

Life Processes

ONE SHOT



GUN SHOT



**100% Paper yahi se bnega
Ek bhi Q bahar se nahi hogा**

LIFE PROCESSES:

The basic and essential functions / process performed by living organisms to maintain their life

Nutrition :

The process of obtaining & Utilisation of Food.

Respiration:

The process of breaking Down of Food to obtain Energy

Transportation :

The process of transfer of substances from one part of the body to other parts.

Excretion:

The process of removal of waste materials produced in the cells of the body



NUTRITION

AUTOTROPHIC NUTRITION

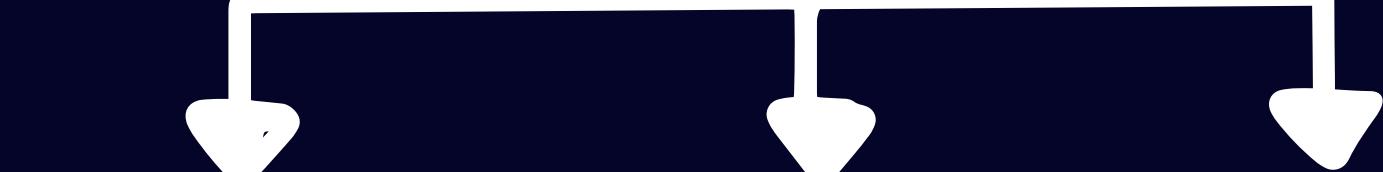
The organism makes its own food from simple inorganic materials

Example: Green Plants,
Autotrophic Bacteria



HETEROTROPHIC NUTRITION

organism cannot make (or synthesize) its own food from simple inorganic materials.



Holozoic

Organisms consume and internally digest complex organic food substances.

e.g. Human beings
Dog , Cat
— Amoeba

Saprophytic

Organisms feed on dead and decaying organic matter.

e.g. Fungi (bread moulds, yeast, mushroom)

Parasitic

Organisms derive nutrition from another living organism (host), often causing harm to the host.

e.g.: lice, leech, tapeworm , Cascuta (amer-bel)

PHOTOSYNTHESIS

The process by which plants make their own food from carbon dioxide and water by using sunlight energy in the presence of chlorophyll is called photosynthesis

Conditions necessary for photosynthesis

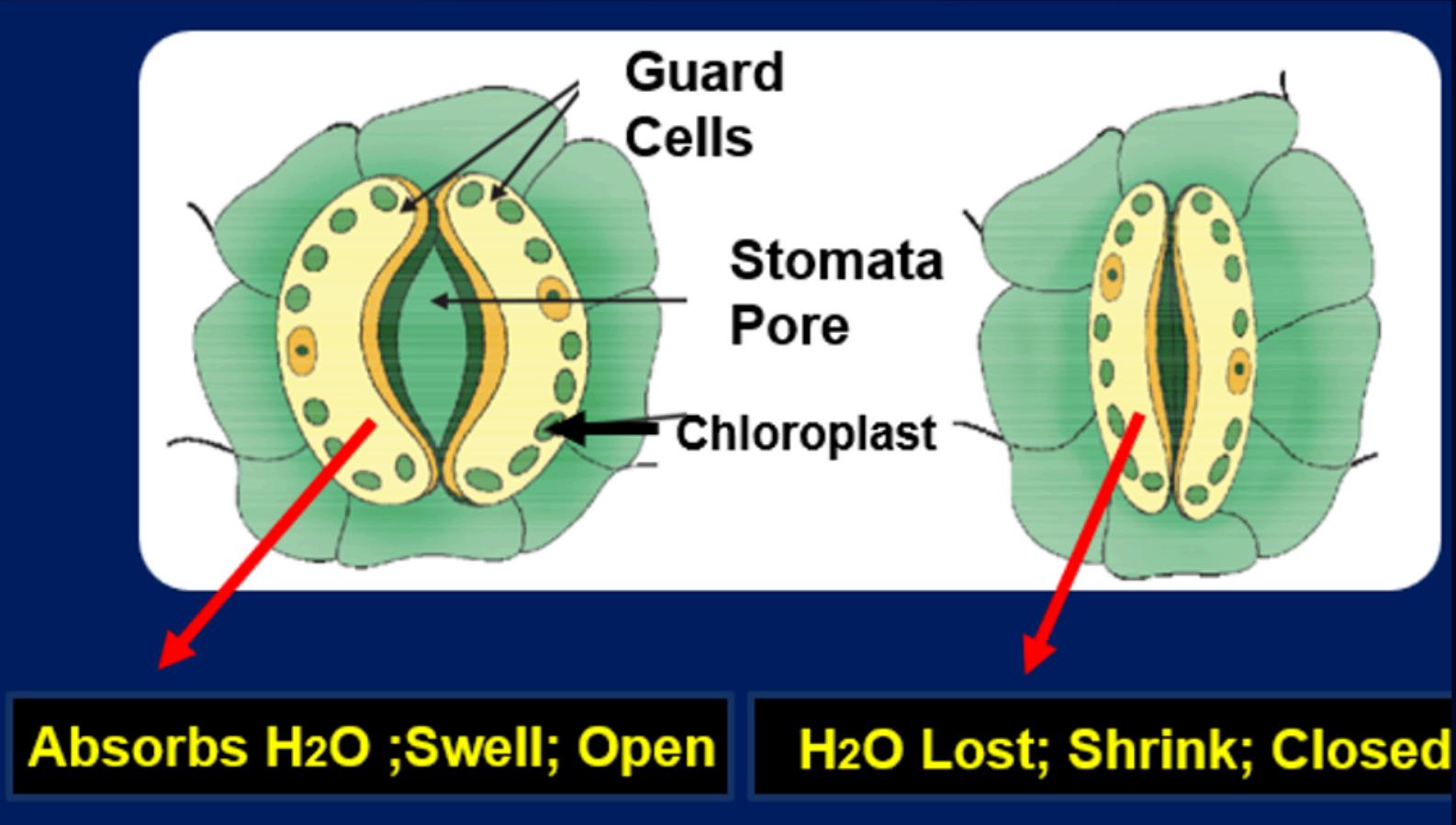
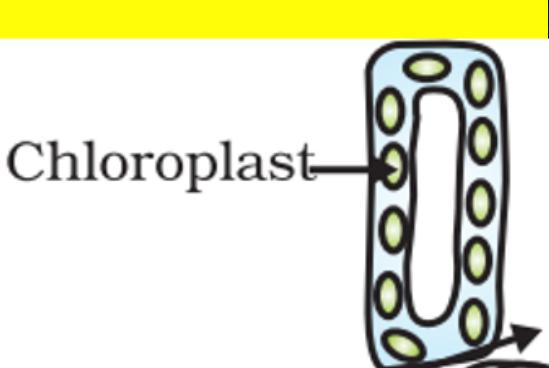
- A) Sunlight
- B) Chlorophyll
- C) Carbon dioxide
- D) Water



- 1) Absorption of light energy by chlorophyll.
↓
- 2) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.
↓
- 3) Reduction of carbon dioxide to carbohydrates.

Site of photosynthesis: Chloroplasts

Chlorophyll is present in the green-coloured organelles called 'chloroplasts' inside the plant cells. The leaves are green because they contain chloroplasts.

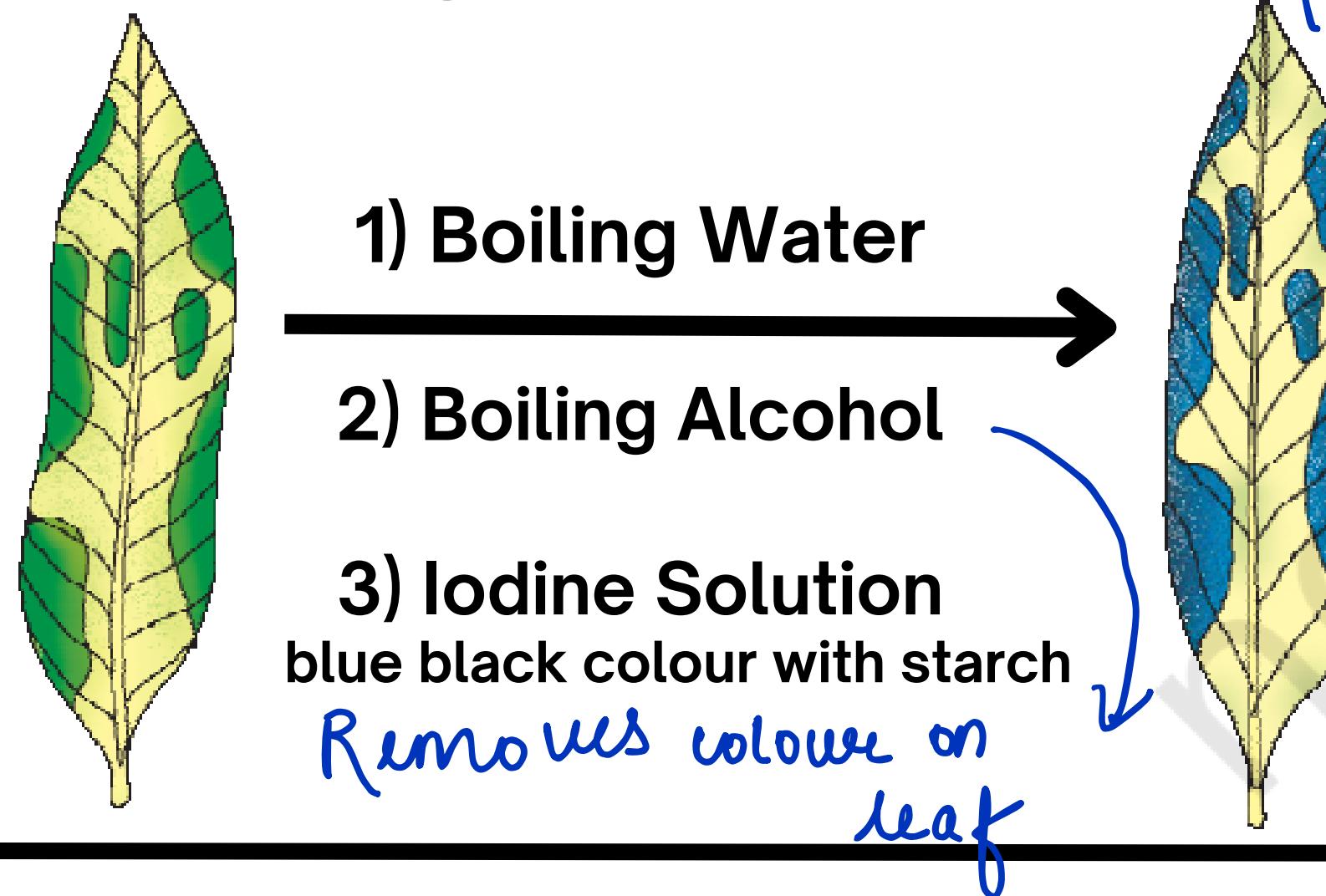


- CO₂ enters through Stomata
- Stomata → tiny pores present on the Surface of the leaves

WATER - TAKEN UP BY ROOTS FROM SOIL
Nitrogen, phosphorous, magnesium, and iron are also taken
Nitrogen is taken in form of nitrates and nitrites

In plants, food (glucose) is stored in the form of starch
In animals, it is stored in the form of glycogen

Variegated leaf



Green parts of leaf → chlorophyll
→ photosynthesis occurs

Starch is present at green sites only
Proving chlorophyll is essential for photosynthesis

Non green parts of leaf
→ No chlorophyll → No photo.
synthesis
Hence, no starch

1) Glass jars sealed & kept in Sun

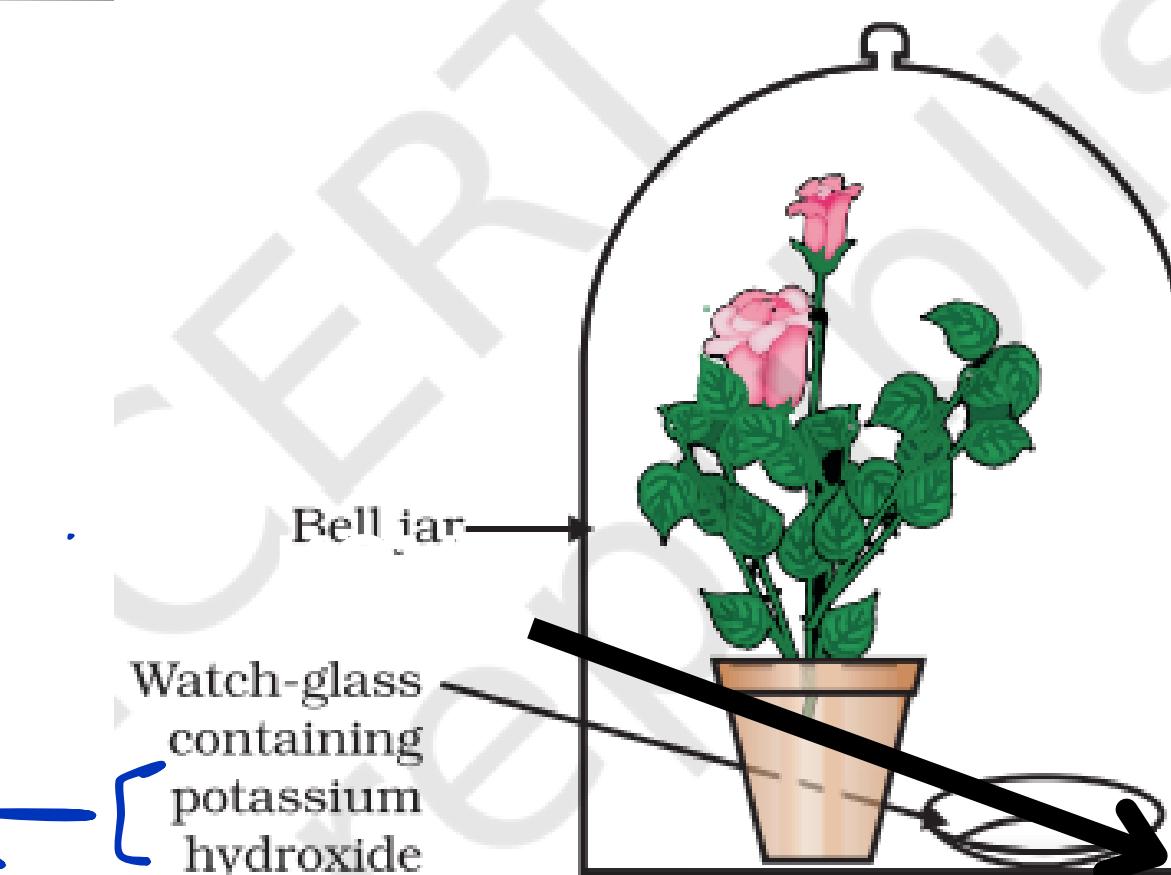
2) KOH in one jar $KOH \rightarrow$ absorbs CO_2

3) Test for Starch

NO
starch

No
photo
synthesis

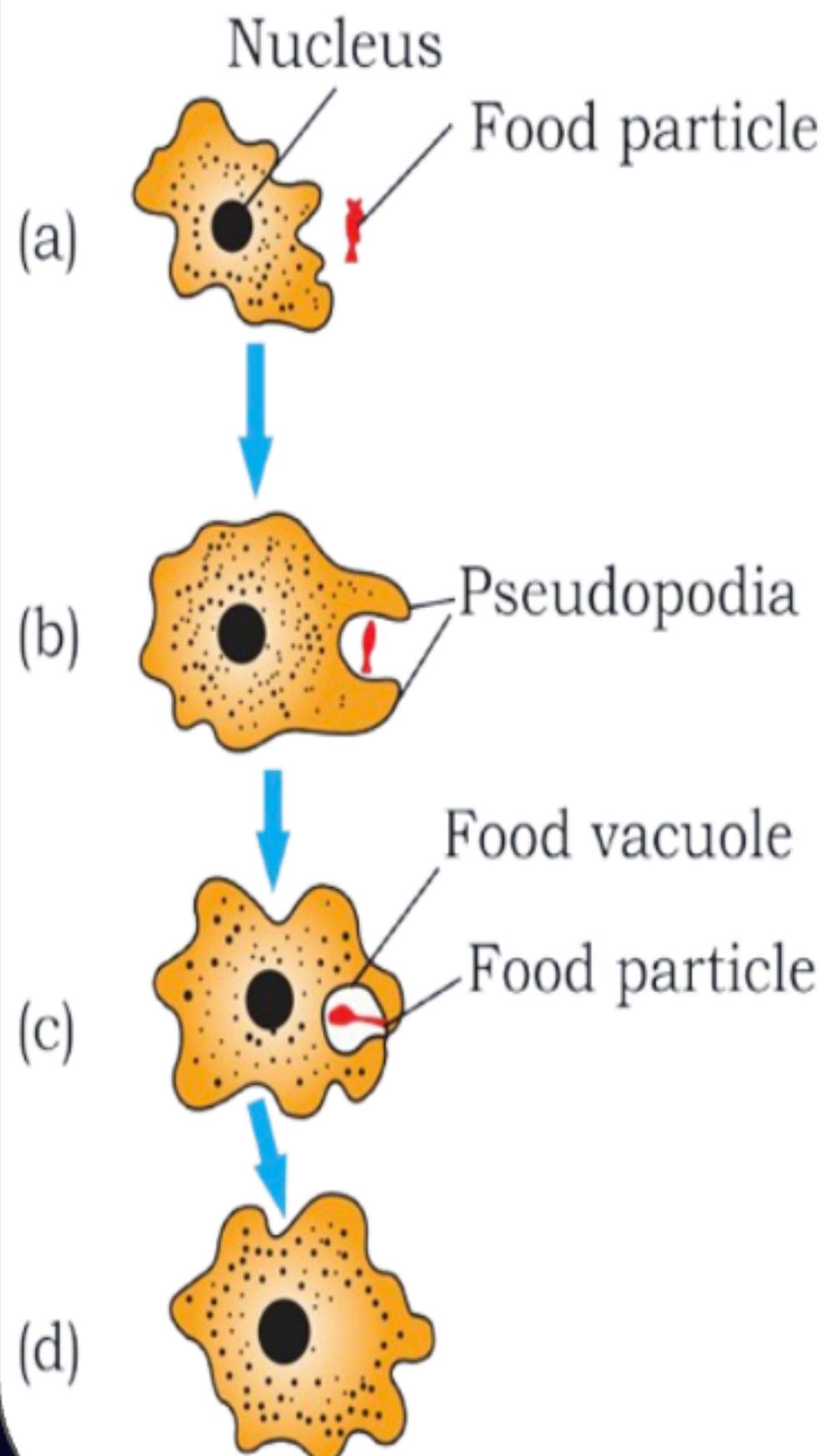
Absorbs
 CO_2



Question - (a) What is photosynthesis? Identify the organelle and the organs where it occurs, explain the process using the balanced equation, and state the source of the oxygen released during this process.

(b) How would you design an experiment to demonstrate that carbon dioxide is essential for photosynthesis, and what would be the expected observation and conclusion? (CBSE 2021,2022,2023,2024)

Nutrition in AMOEBA (Unicellular Organism)



**1) Amoeba takes in food using temporary finger-like extensions of the cell surface
Called Pseudopodia**

**2) Food vacuoles :
complex substances → simpler substances**

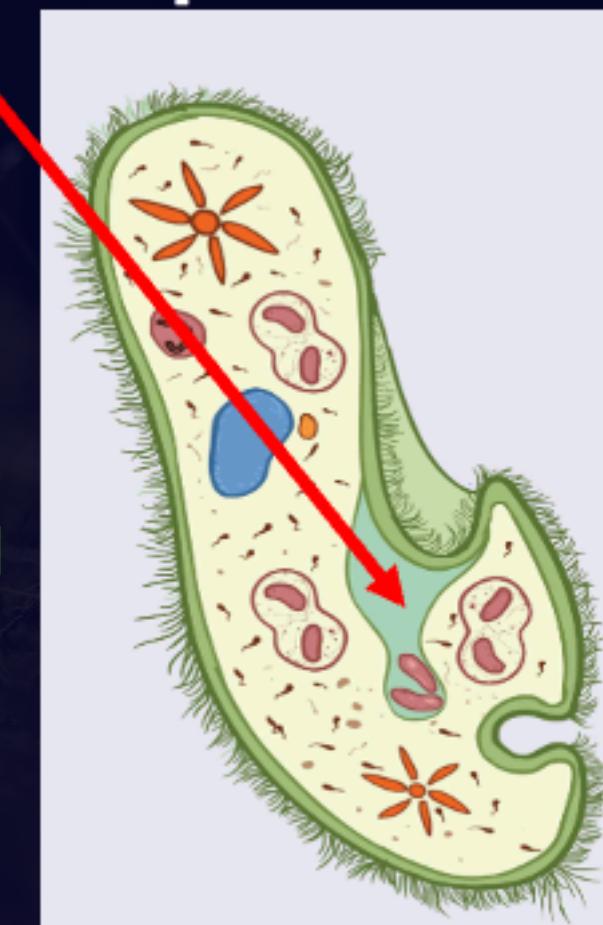
3) Absorption of digested food in cytoplasm by diffusion

**4) Undigested food :
moves to cell surface and thrown out**

HOLOZOIC NUTRITION

Nutrition in Paramecium (Unicellular Organism)

- 1) The cell has a definite shape (like Slipper)
- 2) Food is moved to a specific spot by the movement of cilia (hair like structure)
- 3) specific spot



Nutrition In Human Beings

Alimentary Canal → Long tube from Mouth to Anus

Teeth: Crushing/Cut Food in small pieces

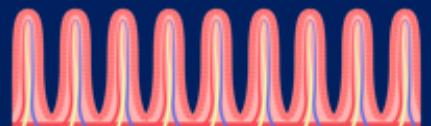
Liver: secretes bile juice which is stored in gallbladder.

- (a) makes acidic food coming from stomach alkaline
- (b) emulsification of fats – breaks down fats into smaller globules

Pancreas: secretes pancreatic juice
trypsin → digests proteins ;
lipase → breaking down of emulsified fats

Small Intestine :

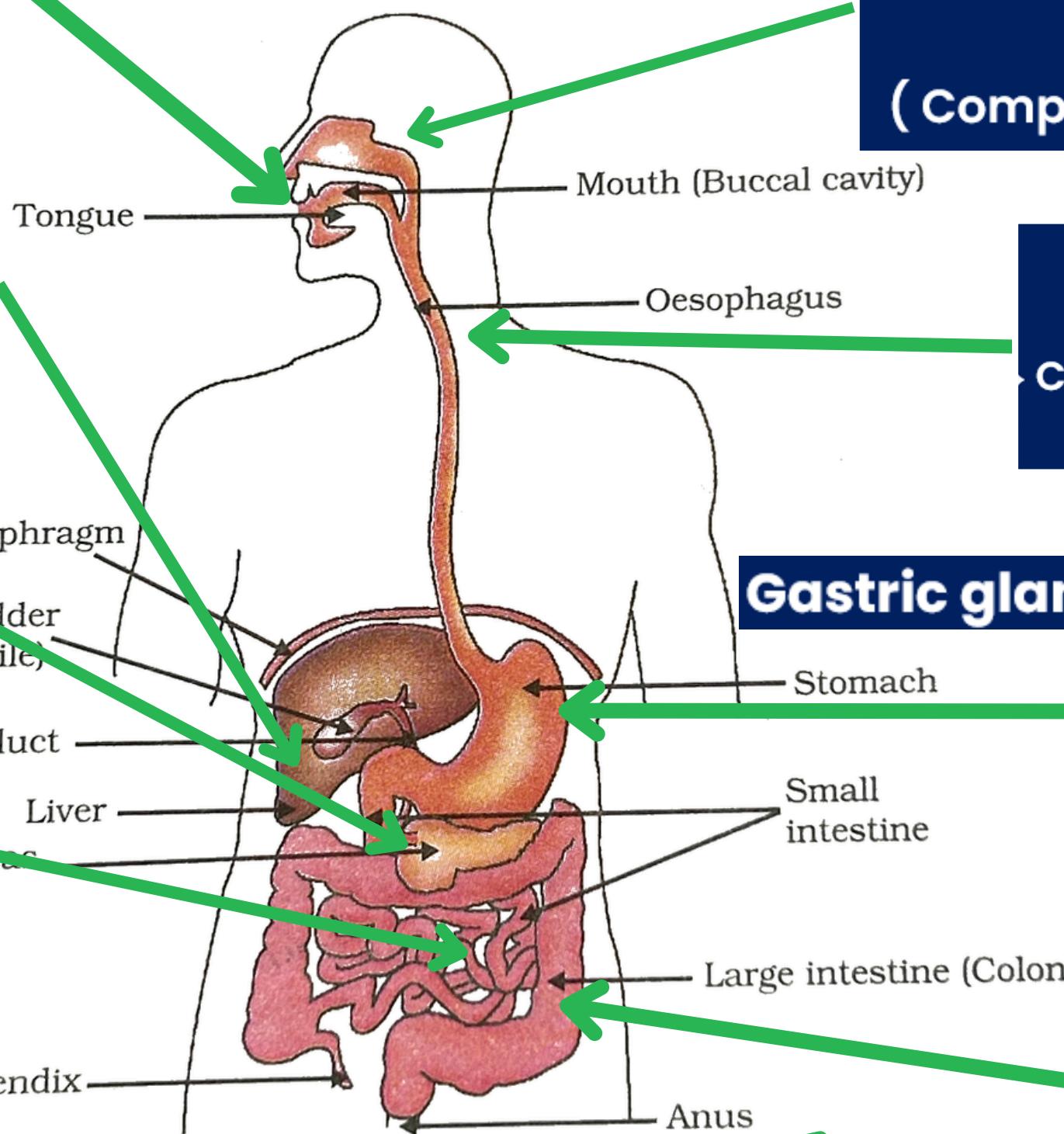
coiled; Longest part of alimentary canal
site of complete digestion of carbohydrates , proteins and fats.
Receives secretion from liver & Pancreas



lots of finger like projections → villi

Villi → supplied with blood vessels

Hence, digested food is absorbed and taken to all the cells of body,



Proteins → amino acids
Carbohydrates → glucose
Fats → fatty acid + glycerol

exit of waste material via anus is regulated by anus sphincter

Salivary Glands : Secret Saliva
Saliva contains Enzyme → Salivary Amylase
Which breakdown Starch
(Complex Carbohydrates) to simple sugar

Oesophagus : food pipe

Peristaltic movement

Contraction & Expansion of wall of food pipe
Pushes food into stomach

Gastric glands

Hydrochloric acid
Creates Acidic medium for enzyme pepsin

Pepsin

Protein digesting enzyme

Mucus

Protects inner lining of stomach from acid

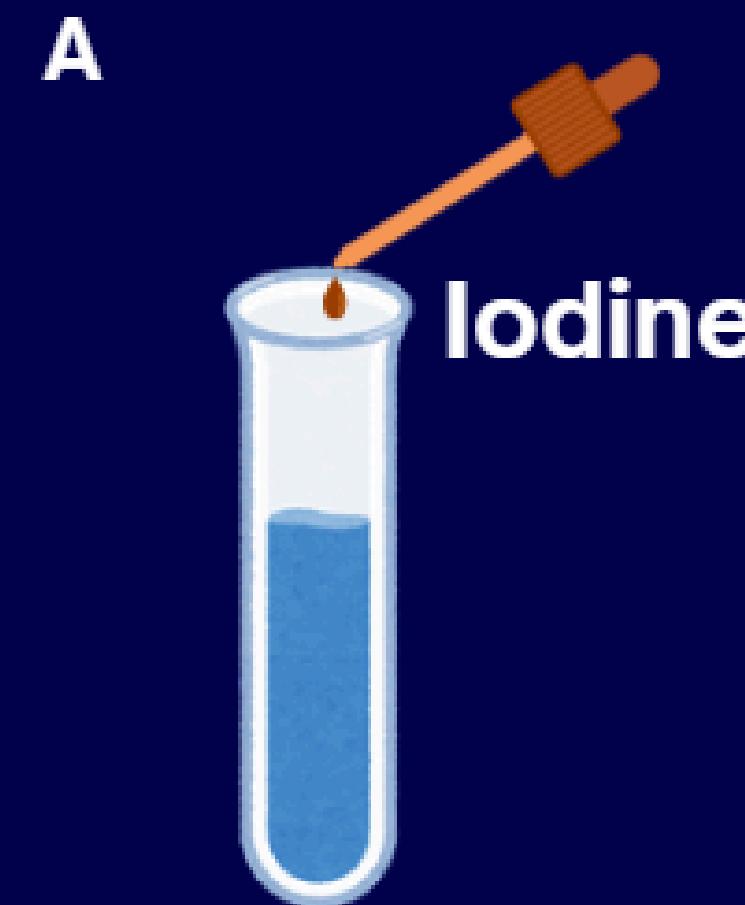
Large Intestine :

Unabsorbed food → sent to Large Intestine
Absorbs more water from this material.

Rest of the material is removed via anus.

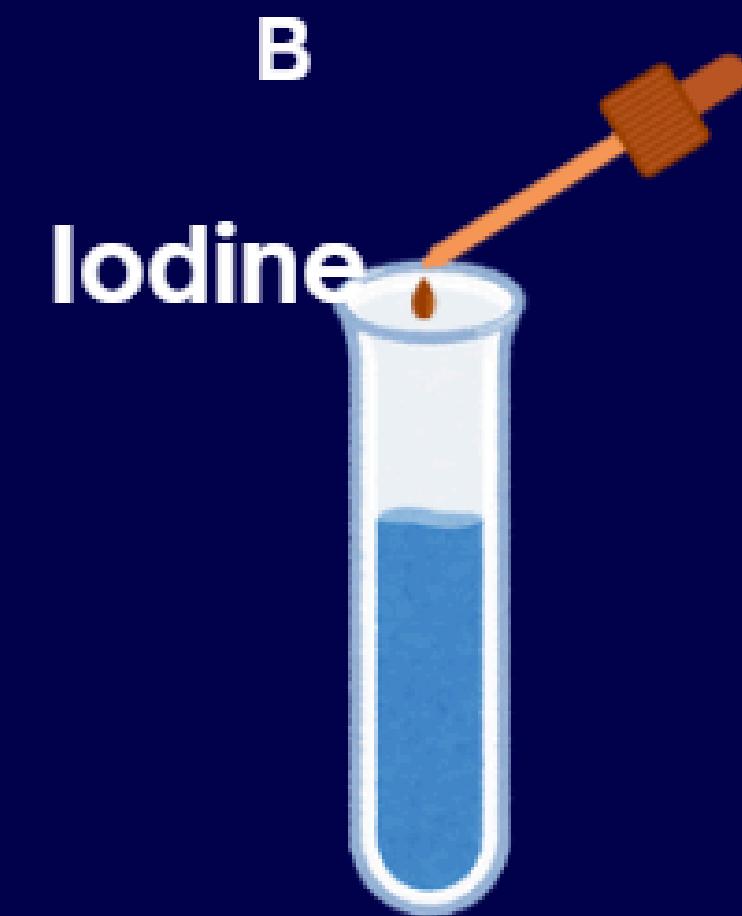
Herbivorous → longer small intestine for digestion of cellulose

Carnivorous → shorter small intestine since meat is easier to digest



Starch + Saliva
(breaks down starch)

- No color change
- Starch not present



Starch

- Color change
- Starch present

CONCLUSION

Saliva causes break down of starch

Question – (a) What is the name of the enzyme found in the fluid of our mouth cavity, and which gland produces it? Explain the action of saliva on food with the help of an activity.

(b) Name the type of nutrition exhibited by Amoeba. Explain how food is taken in and digested by this organism. (CBSE 2023, 2024)

Question - (a) What is the role of each of the following in the human digestive system:

(i) Hydrochloric acid (ii) Villi (iii) Anal sphincter (iv) Lipase (v) Mucus (vi) Bile juice (vii) Trypsin

(b) How is the absorption of digested food carried out in the small intestine, and why is it necessary?

(c) Why is the small intestine longer in herbivores than in carnivores?

CBSE(2020,2023,2024)

RESPIRATION

The process of releasing energy from food is called respiration

Breathing

Physical process

Process of Inhaling & Exhaling the air

No energy released instead energy is required

Happens in lungs

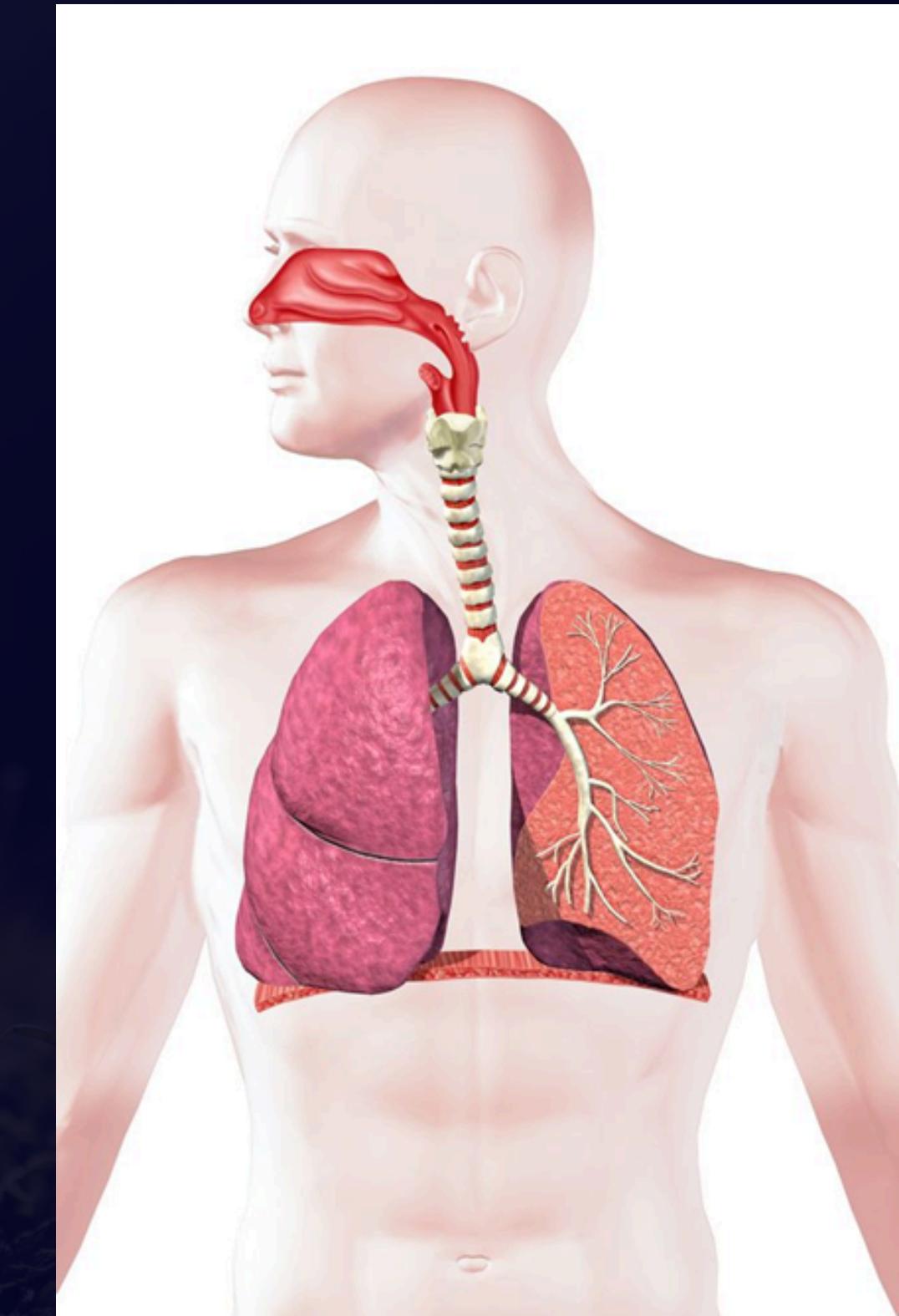
Respiration

Chemical process

Process of breaking down of food to produce energy

Energy is released in form of ATP

Happens in cells



Anaerobic Respiration

Alcoholic respiration/ Fermentation

Ethanol + Carbon dioxide + Energy
(2-carbon molecule)

Lactic acid respiration/ Fermentation

Lactic acid + Energy
(3-carbon molecule)

Carbon dioxide + Water + Energy

Aerobic Respiration ↑

Glucose
(6-carbon
molecule)

In cytoplasm

Pyruvate
(3-carbon
molecule)
+ Energy

Absence of

Oxygen (In yeast)

Lack of oxygen

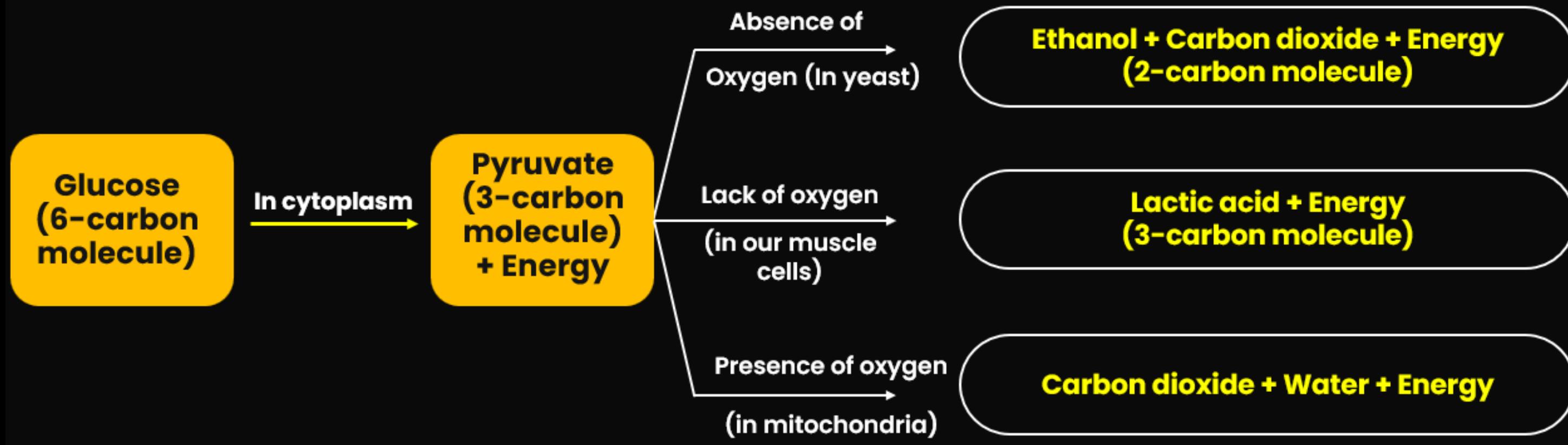
(in our muscle
cells)

Attached to bones

Presence of oxygen

(in mitochondria)

- The buildup of lactic acid in our muscles during sudden activity causes cramps



Aerobic Respiration

Oxygen is required
More Energy produced
Complete oxidation and breakdown of glucose
Occurs in cytoplasm & mitochondria
End products: $\text{CO}_2 + \text{H}_2\text{O}$

Anaerobic Respiration

Oxygen not required
Less Energy produced
Incomplete oxidation and breakdown of glucose
Occurs only in cytoplasm
End products: $\text{CO}_2 + \text{ethanol} / \text{Lactic acid}$

RESPIRATORY SYSTEM IN HUMAN

Nostrils

Air enters the passage

Rings Of Cartilage

Prevents air passage from collapsing

Nasal Passage

have hairs lining passage for filtration of air

→ Passage lined with mucus

→ To trap dirt and dust and filtration of air

Pharynx

Common passage for food & air

Larynx (voice-box)

produces sound , contains vocal cords

Trachea
Windpipe

Bronchus

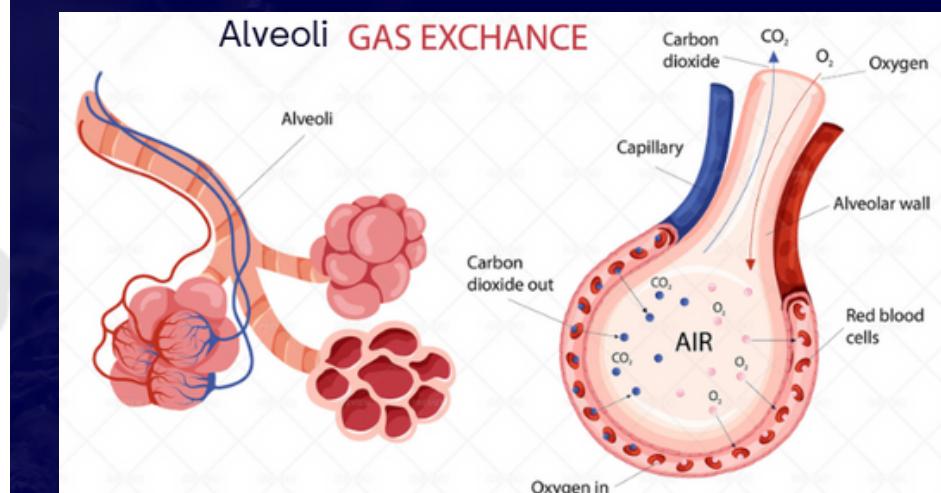
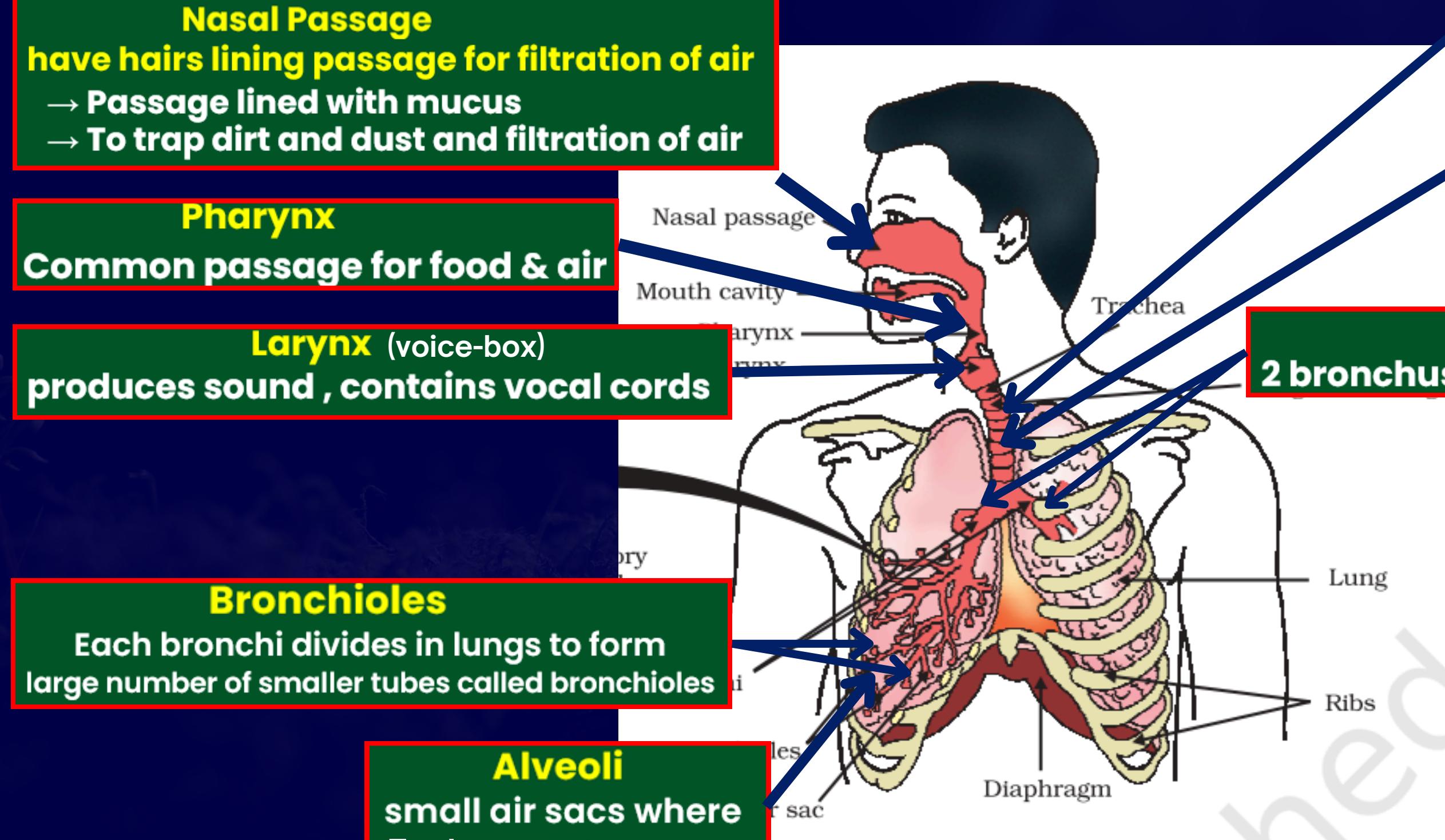
2 bronchus Connect trachea to each lung

Bronchioles

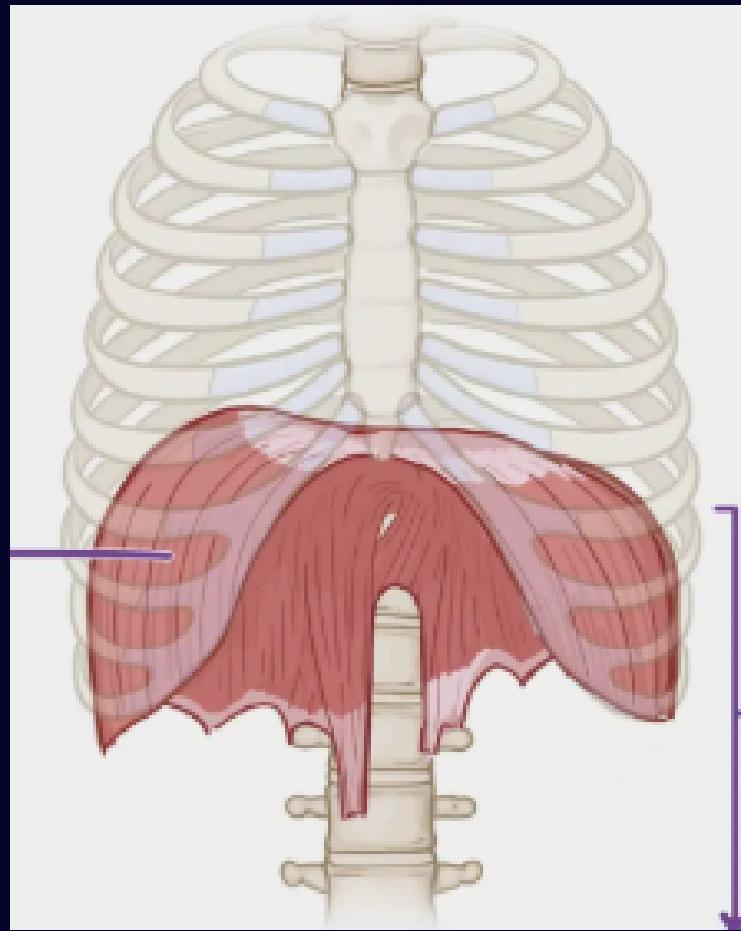
Each bronchi divides in lungs to form large number of smaller tubes called bronchioles

Alveoli

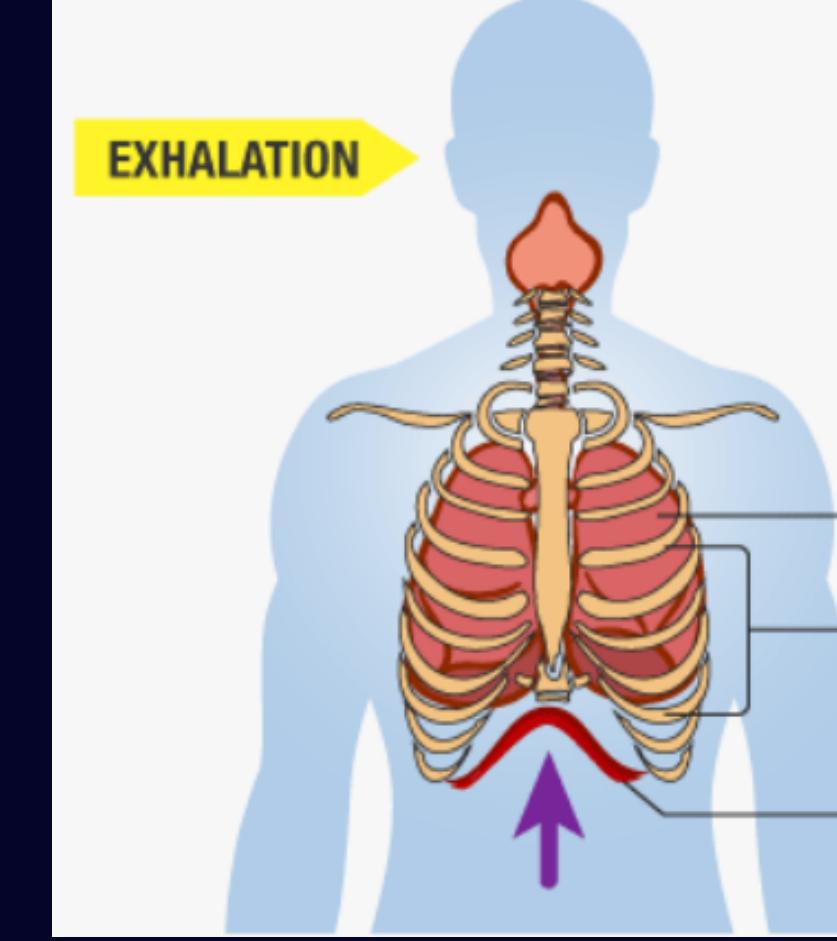
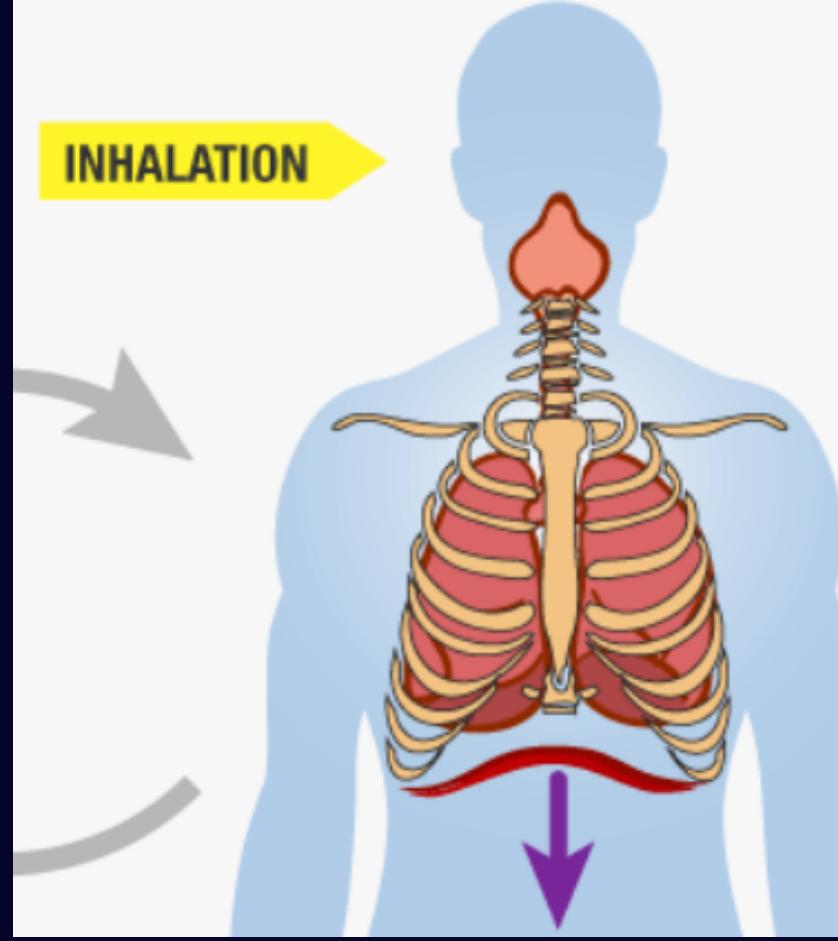
small air sacs where Exchange of O₂ & CO₂



The diaphragm is a large, dome-shaped muscle that separates the chest from the abdomen



Residual volume - Amount of air always remaining in lungs (to provide sufficient time to absorb O₂ and release CO₂)



Inhalation / Inspiration

diaphragm contracts

diaphragm moves downward and becomes flat.

Chest cavity becomes larger

Air is sucked into the lungs

Exhalation / Expiration

diaphragm relaxes

diaphragm moves upward and becomes dome-shaped.

Chest cavity becomes smaller

Air is pushed out from the lungs

RESPIRATION IN PLANTS

exchange of gases → Occurs Through Stomata

Day Time :

Photosynthesis -> Oxygen produced

Respiration -> Carbon Dioxide is produced

This CO₂ is used in Photosynthesis

Net Result -> O₂ is given out

Night Time :

No Photosynthesis

Respiration -> Carbon Dioxide is produced

Net Result -> CO₂ is given out

Breathing in Fish

Fish → take in water through Mouth → force it past the gills -> dissolved O₂ is taken by blood

Terrestrial Organisms

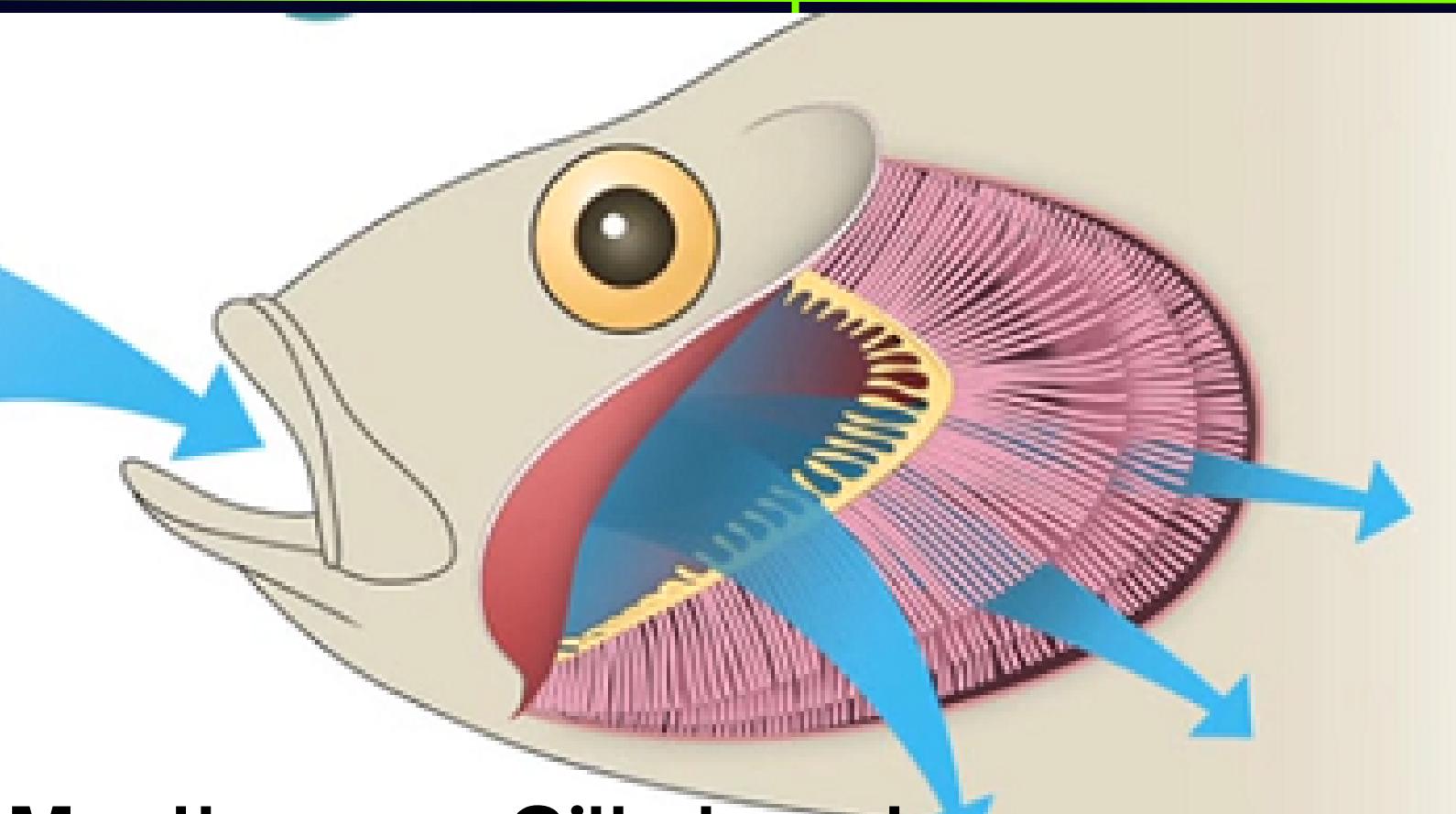
Breathe Oxygen in atmosphere

Rate of breathing is less

Aquatic Organisms

Use dissolved oxygen in water

Rate of breathing is more



Vice-Versa

Question – States reasons for the following:

- (i) Sometimes while running, the athletes suffer from muscle cramps.**
- (ii) The lungs are designed in human beings to maximize the area for exchange of gases.**
- (iii) Rate of breathing in aquatic organisms is much faster than that in terrestrial organisms.**
- (iv) In human beings, when air is taken into the body through the nostrils and passed through the throat, the air passage does not collapse.**
- (v) The test tube containing lime water turns milky when we exhale.**

CBSE(2020, 2021, 2022, 2024)

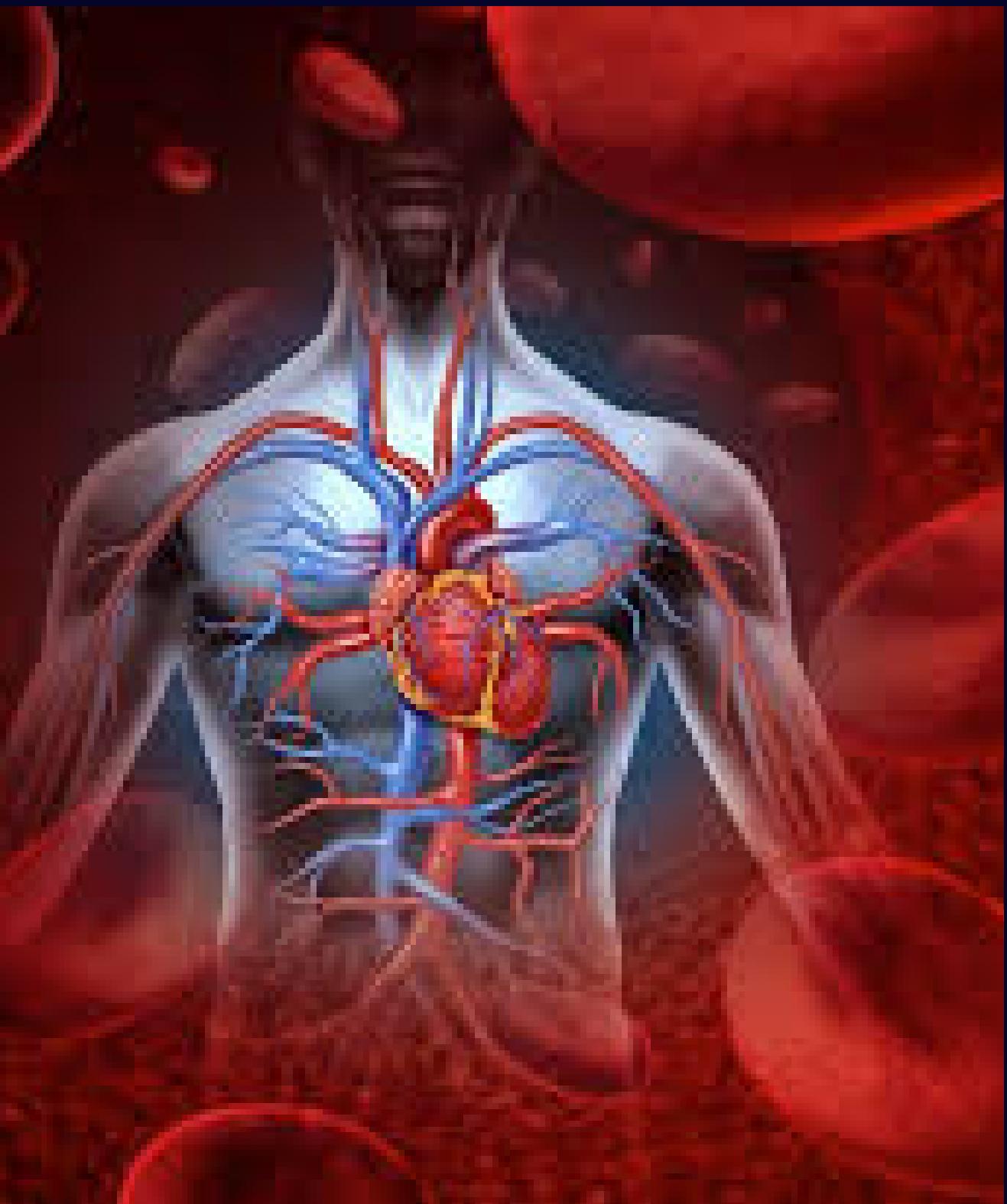
TRANSPORTATION

The process of transfer of substances from one part of the body to other parts.

TRANSPORTATION IN HUMANS

- CIRCULATORY SYSTEM
- LYMPHATIC SYSTEM

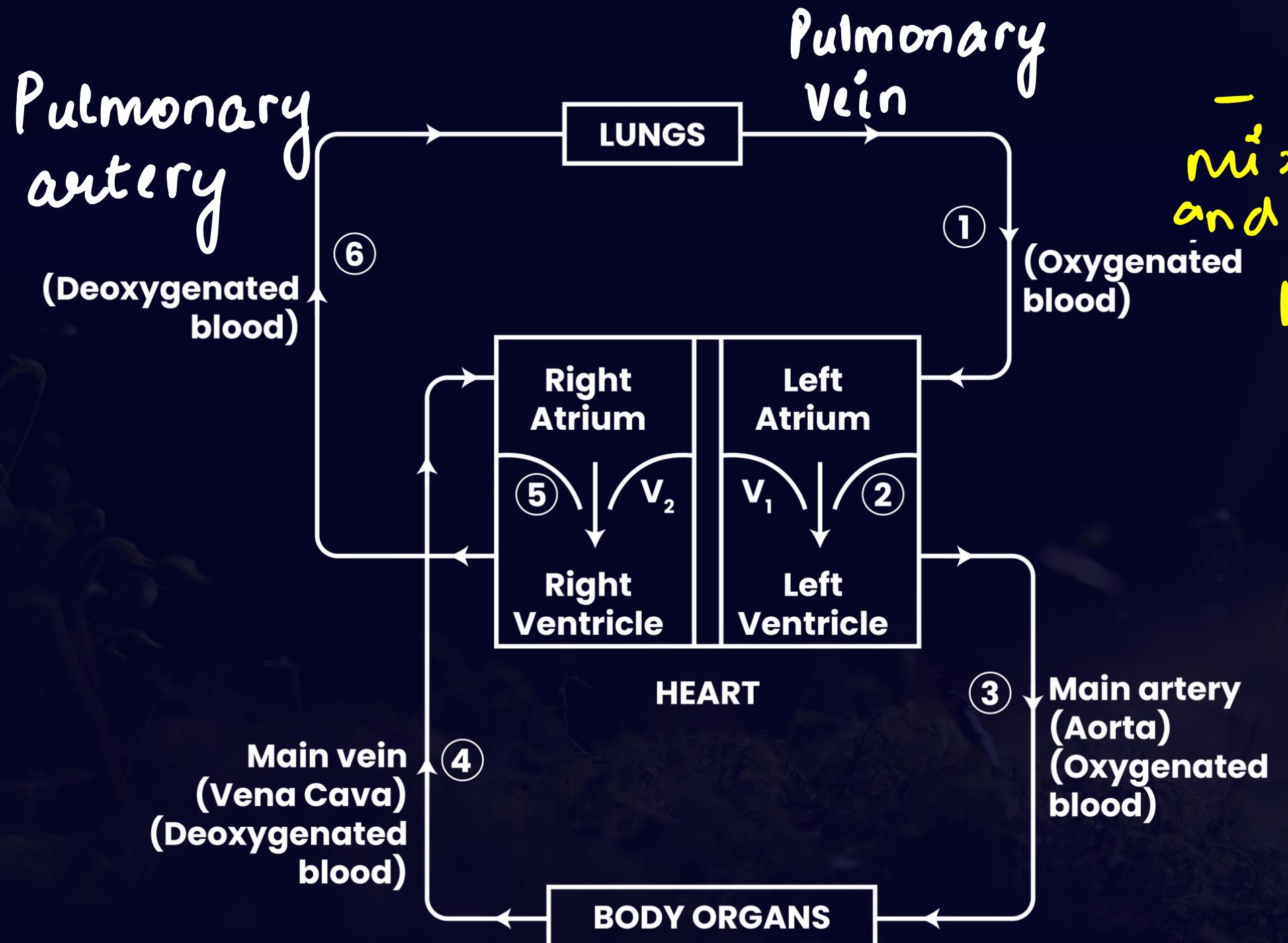
The circulatory system consists of the heart, blood, and blood vessels



HEART

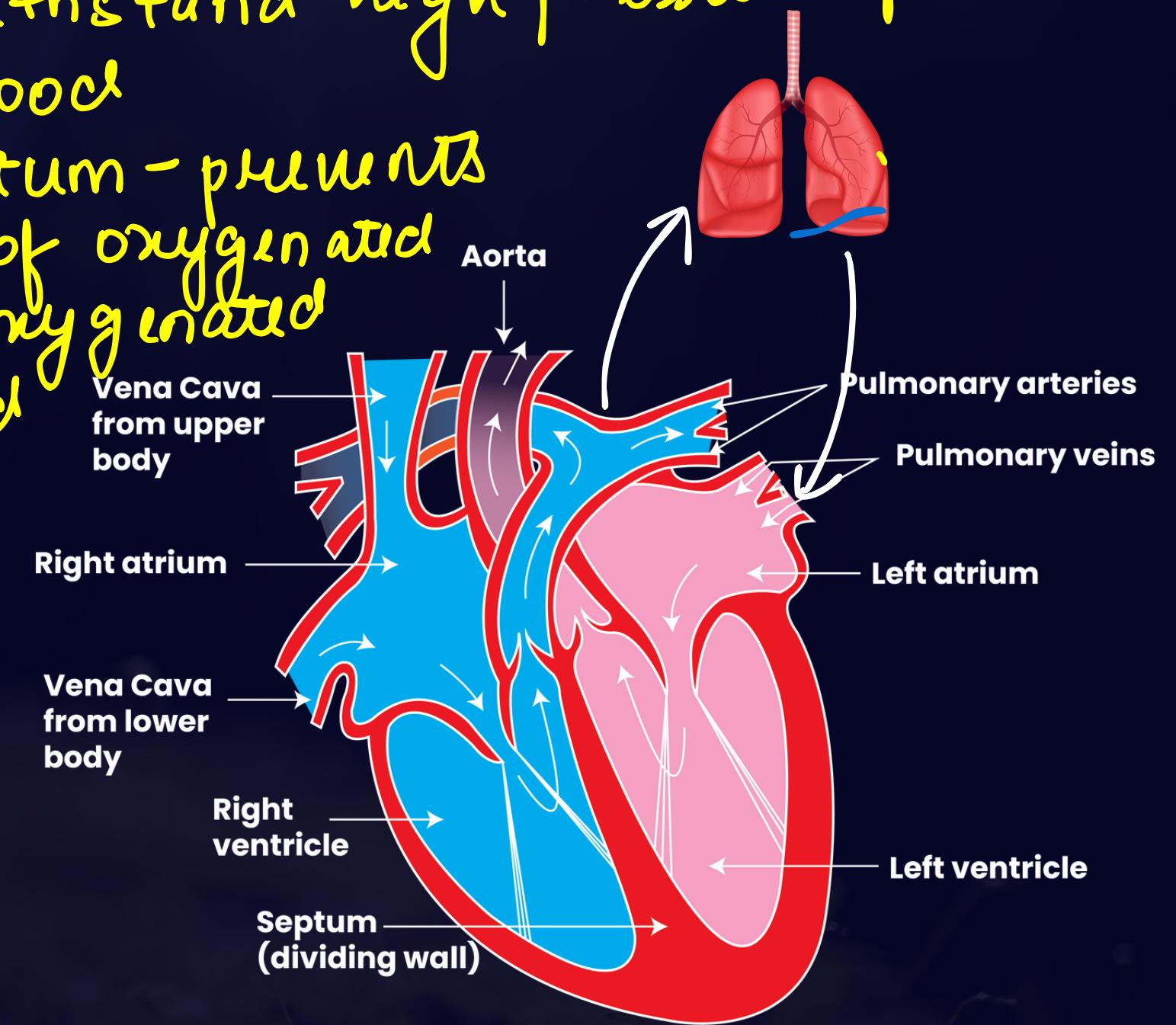
- Ventricles have thicker walls than atria to withstand high pressure of blood

- Septum - prevents mixing of oxygenated and deoxygenated blood



Largest artery- Aorta

Largest vein- Vena cava



Arteries- Carry oxygenated blood away from heart

Veins- Carry deoxygenated blood to the heart

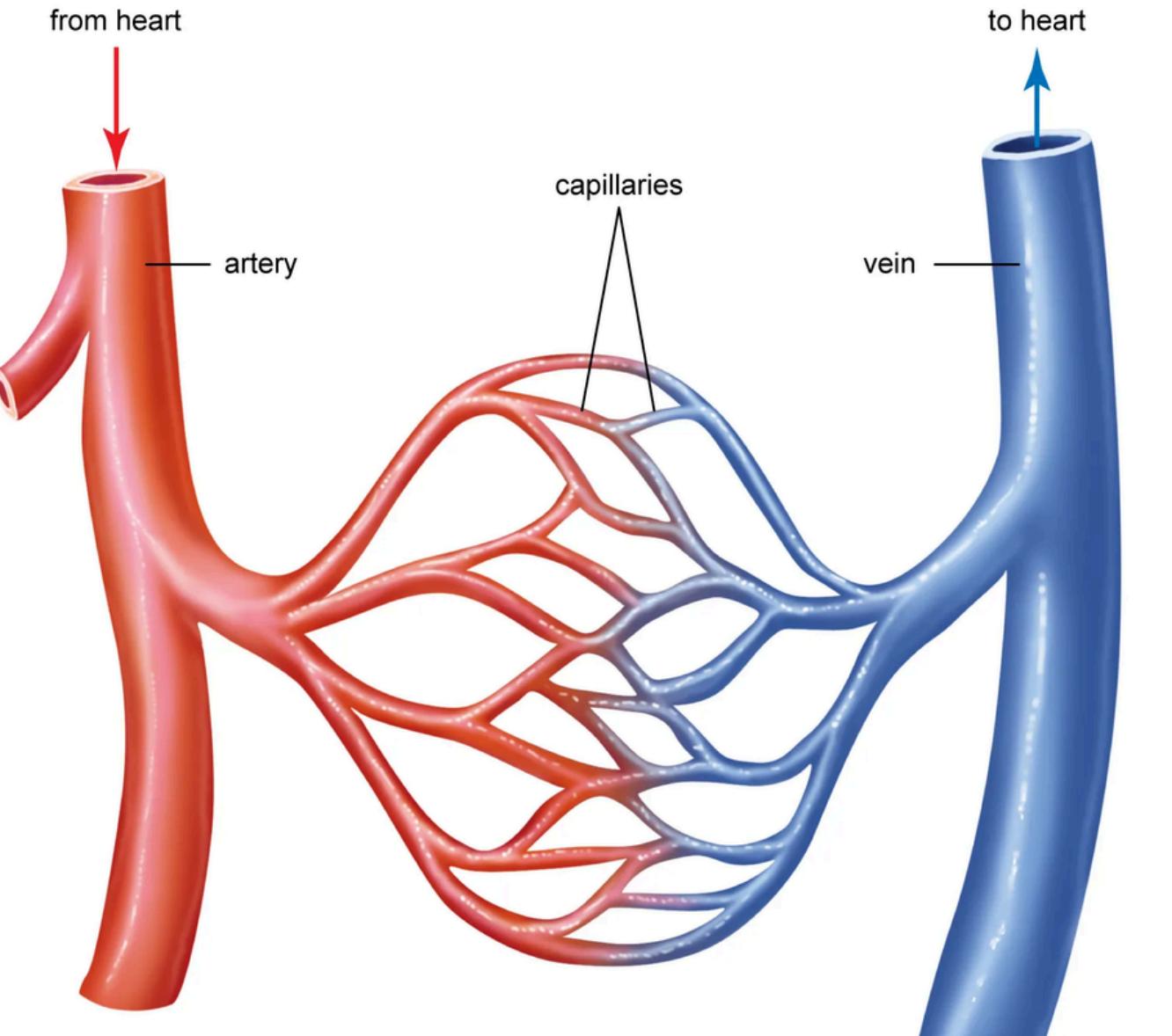
Pulmonary artery - Carries deoxygenated blood

Pulmonary vein - Carries oxygenated blood

BLOOD VESSELS

Exceptions -
Pulmonary artery- Carries deoxygenated blood
Pulmonary vein- Carries oxygenated blood

Feature	Arteries	Veins	Capillaries
Direction of Blood Flow	Carries blood away from the heart	Returns blood to the heart	Helps in exchange of substances
Oxygen	Rich in oxygenated blood	Contains deoxygenated blood	Transports both oxygenated & deoxygenated blood
Pressure	High pressure	Low pressure	Moderate pressure
Walls	Thick and elastic walls	Thin and less elastic walls	Very thin (one cell thick)
Valves	Not present	Present (to prevent backflow)	Absent



Valves are present in veins to prevent backflow of blood

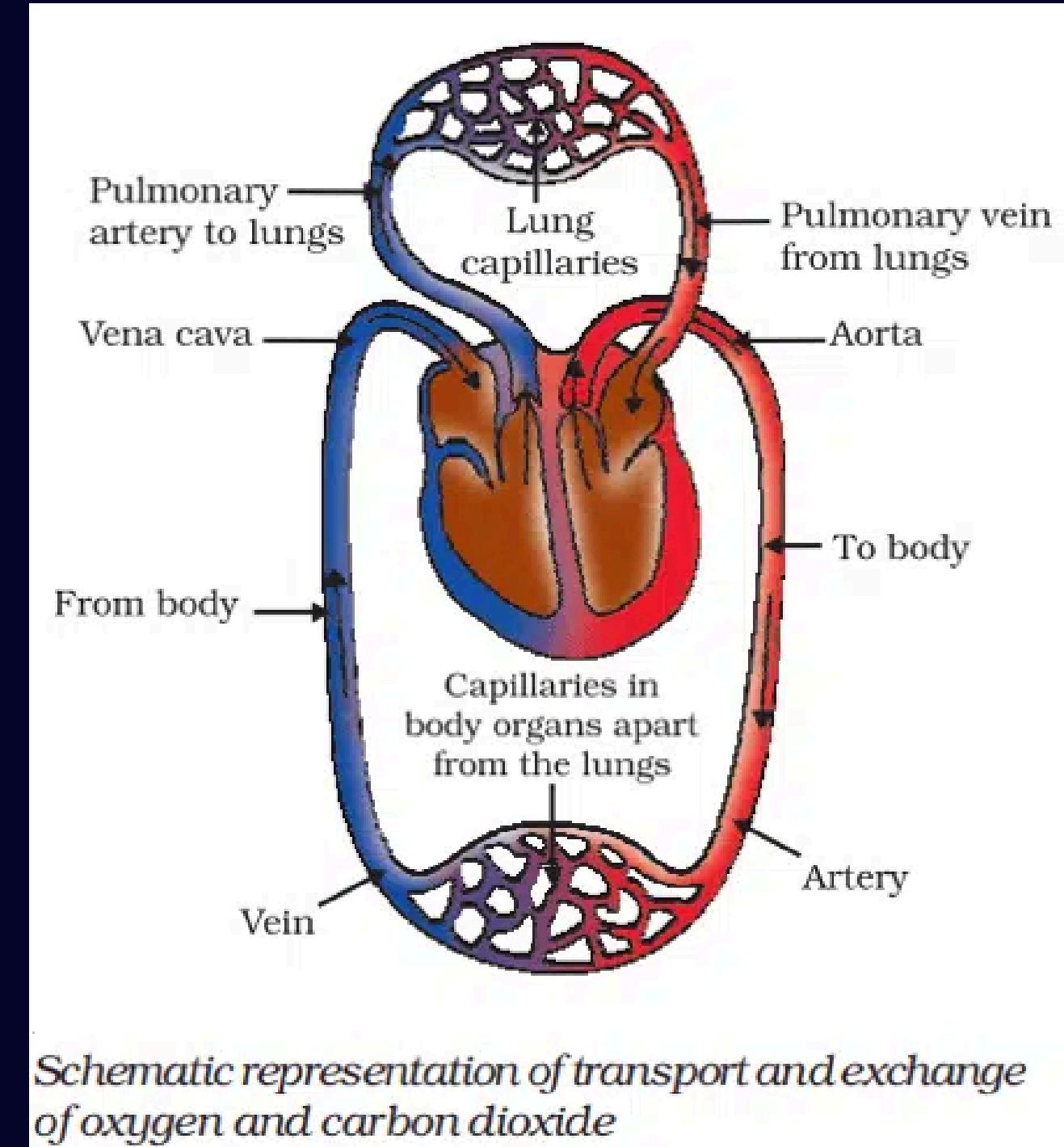
Double Circulation

Blood flows twice through the heart before completing a full circuit.

Single Circulation

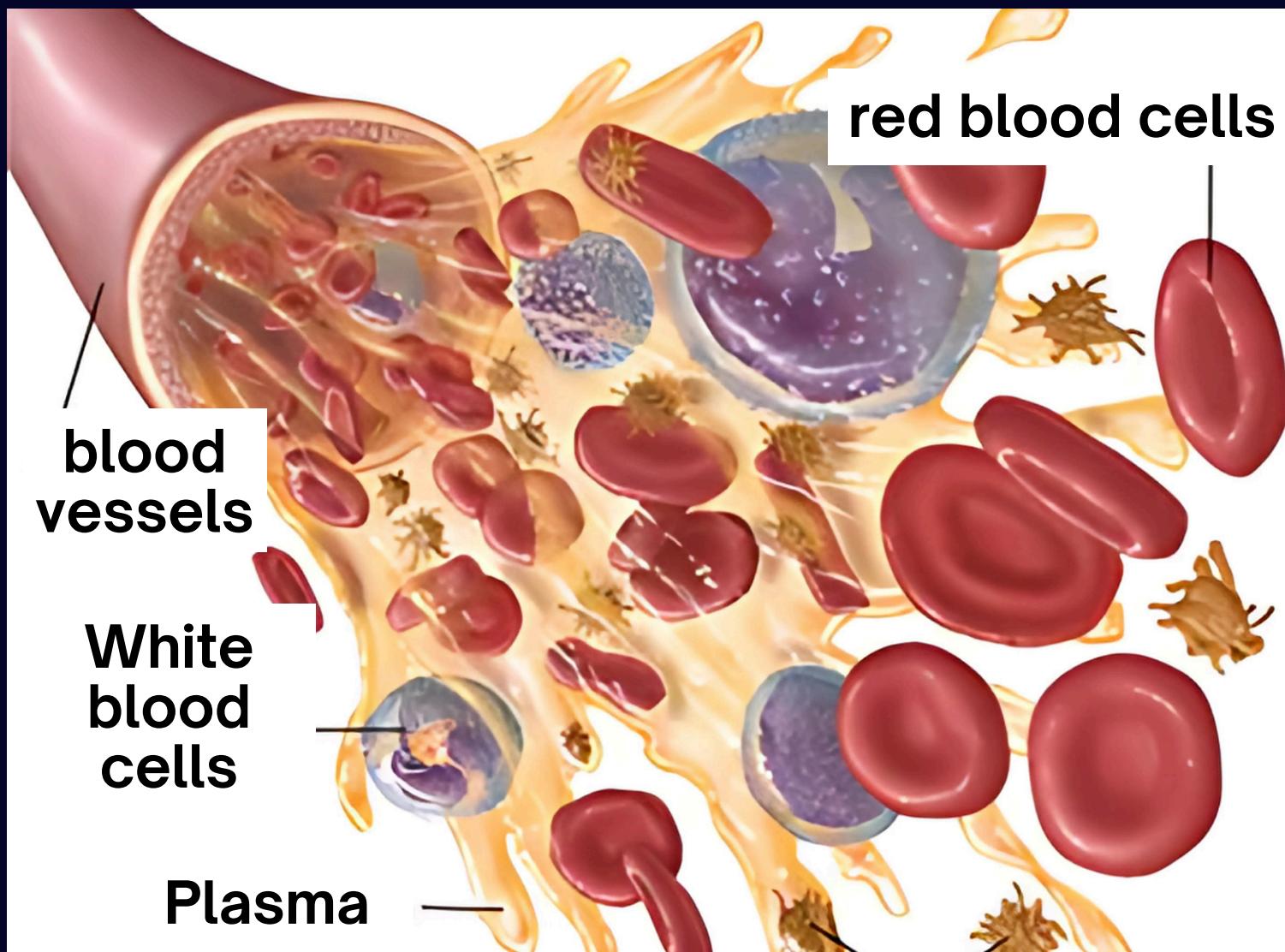
Blood passes only once through the heart in a complete cycle.

Animal Group	Heart Chambers	Circulation Type	Body Temperature Regulation
Birds (Aves), Mammals	4	Complete double circulation	Warm blooded
Amphibians, Reptiles	3	Partial double circulation	Cold blooded
Fishes (Pisces)	2	Single circulation	Cold blooded



Blood Components

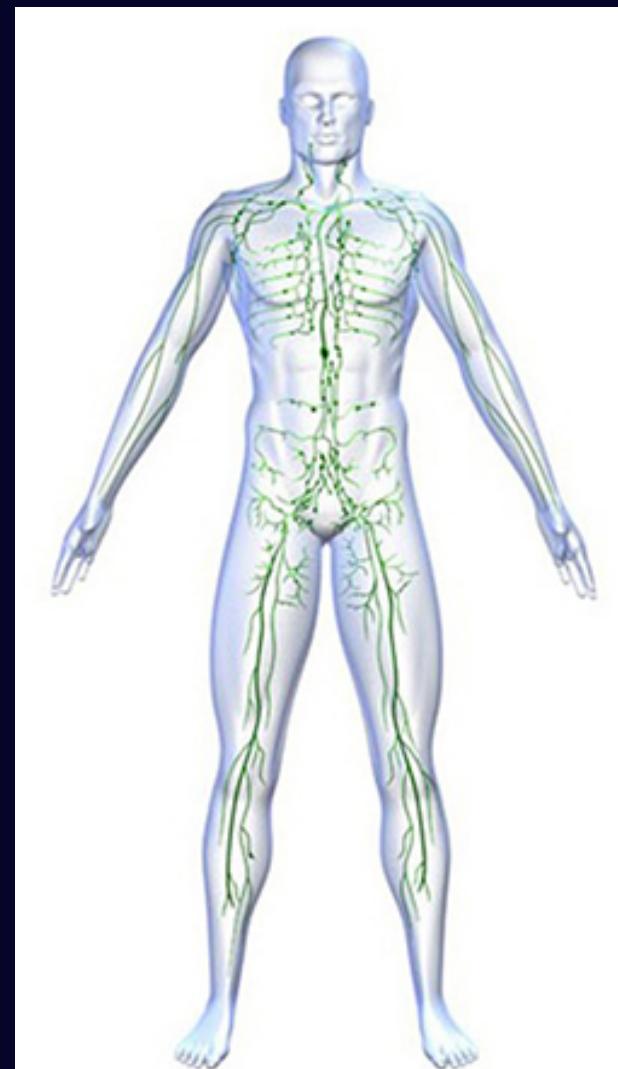
- Plasma: Fluid medium, transports food, carbon dioxide and nitrogenous waste.
- RBCs: Contain haemoglobin and transport oxygen
- WBCs: Fight infections. Produce antibody to kill pathogens
- Platelets: Clotting of blood



LYMPH or TISSUE FLUID

Some components of blood leak through pores in walls of capillaries (plasma, proteins and blood cells (Not RBC)

- Lymph is a part of lymphatic system
- Colourless fluid
- Contains less protein than blood
- Carries digested and absorbed fat from intestine
- Drains excess fluid back into the blood



Question – States reasons for the following:

- (i) The muscular walls of the ventricles are thicker than those of the atria. (2020)**
- (ii) Circulation of blood in aquatic vertebrates differs from that in terrestrial vertebrates.**
- (iii) When we are injured and start bleeding, it stops after some time.**

Question – What is lymph, and how does it differ from blood?

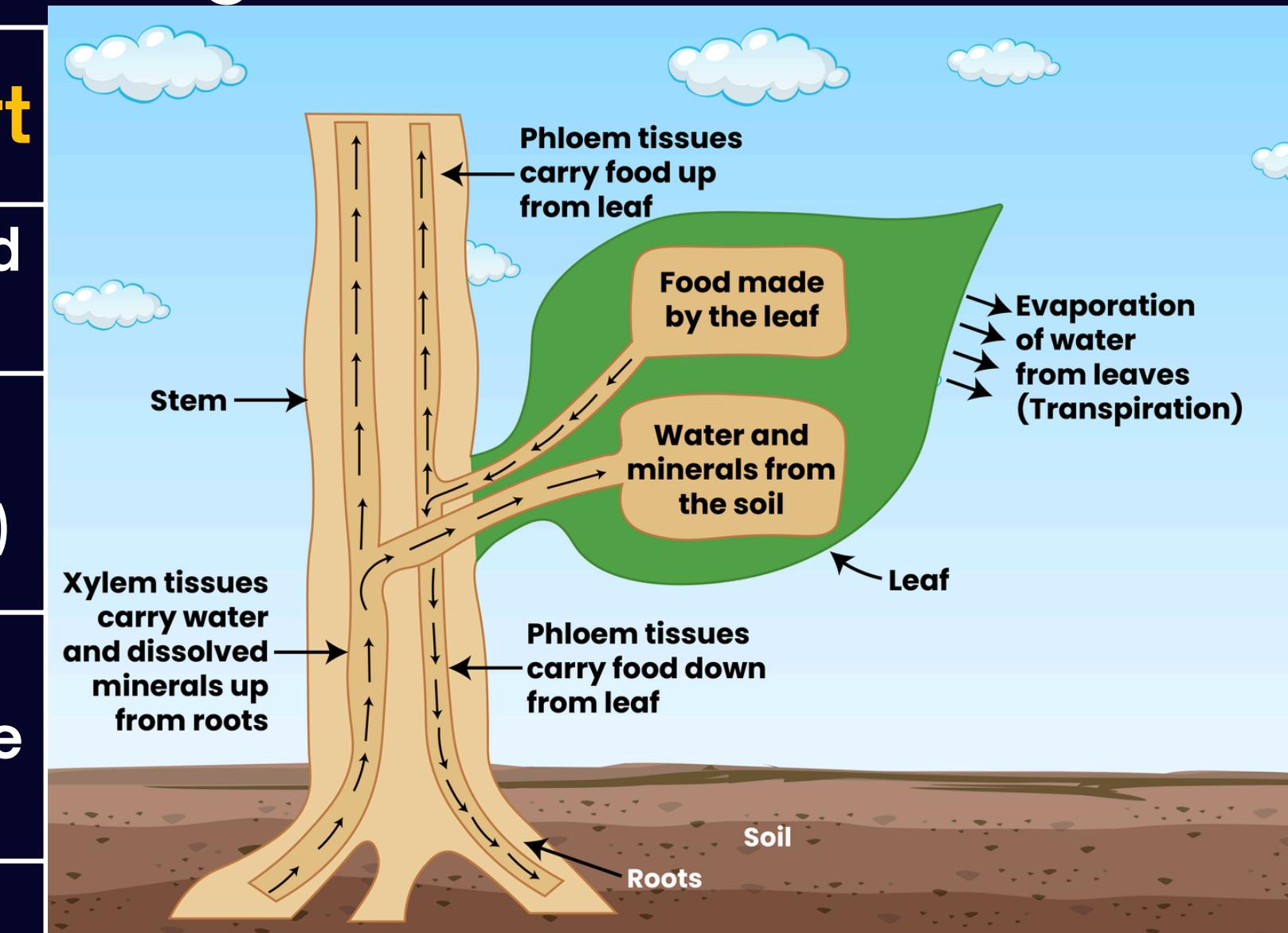
(CBSE 2022, 2024)

TRANSPORTATION IN PLANTS

Slow transportation system - 1) Plants do not move 2) have a large proportion of dead cells in many tissues. Hence they have low energy needs and use slow transport systems. But, transportation distance can be very large

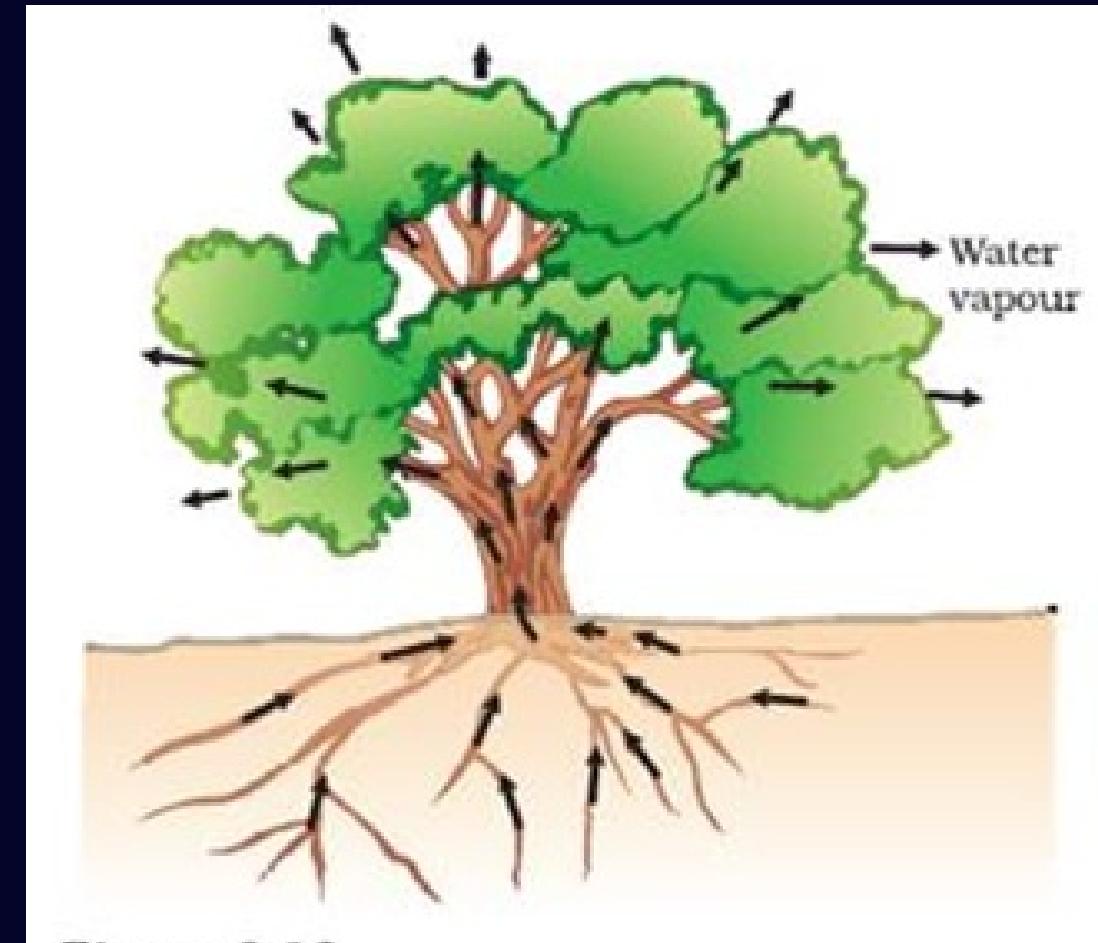
Xylem & Phloem are independent conducting tubes

Feature	Xylem Transport	Phloem Transport
Transports	Water and minerals	Food, amino acids and other substances
Direction of Flow	Unidirectional (upwards from roots to aerial parts)	Bidirectional (both upward and downward)
Process Involved	Physical forces(such as root pressure and transpirational pull)	Active transport (requires energy in the form of ATP)
Main Tissues Involved	Xylem vessels, tracheids	Sieve tubes, companion cells



Transport of water

- Root pressure-Roots take up ions from soil which creates difference in the concentration of these ions
 - water from soil moves into the roots
 - there is a constant movement of water into root xylem and water is steadily pushed upwards.
-
- Transpiration **The loss of water in the form of vapour from the aerial parts of the plant is called transpiration**



Role of transpiration

1. Absorption and upward movement of water and minerals from roots to leaves
2. Temperature regulation.

Day time- Major force is transpirational pull

Night time -Root pressure

Transport of food

- ### Translocation
- The transfer of food from leaves to other parts of the plant is called translocation
 - phloem translocates the food made in the leaves
 - These substances are especially delivered to the storage organs of roots, fruits and seeds and to growing organs

Question – States reasons for the following:

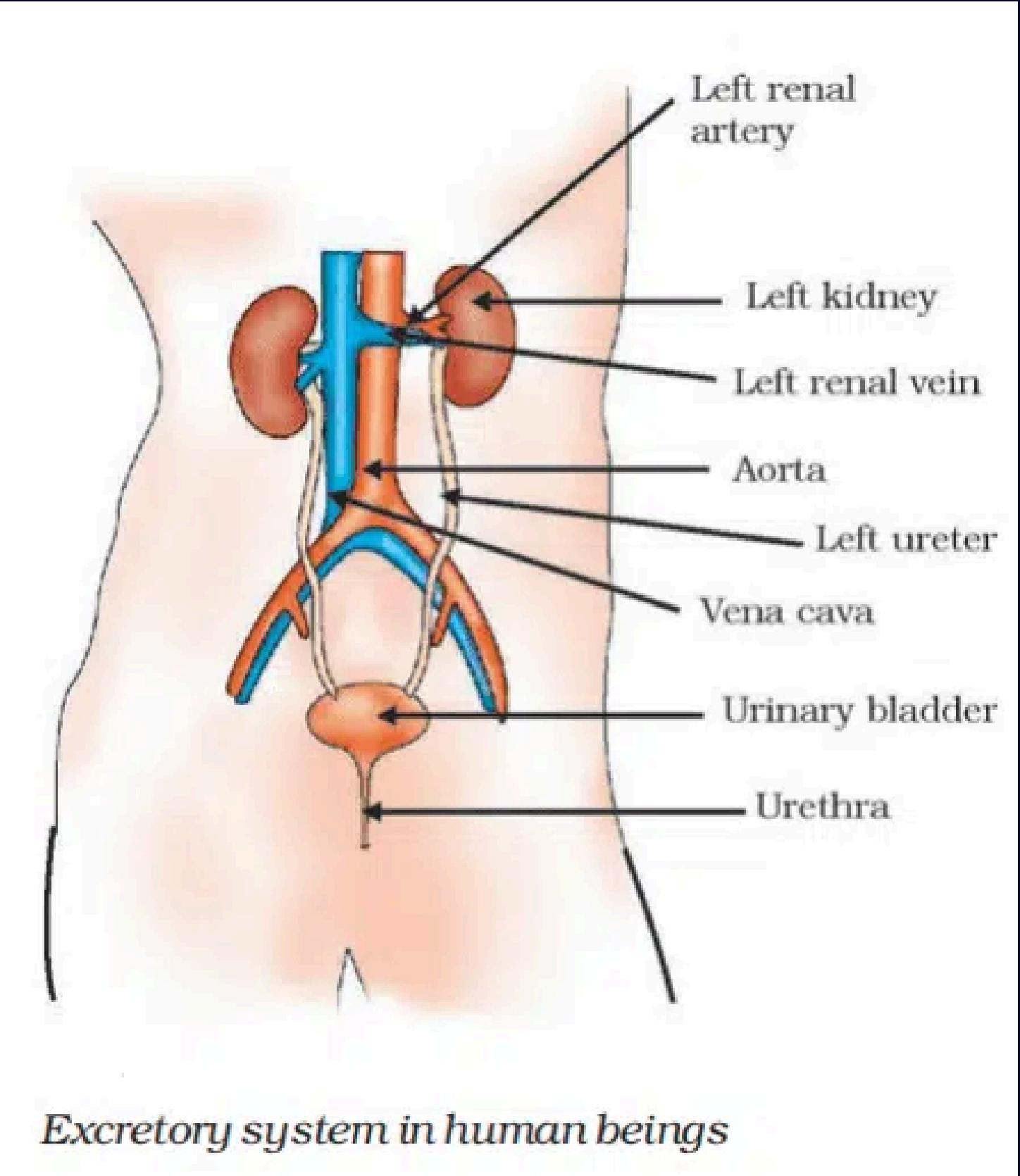
- (i) The transport system in plants is relatively slow.**
- (ii) During the day, water and minerals move more quickly through the xylem compared to at night.**

EXCRETION IN HUMAN BEINGS

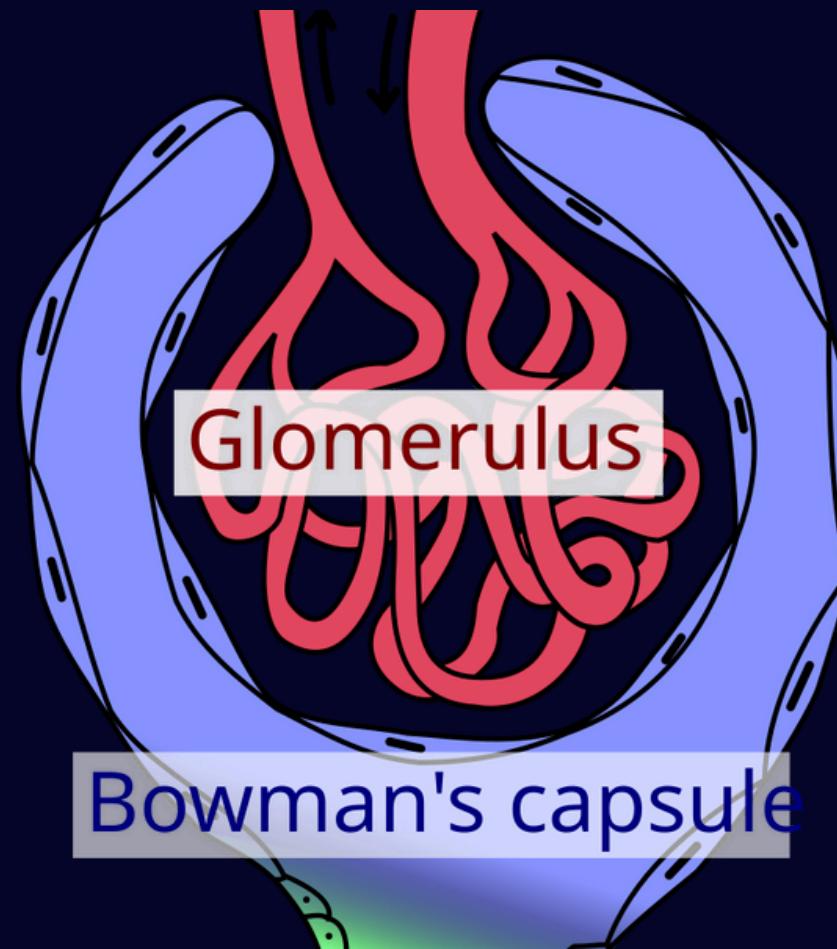
Removal of harmful metabolic wastes from the body is called excretion

The excretory system of human beings include-

- **Kidneys**- Nitrogenous waste such as urea and uric acid are removed from blood through kidneys
- **A pair of ureters**- Connects the kidneys with the urinary bladder
- **Urinary bladder**- Urine is stored in urinary bladder until it is passed out (muscular, under nervous control)
- **Urethra**- Transports urine out of the body

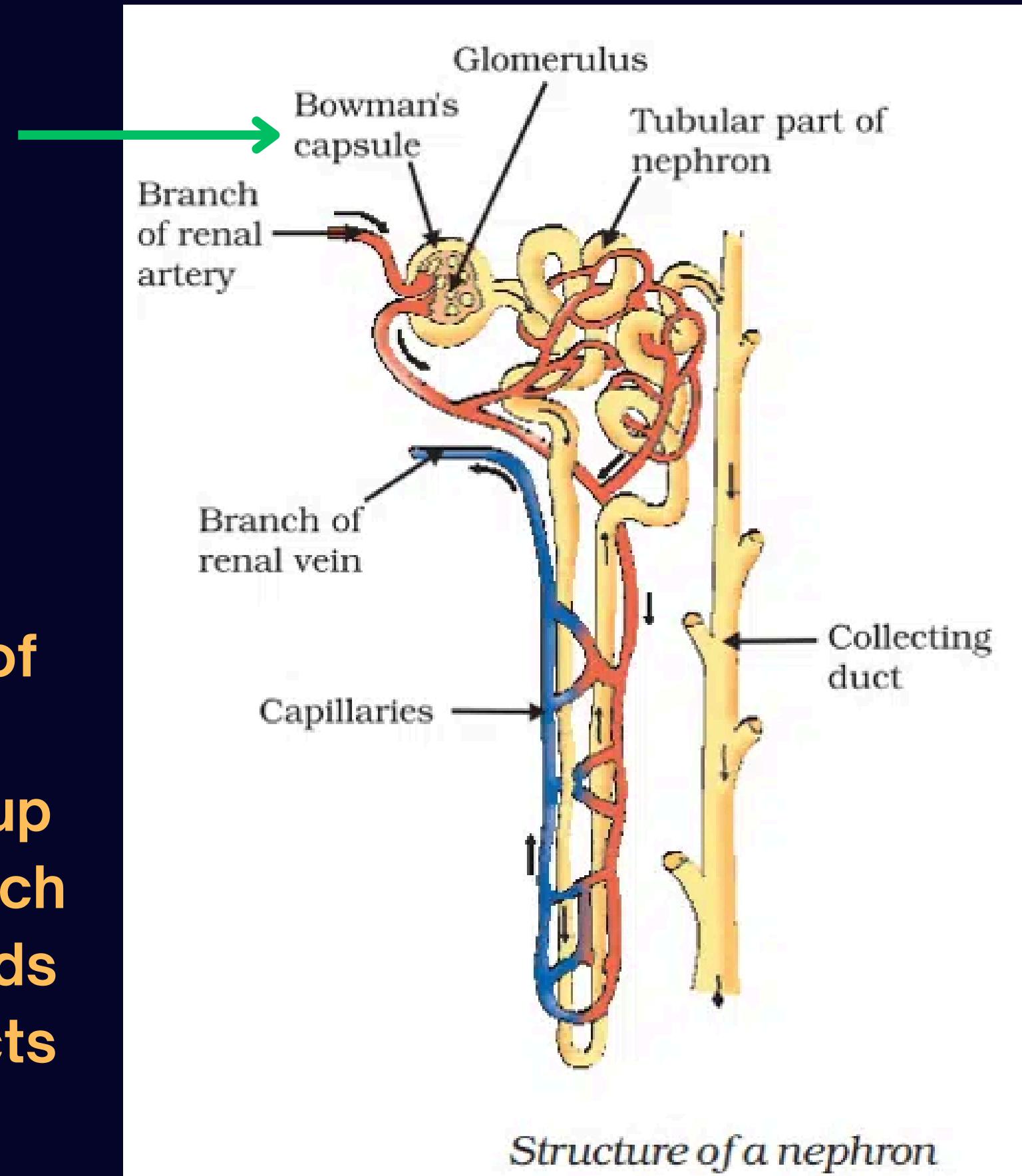


- Nephron is the structural and functional unit of kidney. Each kidney has large number of nephrons



Glomerulus- Cluster of blood vessels

Bowmans Capsule- Cup shaped structure in each Nephron ,that surrounds glomerulus and collects the filtrate



GLOMERULAR FILTRATION-

Nitrogenous wastes, glucose, water, amino acid, excessive salts from the blood are filtered and initial filtrate enters into Bowman Capsule of the nephron.

SELECTIVE REABSORPTION-

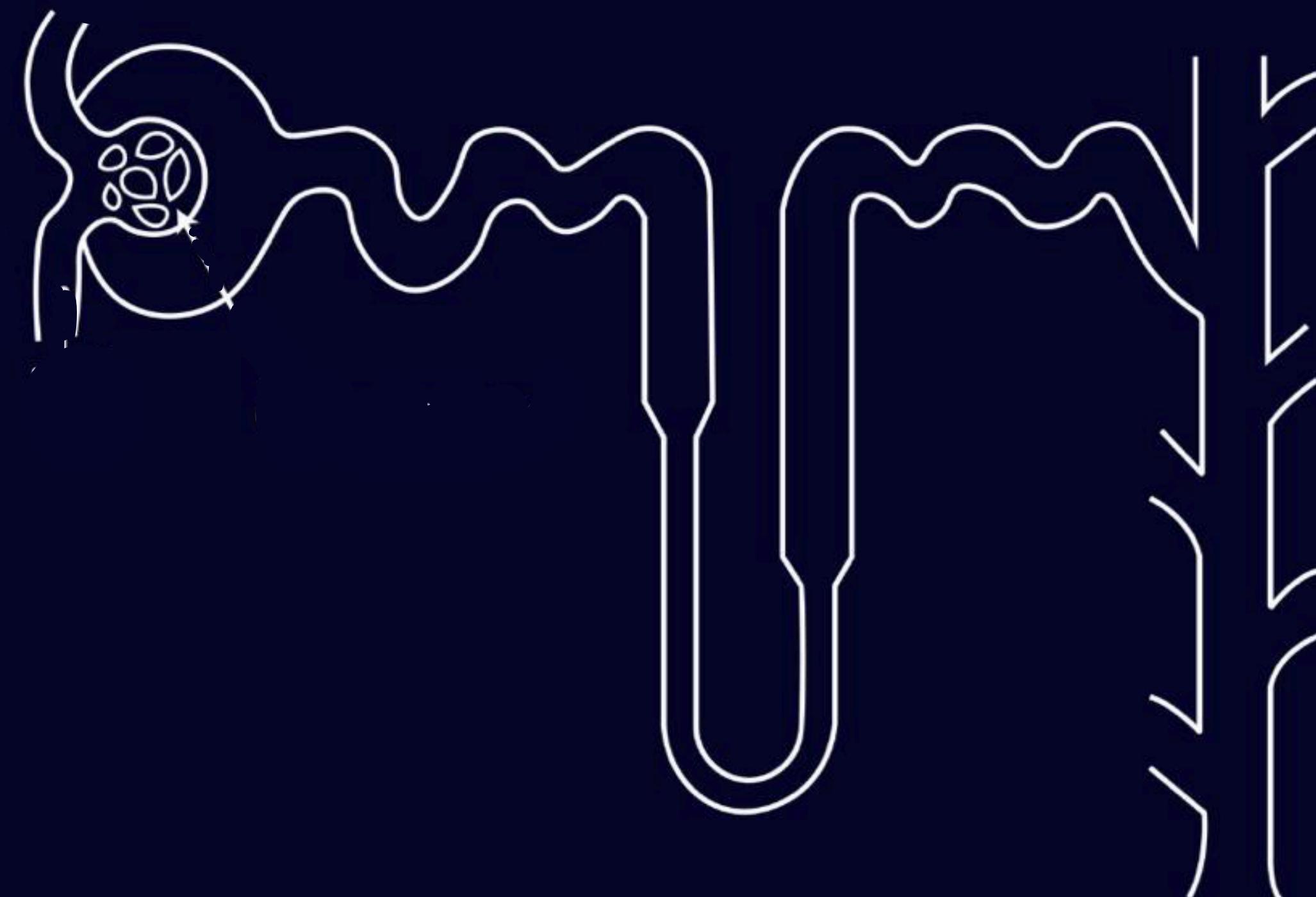
Useful substances like glucose, amino acids, salts and a major amount of water from the filtrate are reabsorbed back by capillaries surrounding the nephron

TUBULAR SECRETION -

Urea, extra water and salts are secreted into the tubule which open up into the collecting duct & then into the ureter.

Amount of water reabsorbed depends on

- 1. Amount of excess water in body**
- 2. Amount of dissolved waste to be excreted**



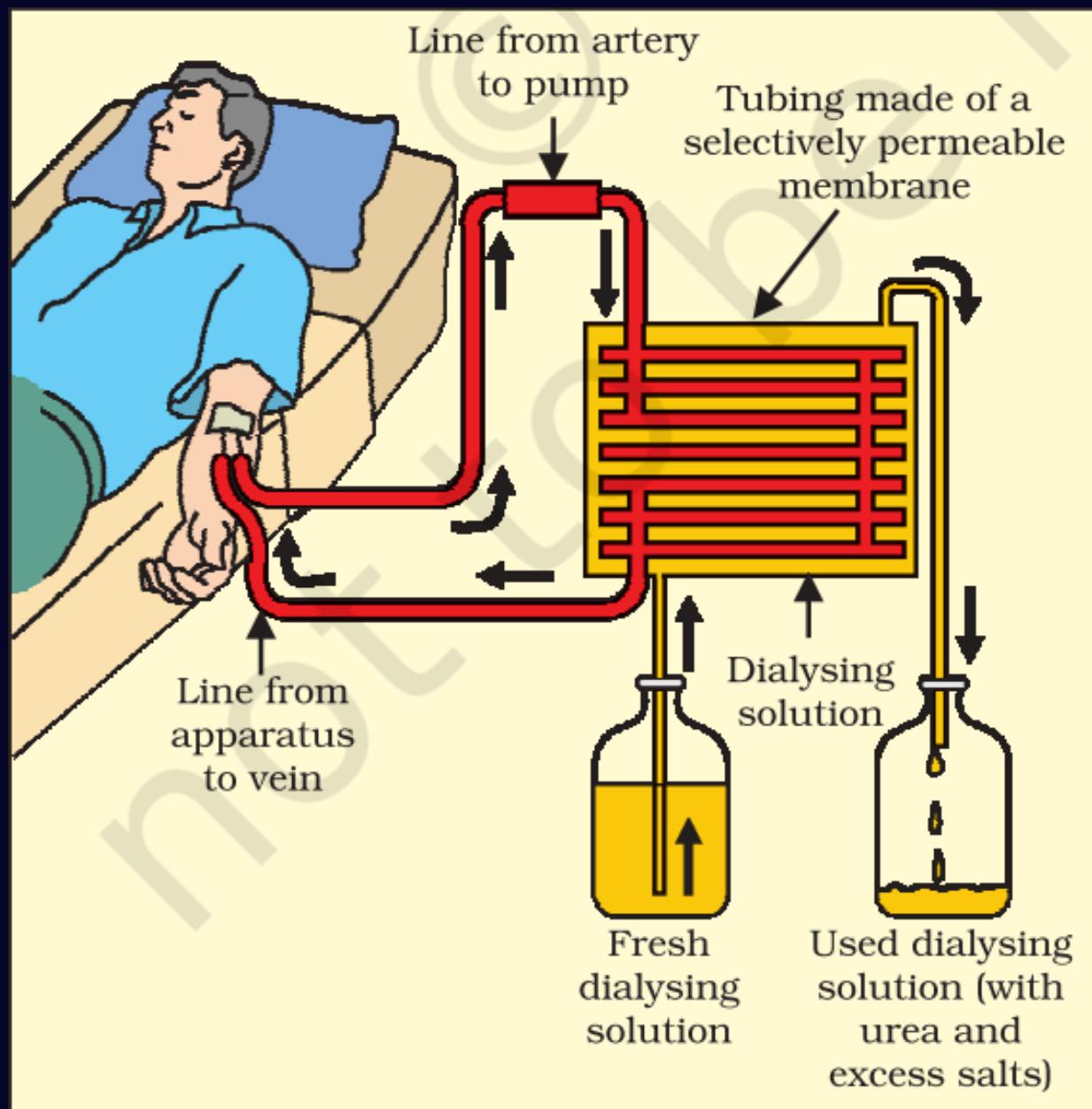
Question – Read the following and answer the questions.

In case of kidney failure, an artificial kidney can be used. An artificial kidney is a device to remove waste products from the blood through dialysis.

- (a) (i) Name the artery that brings oxygenated blood to the kidney.
(ii) Name the cluster the thin-walled blood capillaries present in the Bowman's capsule.**
- (b) In human excretory system name the organ which stores urine. Is this organ under hormonal control or nervous control?**
- (c) (i) List two major steps involved in the formation of urine and state in brief their functions.
(ii) In which part of the nephron does selective reabsorption take place? List the factors which the amount of water from urine reabsorbed depends on.**

ARTIFICIAL KIDNEY (HEMODIALYSIS)

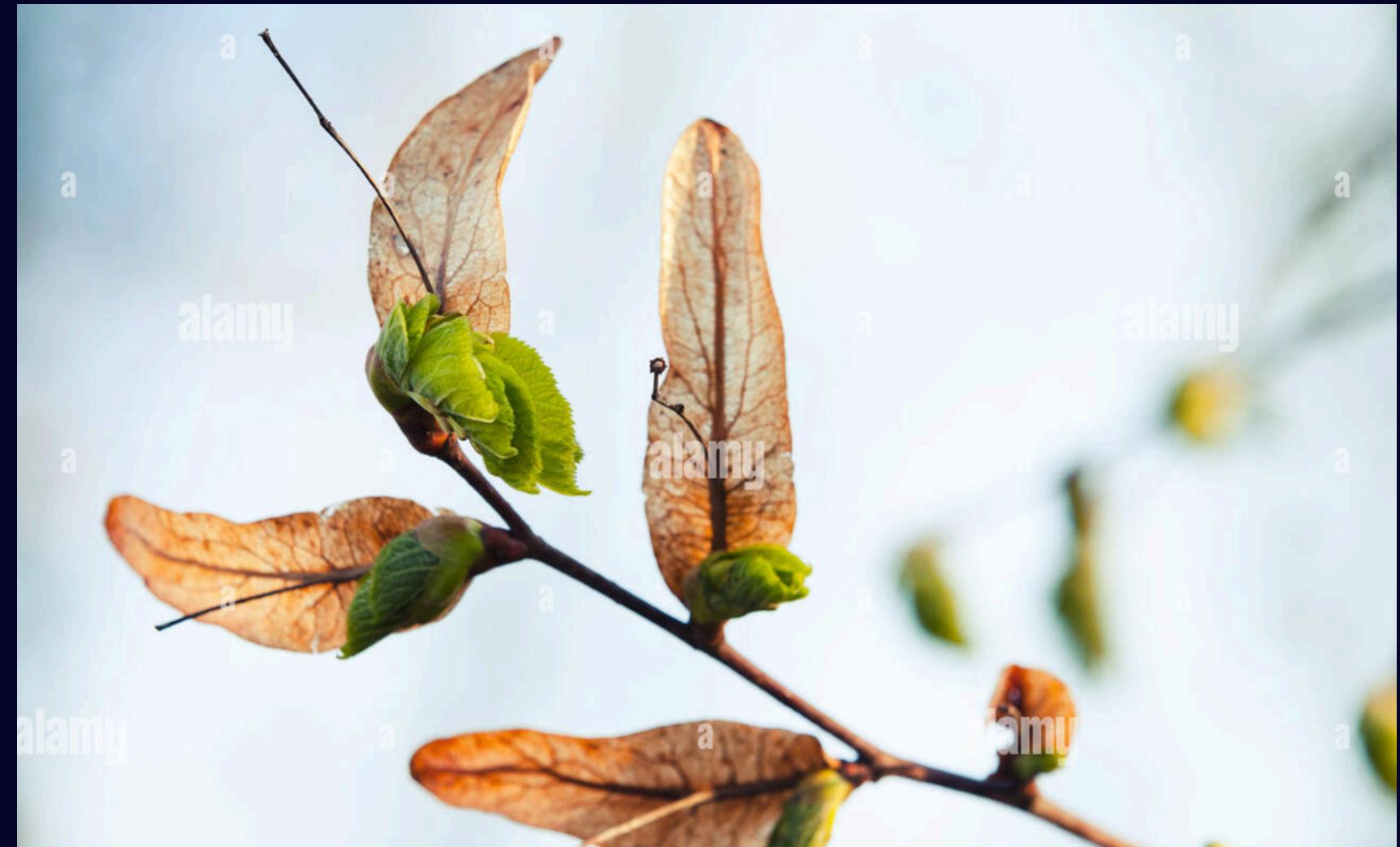
- In case of kidney failure, an artificial kidney can be used
- An artificial kidney removes nitrogenous waste products from the blood through dialysis.
- Artificial kidney --> No reabsorption involved



- Dialysing fluid --> same osmotic pressure as blood (without nitrogenous wastes)
- Used dialysing solution --> rich in urea and excess salts

Excretion in plants

- Oxygen and carbon dioxide --> by diffusion through stomata
- Excess water --> removed by transpiration.
- Shedding of old leaves
- Plants also secrete some waste substances into the soil around them.



Question - a) Describe the structure of the basic filtration unit present in the kidney

b) Explain in brief two ways by which leaves of a plant help in excretion.

CBSE (2019 2020, 2021, 2023)