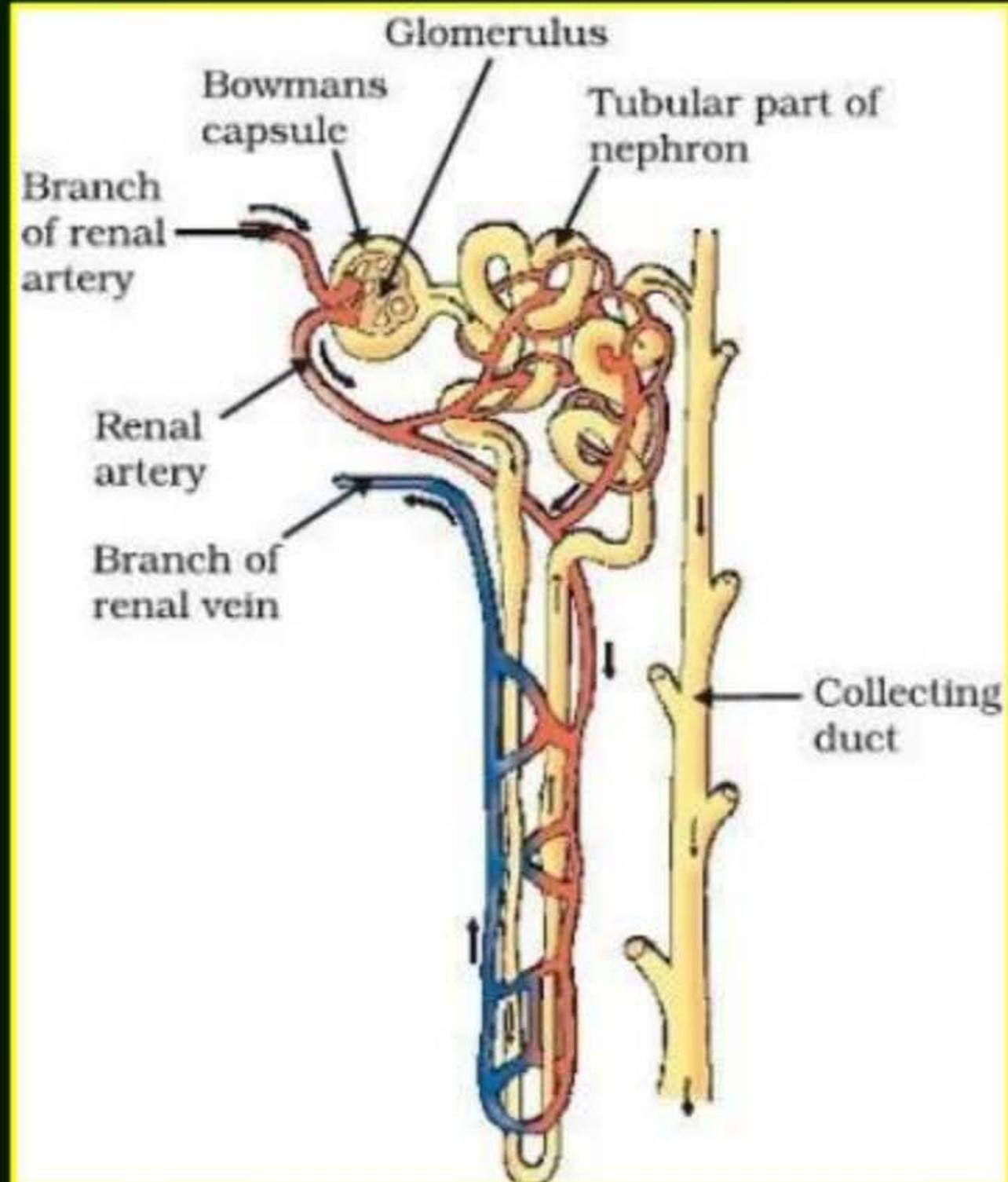


Answer

Structure of Nephron: Nephron is the filtration unit of kidney. It consists of a tubule which is connected with collected duct at one end and a cup-shaped structure at the other end.

This cup-shaped structure is called Bowman's capsule. Every Bowman's capsule contains a cluster of capillaries, called glomerulus, within the cup-shaped structure.

The blood enters into glomerulus through ✓ afferent arteriole of renal artery and leaves it through efferent arteriole.



Functioning of Nephron:

(i) **Filtration:** Filtration of blood takes place in Bowman's capsule from the capillaries of glomerulus. The filtrate passes into the tubular part of the nephron. This filtrate contains glucose, amino acids, urea, uric acid, salts and a major amount of water.

(ii) **Reabsorption:** As the filtrate flows along the tubule useful substances like glucose, amino acids, water and salts are selectively reabsorbed into the blood by capillaries surrounding the nephron tubule.

The amount of water reabsorbed depends on the need of the body and also on the amount of wastes to be excreted.

(iii) **Urine:** The filtrate which remains after reabsorption is known as **urine**. Urine contains dissolved nitrogenous waste, i.e., urea and uric acid, excess salts and water.

Urine is collected from nephrons by the collecting duct to carry it to the ureter.

QUESTION-

What are the methods used by plants to get rid of excretory products?

To get rid of excretory products, plants use the following ways:

- i. ✓ The plants get rid of gaseous waste products through **stomata** on leaves and **lenticels** in stems.
- ii. ✓ The plants get rid of stored solid and liquid wastes by shedding of leaves, peeling of bark and felling of fruits.
- iii. ✓ The plants also secrete wastes in the form of gums and resins.
- iv. ✓ Some waste substances are excreted through roots into the soil around them.
- v. ✓ Excess of water is eliminated by the process of transpiration.
- vi. ✓ In living cells, many cytoplasmic wastes are shifted to cellular vacuoles.

QUESTION-



How is the amount of urine produced regulated?

The amount of urine produced depends on how much of excess water is there in the body, and on how much of dissolved waste is there to be excreted.

More [↑] water and dissolved waste in the body will produce more urine and on the other hand, less water and less dissolved waste will therefore, produce less urine. ^{↑↑} ↓↓ .

The kidneys in human beings are a part of the system for

- A nutrition
- B respiration
- C excretion
- D transportation



excretion

Answer

(C) excretion

QUESTION-



The xylem in plants are responsible for

- A** transport of water ✓
- B** transport of food
- C** transport of amino acids
- D** transport of oxygen

Answer

(A) Transport of water

The autotrophic mode of nutrition requires

- A carbon dioxide and water
- B chlorophyll
- C sunlight
- D all of the above

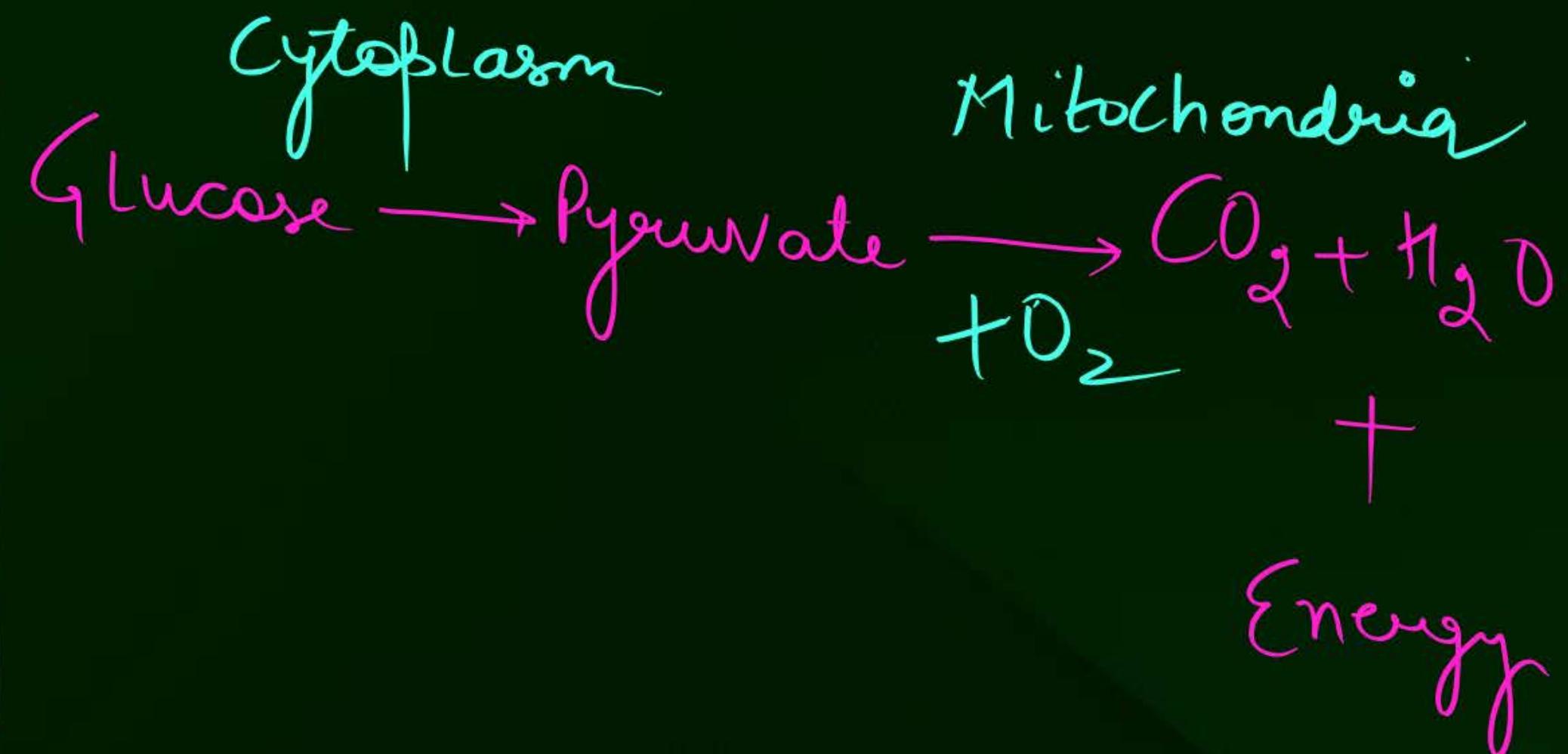
Answer

(D) All of the above

QUESTION-

The breakdown of pyruvate to give carbon dioxide, water and energy takes place in

- A cytoplasm
- B mitochondria
- C chloroplast
- D nucleus



Answer

(B) mitochondria

QUESTION-

How are fats digested in our bodies? Where does this process take place?

Kaise ?

Kahan be



Fats are found in the intestine in the form of large globules which makes it more difficult for enzymes to act on them.

Bile juice secreted by liver contains bile salts which break down large fats globules into smaller globules (Emulsification of fats) increasing the efficiency of enzyme action.

(1)

The pancreas also secretes lipase that helps in breaking down emulsified fats. This process of fat digestion occurs in small intestine.

(2)

The small intestine is the site of the complete digestion of fats.

QUESTION-



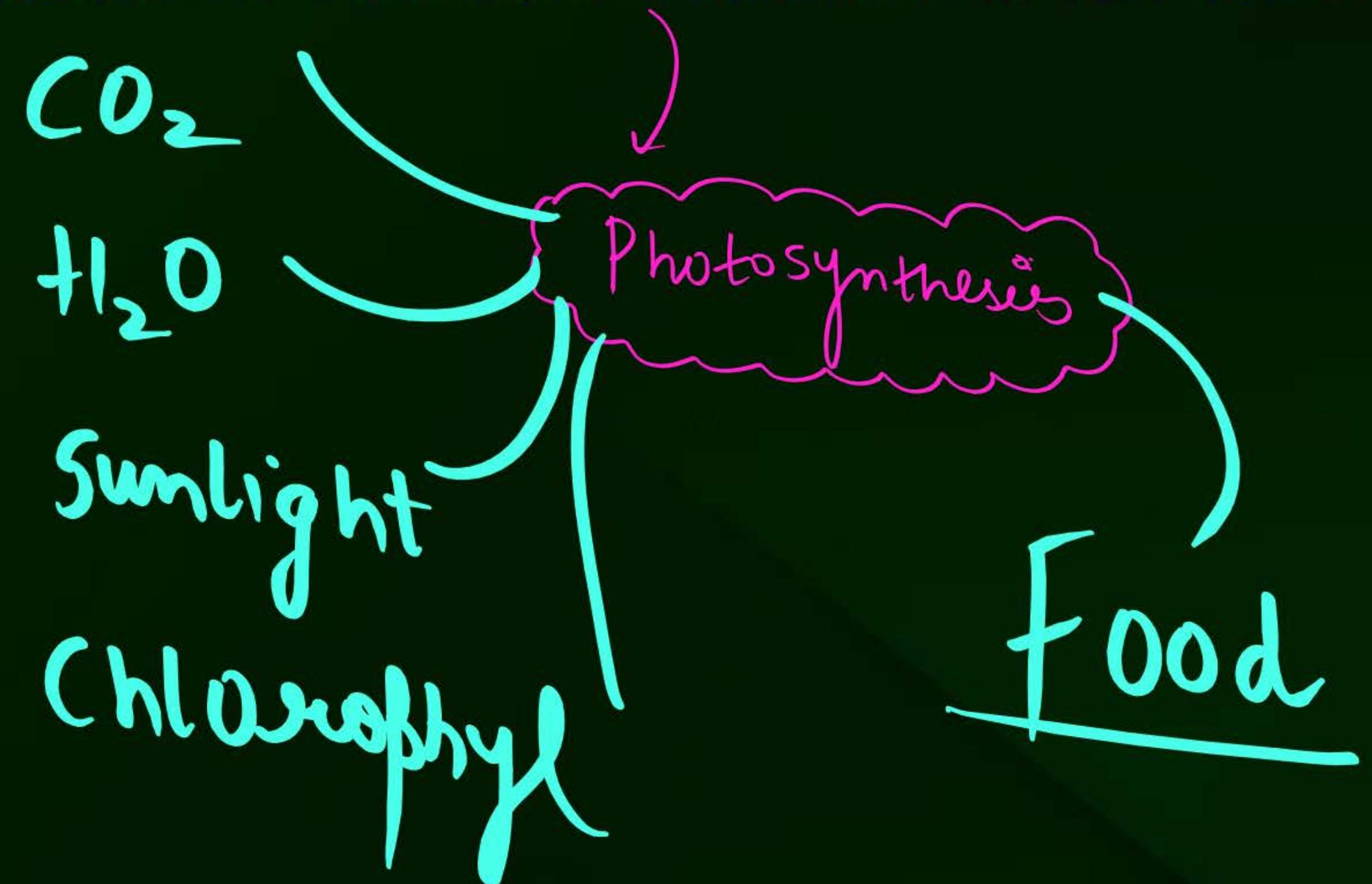
What is the role of saliva in the digestion of food?

Answer

- (i) The saliva contains salivary amylase enzyme which breaks own starch to sugars like maltose.
- (ii) The saliva moistens the food which helps in chewing and breaking down the big pieces of food into smaller one.

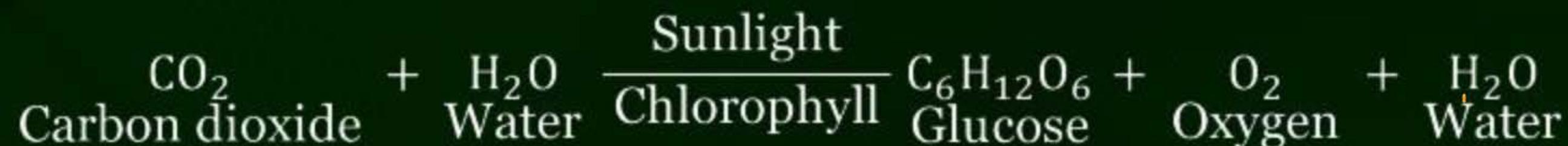
QUESTION-

What are the necessary conditions for autotrophic nutrition and what are its byproducts?



The conditions necessary for autotrophic nutrition are sunlight, chlorophyll, carbon dioxide and water.

The byproducts of autotrophic nutrition are water and oxygen.



QUESTION-

What are the differences between **aerobic** and **anaerobic respiration**? Name some organisms that use the **anaerobic mode of respiration**.

$O_2 \checkmark$

O_2

O_2

$O_2 \times$

Aerobic Respiration	Anaerobic Respiration
1. Aerobic respiration takes place in the presence of oxygen.	1. Anaerobic respiration takes place in the absence of oxygen.
2. Complete breakdown of food occurs in it.	2. Incomplete oxidation of food occurs.
3. The end products are carbon dioxide (CO_2) and water (H_2O).	3. The end products may be ethanol and carbon dioxide or lactic acid.
4. It produces a considerable amount of energy, due to complete oxidation of food molecules.	4. Much less energy is produced, due to incomplete oxidation of food.

QUESTION-

How are the alveoli designed to maximise the exchange of gases?



- ✓
- ✓
- (i) The alveoli are thin walled and richly supplied with a network of blood vessels to facilitate exchange of gases between blood and the air filled in alveoli.
- ✓
- (ii) Alveoli have balloon-like structures which provide maximum surface area for the exchange gases. ✓

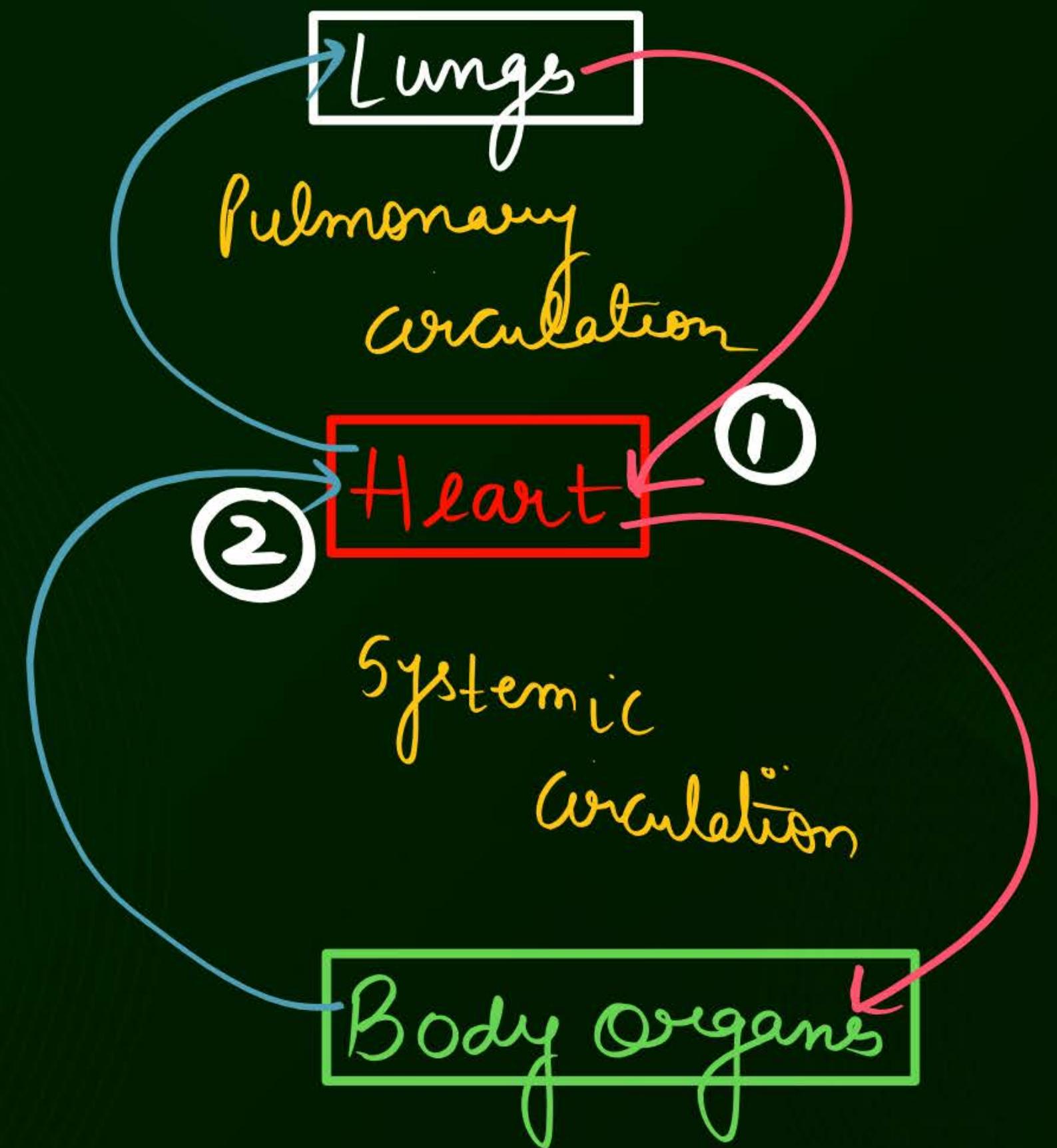
QUESTION-

**What would be the consequences of a deficiency of haemoglobin in our bodies?
[CBSE 2019(31/3/3)]**

The deficiency of haemoglobin in our body is called **anaemia**. In anaemia, the blood is unable to carry the sufficient amount of oxygen required by the body. So, respiration would be less and less energy will be available to the body. The haemoglobin deficient person will feel weak, pale, lethargic and will be unable to perform heavy physical work.

Describe double circulation of blood in human beings. Why is it necessary?





The blood passes through the heart twice through separate pathways for completing one cycle. This type of circulation is called double circulation.

The double circulation of blood includes:

- (i) Systemic circulation (B/w heart & other body organs)
- (ii) Pulmonary circulation (B/w heart & lungs).

(i) **Systemic circulation:** It involves supplying oxygenated blood from lungs to reach left atrium to left ventricle, which is pumped to aorta to distribute blood to various body parts.

The deoxygenated blood is collected from the various body organs by the veins to pour into vena cava and finally into the right atrium (auricle). Right atrium transfers this blood into the right ventricle.

(ii) **Pulmonary circulation:** The deoxygenated blood is pushed by the right ventricle into the lungs for oxygenation through pulmonary artery. The oxygenated blood is brought back to left atrium of the human heart through pulmonary vein. From left atrium, the oxygenated blood is pushed into the left ventricle. The left ventricle pumps oxygenated blood into aorta for systemic circulation.

Mammals & birds

Necessity of double circulation: In humans, having four-chambered heart (which consists of two auricles and two ventricles) the left side and right side of heart are completely separated to prevent the oxygenated blood from mixing with deoxygenated blood. Such a separation allows a highly efficient supply of oxygen to the body cells which is necessary for producing a lot of energy. This energy is useful in case of human beings that have high energy need because they constantly require energy to maintain their body temperature.

QUESTION-

What are the differences between the transport of materials in xylem and phloem?

Transport in Xylem

1. It transports water and minerals.
2. The movement is generally unidirectional.
4. It is carried out by xylem vessels and tracheids.
5. ATP is not required but root pressure and transpiration pull is involved

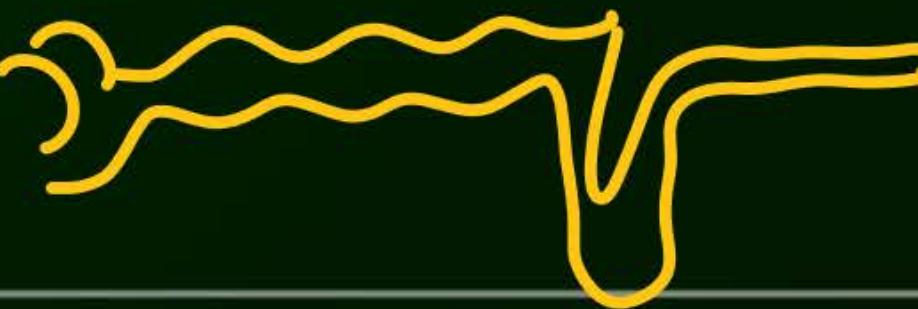
Transport in Phloem

1. It transports food
2. The movement is bidirectional.
4. Takes place in sieve tubes with the help of adjacent companion cells.
5. Energy (ATP) is required for translocation.

QUESTION-

Compare the functioning of alveoli in the lungs and nephrons in the kidneys with respect to their structure and functioning.





Alveoli

1. Its structure is that of a pouch like air sac.
2. The walls of alveoli are very thin.
3. Alveoli's are surrounded by the thin blood capillaries.
4. The presence of millions of alveoli in the lungs provides a very large surface area for the exchange of gases between blood and inhaled air.

Nephron

1. They are elongated tubules.
2. Each nephron has two components- ✓ Bowman's capsule and tubules.
3. Blood capillaries form two patches- glomerulus and peritubular ✓ capillaries.
4. The function of tubular part of nephron is to allow the selective reabsorption of the useful substances ✓ into the blood capillaries.



THANK YOU

Bachchon

