

Chapter :- Life Processes.

(1)

Life :- Earth happens to be the only known planet having a life. There are beings who live, die and become a part again. The living organisms can be differentiated from the inanimate entities on various parameters of life processes.

Life Processes :-

- Maintenance of living organisms is essential even if they are moving, resting or even sleeping since these maintenance processes are needed to prevent damage and breakdown energy is needed for them. This energy comes outside the body of the individual organism.
- The processes which together perform the function of maintenance of 'life' are called as life processes.
- Nutrition, respiration, circulation, excretion are examples of essential life processes.
- In unicellular organisms, all these processes are carried out by that single cell.
- In multicellular organisms, well-developed systems are present to carry out the processes.

Nutrition :-

The process of acquiring food that is needed for nourishment and sustenance of the organism is called nutrition.

- There are two main modes of nutrition, autotrophic and heterotrophic.
- Heterotrophic nutrition has subtypes :- holozoic, parasitic and saprophytic nutrition.



How do living things get their food?

- Some organisms use simple food material obtained from inorganic sources in the form of carbon dioxide and water.
- Autotrophs include green plants and some bacteria.
- Other organisms utilise complex substances.
- To achieve this, organisms use bio-catalysts called enzymes.
- The heterotrophs survival depends directly or indirectly on autotrophs.
- Heterotrophic organisms include animals and fungi.

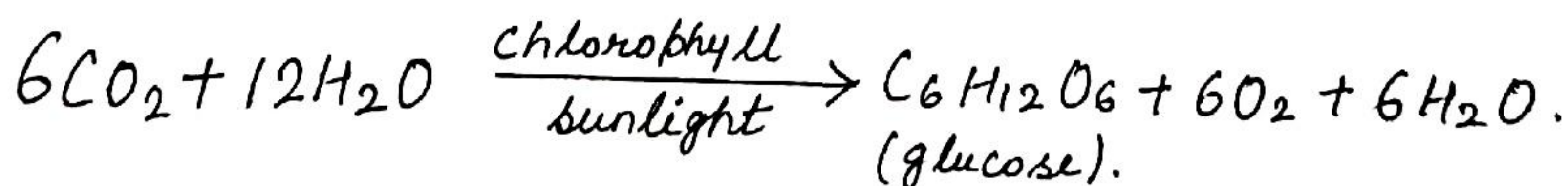
Autotrophic Nutrition :-

If an organism can nourish itself by making its own food using sunlight or chemicals, such mode of nutrition is called as Autotrophic Nutrition.

- Plants photosynthesis (use of light energy) and are called photoautotrophs.
- Few bacteria use chemicals to derive energy and are called chemoautotrophs.

Photosynthesis :-

- Photosynthesis is an important process by which food is formed.
- Carbon and energy requirements of autotrophs are fulfilled.
- Autotrophs take in substance from outside and convert into stored forms of energy.
- Chlorophyll is present in the green parts absorbs light energy.
- This light energy is used to split water into H_2 and O_2 .
- Carbohydrates are utilised to provide energy to the plant.
- Chlorophyll is essential for photosynthesis and stomata to facilitate intake of carbon dioxide.

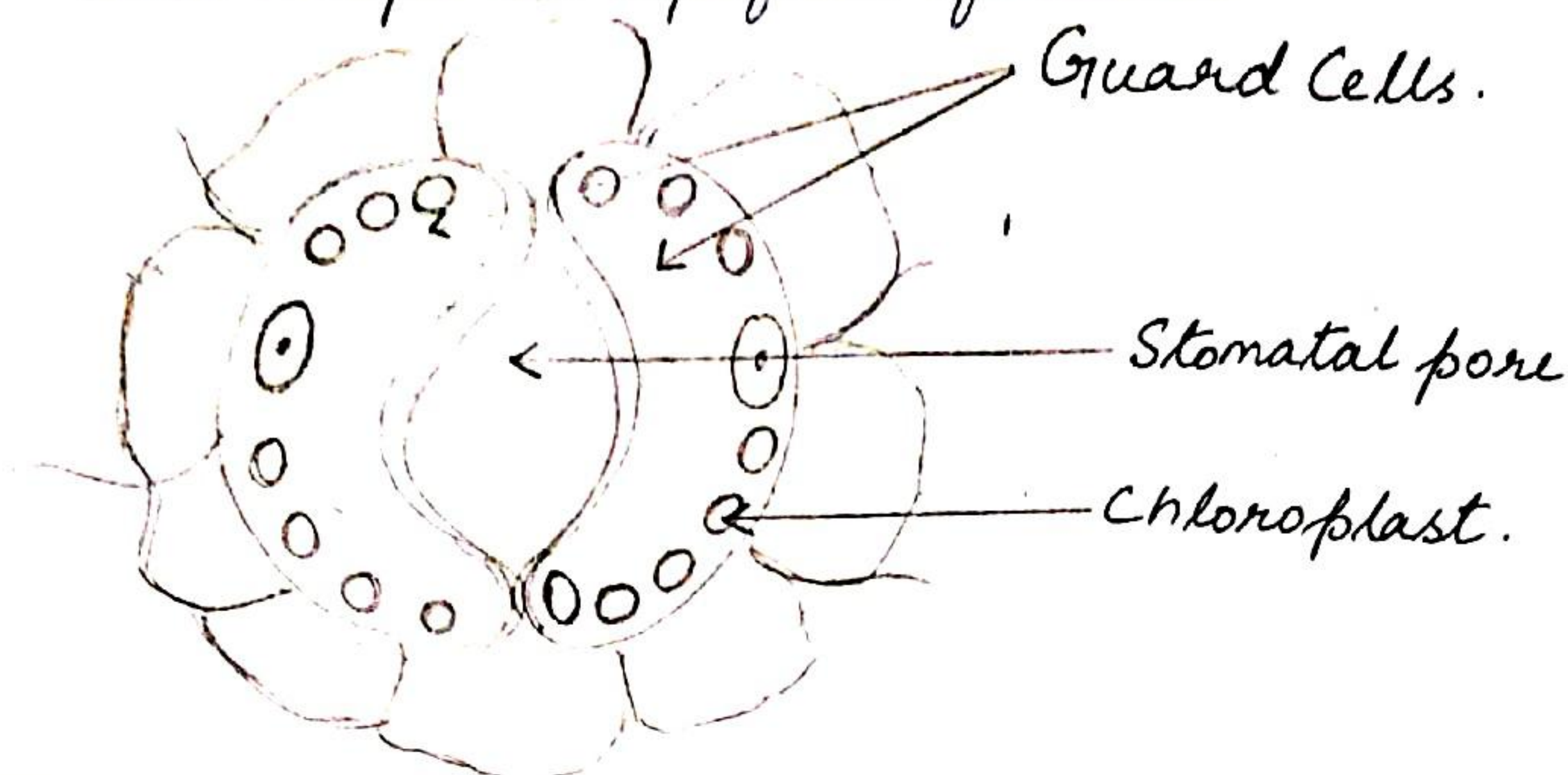


Raw Materials for Photosynthesis :- CO_2 and H_2O .

Site of Photosynthesis :- Chloroplast in the leaf.
Chloroplast contain chlorophyll.

Stomata :- Tiny pores present on the surface of leaves.

- It helps in the exchange of gases O_2 & CO_2 .
- loses large amount of water during transpiration and helps in up flow of water.



Chloroplast :- It contains the green pigment chlorophyll which has a pivotal role in photosynthesis.

Heterotrophic Nutrition :-

There is a range of strategies by which the food is taken in and used by the organisms. Some organisms break down the food materials outside the body and absorb it.

Holozoic Nutrition :- Animals take in solid food and break-down it inside the body. eg. Amoeba, animals.

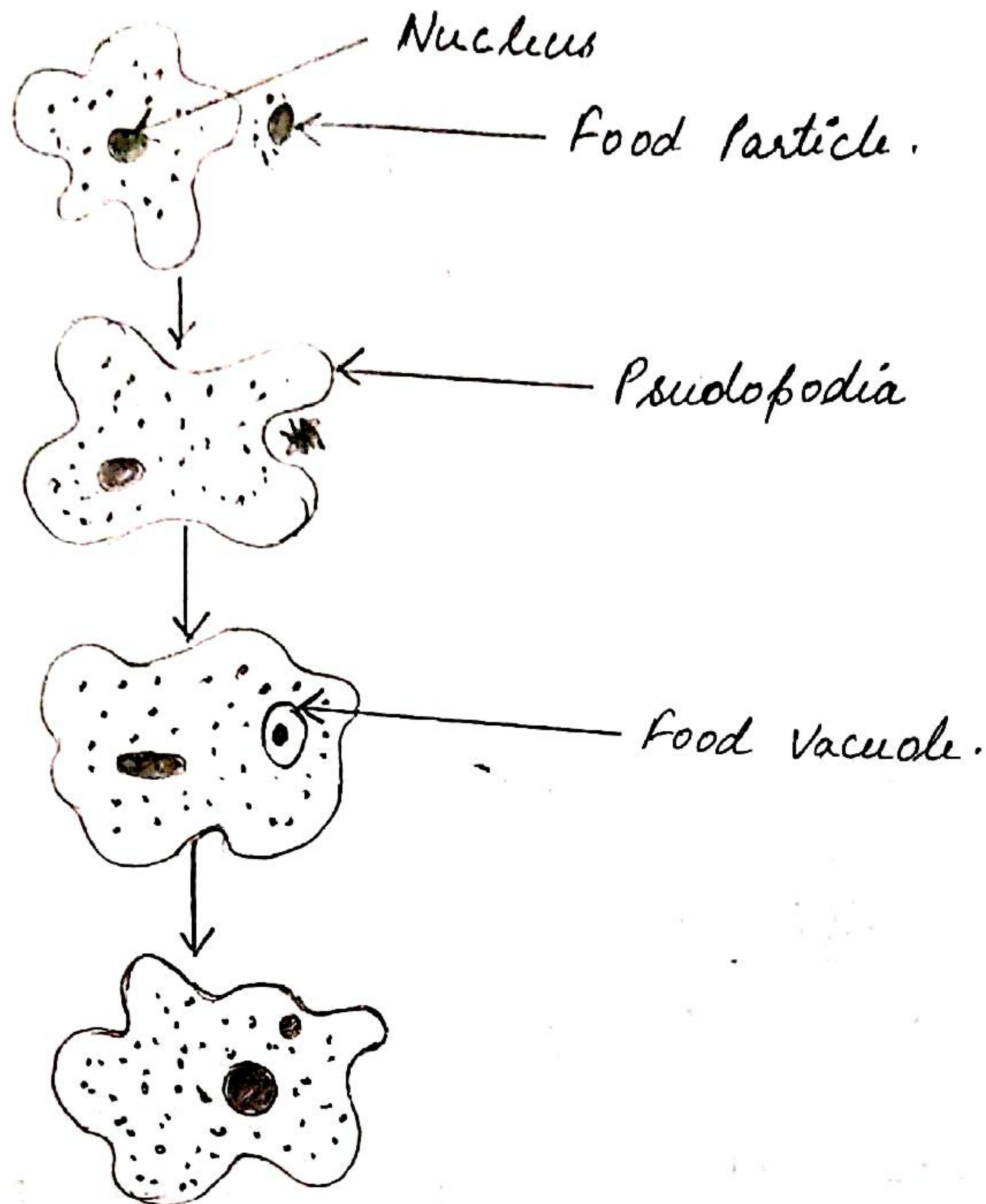
Saprophytic Nutrition :- Organisms feed on dead and decaying organic matter. eg. Fungi and other saprophytes. The food is partially digested outside the body and then it is absorbed.

Parasitic Nutrition :- Parasites live inside or outside other organisms (host) and derive nutrition from it. Eg. Leech, Ascaris and Cuscuta.

Nutrition in Amoeba :-

- Amoeba feeds by holozoic mode of nutrition.
- It engulfs the food particles using pseudopodia, the process called phagocytosis. The engulfed food gets enclosed.

- food vacuole is formed.
- undigested food is thrown out.



- Nutrition in Human Beings :-** The Human digestive system comprises of alimentary canal and associated digestive glands.
- There are five stages in human nutrition :- Ingestion, Digestion, Absorption, Assimilation and Egestion.
 - Four stages i.e ingestion, digestion, absorption and egestion takes place in alimentary canal, while assimilation of food takes place in the whole body.

Human Digestive System :-

1. Mouth :- It is the opening of the alimentary canal and helps in ingestion of food. Buccal cavity is present behind the mouth and has teeth and tongue.

Salivary Glands → Secrete saliva (Salivary Amylase).

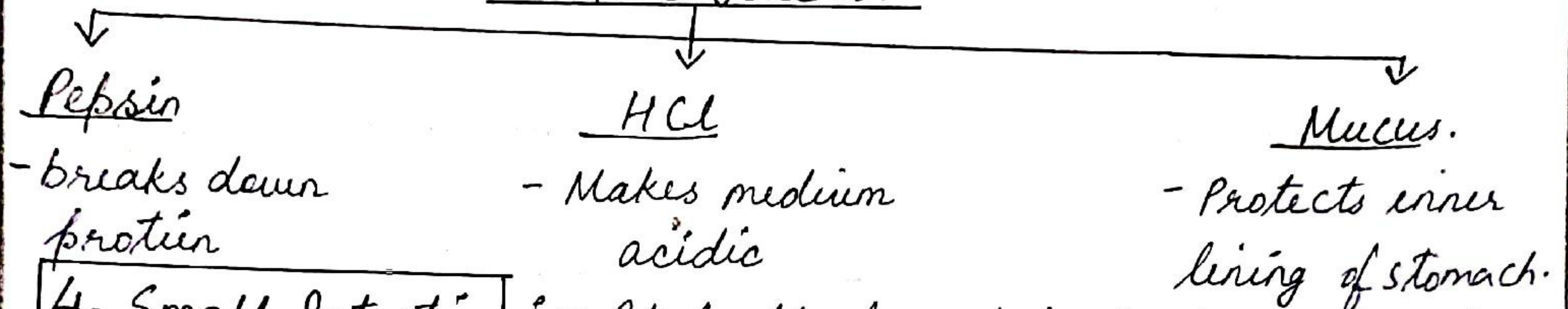
Teeth → Chewing and Grinding of food.

Tongue → Rolling and Tasting of food.

2. Oesophagus :- The swallowed food passes into the oesophagus. It is a muscular tube, about 25 cm long with a sphincter (valve/opening) at each end). Takes food from mouth by peristaltic movement. Function is :- contraction and expansion of alimentary canal.

3. Stomach :- It is a thick-walled bag like structure. It receives food from oesophagus at one end and opens into the small intestine at other end.

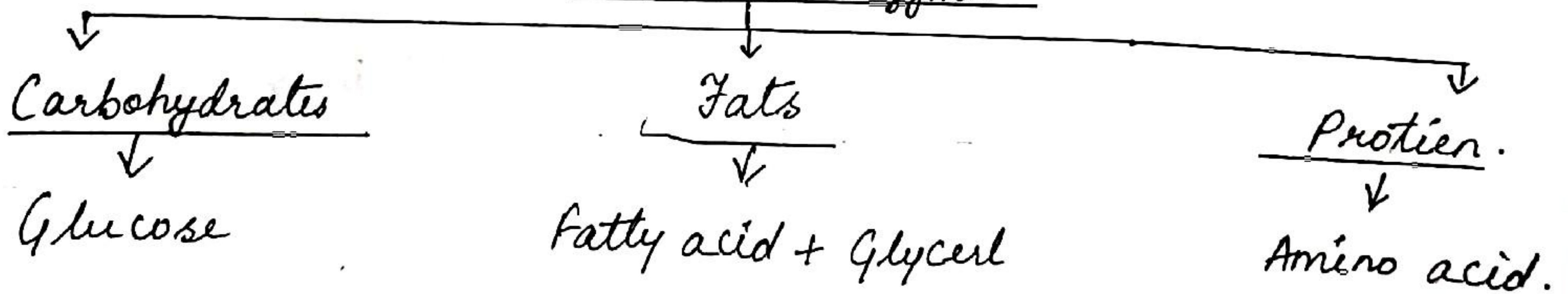
Gastric Juices.



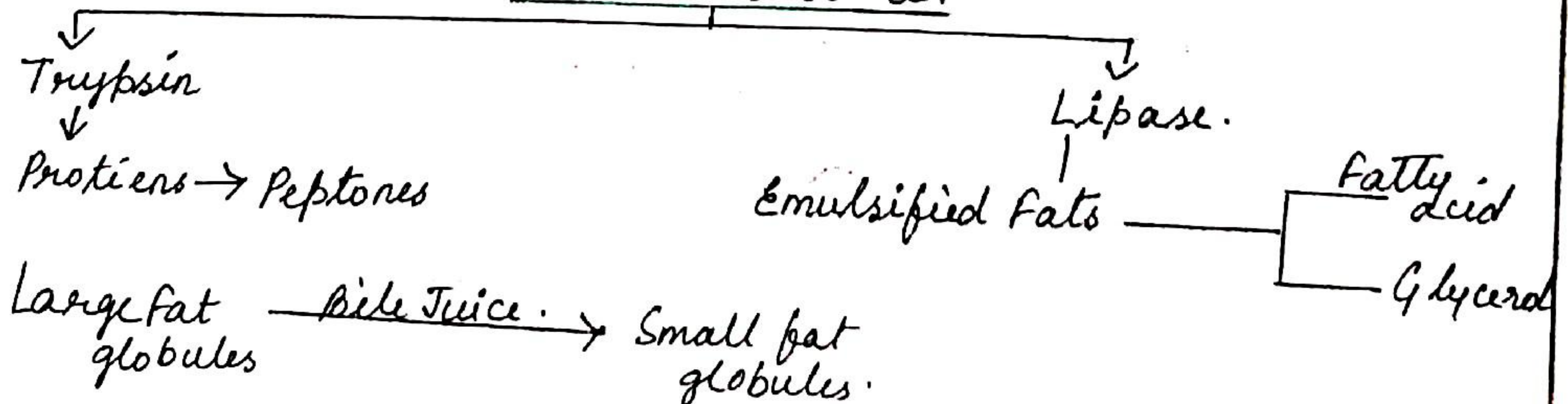
4. Small Intestine :- It is the longest part of the alimentary canal, about 20 feet long. It has three regions:- duodenum, jejunum and ileum. Internal surface of small intestine is folded into finger like projections called villi.

Liver → secretes bile
Pancreas → secrete pancreatic juice.

Intestinal Enzyme



Pancreatic Juice

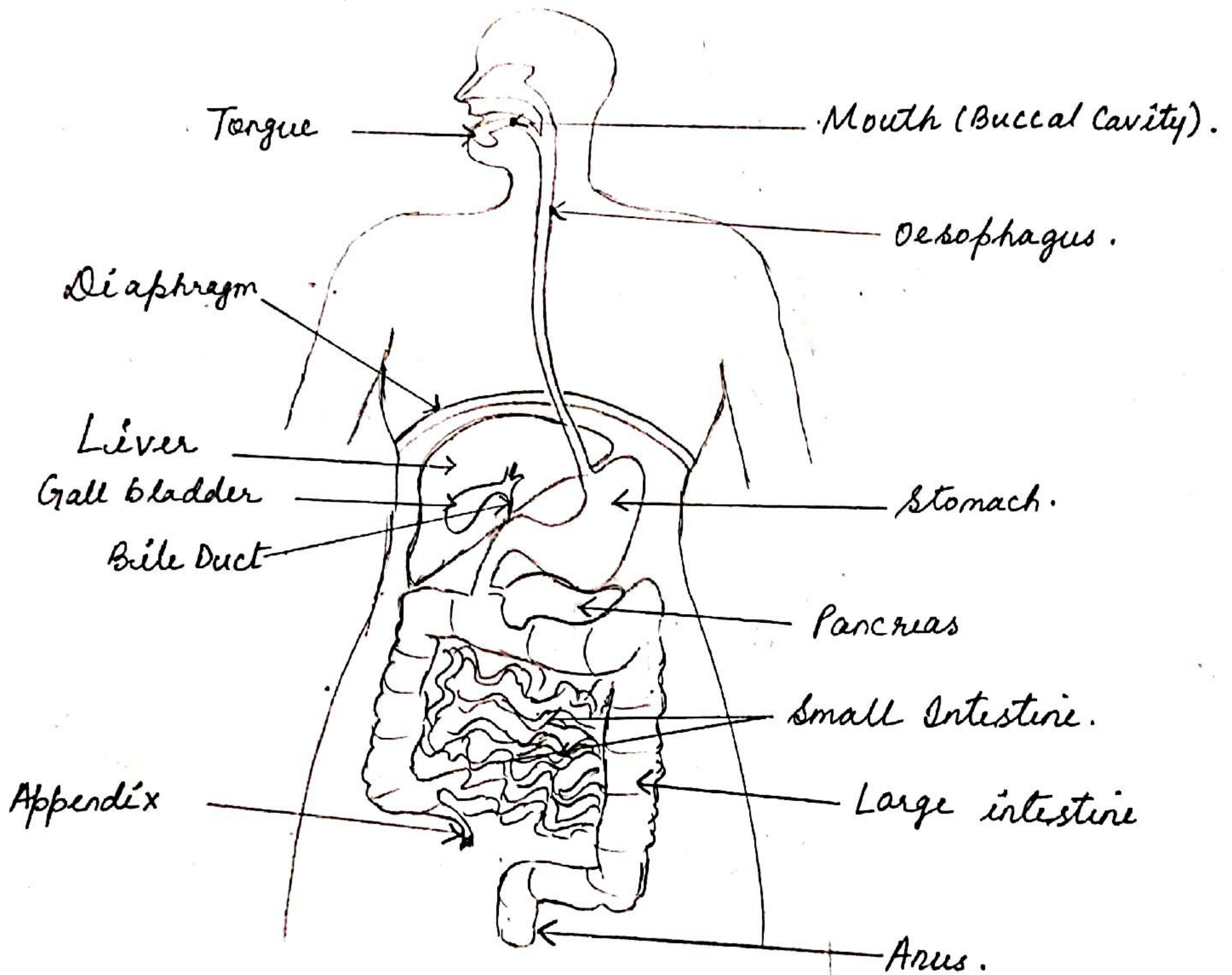


5. Large Intestine :- The region of large intestine after ileum is called the large intestine. The large intestine is about 5 feet long in humans.

- Absorbs excess of water.

6. Rectum :- Temporary collection of waste. It opens to outside the anus.

7. Anus :- The anus has internal and external anal sphincters. Helps in egestion.



Human Alimentary Canal.

Respiration:- Respiration broadly means the exchange of gases, typically the intake of oxygen and release of carbon dioxide from oxidation of complex organic substances.

(i) Gaseous Exchange:- Intake of oxygen from atmosphere and release of carbon dioxide.

Respiration

Aerobic

- in the presence of oxygen.
- occurs in mitochondria
- End products are CO_2 and H_2O
- More amount of energy released (38 ATP).

Anaerobic

- in the absence of oxygen.
- occurs in cytoplasm.
- End products:- alcohol
- less amount of energy released (2 ATP).

Human Respiratory System:-

- Passage of air through respiratory system.

• Nostril $\rightarrow$ Nasal Passage $\rightarrow$ Nasal Cavity $\rightarrow$ Pharynx $\rightarrow$ Larynx $\rightarrow$ Trachea $\rightarrow$ Bronchi $\rightarrow$ Lungs $\rightarrow$ Bronchioles $\rightarrow$ Alveolar sac $\rightarrow$ Blood Capillaries.

Mechanism of Breathing:-

Breathing

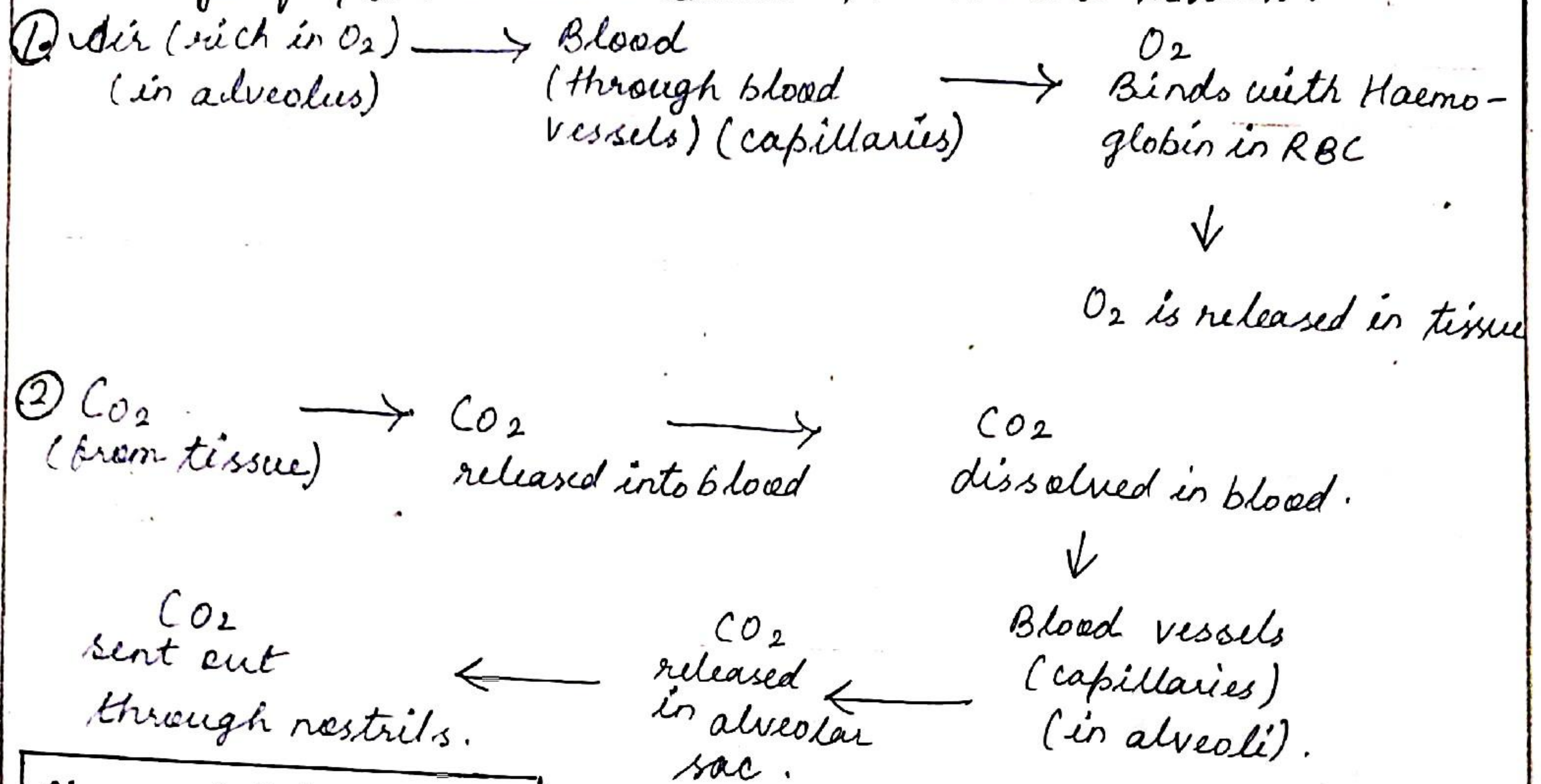
Inhalation

1. During inhalation thoracic cavity expands.
2. Ribs lift up
3. Diaphragm becomes flat
4. Volume of lungs increases and air enters the lungs.

Exhalation

1. Thoracic cavity contracts.
2. Ribs move downwards.
3. Diaphragm becomes dome shaped.
4. Volume of lungs decrease and air exits from lungs.

Exchange of Gases between alveolus, blood and tissues:-



Terrestrial Organism:- Use atmospheric oxygen for respiration.

Aquatic Organism:- Use oxygen dissolved in water.

Respiration in Plants:- Respiration in plants is similar than the respiration in animals. Gaseous exchange occur through:-

- (1) Stomata in leaves.
- (2) Lenticles in stems
- (3) General surface of roots.

Diffusion:- Diffusion is the movement of molecules from high concentration area to the low concentration area without any energy.

Cellular Respiration:- Set of metabolic reactions occurring inside the cells to convert biochemical energy obtained from food into a compound called Adenosine triphosphate (ATP).

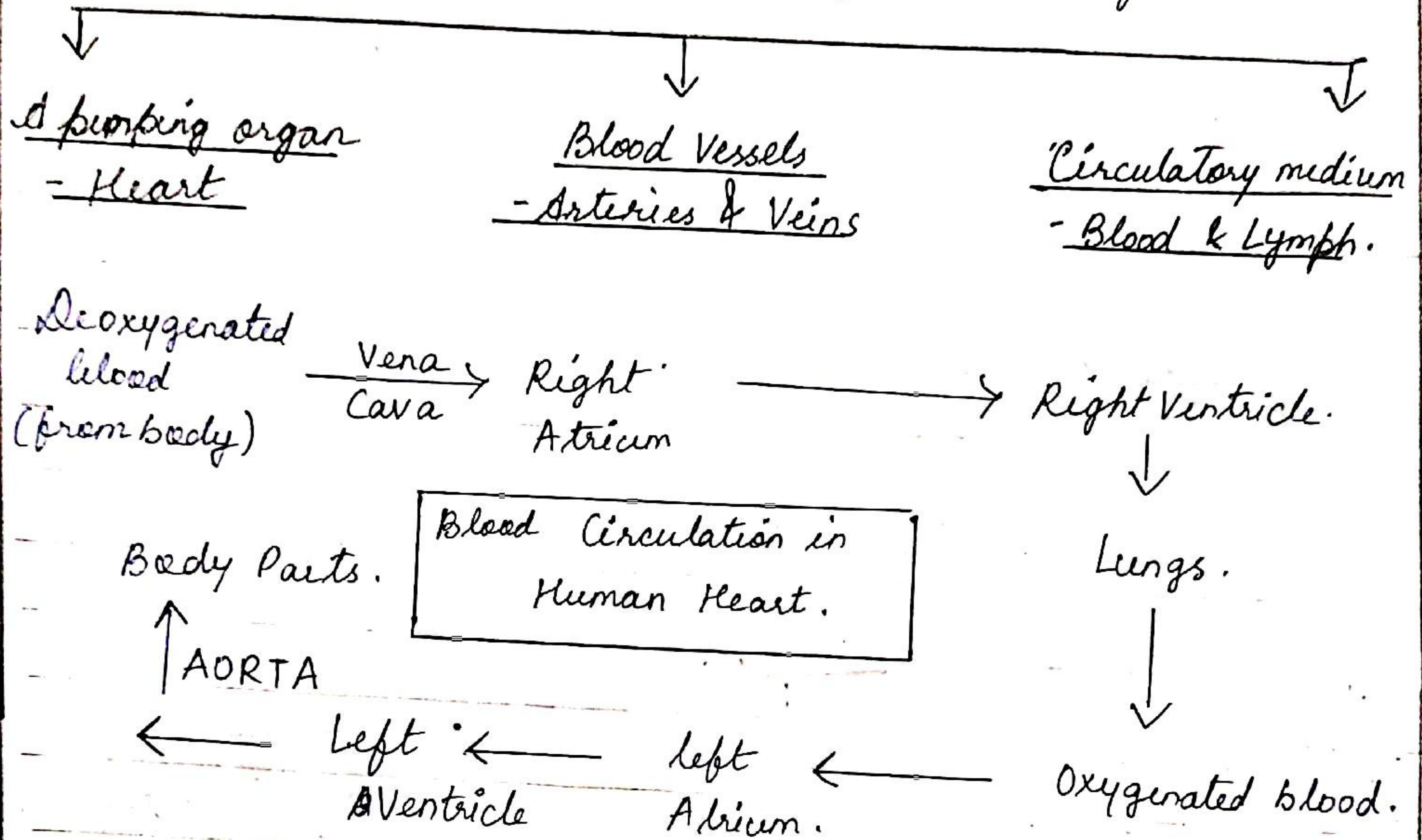
Catabolism:- process of breaking molecules into energy.

Anabolism:- process of synthesizing all compounds required by the cells.

Transportation:-

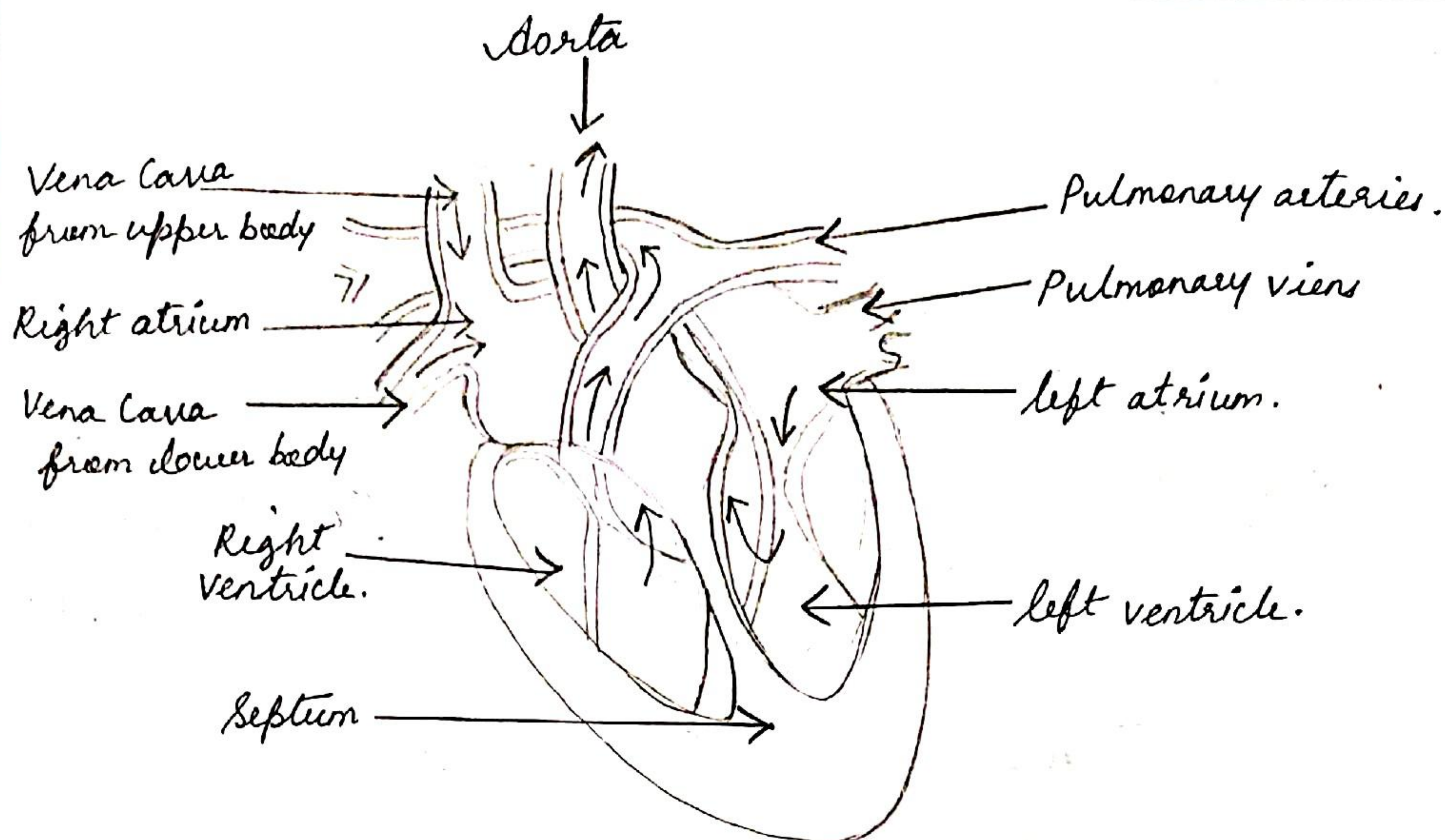
- Human beings like other multicellular organism need regular supply of food, oxygen etc. This function is performed by circulatory system or Transport system.

Circulatory system of human beings consists of:-



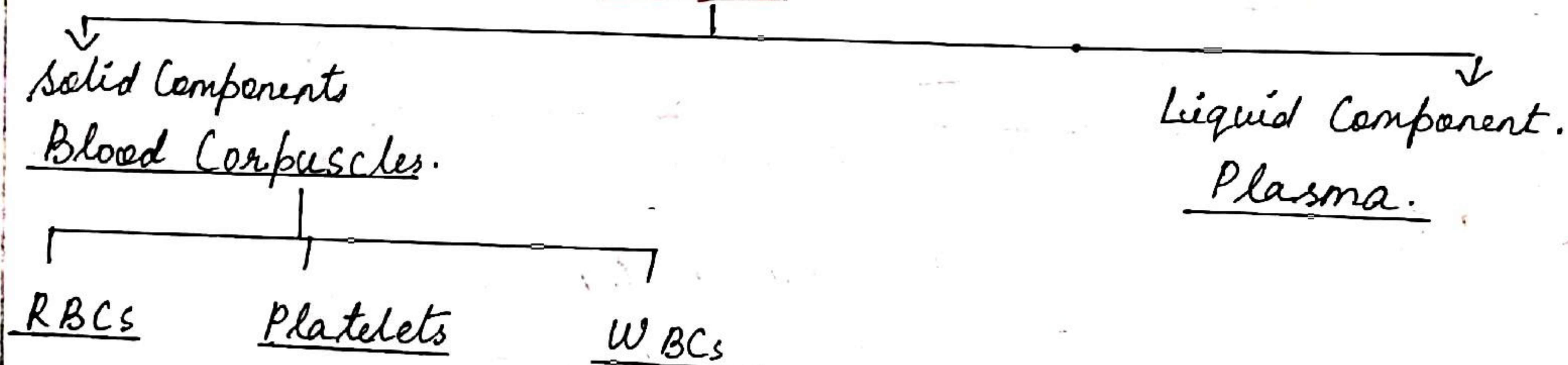
Heart:- It is a muscular organ located near chest slightly towards the left in thoracic cavity. Heart is main pumping organ of the body. It has two upper chambers called atria and lower two chambers called ventricles.

- Double Circulation:- Blood travels twice through the heart in one complete cycle of body.
- Pulmonary Circulation:- blood moves from heart to the lungs and back the heart.
- Systemic Circulation:- blood moves from heart to rest of the body and back to the heart.



Sectional view of Human Heart.

Blood.



RBCs :- Carries respiratory gases (O_2 , CO_2).

- Contains Haemoglobin

- impart red colour to the blood.

Platelets :- Helps in blood Clotting

WBCs :- Provide Body defence by engulfing the germs and producing antibodies.

Plasma :- A yellow fluid contain 90% water and 10% organic substances like Proteins, albumin, globulin, inorganic mineral ions etc.

Lymph :- A yellowish fluid that escapes from blood capillaries into the intercellular spaces. Lymph flows from the tissue to the heart assisting in transportation and destroying germs.

Blood Vessels

↓ Arteries

↓ Veins

Arteries :-

1. Carry oxygenated blood from heart
2. Also called distributing vessels.
3. Thick and elastic
4. Valves absent.
5. Deep seated.

Veins :-

1. Carry deoxygenated blood from body parts
2. Also called collecting vessels.
3. Thin and less elastic
4. Valves present to prevent back flow of blood.
5. Superficial.

Transportation in Plants :- Two type of conducting tissue :-

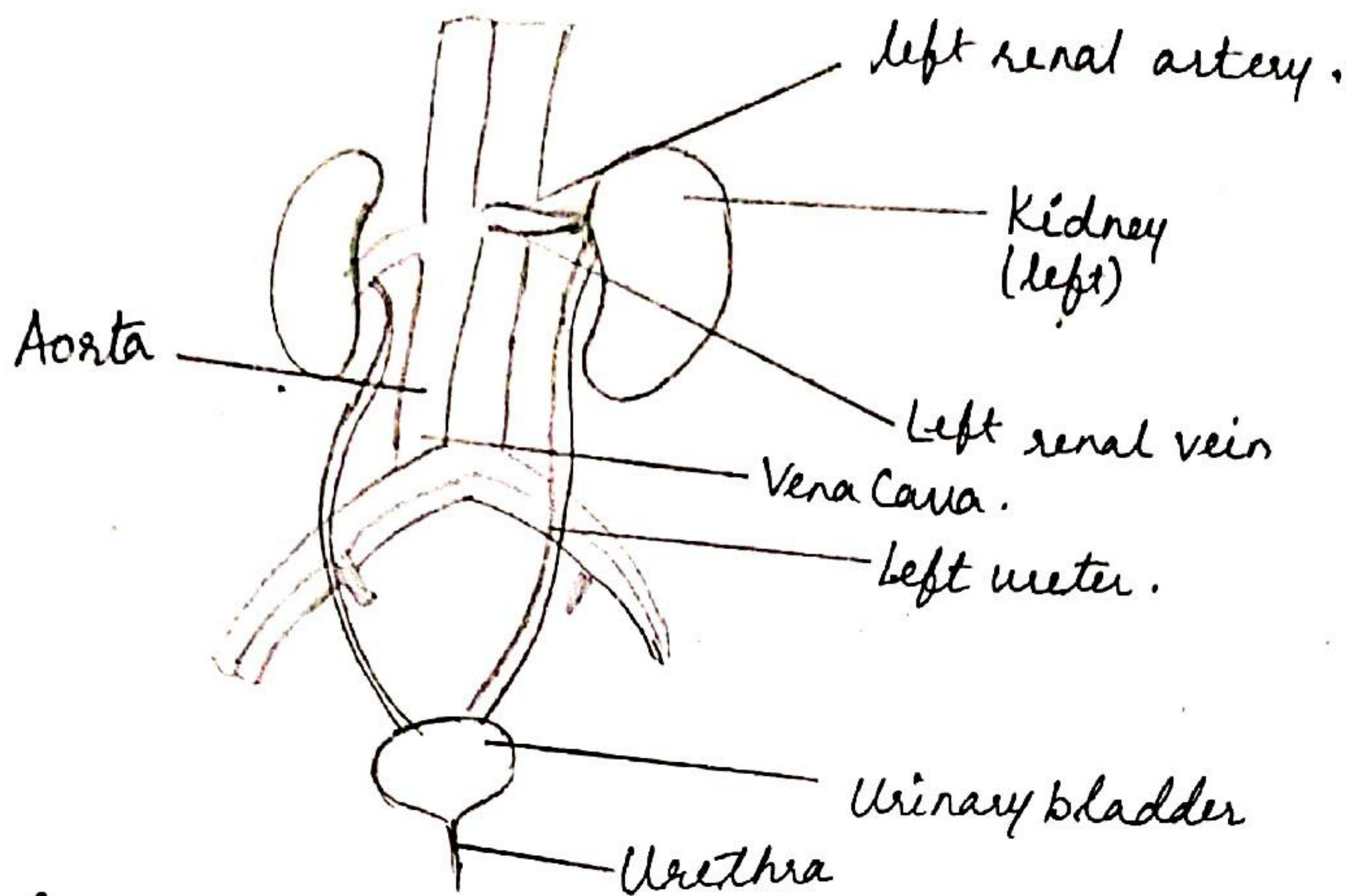
Xylem :- Carries water & minerals from the roots to other part of the plant. No energy used.

Phloem :- Carries product of photosynthesis from leaves. Energy is used from ATP.

Transpiration is the process by which plant lose water in the form of water vapours. Helps in temperature regulation in plants.

Translocation :- Transport of food from leaves to different part of the plant is called Translocation.

Excretion in Humans :- The process of removal of harmful wastes from the body of an organism is called excretion.



Excretory system in Human beings.

Excretory system consists of:- A pair of Kidney
A urinary bladder.
A pair of Ureter
A Urethra.

Process of Excretion:- Renal artery brings in blood containing waste substances to the Kidneys. Kidney filters blood. Urine produced in kidney passes through the ureters into the urinary bladder. until it is released through the urethra.

Functions of Kidney:- It removes waste product from blood, urea which is produced in liver.

Nephron:- Each Kidney has a large number of filterate units called nephrons. Nephron is a structural and functional unit of Kidney.

Mechanism of Urine Formation:-

- Glomerular Filtration
- Tubular re-absorption
- Secretion.

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Haemodialysis:- The process of purifying blood by an artificial kidney. Meant for kidney failure patients.

Excretion in Plants:-

1. Oxygen released during photosynthesis
2. H_2O by transpiration
3. Waste may be stored in leaves, bark etc
4. Waste products stored as gums, resins in old xylem.
5. Plants excrete some waste into the soil around them.