L1

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CLASS X - SCIENCE

LIFE PROCESSES

PRASHANT KIRAD


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Why to Fear when Prashant Bhaiya is here!

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PK HITS🔥

- Nutrition (Diagram)
- Human Heart (Diagram)
- Respiration (Aerobic, Anaerobic)
- Excretion (Specially Nephron)

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TOPICS TO BE COVERED

- Nutrition
  - Types of nutrition
- Photosynthesis & Stomata
- Nutrition in Human beings
- Respiration
  - Types of respiration
- Respiration in Humans
  - Respiration in plants and aquatic animals
- Breathing v/s Respiration

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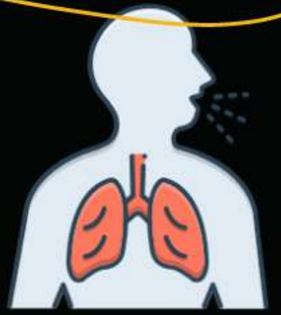
LIFE PROCESSES

The basic and essential activities performed by a living organism to sustain and maintain life.

NUTRITION

RESPIRATION



TRANSPORTATION

EXCRETION

Life Processes: Eat, Breathe, Pee, Repeat—just like a normal day.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NUTRITION

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NUTRITION

The process by which a living organism obtain and utilise food is called *Nutrition*.

Food gives us Energy, growth and development.

COMPONENTS OF FOOD

Carbohydrates

Proteins

Fats

Vitamin & Minerals

TYPES OF NUTRITION

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Autotrophic

Heterotrophic

It is a mode of nutrition in which organisms prepare their own food using simple inorganic substances like carbon dioxide and water in the presence of sunlight and chlorophyll

E.g., Green plants

Chemosynthesis

A type of autotrophic nutrition in which organisms prepares their own food by utilizing chemical energy. E.g., Purple sulfur bacteria

Photosynthesis

A type of autotrophic nutrition in which organisms prepares their own food by utilizing light energy. E.g., Green plants, Cyanobacteria, Algae, Euglena

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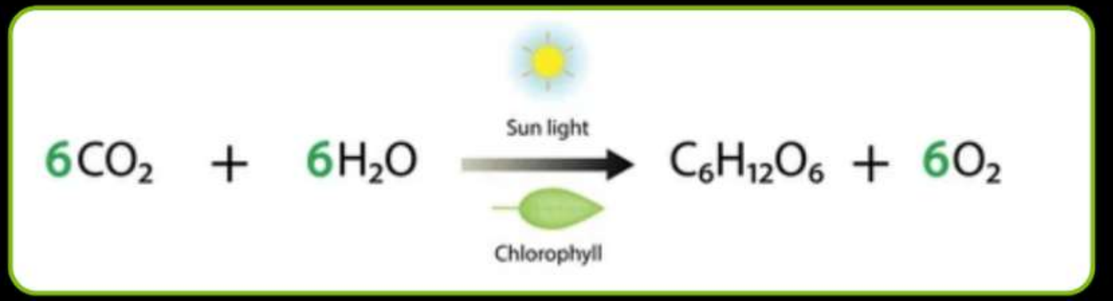

RAW MATERIAL FOR PHOTOSYNTHESIS

- **Sunlight**: It is inorganic material.
- **Chlorophyll**: Sunlight absorbed by chlorophyll.
- **CO2:** Enters through stomata and oxygen (O2) is released as by-product through stomata on leaf.
- **Water:** Water + dissolved minerals like nitrogen, phosphorus etc. are taken up by the roots of the soil.

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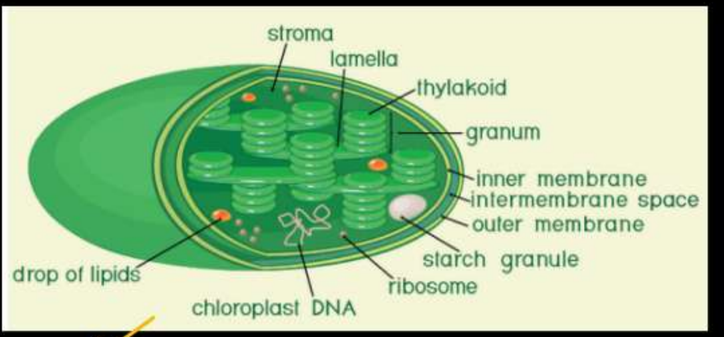
SITE OF PHOTOSYNTHESIS

Chloroplasts are the site of photosynthesis which are green pigmented cell organelles containing **chlorophyll.**



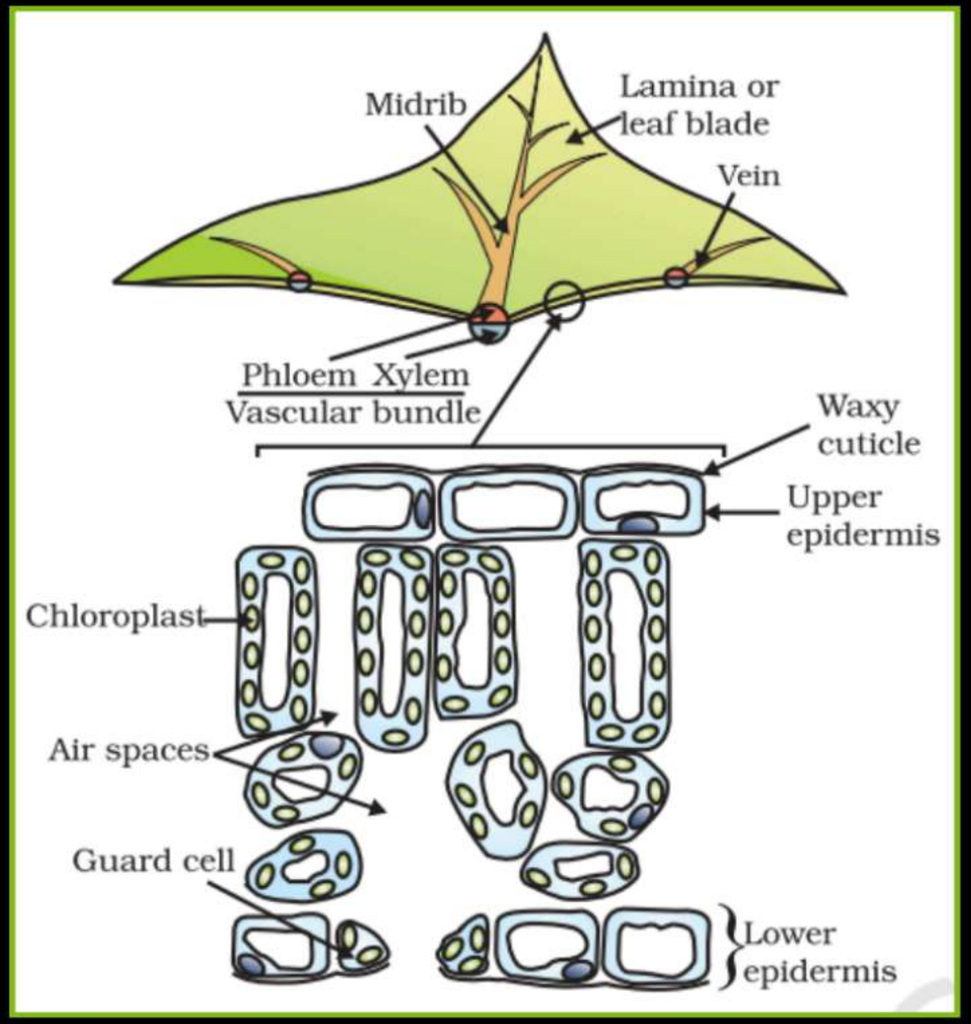
MAIN EVENTS OF PHOTOSYNTHESIS

- Absorption of light energy by chlorophyll.
- Conversion of light energy into chemical energy + splitting (breaking) of water into hydrogen and oxygen.
- Reduction of CO_2 to carbohydrates.

$H_2O \rightarrow H$, O

Plants store glucose in the form of starch, while humans store glucose in the form of glycogen.

CROSS SECTION OF A LEAF



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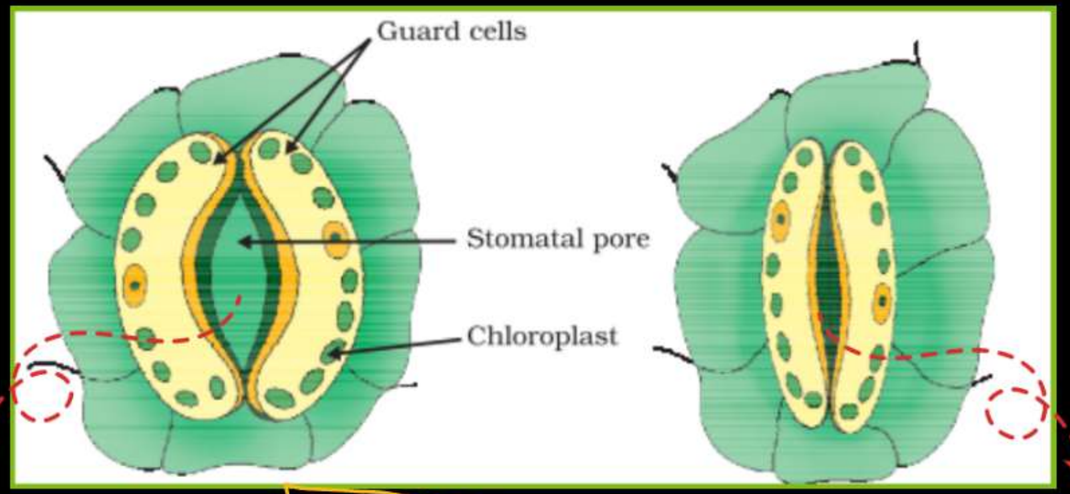
STOMATA AND ITS FUNCTIONS

Stomata are the tiny pores present on the surface of the leaves.

Functions of Stomata:

- Exchange of gases O2/CO2.
- Loses large amount of water (water vapour) during transpiration.

OPENING AND CLOSING OF STOMATA



It opens when water enters i.e., on swelling of guard cells.

H_2O

It closes when water leaves i.e., on shrinking of guard cells.

HETEROTROPHIC NUTRITION

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Type of nutrition in which organisms do not posses the ability to synthesize their own food. They depend on the autotrophs for their food supply directly or indirectly.

Holozoic

Animals taken in solid food and breakdown inside the body. E.g., Amoeba, animals

Saprophytic

Organisms feed on dead and decaying matter. Food is digested externally and then nutrients are absorbed.
E.g. Bread mold Mushroom Yeast etc.

Parasite

Organisms derive nutrition from plants or animals without killing them. They obtain nutrition by living on or inside the host
e.g. Tapeworm Lice Ticks Leech

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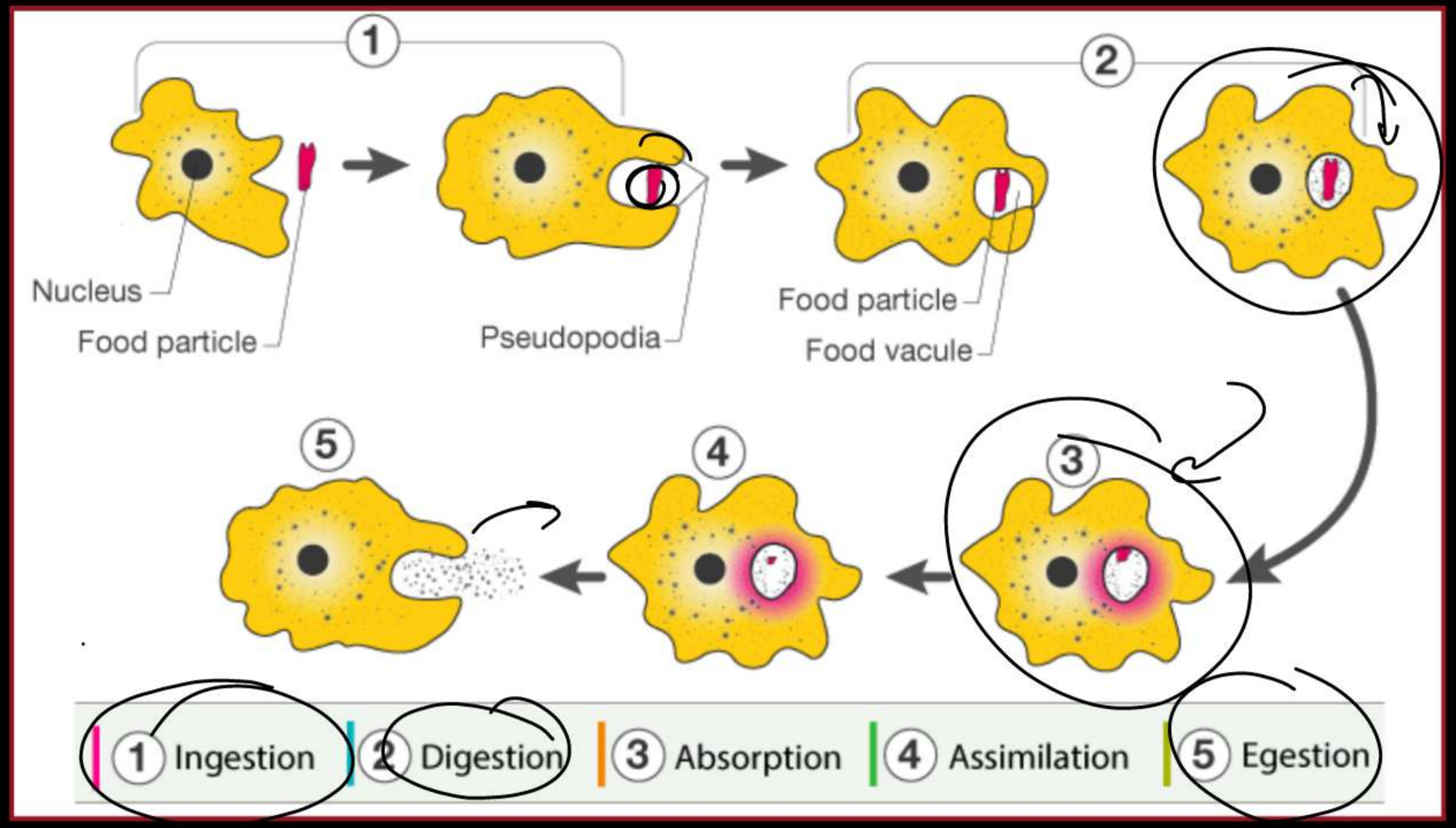
NUTRITION IN AMOEBA

Food is taken up through the entire surface.



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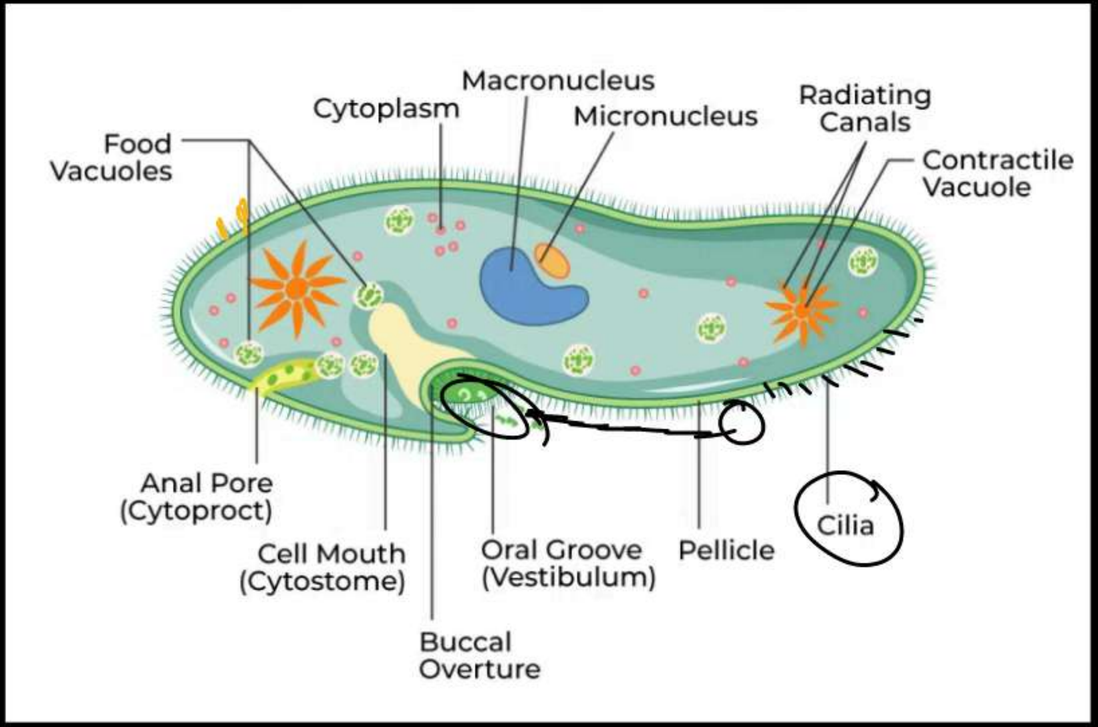
NUTRITION IN PARAMECIUM

Cilia (present all over the body) → Take in food → At a specific spot



NUTRITION IN HUMANS

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Ingestion: Intake of food material

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Digestion: Breakdown of complex food

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Absorption: Movement of digested food

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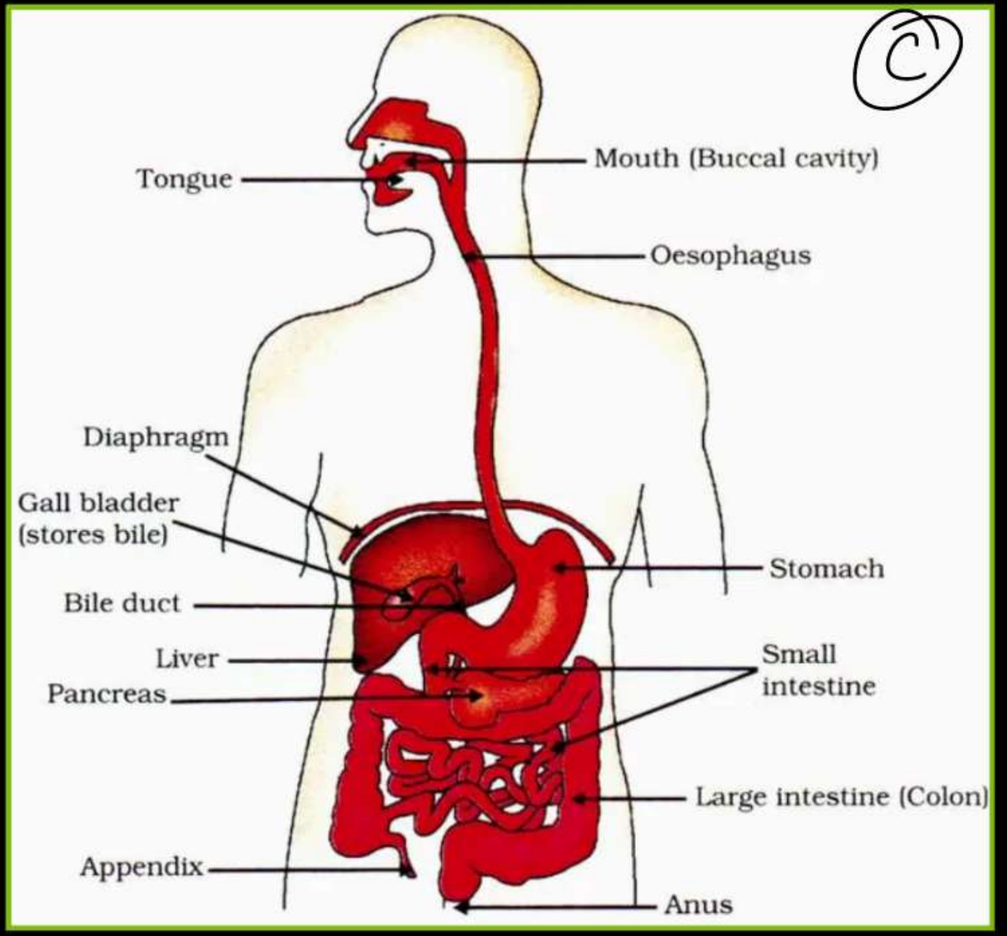
Assimilation: Utilization of food products

↓

Egestion: Removal of waste



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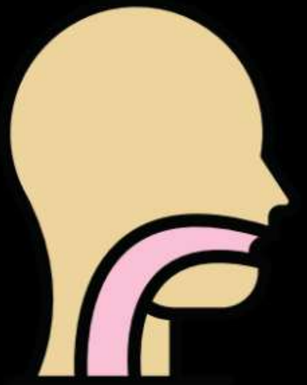
MOUTH (BUCCAL CAVITY)

- **Mouth** - Intake of food
- **Teeth** - Chewing/grinding of food.
- **Tongue** - Rolling and Tasting of food
- **Salivary glands** - Secrete saliva + Mucus

Starch → (Salivary Amylase) → Maltose (Simple Sugar)

OESOPHAGUS (FOOD PIPE)

Taking food from mouth to stomach by Peristaltic movements (Contraction and expansion of muscles of the oesophagus).



STOMACH

HCL ↑

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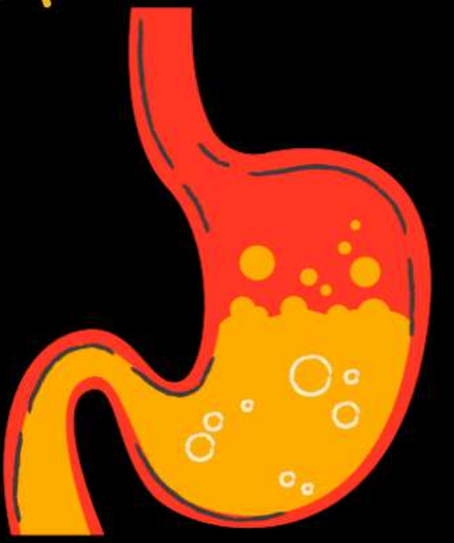
- Stomach is a large J-shaped organ which expand when food enters.
- The muscular walls of the stomach help in mixing the food thoroughly with more digestive juices.



Gastric juices

- **Pepsin** (Enzyme that breaks down proteins)
- **HCl** (Makes the medium acidic)
- **Mucus** (Protects the inner lining of stomach)

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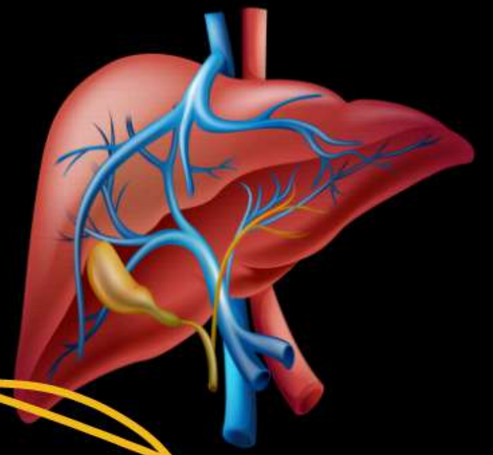
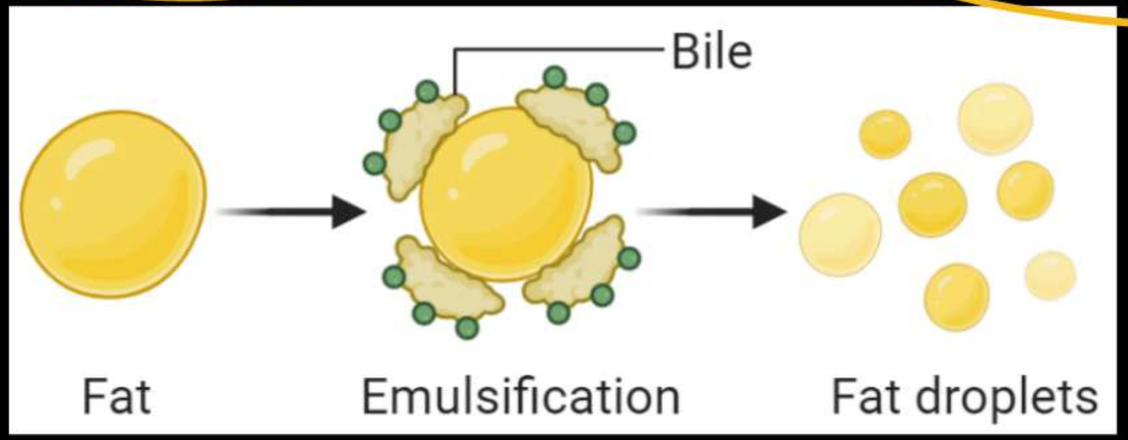
LIVER

- Secretes Bile juice.
- Bile juice is stored in gall bladder.
- Bile juice makes food alkaline.
- Bile juice helps in emulsification of fats



Breakdown of large fat glbules → Small soluble fat globules



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PANCREAS

Secretes pancreatic juice which contains enzymes like:

Trypsin - helps in digestion of proteins.

Lipase - helps in breakdown of emulsified fats.

Pancreatic amylase - helps in digestion of carbohydrates

[PK]

SMALL INTESTINE (Chota Don)

- The small intestine is the *site of the complete digestion* of carbohydrates, proteins and fats.
- It is *5-7 meters* long.
- Walls of small intestine *secrete intestinal enzyme which convert Carbohydrates into glucose, fats in fatty acid + glycerol and Proteins into amino acids.*

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ABSOPRPTION OF FOOD IN SMALL INTESTINE

Food in small intestine is absorbed by these finger like structure called *villi*.

- Villi are *finger-like* projections.
- Increases the surface area for absorption.
- *Richly supplied with blood vessels* which take the absorbed food to each and every cell of the body.
- Food is utilized for *obtaining energy, building up new tissues and the repair of old tissues.*

LARGE INTESTINE

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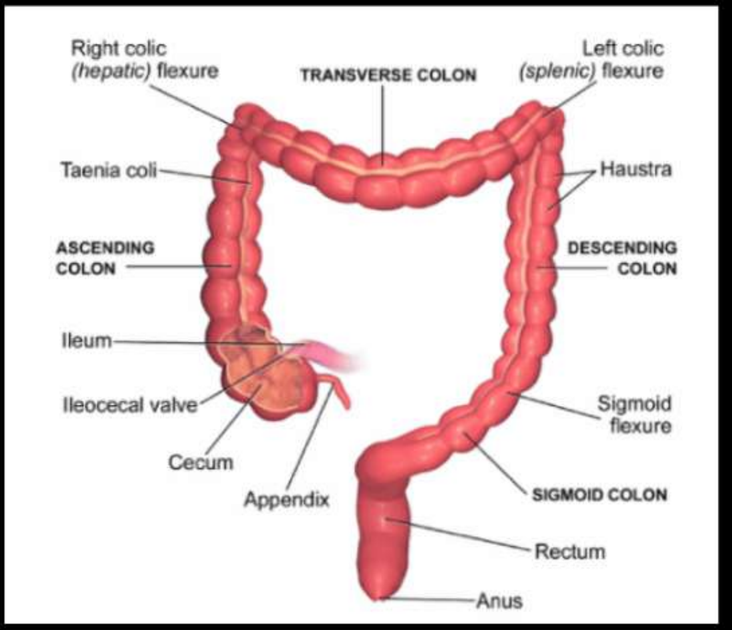
- Absorb excess of water.
- The rest of the material is removed from the body via the anus.



ANUS

- Removal of undigested and unabsorbed food.

Herbivores consume producers like plants which contain *cellulose* in the cell wall of their cells. Digestion of cellulose in the gut takes a longer time and hence, the gut of herbivores is longer than gut of carnivores.

NUTRITION IN DESERT PLANT

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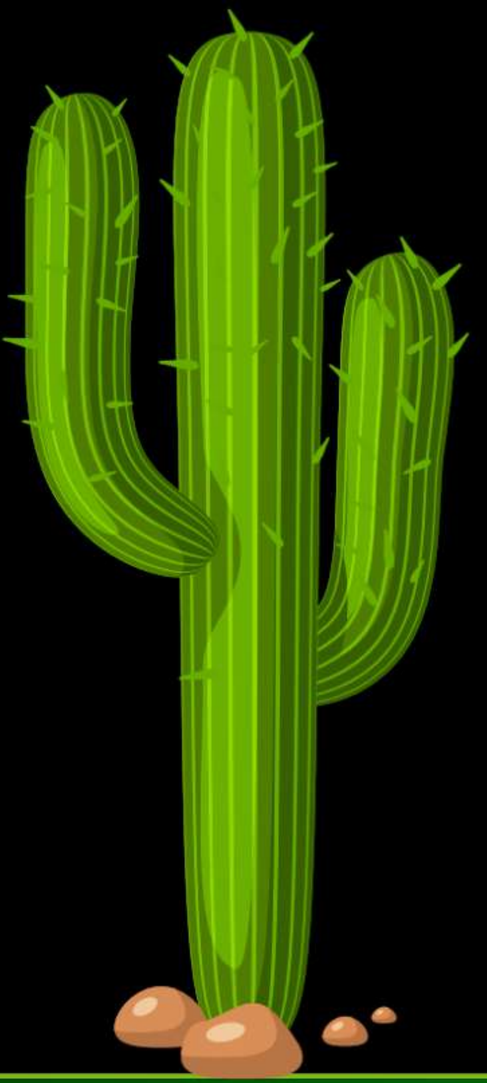
Night → CO_2

- In desert plants, stomata open at night to reduce water loss. During this time, they take in carbon dioxide (CO_2) and store it in the form of an intermediate compound.

- During the day, when stomata are closed to conserve water, this stored compound is used to perform photosynthesis in the presence of sunlight. This special process helps desert plants survive in dry conditions.

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RESPIRATION

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BREATHING

It is exchange of gases (Oxygen and carbon dioxide).

Inhalation: Taking air inside the body.

Exhalation: Releasing air outside the body.

Why do we breathe?

Our body needs oxygen to efficiently produce energy. When cells generate energy, they also produce carbon dioxide as a byproduct. We obtain oxygen by inhaling fresh air and remove carbon dioxide from the body by exhaling stale air.

PASSAGE OF AIR THROUGH RESPIRATORY SYSTEM

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Respiration is the process by which living organisms obtain energy (in the form of ATP) by breaking down food molecules, such as glucose, within cells.

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$$

TYPE OF RESPIRATION

- Aerobic respiration
- Anaerobic respiration

AEROBIC V/S ANEROBIC

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Aerobic respiration	Anaerobic respiration
Takes place in the presence of oxygen.	Takes place in the absence of oxygen.
Occurs in Mitochondria.	Occurs in cytoplasm.
End products are CO_2 and H_2O	End products are alcohol or lactic acid.
More amount of energy is released.	Less amount off energy is released.

BREATHING V/S RESPIRATION

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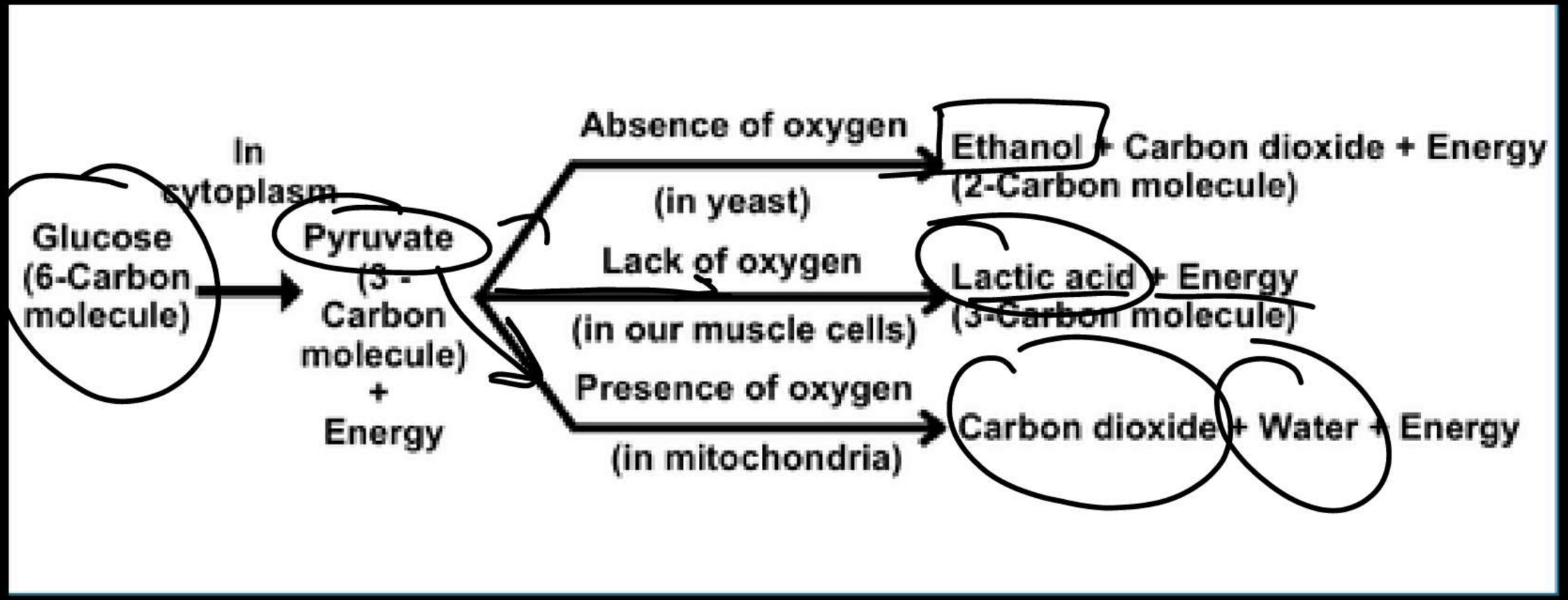
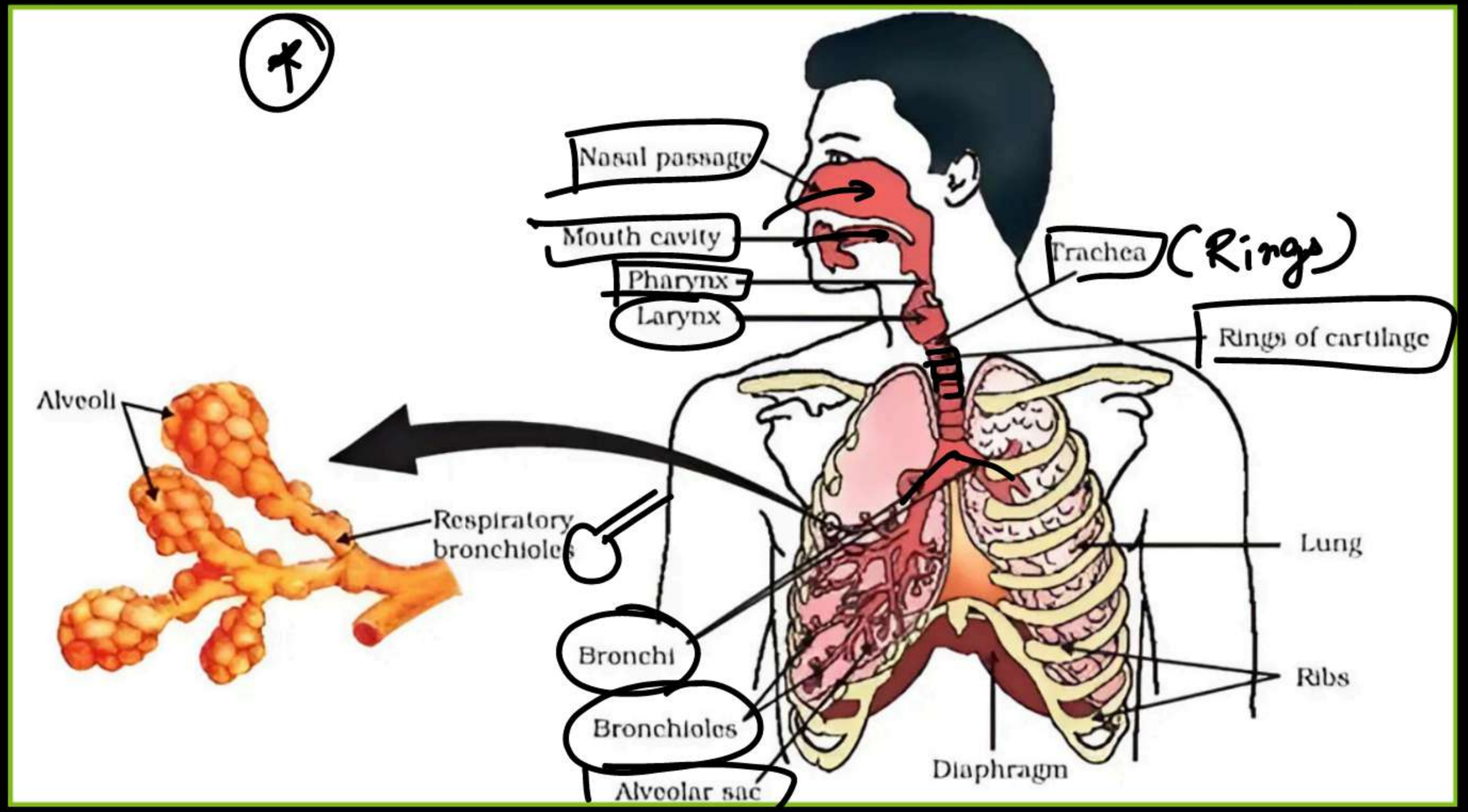
Breathing	Respiration
Intake of fresh air and removal of foul air	Oxidation of food to form carbon dioxide, water and energy.
A physical process	A biochemical process.
No energy is released rather used.	Energy is released in the form of ATP.
No enzymes involved.	Less amount off energy is released.

BREAKDOWN OF GLUCOSE



HUMAN RESPIRATORY SYSTEM



PASSAGE OF AIR THROUGH RESPIRATORY SYSTEM

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- **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 membrane. It warms, moisturize, and filter air before it reaches the lungs.
- **Pharynx:** It contains rings of cartilage which ensure that the air-passage does not collapse.

PASSAGE OF AIR THROUGH RESPIRATORY SYSTEM

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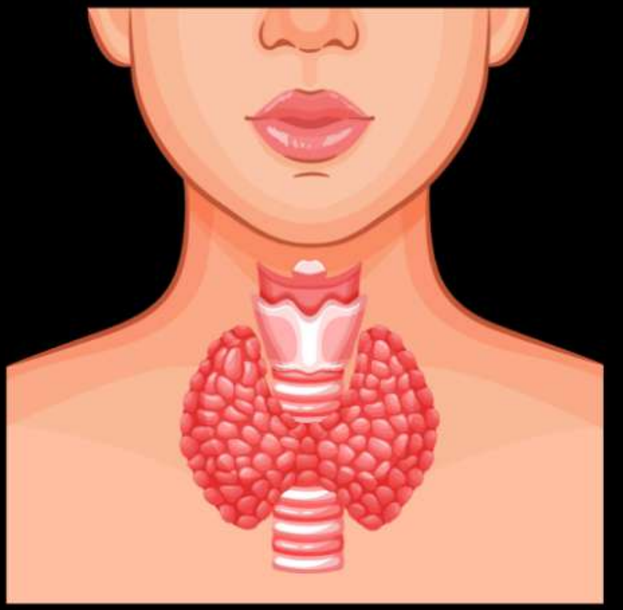
- **Larynx:** It houses the vocal cords and manipulates pitch and volume, which is essential for phonation. It is also known as voice box.

- **Trachea:** Pharynx splits into trachea and esophagus. It connects the larynx (or voice box) to the bronchi of the lungs. It provides air flow to and from the lungs for respiration.



PASSAGE OF AIR THROUGH RESPIRATORY SYSTEM

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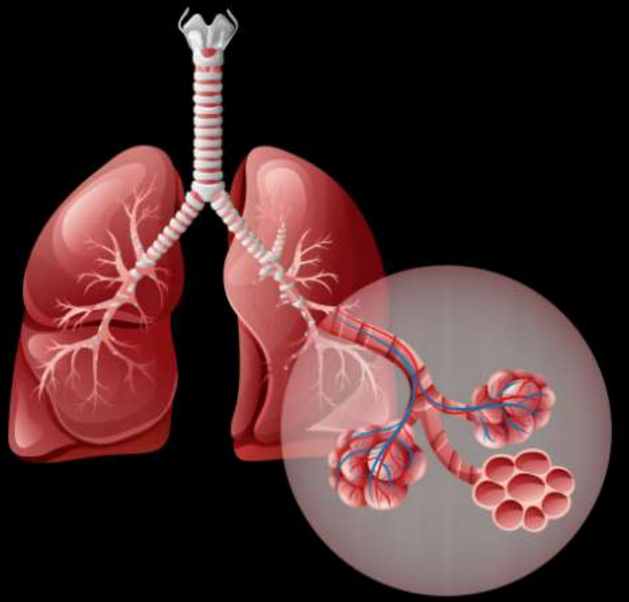
- **Bronchi:** They are the main passageway into the lungs. They are the extensions of the windpipe that shuttle air to and from the lungs. The oxygen goes to the lungs and carbon dioxide leave the lungs through them.



- **Bronchioles:** Bronchi get smaller when they reaches closer to lungs tissues and are called Bronchioles. They are the passageways by which air passes through the nose or mouth to the alveoli of the lungs

PASSAGE OF AIR THROUGH RESPIRATORY SYSTEM

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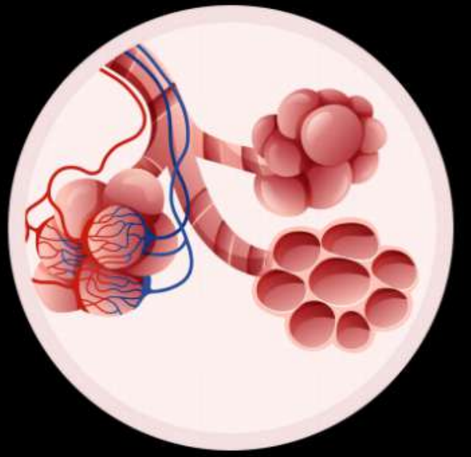
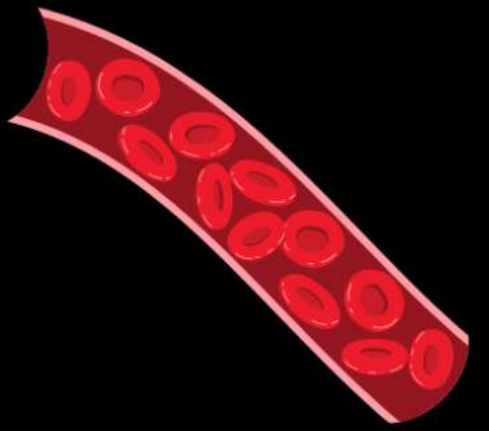
- **Alveoli:** They are smaller tubes which finally terminate in balloon-like structures which are called alveoli. They allow oxygen and carbon dioxide to move between the lungs and bloodstream.



- **Blood capillaries:** They are the sites of the transfer of 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.*



ALVEOLUS GAS EXCHANGE

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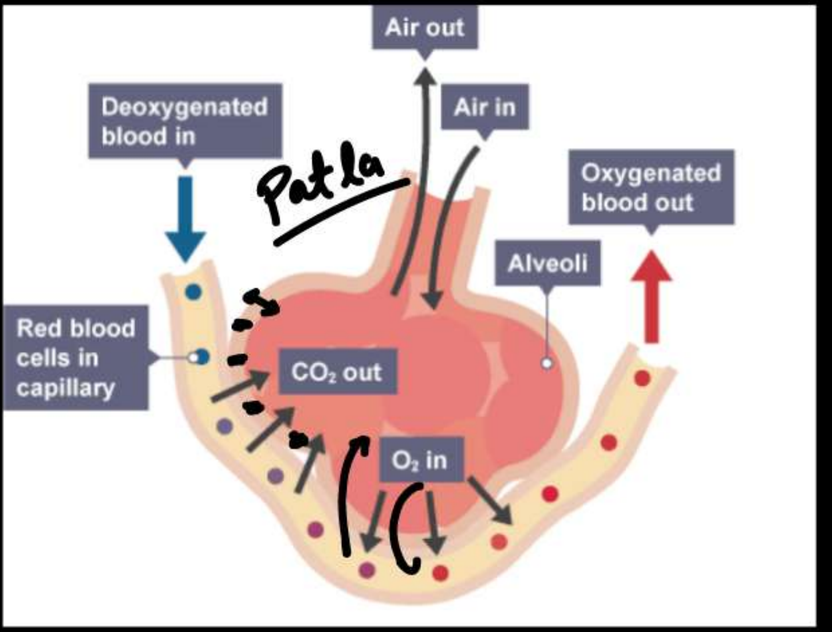
The blood brings carbon dioxide from the rest of the body for release into the alveoli, and the oxygen in the alveolar air is taken up by blood in the vessels to be transported to all the cells in the body.



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HEMOGLOBIN

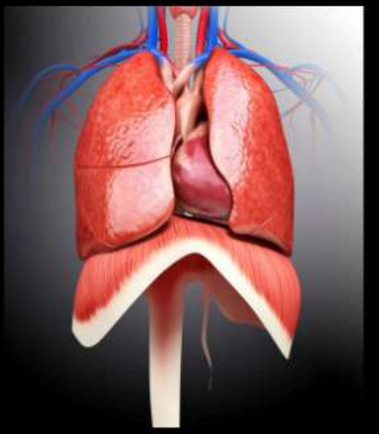
- Respiratory pigment
- Iron containing protein
- Provides red color to RBC

→ O_2

Affinity of Hemoglobin for various gases: CO > O2 > CO2

DIAPHRAGM

It is a thin skeletal muscle that is at the base of the chest and separates the abdomen from the chest.



INHALATION V/S EXHALATION

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Inhalation	Exhalation
Diaphragm flattens	Diaphragm arches upwards
Intercostal muscles contract	Intercostal muscles relax
Ribcage moves upwards and outwards	Ribcage moves downwards and inwards
Volume of thoracic cavity increases	Volume of thoracic cavity decreases
Air pressure decreases	Air pressure increases
Air flows into lungs	Air is forced out of the lungs

HOW DO FISHES BREATHE UNDERWATER?

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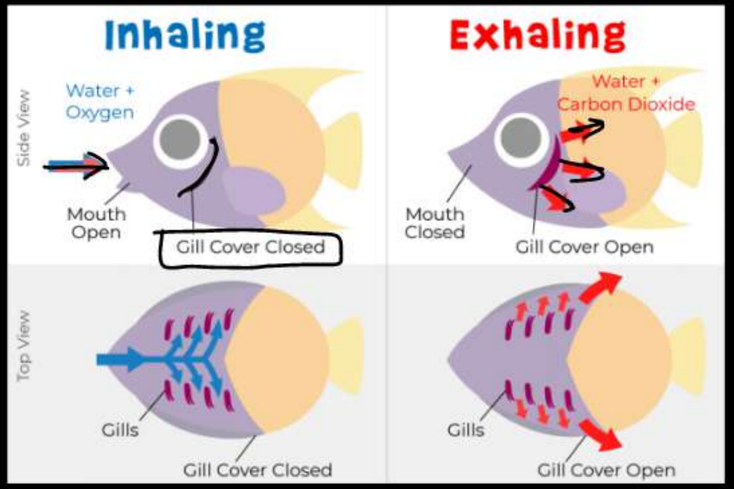
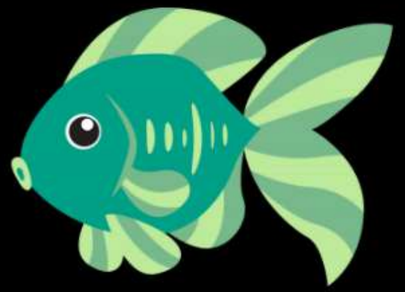
- Gills are the respiratory organs for fishes. Fishes take in oxygen which is dissolved in water through gills.

- *Since, availability of oxygen is less in the aquatic environment, so the breathing rate of aquatic organisms is faster.*

- Also, insects have a system of spiracles and tracheae which is used for taking in oxygen





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CAPL

1.The opening and closing of the stomatal pores depends upon

(a)Oxygen
(b)Temperature
(c)Water in guard cells
(d)The concentration of CO_2 in stomata

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2.Most of the digestion and absorption of the food takes place in the

(a) small intestine (Chota Don)
(b) liver
(c) stomach
(d) large intestine.

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3. During respiration, the breakdown of glucose occurs in the:

(a) Cytoplasm and mitochondria
(b) Nucleus
(c) Ribosomes
(d) Chloroplast

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4. In humans, digestion of carbohydrates starts in the:

(a) Stomach
(b) Small intestine
(c) Mouth
(d) Large intestine

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5. The energy currency of the cell is:

(a) DNA
(b) Glucose
(c) ATP
(d) RNA

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6.What causes the movement of food inside the alimentary canal in human beings ?

Answer: The pharynx, esophagus, oral cavity, stomach, small intestine, and large intestine are all part of alimentary canal

Peristalsis: The movement of food within the alimentary canal is mostly caused by peristalsis. Peristalsis is an involuntary contraction of muscles in the digestive tract that permits food to travel through the alimentary canal.

It helps with food digestion.

Muscles in the lining of the alimentary canal contract repeatedly to propel food forward.

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7. State the role played by the following in the process of digestion:
(i). Enzyme trypsin (ii). Enzyme lipase (iii). List two functions of finger-like projections present in small intestine

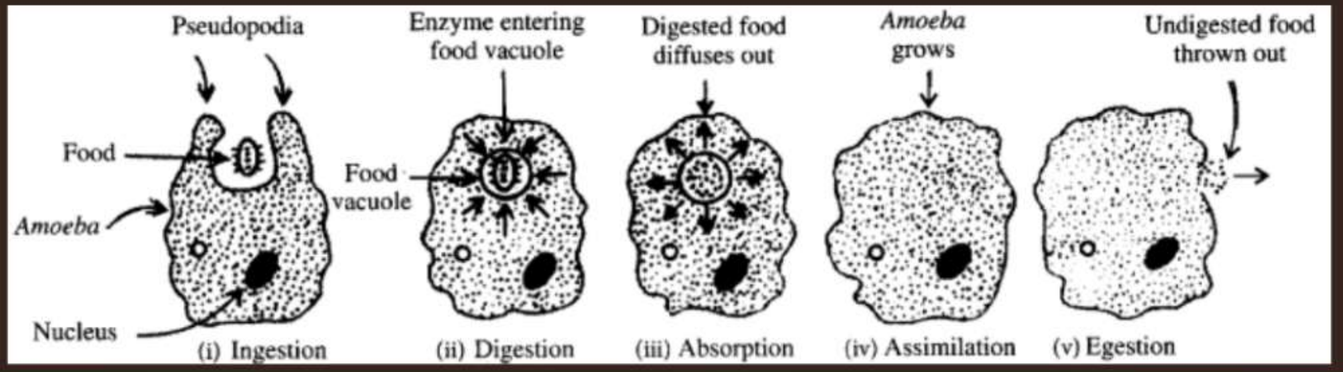
7. State the role played by the following in the process of digestion:
(i) Enzyme trypsin: Trypsin helps in breaking down proteins into simpler substances. It is produced by the pancreas and works in the small intestine.
(ii) Enzyme lipase: Lipase helps in breaking down fats into fatty acids and glycerol. It is produced by the pancreas and works in the small intestine.
(iii) Functions of finger-like projections (villi) in the small intestine:

1. Villi increase the surface area of the small intestine for better absorption of digested food.
2. They absorb nutrients like glucose, amino acids, and fatty acids into the blood for transport to all parts of the body.

8.Explain with the help of neat and well labelled diagrams the different steps involved in nutrition in Amoeba.

The mode of nutrition in Amoeba is holozoic. The process of obtaining food by Amoeba is called phagocytosis. Amoeba ingests food by using its finger-like projections called pseudopodia. The food is engulfed with a little surrounding water to form a food vacuole inside the Amoeba. The food is digested inside food vacuole by digestive enzymes.

Food is absorbed directly into the cytoplasm of Amoeba by diffusion. When considerable amount of undigested food collects inside Amoeba then its cell membrane ruptures at any place to throw out this undigested food.Diagrammatic representation of different stages in the holozoic nutrition (feeding) of Amoeba is as follows



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9. How are the lungs designed to maximise the area for exchanging gases in humans?

Answer: The air passage in the lungs is divided into smaller tubes called bronchi which form bronchioles. The bronchioles terminate in balloon-like structures called alveoli. These alveoli provide maximum area for the gaseous exchange. The alveoli walls are very thin and contain an extensive network of blood vessels to facilitate the exchange of gases.

Important

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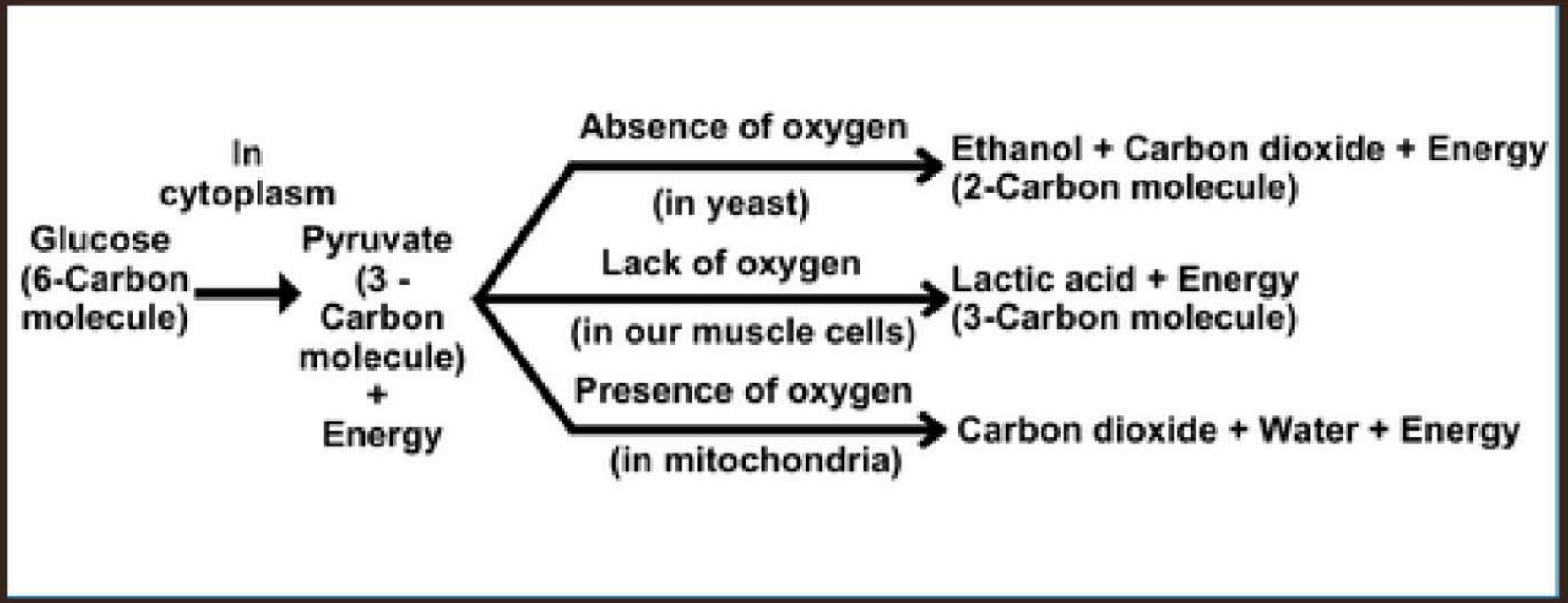
10. Draw a flow chart to show the breakdown of glucose by various pathways.

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