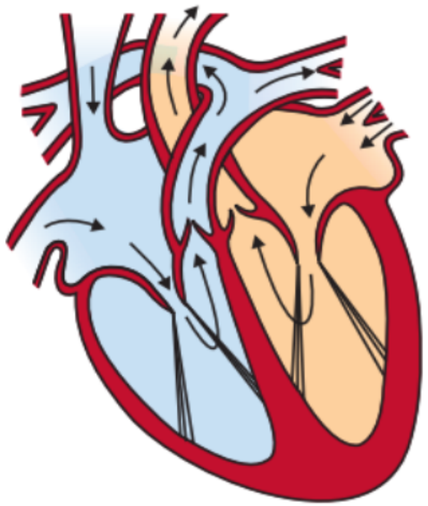


CHAPTER 5

Life Processes

Hello bacchon, aaj is chapter me hum sabhi **Life Processes** ke bare me study karenge, yani jinda rahne ke liye hum **kya-kya (metabolism)** karte hai ye study karenge —

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

Characteristics of Living things

Growth

Movement

Respiration

Sensitivity

Reproduction

Excretion

Nutrition

Living things

→ Living things show movement of the part of body.

→ They grow

→ They reproduce

→ They can feel

→ They respire

→ They need food.

Non - living things

→ Living things do not show movement of the part of body.

→ They can not grow

→ They do not reproduce

→ They can not feel

→ They can not respire

→ They do not need food.

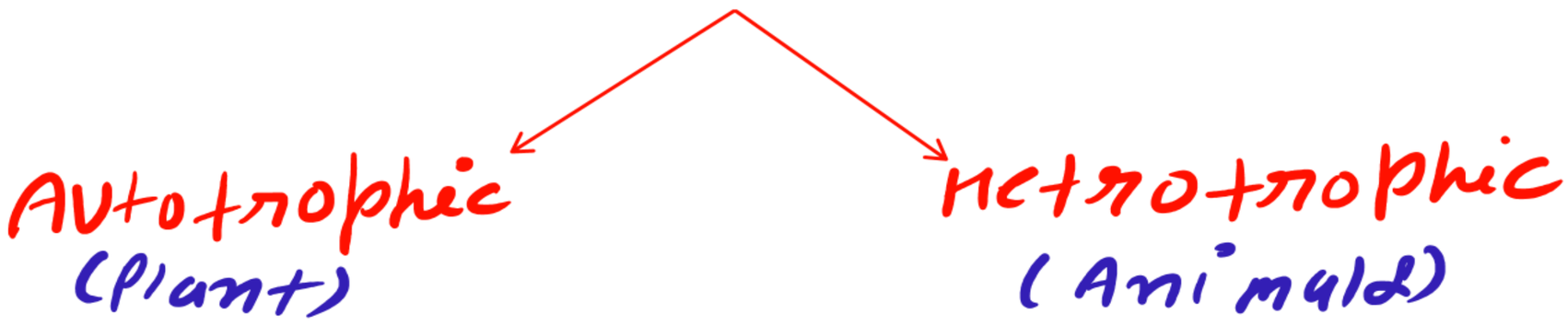
Nutrition

Life process –

The basic functions performed by living organisms for their survival and body maintenance are called life process.

Life Processes require energy which is provided by nutrition.

Modes of Nutrition



Autotrophic Nutrition

1. Carbon and energy requirements of the autotrophic organism are fulfilled by photosynthesis.

2. Photosynthesis:

   It is the process by which autotrophs take in substances from the outside and convert them into stored forms of energy. This material is taken in the form of carbon dioxide and water which is converted into carbohydrates in the presence of sunlight and chlorophyll.

Note:

Similarly, in our body, some of the energy derived from the food we eat is stored in our body in the form of glycogen.

Plant → Starch (Stored)

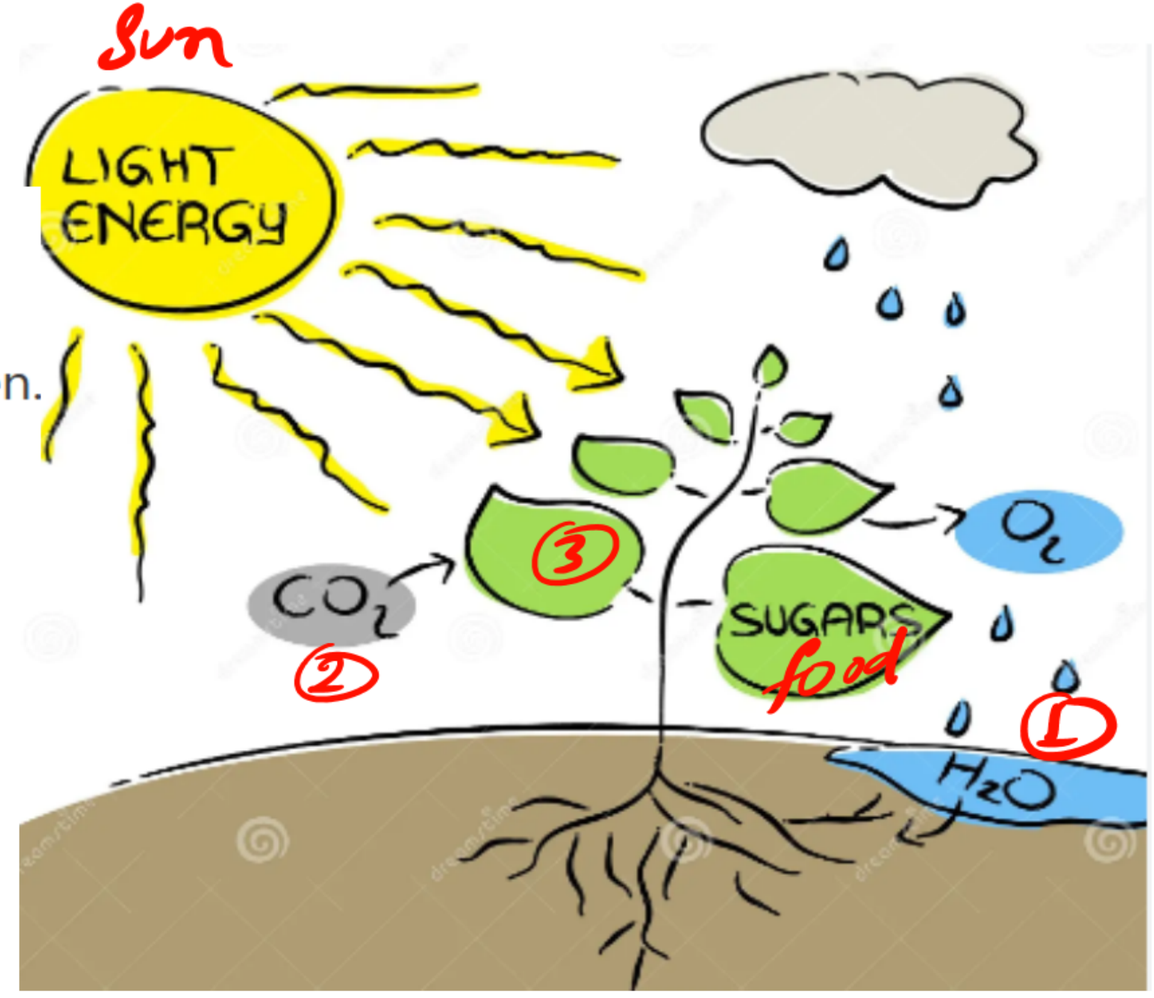
Human → Glycogen (Stored)

Photosynthesis is the process by which plants use sunlight, water, and carbon dioxide to create oxygen and energy in the form of sugar.

Raw materials for photosynthesis

1. Absorption of light energy by chlorophyll.
2. Conversion of light energy to chemical energy.
3. Splitting of water molecules into hydrogen and oxygen.
4. Reduction of carbon dioxide to carbohydrates.

Starch

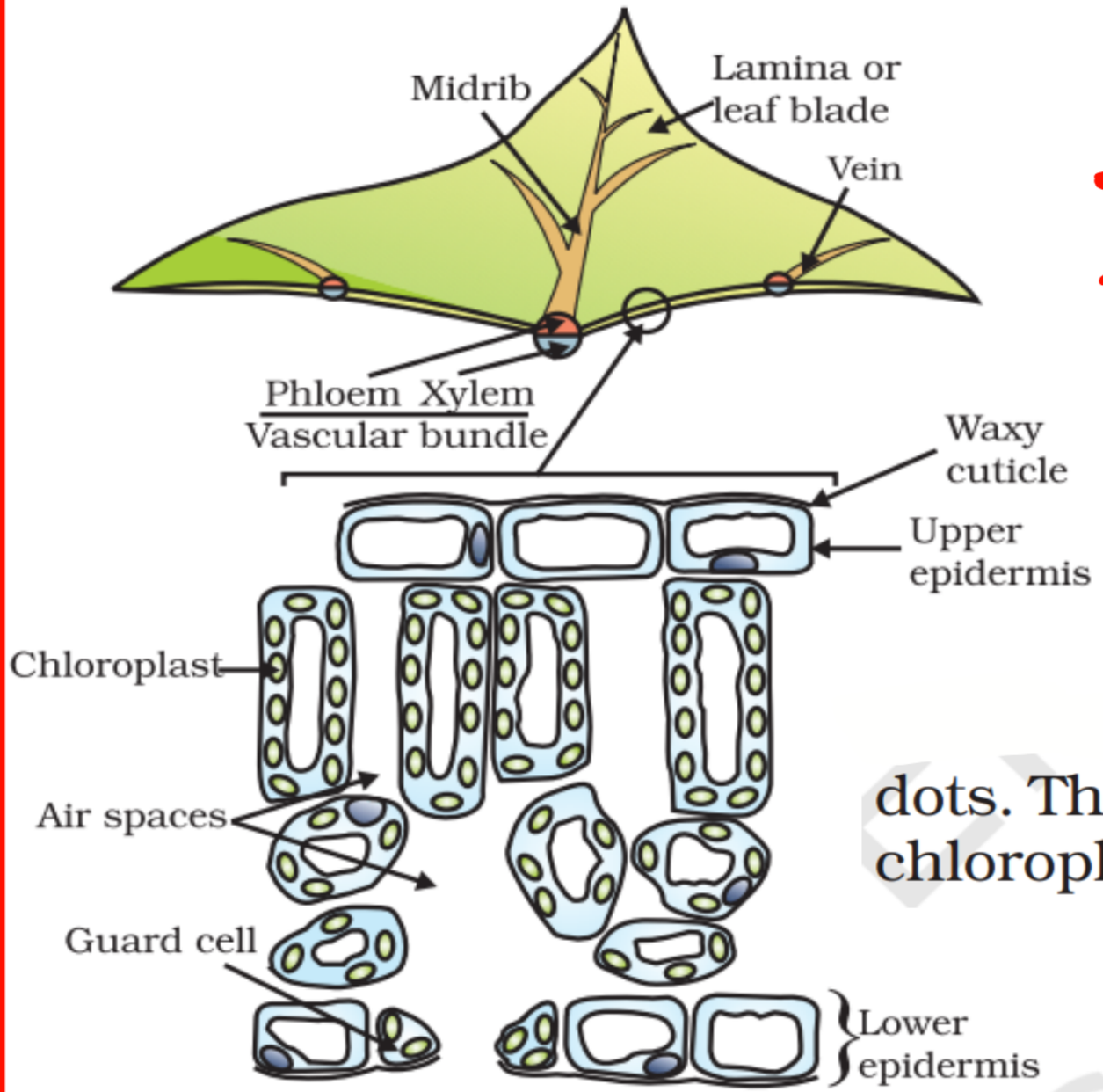


Equation for photosynthesis

$$6CO_2 + 12H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} C_6H_{12}O_6 + 6O_2 + 6H_2O$$

(Glucose) sugar

oxygen



Note -

- Chlorophyll is essential for photosynthesis.
- leaf has tiny pores (stomata)

Desert -

plants take up carbon dioxide at night and prepare an intermediate which is acted upon by the energy absorbed by the chlorophyll during the day.

some cells contain green dots. These green dots are cell organelles called chloroplasts which contain chlorophyll.

- The exchange of gases occurs across the surface of stems, roots, and leaves as well.
- Since large amounts of water can also be lost through these stomata, the plant closes these pores when it does not need carbon dioxide for photosynthesis.
- The opening and closing of the pore are a function of the guard cells. The guard cells swell when water flows into them, causing the stomatal pore to open. Similarly, the pore closes if the guard cells shrink.

function of guard cell –

open
(Swell up)
↓
Out → O2

Close
(Shrink)
↓
In → CO2

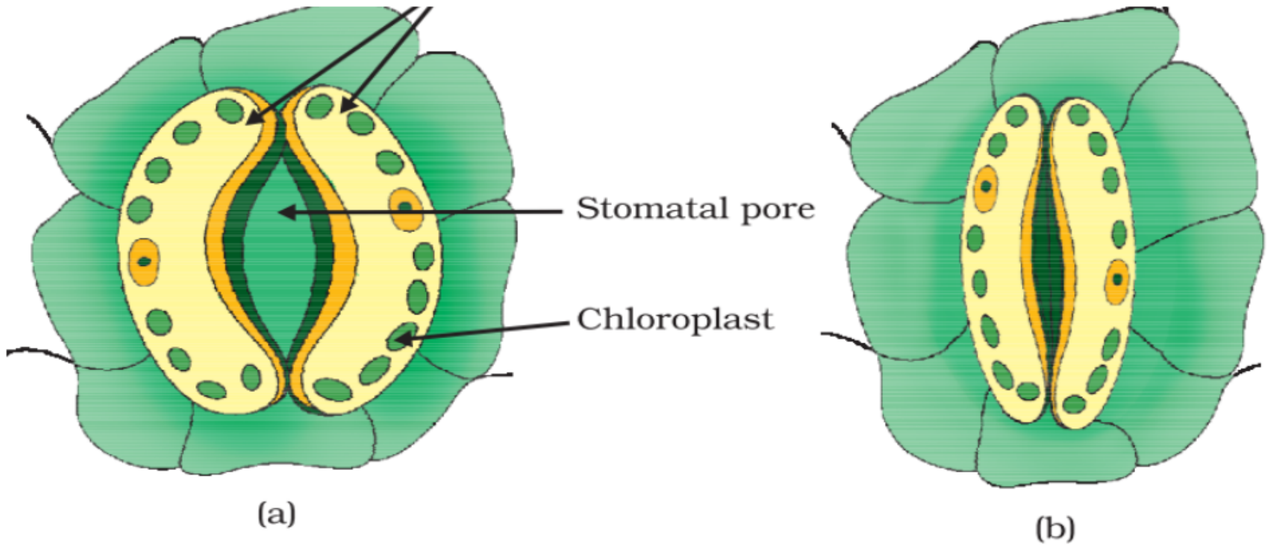


Figure 5.3 *(a) Open and (b) closed stomatal pore*

Guard (Swell) guard (Shrink)

Activity (Exam me bahut bar puchha gya hai)

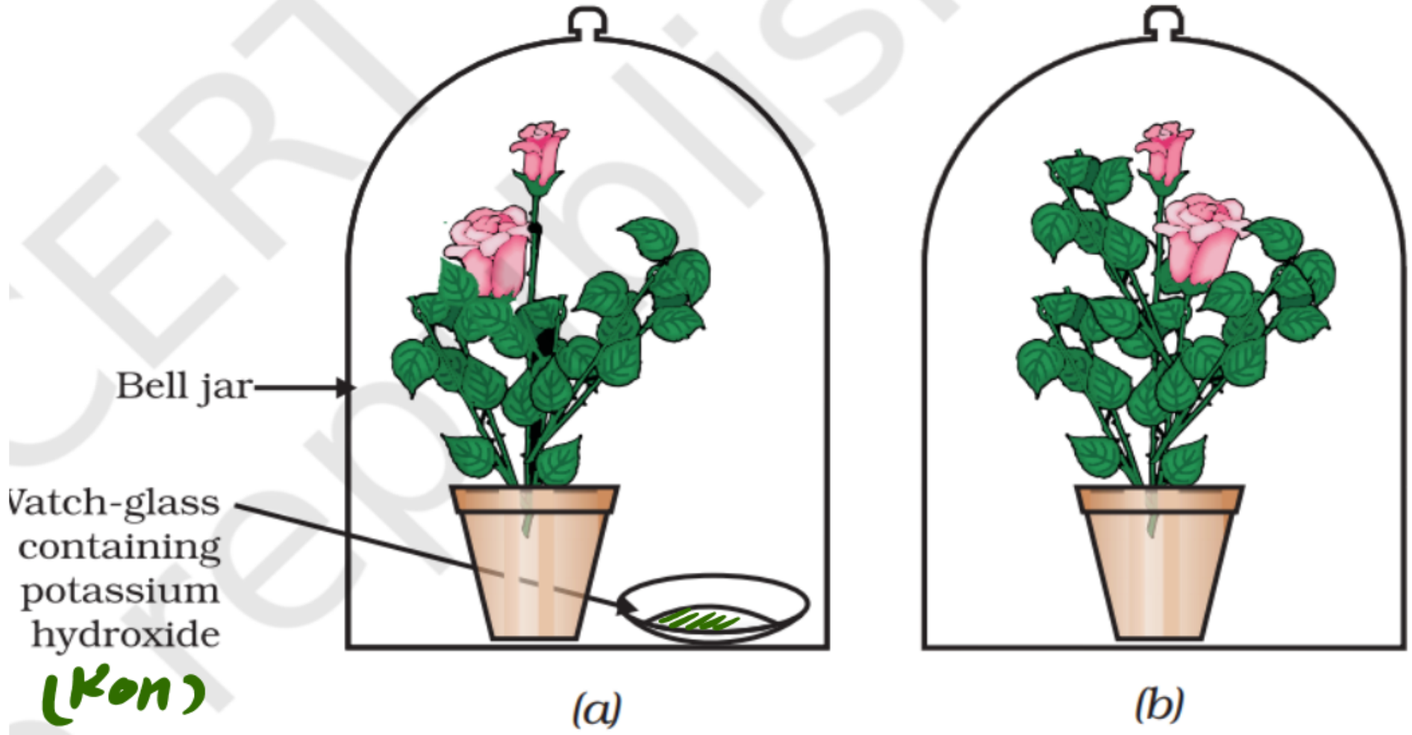


Figure 5.4 *Experimental set-up (a) with potassium hydroxide (b) without potassium hydroxide*

note –
KOH is used to absorb CO_2 inside the jar.

आयोडीन घोल का उपयोग करके पत्ती में स्टार्च का परीक्षण करें

• आयोडीन घोल से स्टार्च का पता लगाया जाता है।

KOH हवा से कार्बन डाइऑक्साइड को अवशोषित कर लेता है, जिससे पौधों को प्रकाश संश्लेषण के लिए पर्याप्त कार्बन डाइऑक्साइड नहीं मिल पाता। कार्बन डाइऑक्साइड के बिना, पौधे स्टार्च का उत्पादन नहीं कर सकते।

Extra Gyan –

Dietary carbohydrates

Types of Carbohydrates	Source
Sugar	Fruits, milk, sugarcane
Starch	Potato, wheat, rice, sweet potato
Cellulose (Roughage)	Salads and raw vegetables

Vitamins may be water-soluble or fat-soluble.

Water-soluble: Vitamins B—complex (B_1, B_2, B_4, B_{12}) and C

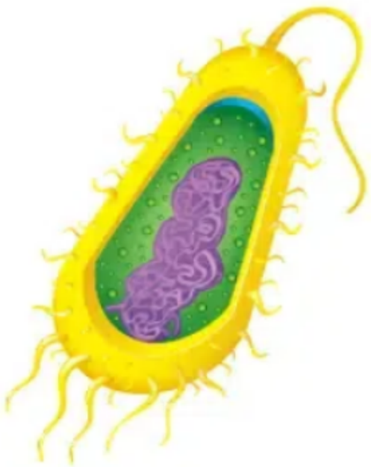
Fat-soluble: Vitamins A, D, E and K

Heterotrophic Nutrition

- **Saprophytic:** Some organisms break down the food material outside the body and then absorb it. Examples are fungi like bread moulds, yeast, and mushrooms.

Peniciullium

Mushroom



Bacillus

- **Holozoic:** Others take in whole material and break it down inside their bodies.

Examples of holozoic organisms include **humans, animals, and some protozoans**.

Examples of holozoic animals

Herbivores

These animals eat plants for food, such as cows, deer, elephants, and buffaloes.

Carnivores

These animals eat other animals for food, such as lions, tigers, and leopards.

Omnivores

These animals can eat both plants and animals, such as pigs, cockroaches, raccoons, and ants.

- **Parasitic**: Some other organisms derive nutrition from plants or animals without killing them. This parasitic nutritive strategy is used by a wide variety of organisms like cuscuta (amar-bel), ticks, lice, leeches, and tape-worms.

There are many examples of parasites, including **worms, insects, mites, and plants**.

Worms

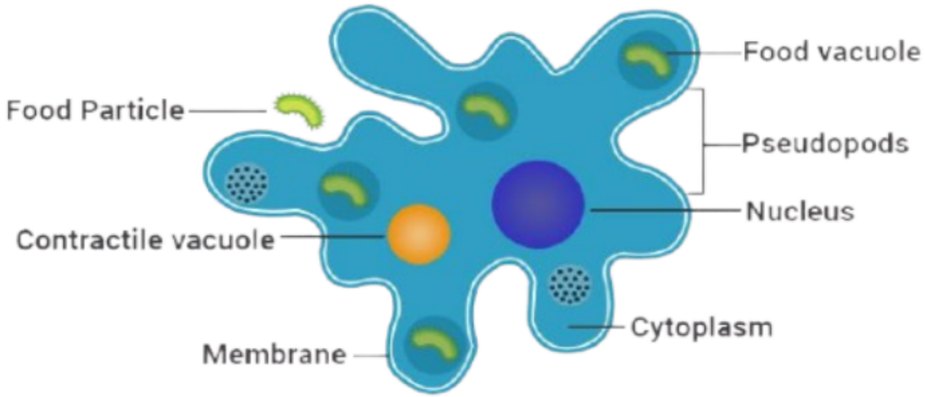
- **Tapeworms**: Segmented flatworms that attach to the intestines of animals and humans

How do organisms obtain their food

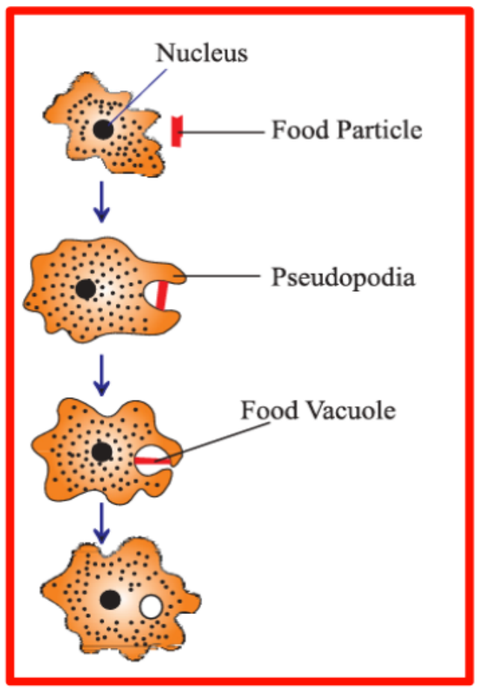
Unicellular/Single celled organisms : Food is taken up through entire surface.

Example : (i) Amoeba

(ii) Paramaecium



Amoeba

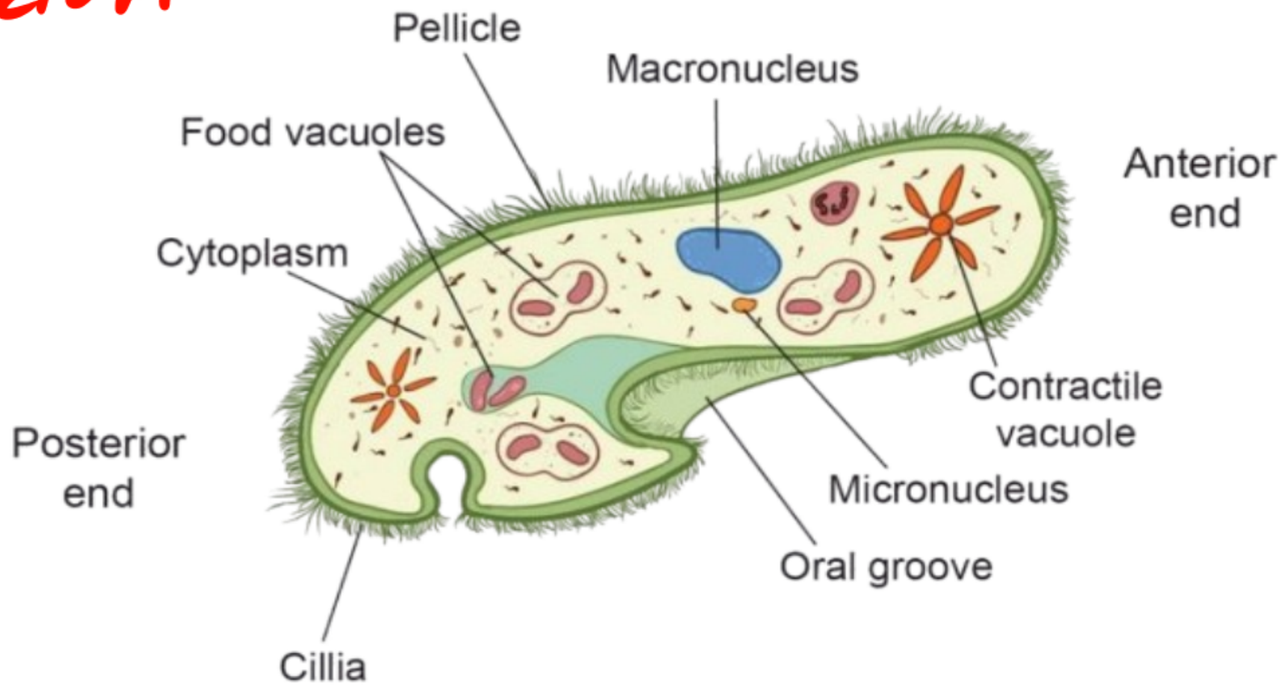


* In Amoeba food is captured by pseudopodia and gets enclosed in a food vacuole.

* Digestion occurs inside food vacuole.

* The digested food diffuses into the cell cytoplasm and undigested part of food is expelled at any point on the body surface

Paramaecium –



Paramaecium

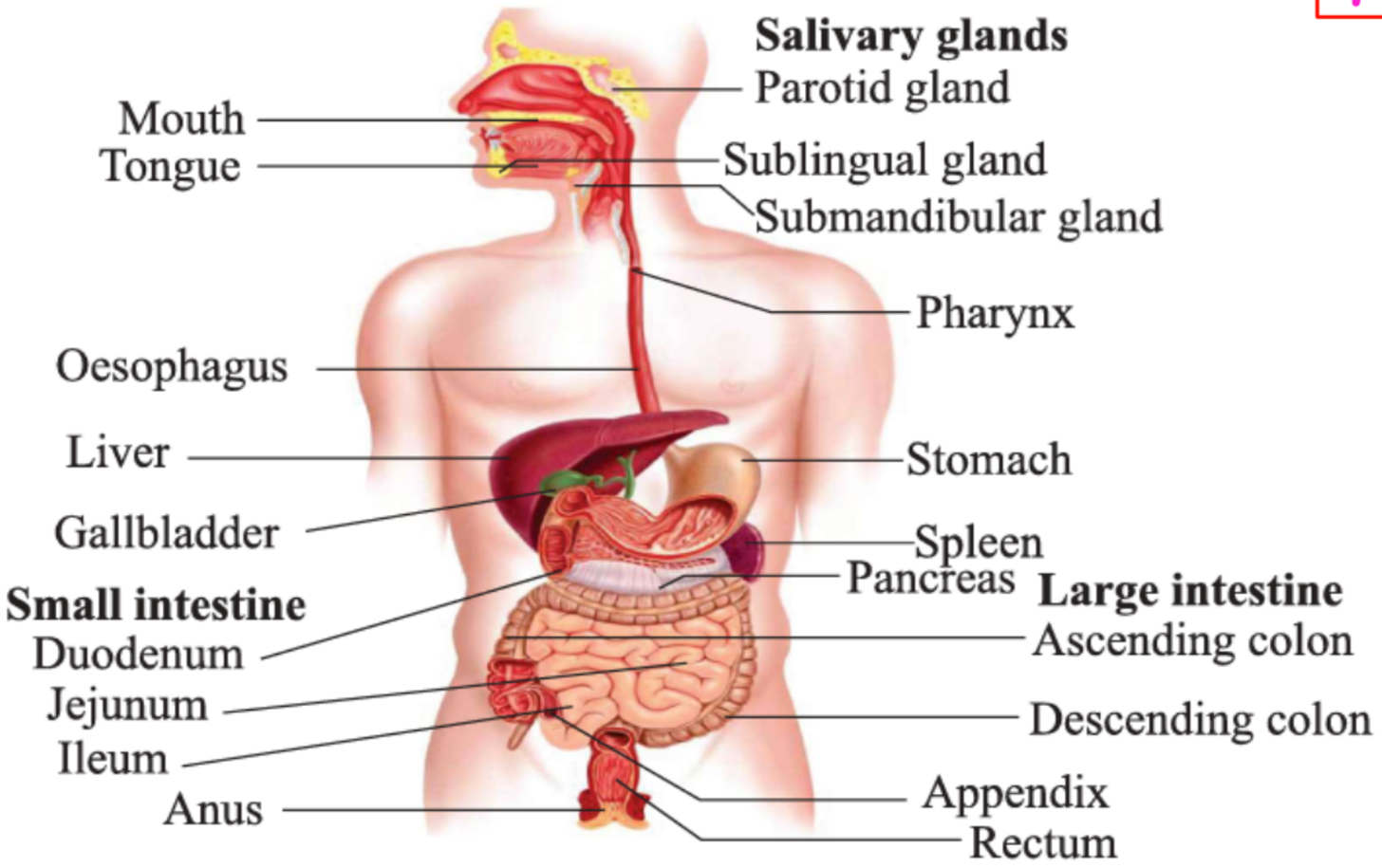
Paramaecium → Cilia → Take in food → At a specific spot

(Present all over the body)

* Same process (Amoeba)

Digestion System

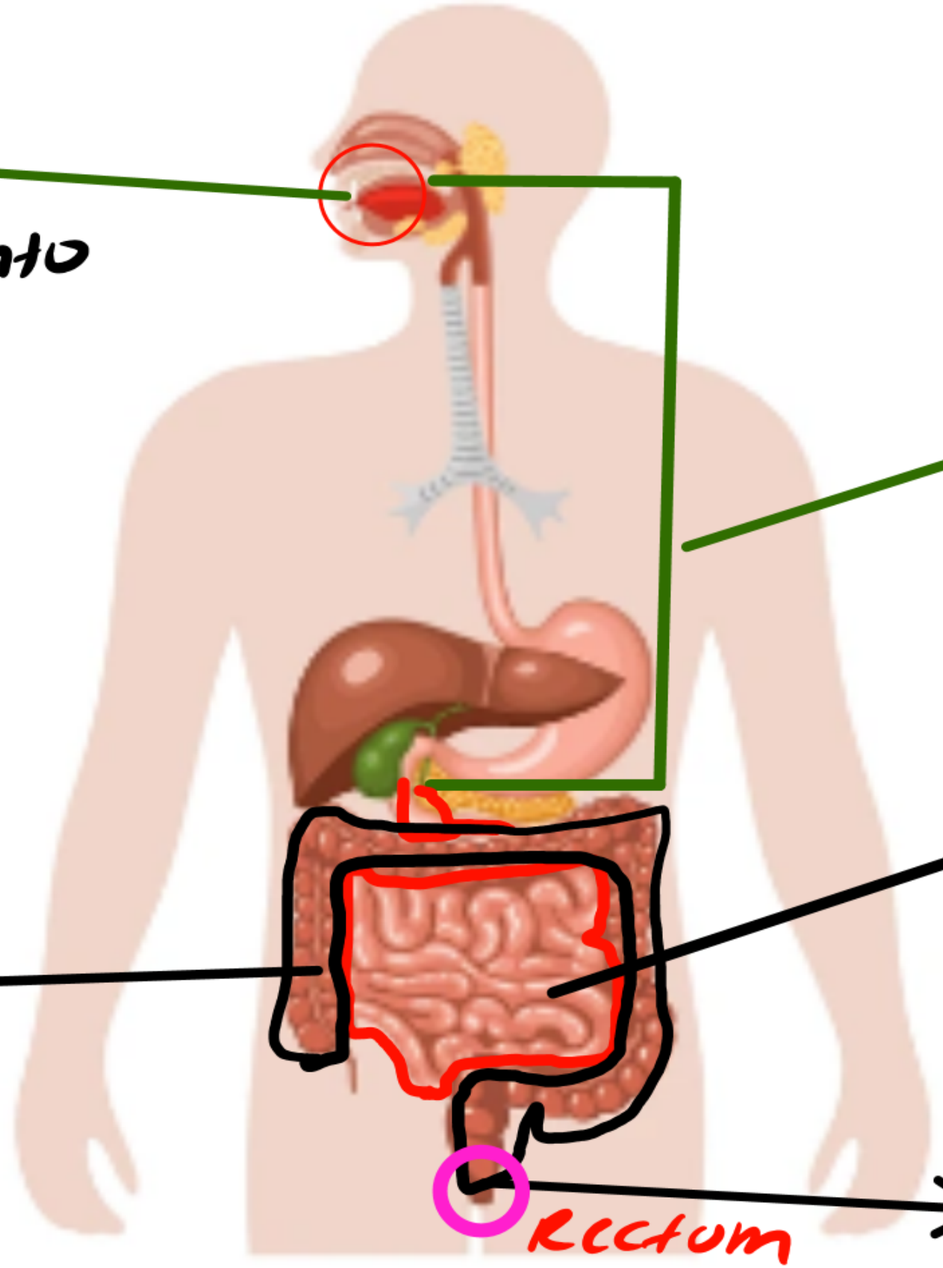
Nutrition in human being



Human Digestive System

digestion kuchh steps me complete hote hai.

1. ingestion
2. digestion
3. absorption
4. assimilation
5. egestion



① Ingestion
(Intaking food into mouth)

② digestion
[mouth to Stomach]

③ Small Intestine
① absorption
② assimilation

Large Intestine
→ water
→ salt

Rectum

④ Egestion
(through anus)

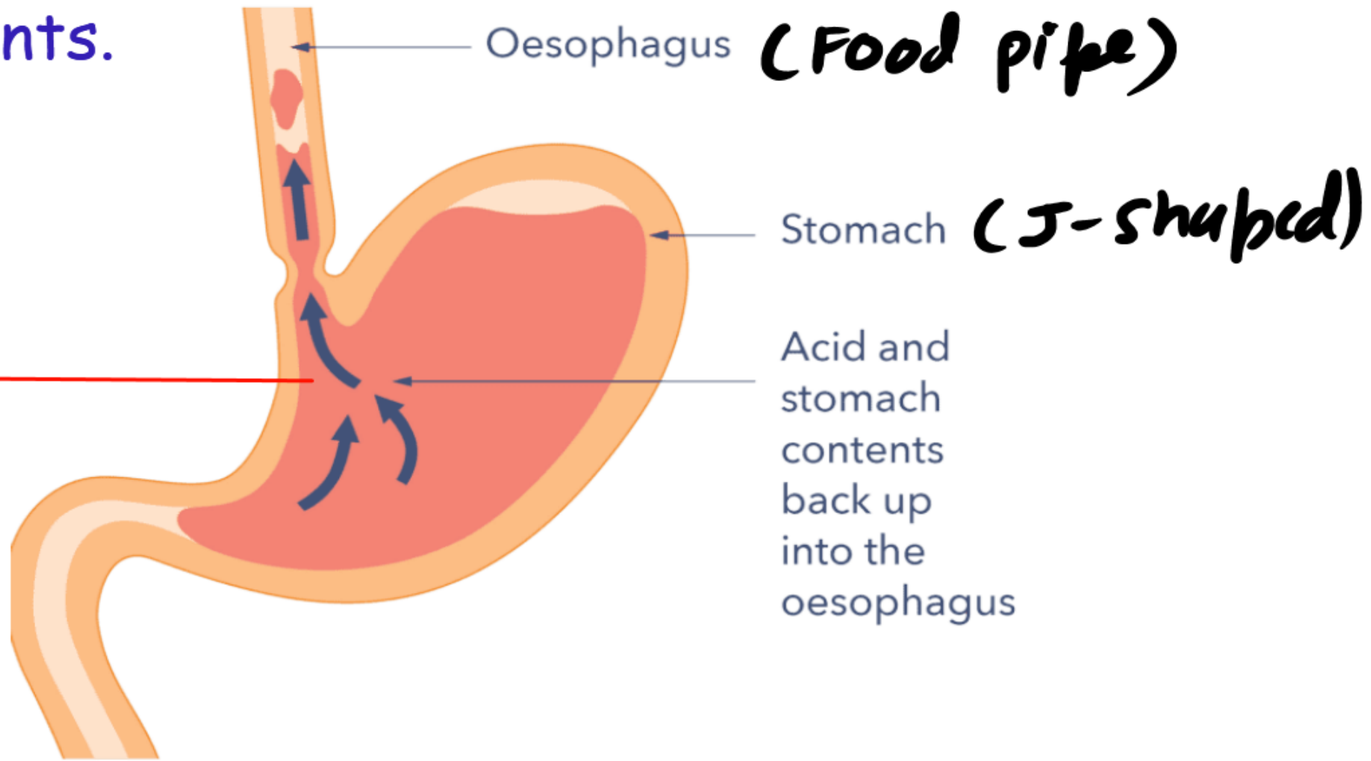
Extra G/un —

Human alimentary canal is about 9 metres long tube, from mouth to anus.
In mouth, teeth bite, tear, chew and grind the food.
Food is mixed thoroughly with saliva secreted by salivary glands and is swallowed with the help of muscular tongue.
Oesophagus is about 25 cm long muscular tube which passes food from mouth to stomach by its peristaltic movements.

Break down → food

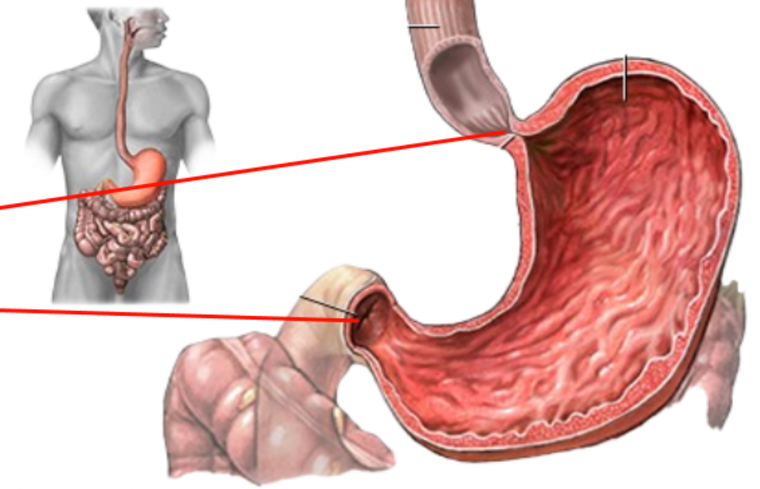
HCl (Hydro Chloric acid)

Kill bacteria (Present in the food)



Stomach —

(Sphincter muscle)



→ Stomach is a muscular bag. It contains gastric glands in its wall that secrete gastric juice, hydrochloric acid (HCl) and mucus.

→ Stomach stores food, churns it into a fine pulp called chyme and mixes gastric juice with it.

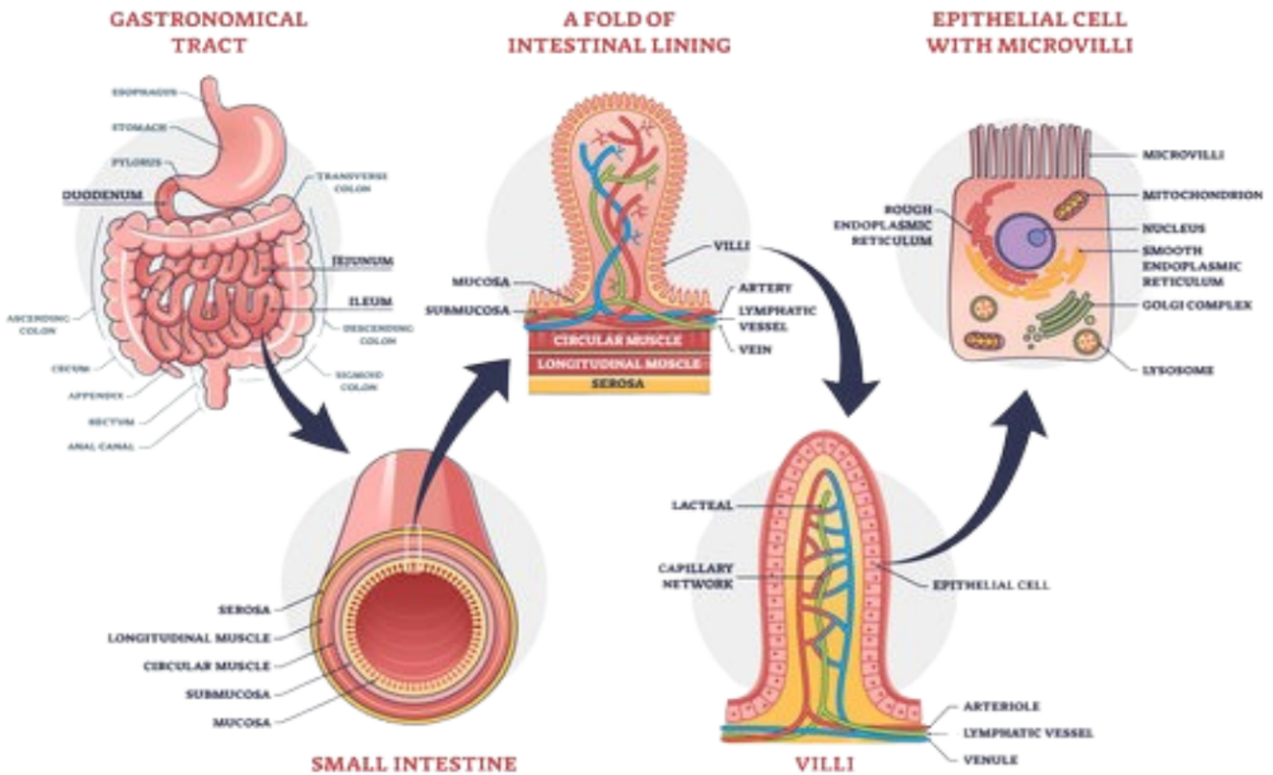
→ The mucus protects the inner lining of the stomach from the action of the acid under normal conditions.

→ Pepsin is a protein-digesting enzyme.

→ The exit of food from the stomach is regulated by a sphincter muscle which releases it in small amounts into the small intestine.

Small Intestine –

- Small intestine is about 6 metres long and 2.5 cm wide coiled tube.
- It is the site of complete digestion of food.
- It receives the secretions from pancreas and liver.
- It has numerous finger-like projections called villi for absorption of food.
- The unabsorbed food is passed to large intestine.

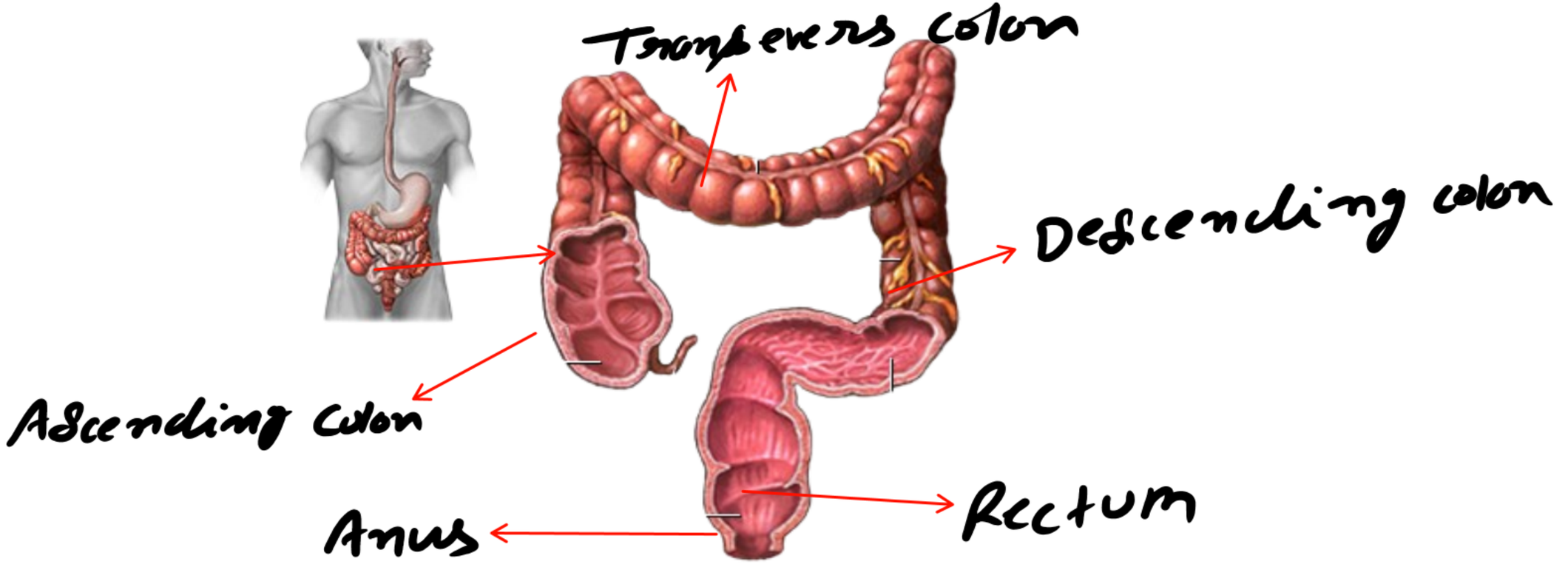


Large Intestine —

→ Large intestine (colon) is about 1.5-1.8 metres long and about 6 cm wide tube.

→ It opens outside through anus.

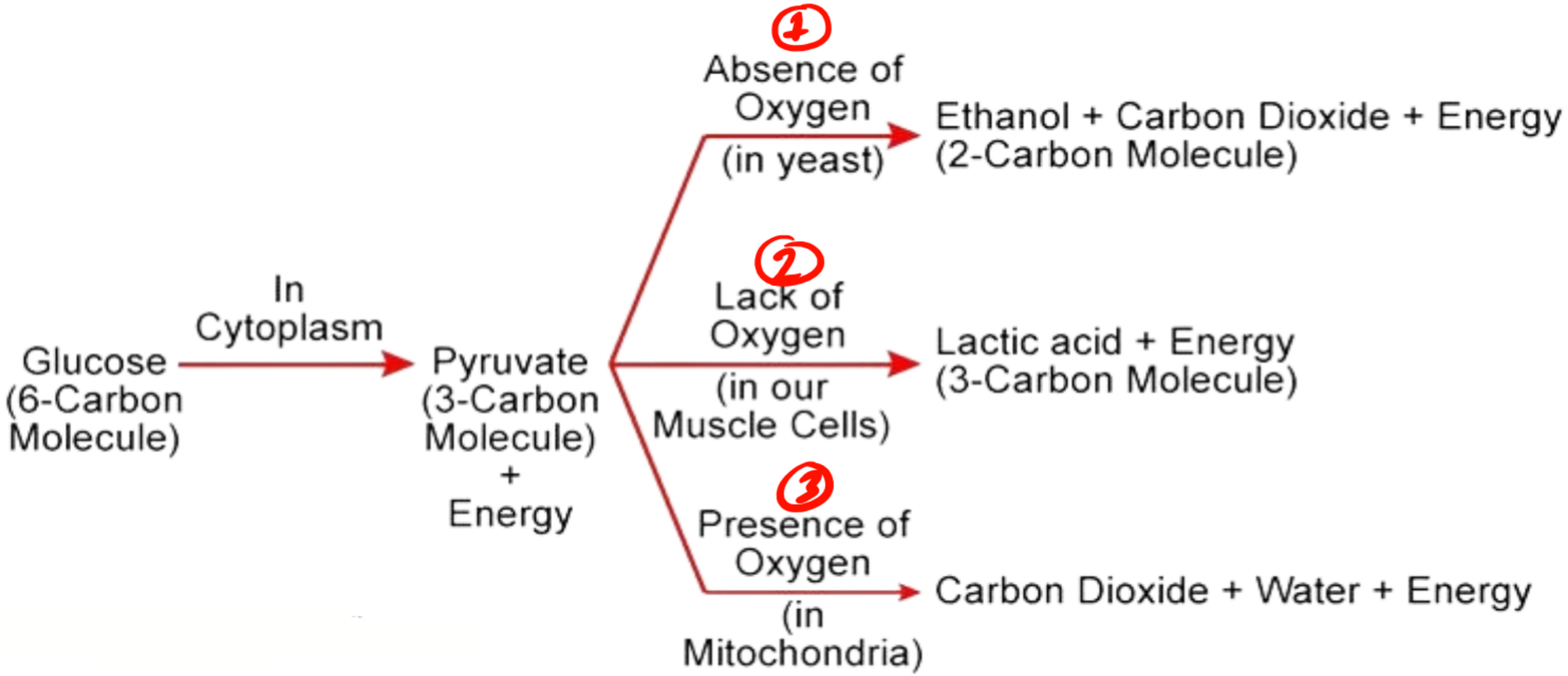
→ In large intestine, the water and salt from undigested food is absorbed and rest is removed from the body through anus.



Respiration

Respiration —

Respiration is the process of oxidation or breaking down of organic compounds to obtain energy.



1. Aerobic respiration

in which breakdown of glucose occurs in the presence of oxygen.

In the presence of oxygen, pyruvic acid inside the mitochondria is broken down into CO_2, HO_2 and energy is released. This process is called Krebs cycle.

2. Anaerobic respiration

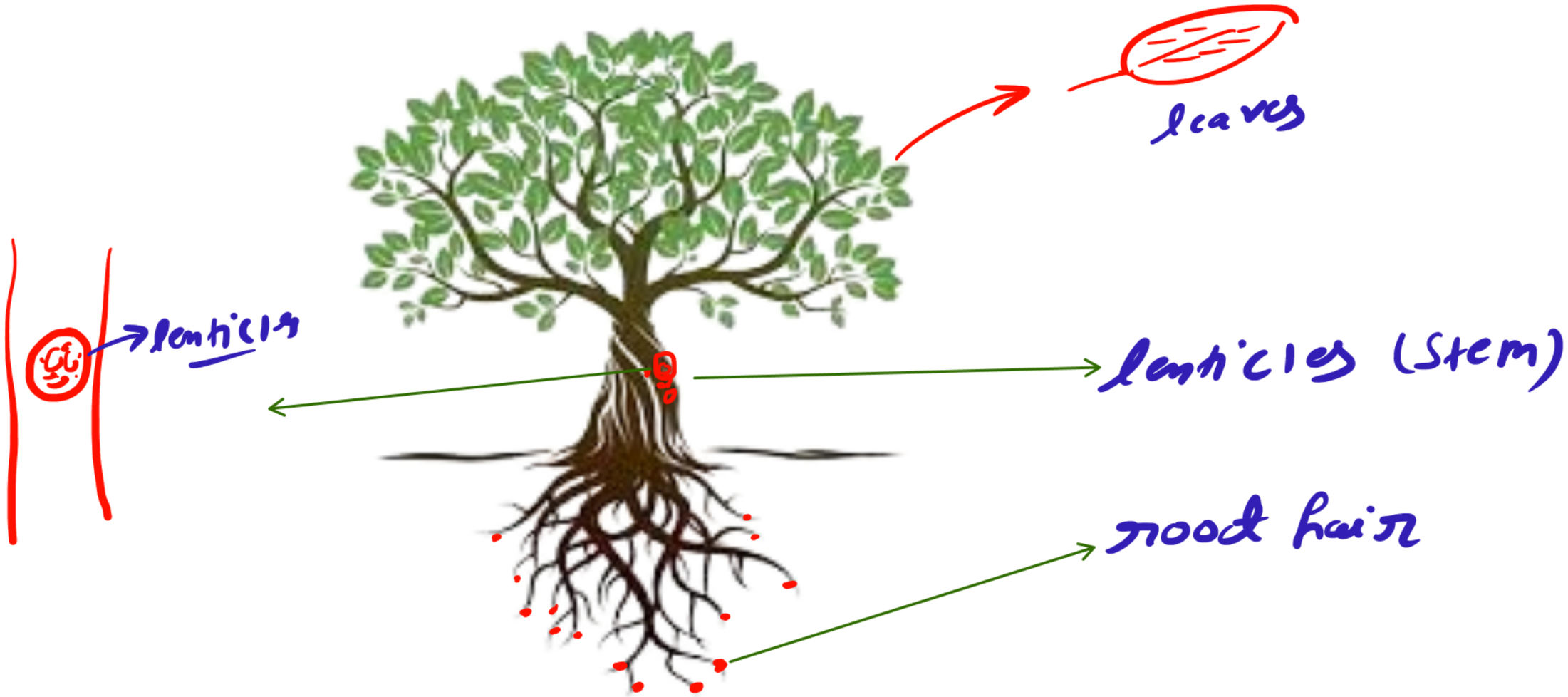
in which breakdown of glucose occurs in the absence of oxygen.

In the absence of oxygen, pyruvic acid breaks into ethyl alcohol or ethanol (2-carbonmolecule), CO_2 and releases energy. It is called anaerobic respiration.

In lack (deficiency) of oxygen in muscles, pyruvic acid breaks into lactic acid (3-carbon molecule) and energy, is released.

Extra Q/Ans —

Respiration in plants occurs through stomata of leaves, through lenticels in older portions of stems and through root hair in roots.



Respiratory Organ

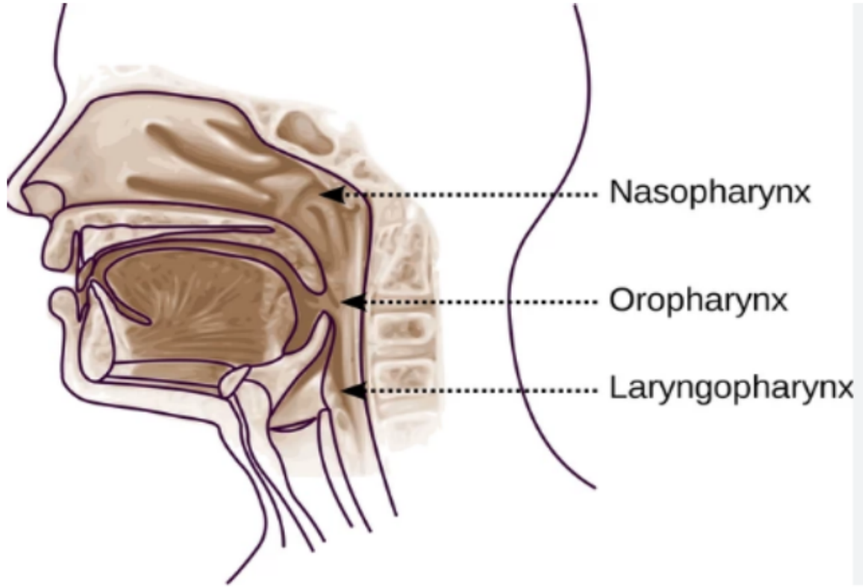
Respiratory Organ	Mode of Respiration	Examples
Body surface	Body surface respiration	Sponges and coelenterate
Gills	Branchial respiration	Fishes
Book gills	Book gill respiration	*Limulus* (king crab)
Skin	Cutaneous respiration	Annelids and amphibians
Trachea	Tracheal respiration	Insects
Lungs	Pulmonary respiration	Most of the tetrapods
Book lungs	Book lungs respiration	Arachnids (spiders and scorpion)

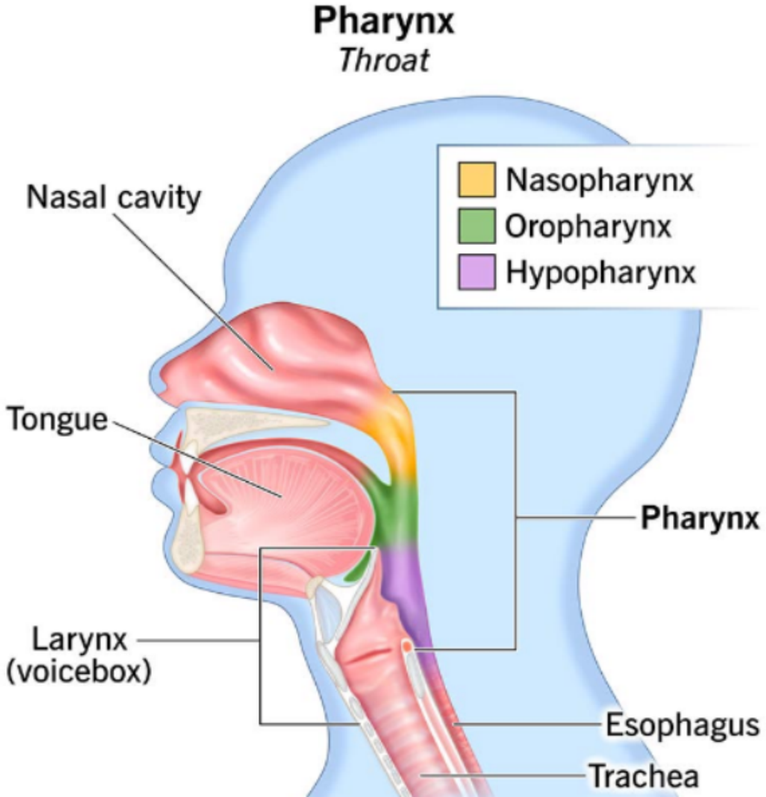
differention b/w breathing and respiration

Breathing	Respiration
1. The process of obtaining oxygen and releasing carbon dioxide is called breathing.	1. The process of releasing energy from food is called respiration.
2. It is a physical process.	2. It is a biochemical process.
3. It takes place in the lungs.	3. It takes place in the lungs as well as in mitochondria.
4. It utilises energy from the food.	4. It releases energy from the oxidation of simple food.

Respiratory System in Man

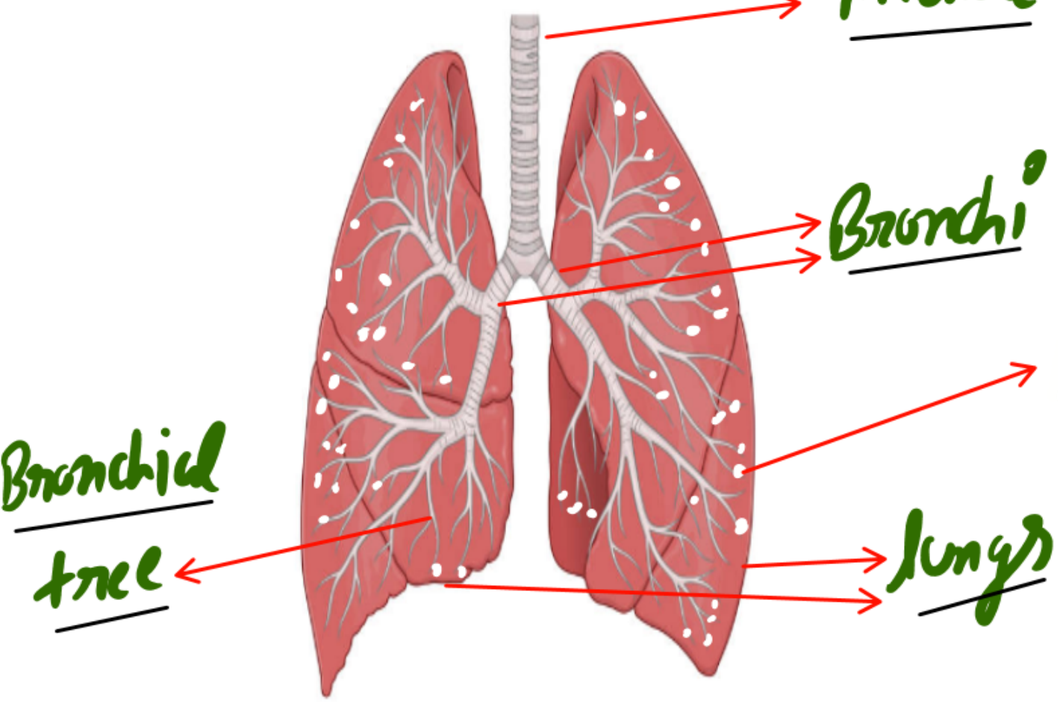
Air is taken into through nostrils and nasal passages (Nose). Hair and mucous lining of nasal passages trap dust and bacteria coming with air and make inhaled air moist.





Trachea opens in pharynx. Its opening in the pharynx called glottis and is guarded by a cartilaginous flap called epiglottis. The wall of trachea is supported with C-shaped cartilaginous rings. Trachea is divided into two primary bronchi.

Each primary bronchus enters the lung of its side and divides into secondary and tertiary (bronchi). A bronchus with its branches is called a bronchial tree.



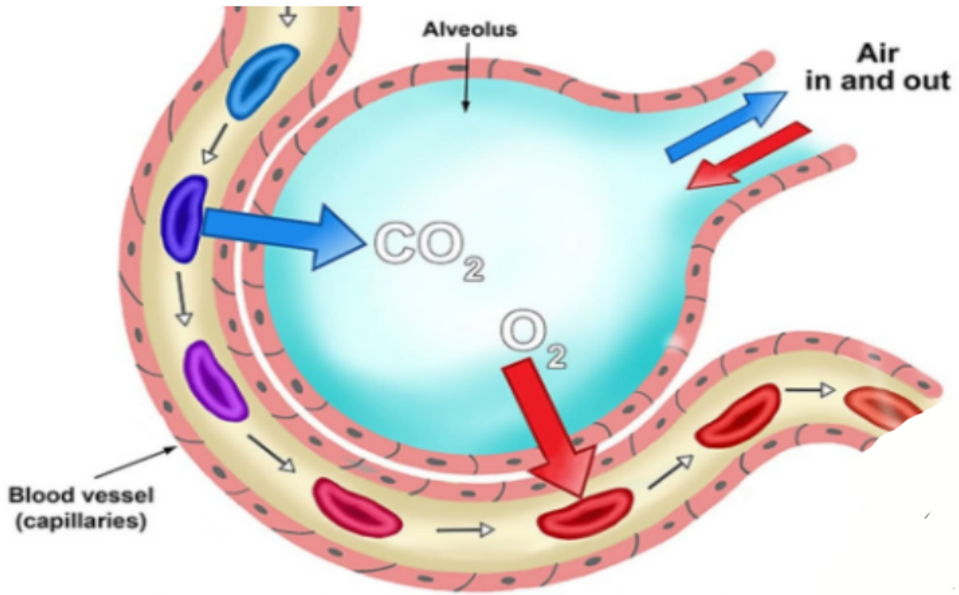
Note –
Alveoli is exchanger of gas.

Alveoli have enormous surface area for gaseous exchange and are covered with network of capillaries for rich blood supply.

The lungs are the main respiratory organs in man.

They are a pair of conical, highly spongy, air-filled sacs formed of millions of alveoli.

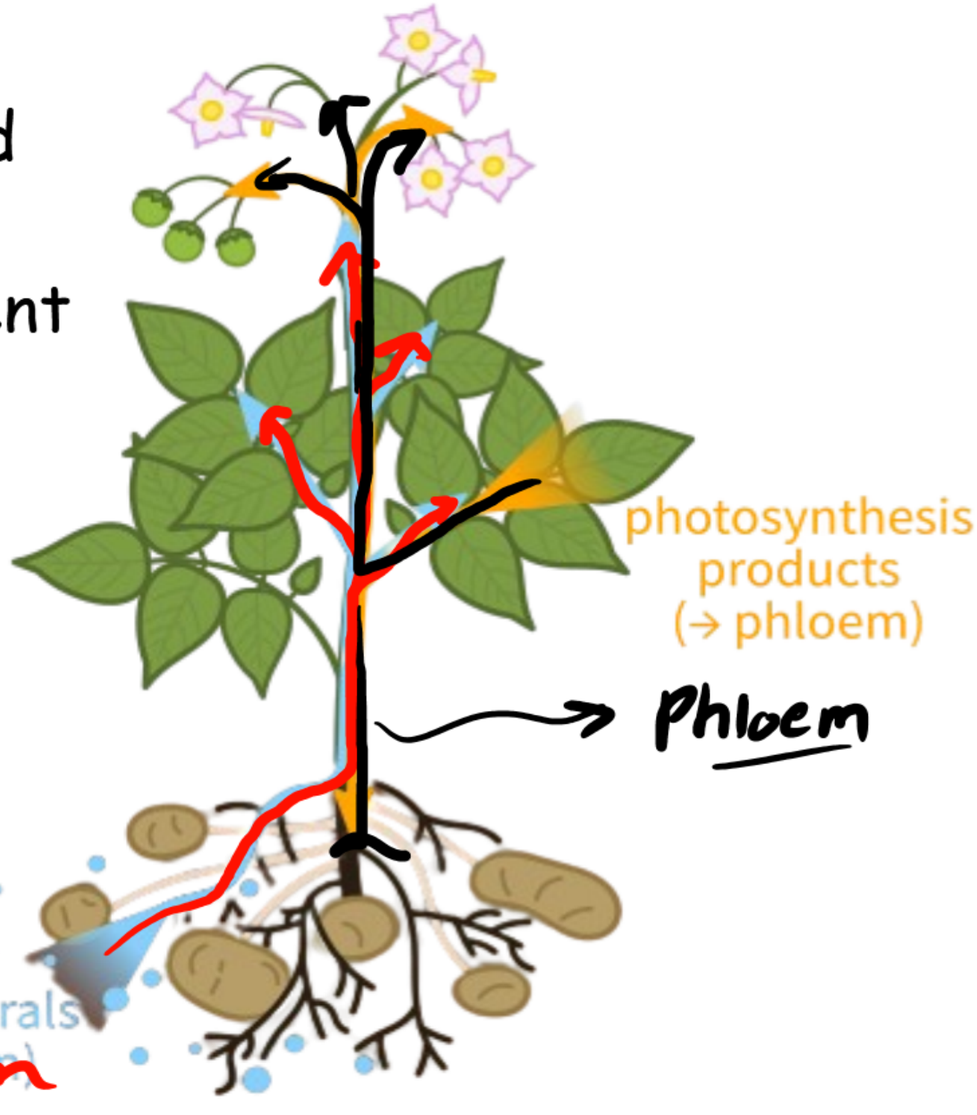
They are enclosed by a double-layered membrane called pleura.



Transportation

Transportation in Plants

- Plant transport systems will move energy stores from leaves and raw materials from roots.
- The xylem moves water and minerals obtained from the soil.
- The transport of food from leaves to different parts of plant is called as translocation. It is carried out by phloem tissue.



Extra Gyan –

- Xylem → जायलम → जल (water)
- Phloem → फ्लोयम → food

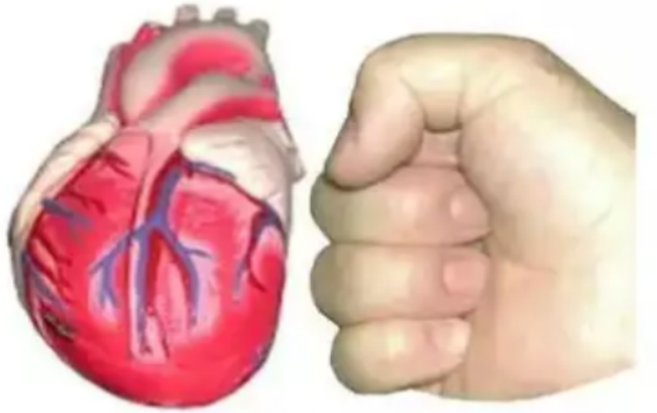
Transportation in Human Beings

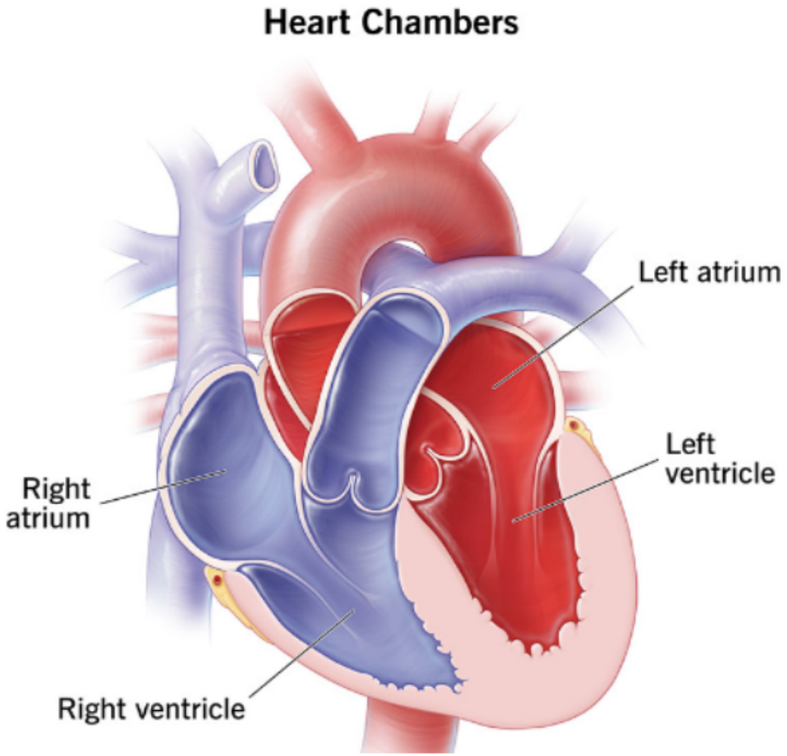
In human beings, transportation is carried out by circulatory system. It is composed of →

- blood
- blood vessels
- heart
- lymph
- lymph vessels

Heart – The Pumping Machine

Heart is a muscular pumping organ of the size of a fist. It is enclosed in a sac called pericardium, formed of two pericardial membranes



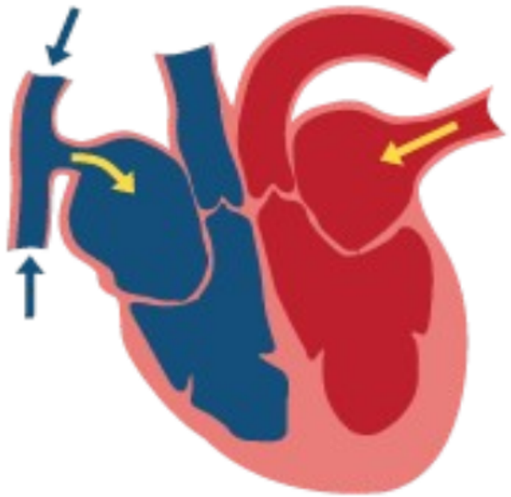


Human heart is four-chambered. It consists of two atria and two ventricles.

Auricles are receiving chambers, whereas ventricles are distributing chambers

- Right ventricle receives deoxygenated blood from the body through superior or anterior vena cava.
- Pulmonary trunk arises from the right ventricle and carries deoxygenated blood to the lungs.

Deoxygenated blood from the body enters the right atrium



The atria relaxed, oxygenated blood from lungs enters the left atrium

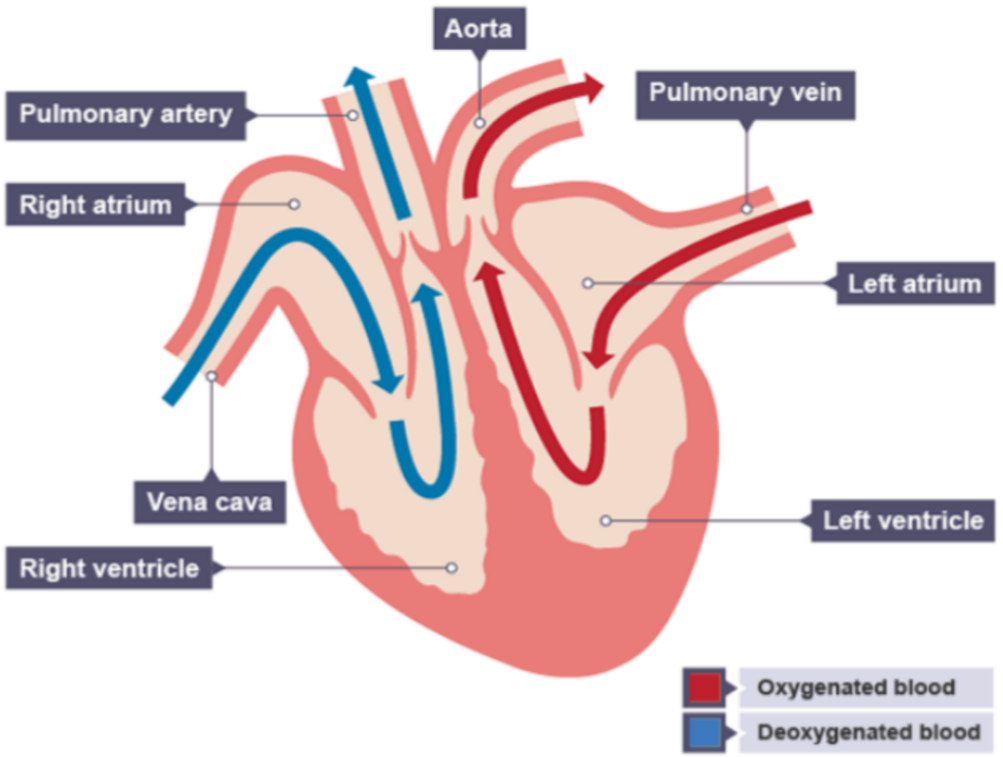
- Left auricle receives oxygenated blood from the lungs via four pulmonary veins.
- Aorta or aortic arch arises from the left ventricle and supplies oxygenated blood to the whole body.

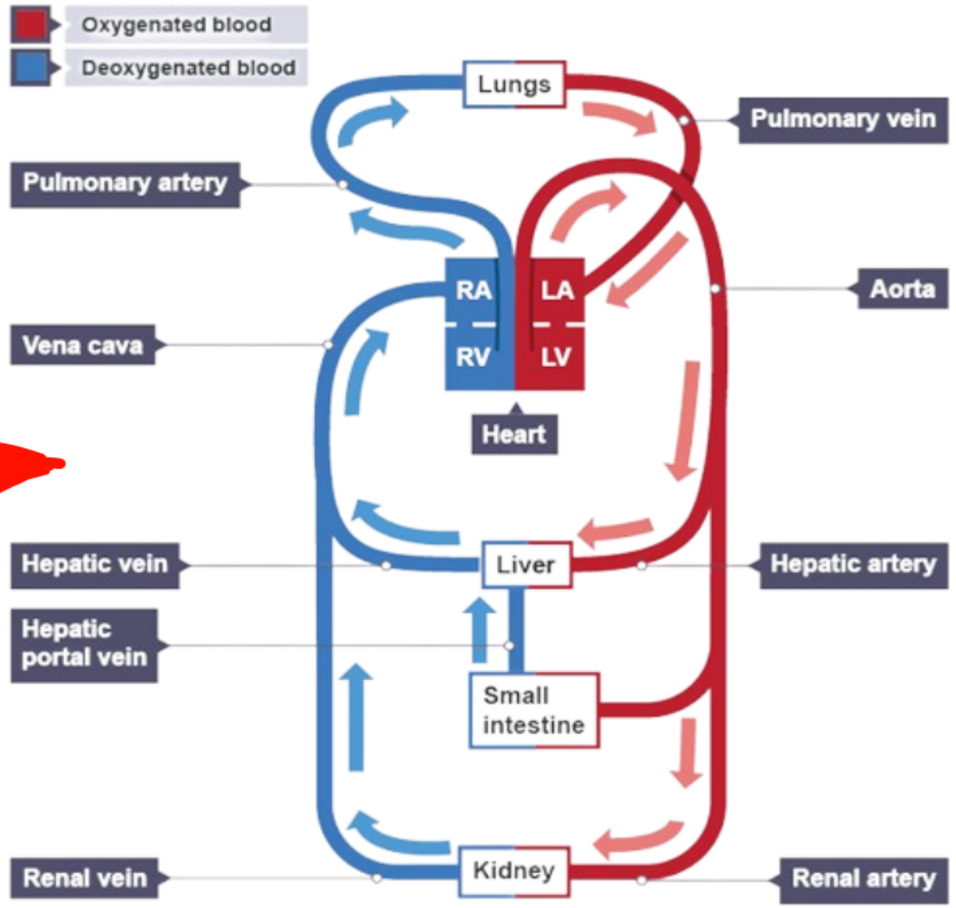
In double circulation

separation of deoxygenated and oxygenated blood

results in two independent circulations:

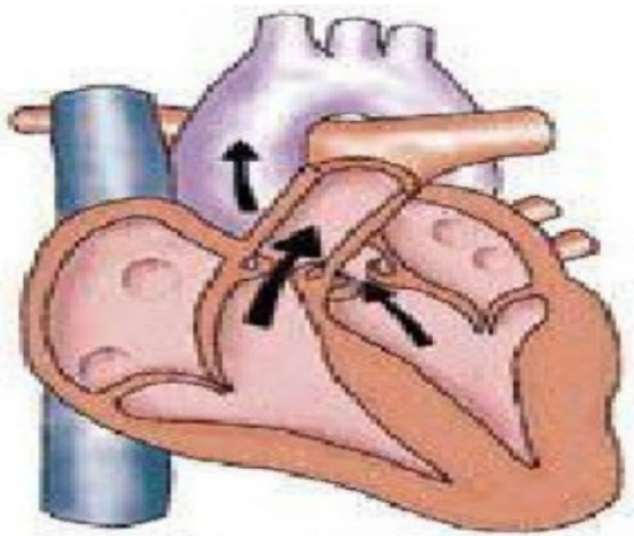
Pulmonary circulation for the oxygenation of deoxygenated blood and systemic circulation for the supply of oxygenated blood to all body organs.





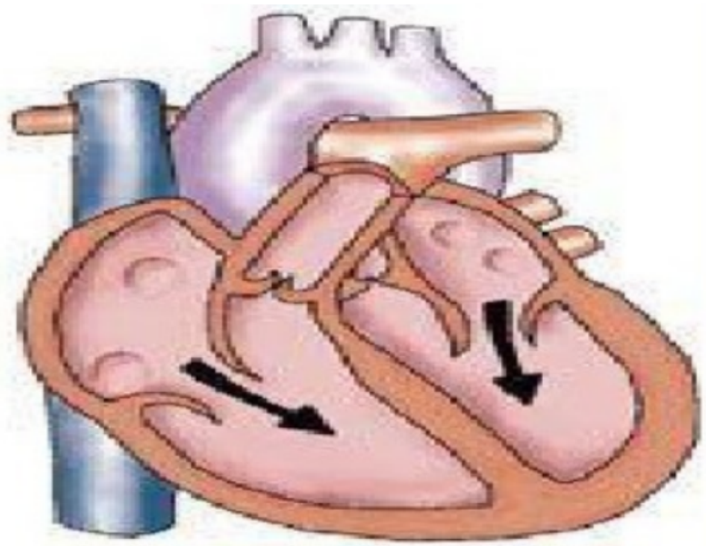
Heartbeat and Cardiac Cycle

Working of heart includes rhythmic contractions **(systole)** and relaxations **(diastole)** of Cardiac cycle is one complete heartbeat which includes one systole and one diastole.



Systole

(Contraction)



Diastole

(Relaxation/Expansion)

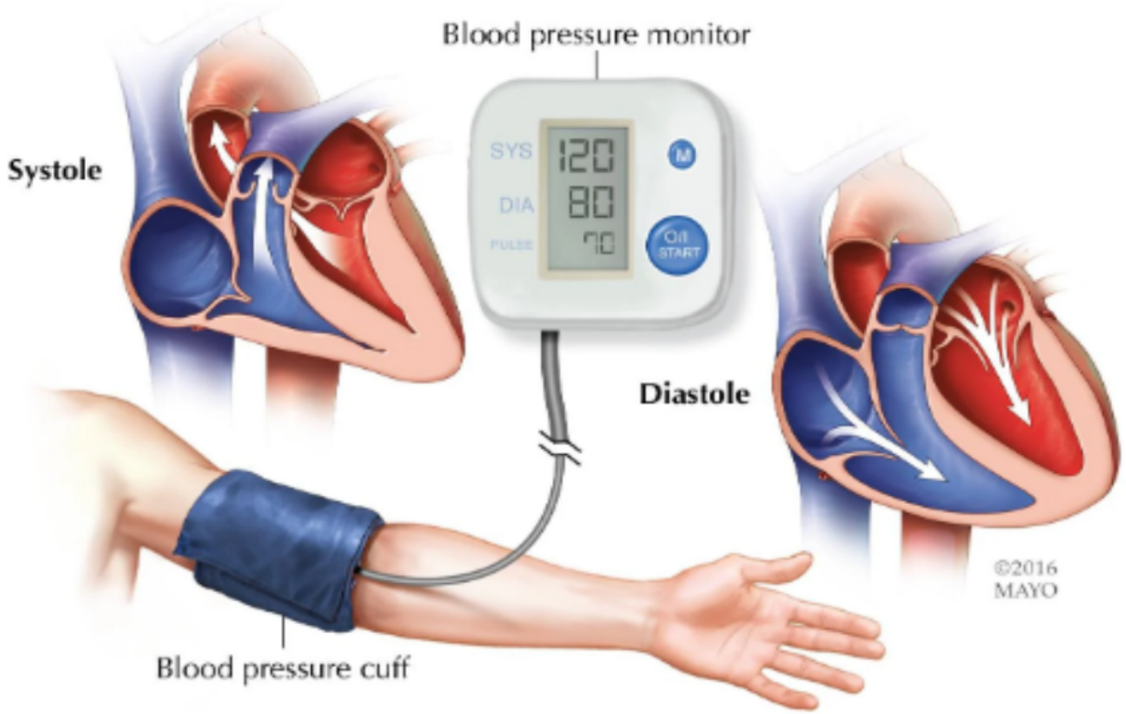
Blood Pressure

The pressure exerted by the blood discharged due to contraction of left ventricle on the wall of blood vessels is **called blood pressure.**

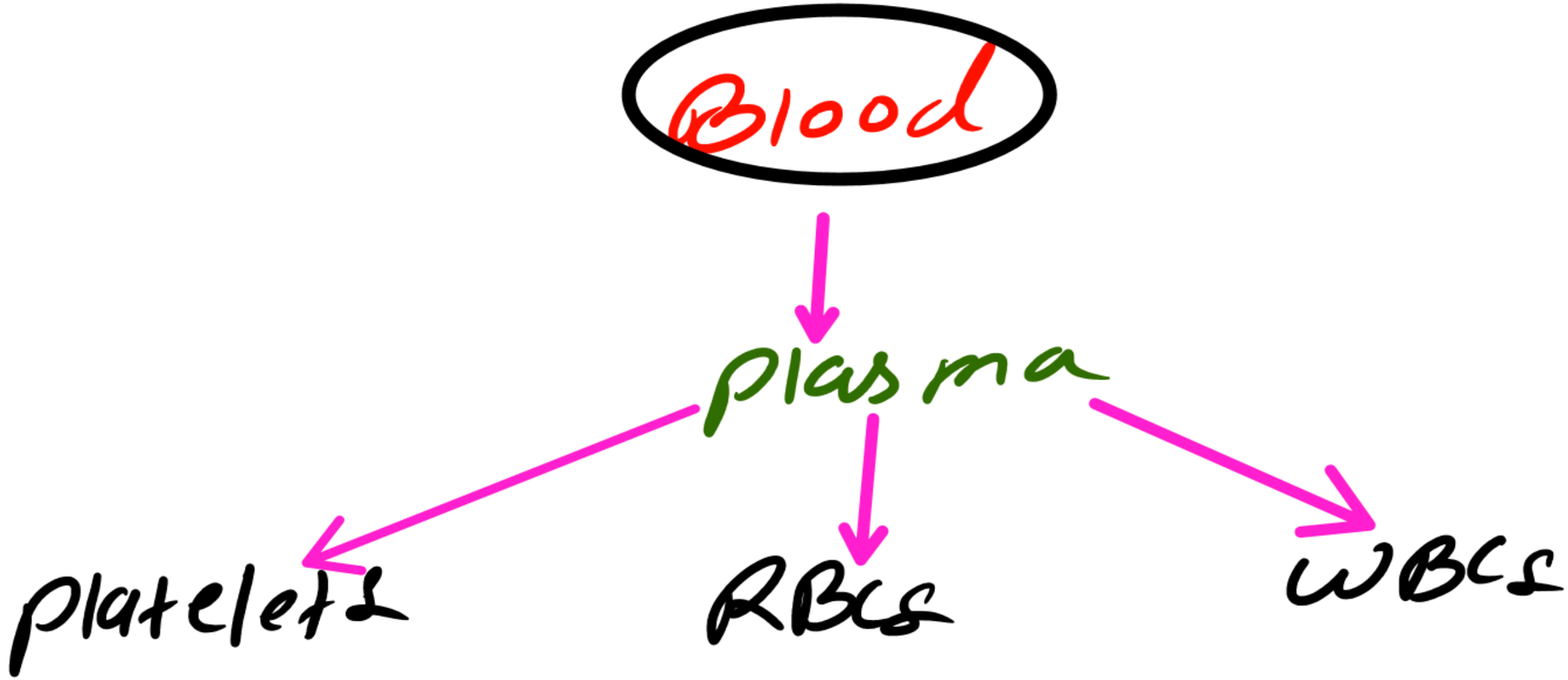
1. Systolic pressure (120 mm of Hg) is exerted during ventricular contraction (ventricular systole).

2. Diastolic pressure (80 mm of Hg) is exerted during relaxation of ventricle (ventricular diastole).

Normal -
Systolic - 120 mm of Hg
Diastolic - 80 mm of Hg

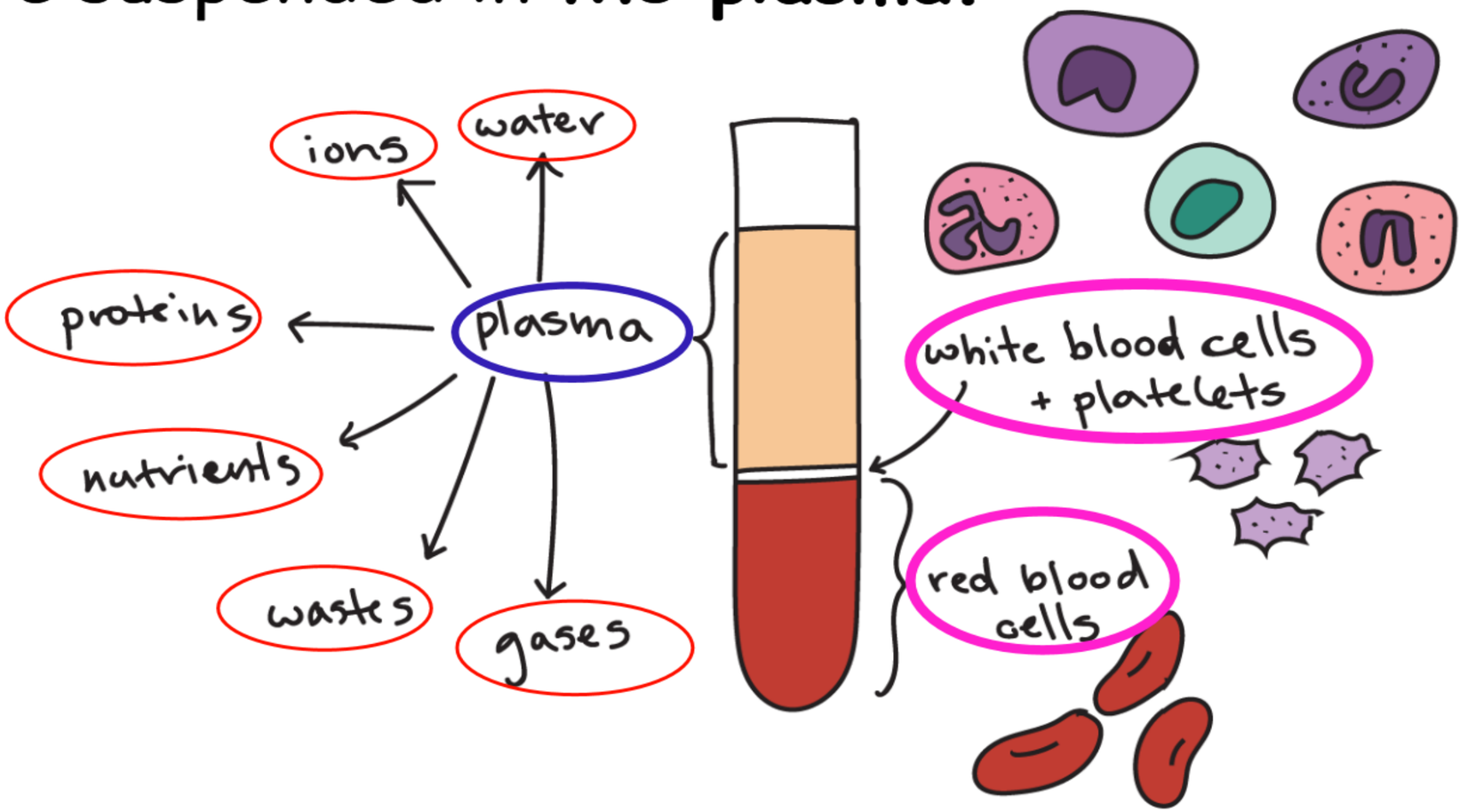


Circulatory System



Blood

It is a red-coloured fluid. The fluid matrix of blood is called plasma. Blood cells or corpuscles **(RBCs, WBCs and platelets)** are suspended in **the plasma.**



Blood Vessels

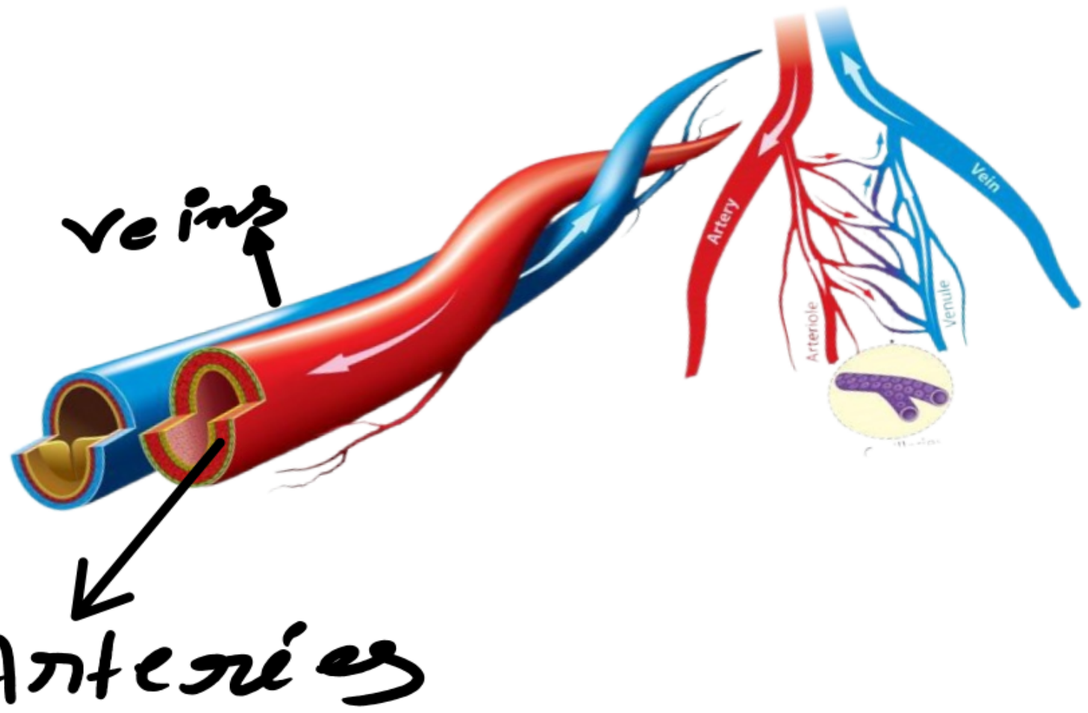
These are of three types:

1. Arteries are distributing vessels. They carry blood from heart to various body organs.

2. Veins are collecting vessels. They collect blood from various parts of **the body and carry it to the heart.**

3. Capillaries are microscopic vessels which form a **link between arteries and veins.**

Arteries	Veins
Carry blood away from the heart	Carry blood towards the heart
Carry oxygenated blood	Carry deoxygenated blood
Red in colour due to oxygenated blood	Blue in colour due to deoxygenated blood
Located deep in the body	Located close to the skin



Lymph is filtered blood. It is a link between blood and tissue fluid which facilitates exchange of substances between blood and body cells by diffusion. The tissue fluid on entering lymphatic capillaries is called lymph.

Excretion

Excretion is the removal of harmful and unwanted metabolic wastes from the body.

Excretion in Plants

Waste products in plants are tannins, resins, gums, essential oils, salt crystal, etc.

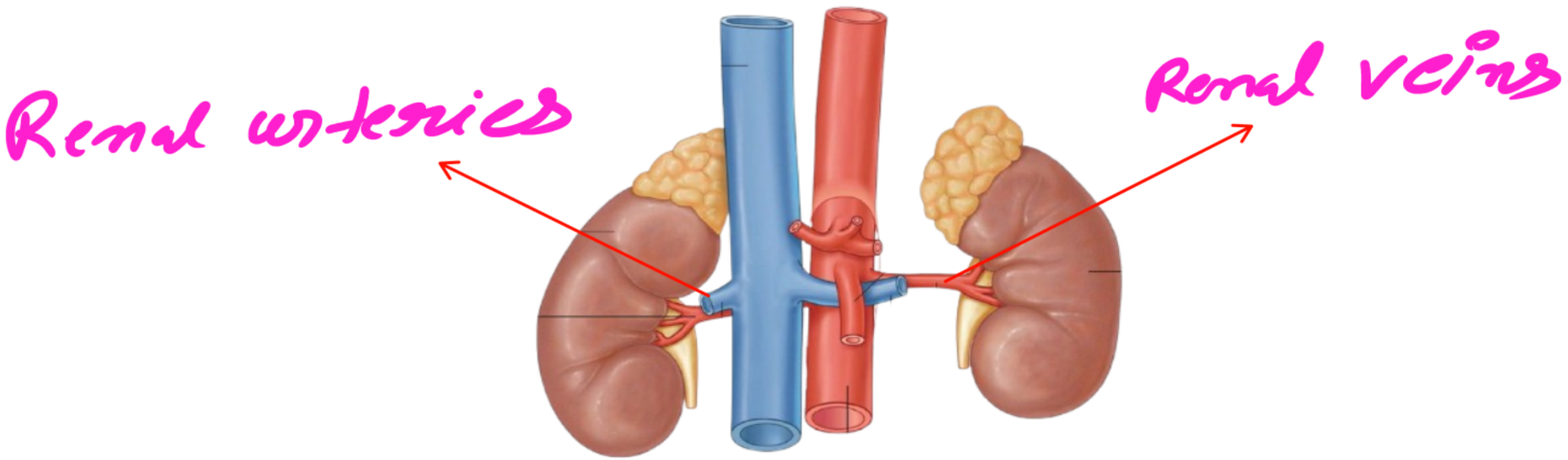
They are deposited in old and non-functional xylem, older leaves which are soon shed off, dead cells of bark, etc.

The plants living in saline habitats excrete excess of salts.

Excretion in Animals

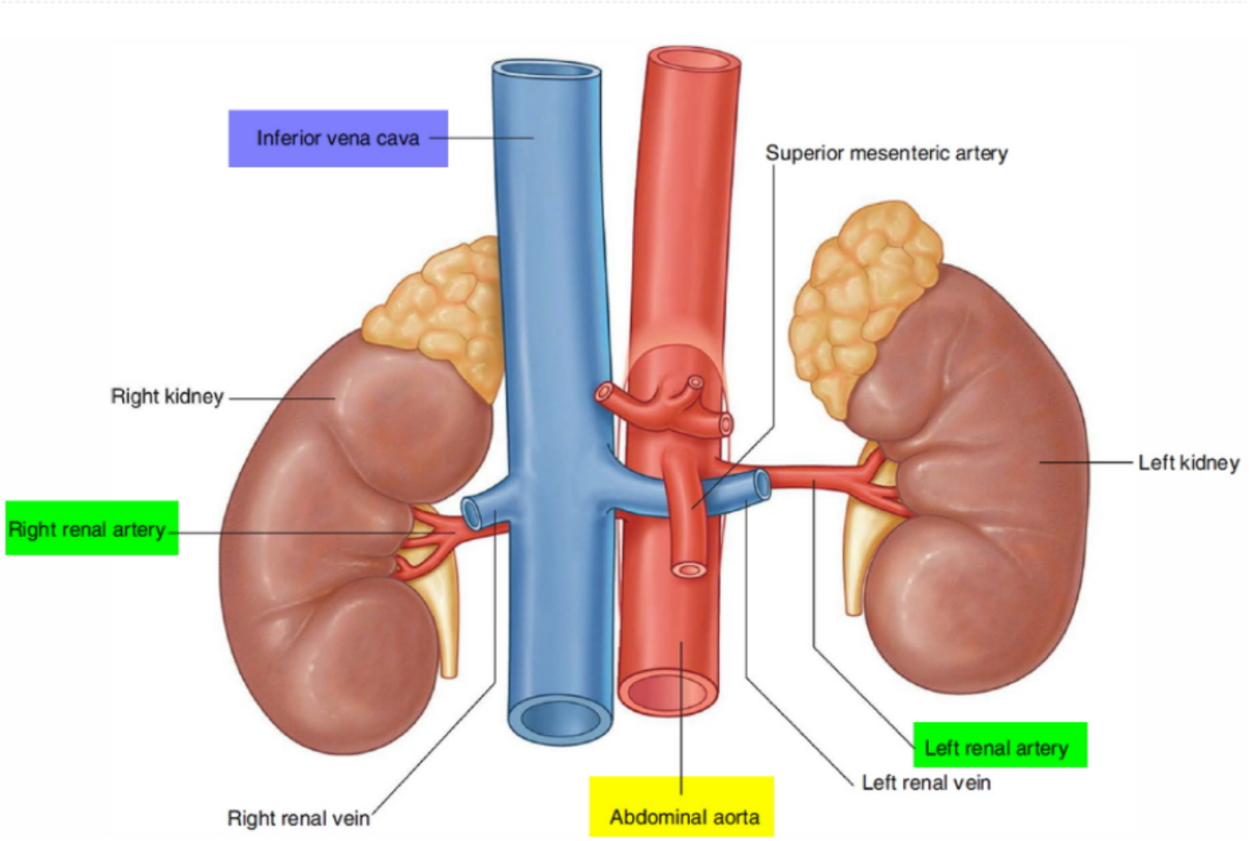
Excretion in man occurs by one pair of kidneys located in the abdominal cavity. Kidneys form urine, remove nitrogenous wastes, excess of water and salts from the blood.

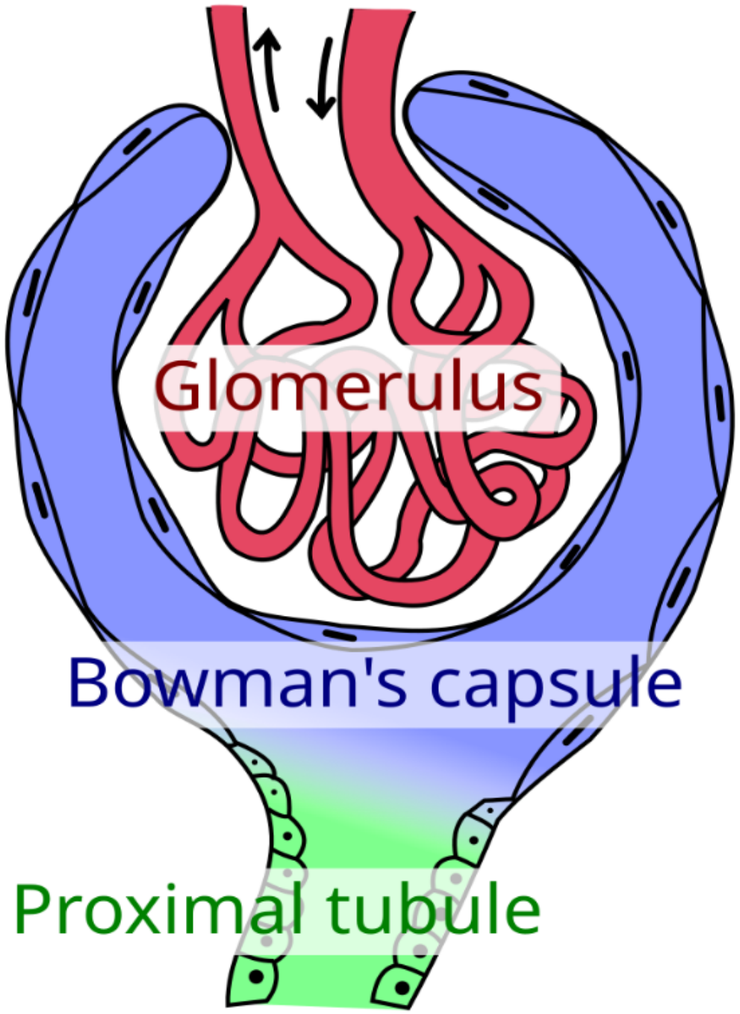
Blood enters Kidneys for filtration through a pair of renal arteries and a pair of renal veins collects filtere blood from kidneys.

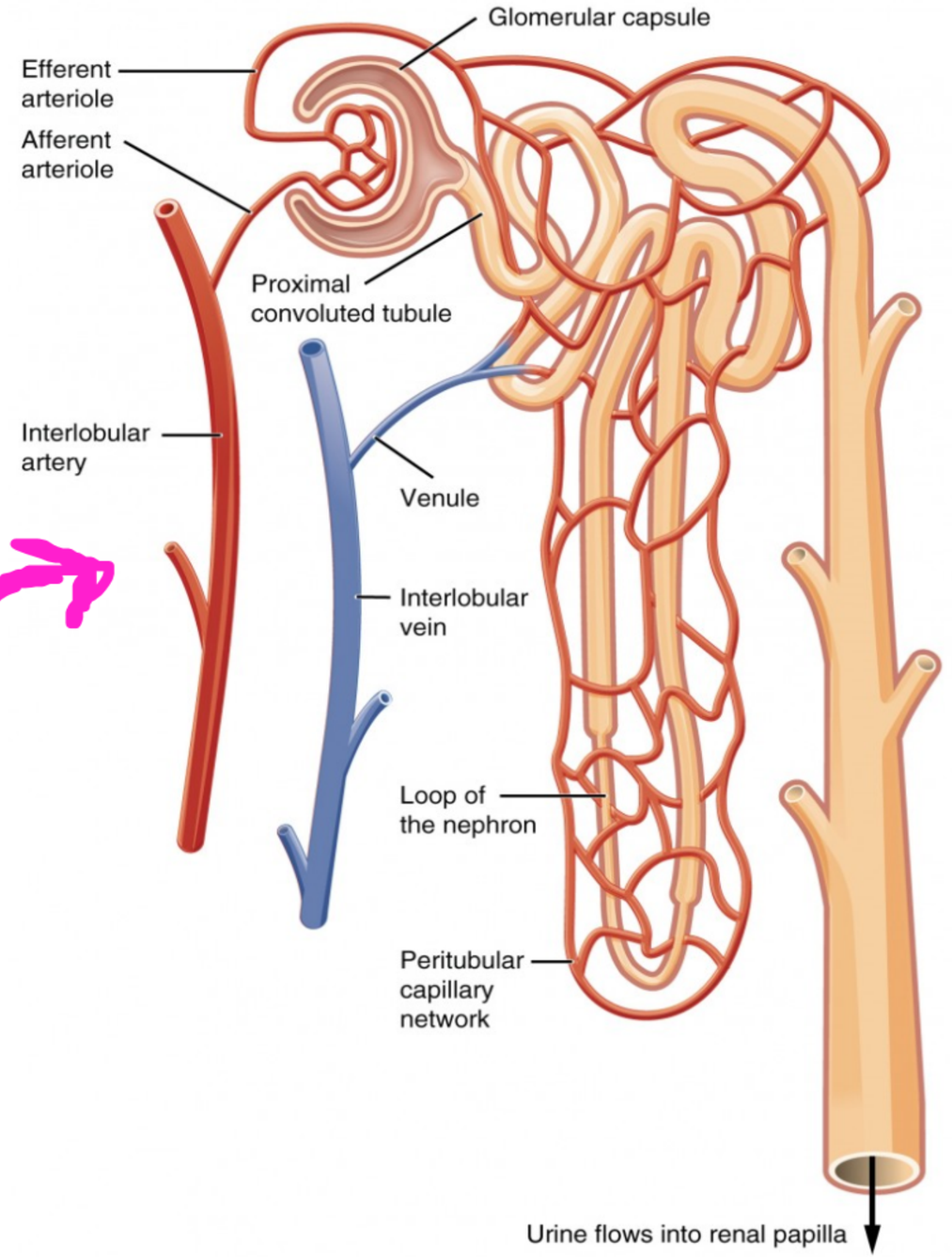


The cup-like hollow proximal part of each nephron is known as Bowman's capsule. Itis filled with a tuft of blood capillaries called glomerulus.

The blood while passing through glomerular capillaries is filtered under pressure and the filtrate is collected in the cavity of Bowman's capsule.




Glomerulus
Bowman's capsule
Proximal tubule

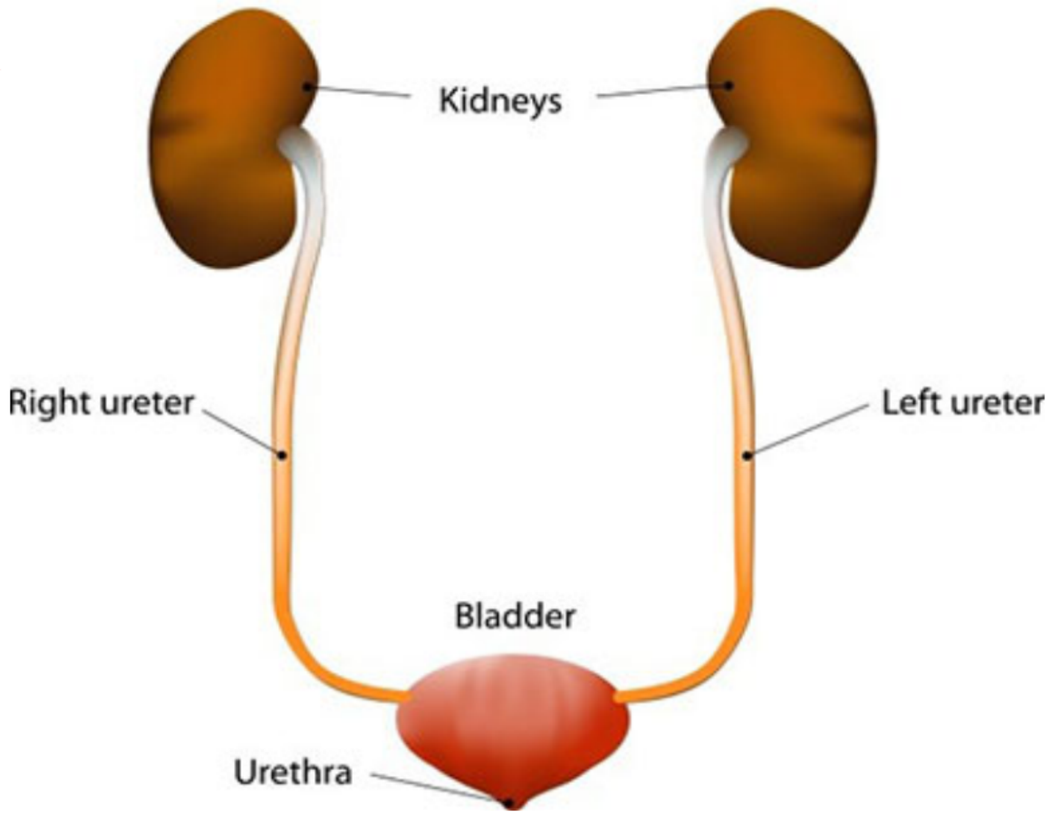

Glomerular capsule
Efferent arteriole
Afferent arteriole
Proximal convoluted tubule
Interlobular artery
Venule
Interlobular vein
Loop of the nephron
Peritubular capillary network
Urine flows into renal papilla

Urine Formation

nephric filtrate changes into urine which is a straw-coloured liquid due to presence of urochrome. It contains water and dissolved solids.

Urine is collected in the urinary bladder. It is released periodically to the exterior through urethra.

Storage of urine



- The End -

Hello mere pyare bacche is chapter ko
achhe se hum sabhi ne cover kar liya
hai. Ab iske notes prepare karna hijiye.