

LIFE PROCESSES

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The basic functions performed by living organisms to maintain their life on this earth

Nutrition Photosynthesis is the process of capturing light energy and transforming it into chemical energy (glucose).

Autotrophic Nutrition

Organisms that prepare their own food. e.g., Green plants, Algae, etc.

Heterotrophic Nutrition

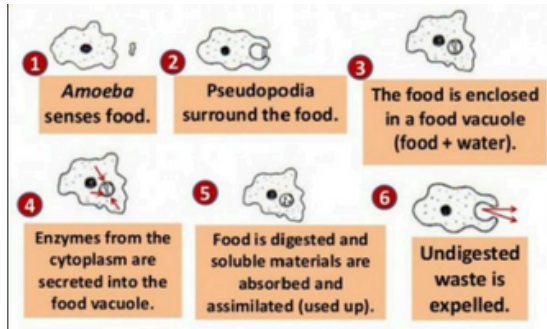
Organisms that are dependent on other organisms for food. E.g., Animals, fungi, etc.

Holozoic nutrition: involves organisms ingesting whole food material, which is then digested and absorbed inside their bodies. Examples include: Animals - [Herbivores: Cow, goat], [Carnivores: Lion, tiger], [Omnivores: Human beings], Unicellular organisms: Amoeba, Paramecium

Saprophytic nutrition: Organisms feed on dead and decaying matter. Food is digested externally and then nutrients are absorbed. e.g. Bread mold, Mushroom, Yeast.

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

Nutrition in Amoeba



- Absorption - 5-7m long, secretes intestinal enzymes, villi absorb nutrients.
- Large Intestine - Absorbs excess water, unabsorbed food moves ahead.
- Egestion - Waste elimination.

Alimentary canal: A long hollow tube which contains organs through which the food actually passes (Oesophagus, stomach, small intestine, large intestine, etc.)

Respiration

Respiration is the process by which food is burnt in the cells (mitochondria) of the body with the help of oxygen to release energy. Energy is stored in the cells in the form of ATP molecules.

Breathing

- Physical process
- No enzymes involved
- Confined to certain organs
- No energy is released; rather, energy is used
- Extracellular process
- Intake of fresh air and removal of foul air

Respiration

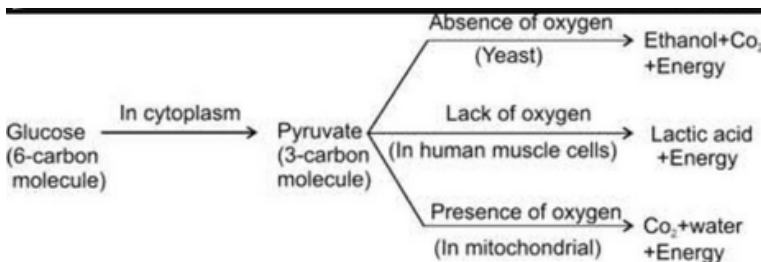
- Biochemical process
- Large number of enzymes are involved
- Occurs in all the cells of the body
- Energy is released in the form of ATP
- Intracellular process
- Oxidation of food to form carbon dioxide, water, and energy

Aerobic Respiration

- Occurs in the presence of oxygen.
- Takes place in the mitochondria.
- Complete breakdown of glucose.
- Produces CO_2 , H_2O , and energy (ATP).
- Yields more energy (~36 ATP).

Anaerobic Respiration

- Occurs in the absence of oxygen.
- Takes place in the cytoplasm.
- Incomplete breakdown of glucose.
- Produces less energy (2 ATP).
- By-products:
 - In yeast: Alcohol and CO_2 .
 - In muscles: Lactic acid (causes muscle cramps).



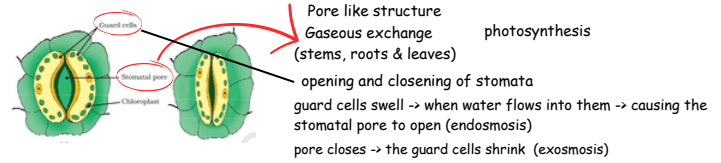
(Break down of glucose by various pathways)

Nutrition in Plants

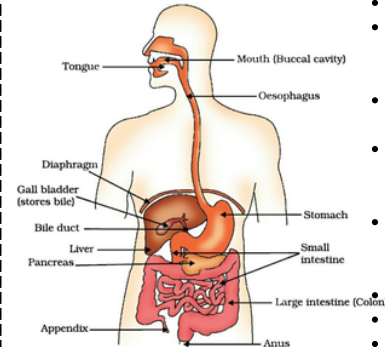


Absorption of light energy by chlorophyll \rightarrow Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen. \rightarrow Reduction of carbon dioxide to carbohydrates

(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)



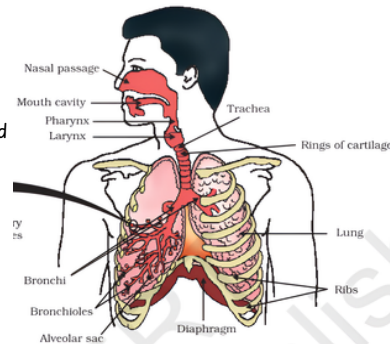
Nutrition in Humans



- Ingestion - Food intake through the mouth.
- Teeth - Chewing and grinding of food.
- Salivary Glands - Secrete saliva, wets food, contains salivary amylase (starch \rightarrow maltose).
- Swallowing & Peristalsis - Moves food from mouth to stomach.
- Stomach - J-shaped organ, expands with food, muscular walls mix food with digestive juices.
- Gastric Juice - Pepsin (breaks proteins), HCl (acidic medium), Mucus (protects stomach lining).
- Small Intestine - Receives:
 - Bile (Liver) - Emulsifies fat.
 - Pancreatic Juice (Pancreas) - Trypsin (proteins), Lipase (fats), Pancreatic amylase (carbs).

Respiration in Humans

- Nostrils: Air enters the body.
- Nasal Cavity: Filters, warms, and moistens air; removes dirt.
- Pharynx: Common passage for food and air.
- Larynx: Contains vocal cords; produces sound.
- Trachea: Windpipe carrying air to lungs.
- Bronchus: Trachea splits into two bronchi, leading to lungs.
- Bronchioles: Smaller branches of bronchi inside lungs.
- Alveolus: Air sacs for gas exchange; oxygen enters blood, CO_2 exits.
- Blood: Transports oxygen to cells and removes CO_2 .



Diaphragm and ribs: These structures facilitate breathing by changing the size of the chest cavity. When we breathe in, the ribs lift, and the diaphragm flattens, expanding the chest cavity and allowing air to be sucked into the lungs.

Transportation

- 1. Blood:** Fluid connective tissue that transports nutrients, waste, and gases.
 - **Blood Cells:**
 - Red Blood Cells (RBCs):** Contain hemoglobin, transport oxygen and carbon dioxide.
 - White Blood Cells (WBCs):** Provide immunity by producing antibodies.
 - **Plasma:** Fluid medium carrying nutrients, waste, and other substances.
 - **Platelets:** Help in blood clotting and maintaining pressure.
- 2. Blood Vessels:**
 - **Arteries:**
 - Carry oxygenated blood away from the heart.
 - Thick, elastic walls.
 - High pressure.
 - **Veins:**
 - Carry deoxygenated blood toward the heart.
 - Thin walls, contain valves.
 - Low pressure.
 - **Capillaries:**
 - Link arteries and veins.
 - Extremely thin walls for exchange of gases and nutrients.
- 3. Heart**

Lymphatic System: Lymph: Colorless fluid carrying digested fats and excess tissue fluid.

Function: Drains into lymphatic capillaries and then into veins. Helps in fat absorption and returns excess tissue fluid to blood.

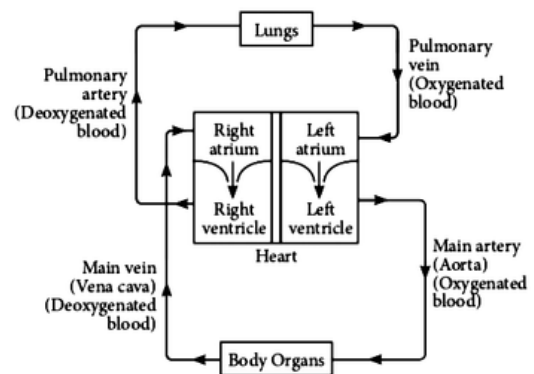
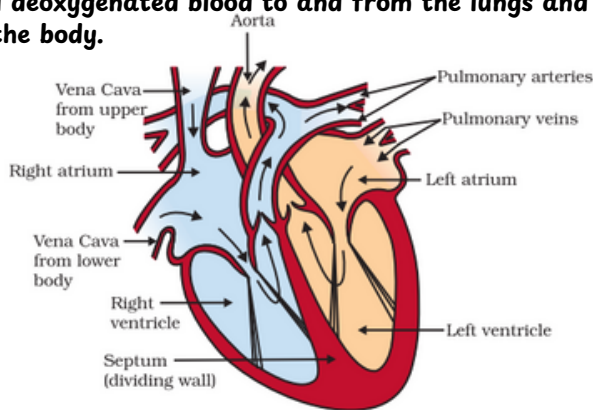
Transportation in Plants

Plants absorb raw materials like nitrogen, phosphorus, and minerals from the soil through roots.

Xylem	Phloem
1. Conducts water and minerals from roots to leaves.	1. Conducts food from leaves to all parts of the plant.
2. Transport is unidirectional.	2. Transport is bidirectional.
3. Composed of mainly dead elements.	3. Composed of mainly living elements.
4. Has four types of cells: Tracheids, Vessels, Xylem parenchyma, and Xylem fibers.	4. Has four types of cells: Phloem fibers, Companion cells, Sieve tubes, and Phloem parenchyma.

Transportation in Humans

Heart - Muscular organ, Located in chest cavity, as big as fist. It is a blood pumping organ that pumps oxygenated and deoxygenated blood to and from the lungs and the rest of the body.



Double Circulation

Atrium	Ventricle
Form the upper chambers	Form the lower chambers
Two types- Right atrium and left atrium	Two types- Right ventricle and left ventricle
Consists of thin wall	Consists of thick wall
Collects blood and supply it to the ventricles	Push blood throughout the body
Consists of SA node and pacemaker cells	Consists of Purkinje fibres

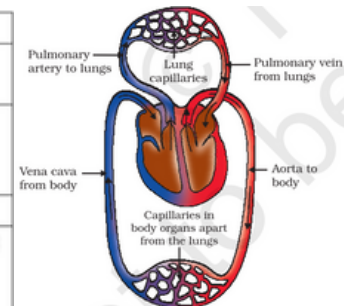
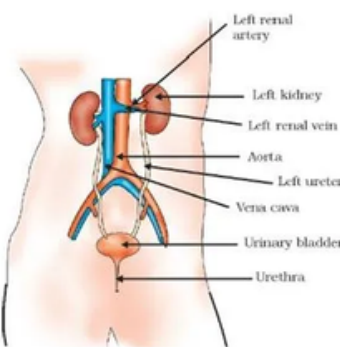


Figure 6.11 Schematic representation of transport and exchange of oxygen and carbon dioxide

Chambers in heart - To prevent mixing of oxygenated and deoxygenated blood. More oxygen will be supplied to body organs in better way. Highly efficient supply of oxygen to the body. More respiration leading to more energy production.

Excretion in Human Beings

Kidneys : Location: Abdomen, one on either side of the backbone. Function: Filter waste from blood to form urine. Nephrons act as filtration units, selectively reabsorbing useful substances like glucose, amino acids, salts, and water.

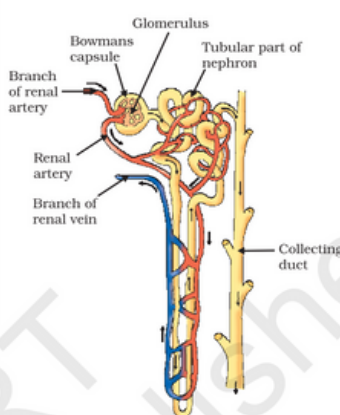


Ureters: Location: Tubes connecting the kidneys to the urinary bladder. Function: Transport urine from kidneys to the urinary bladder.

Urinary Bladder: Location: Pelvic region. Function: Stores urine until expelled. Muscular and under nervous control for voluntary urination.

Urethra: Location: Tube leading from the urinary bladder to the outside of the body. Function: Allows urine to be excreted from the body

Structural & functional unit of kidney/excretion system. Responsible for filtration of blood. There are millions of nephron in each kidney.



Glomerular Filtration: Blood enters the kidneys, and in the nephrons, nitrogenous wastes, glucose, water, amino acids, and excess salts are filtered out. This initial filtrate enters the Bowman's capsule of each nephron.

Selective Reabsorption: As the filtrate moves through the nephron, useful substances such as glucose, amino acids, salts, and a significant amount of water are reabsorbed back into the blood by the capillaries surrounding the nephron.

Tubular Secretion: Urea, additional water, and excess salts are secreted into the tubule, which then opens into the collecting duct. The urine then flows from the collecting ducts into the ureters.

- **Urine Formation:** After filtration and reabsorption, the remaining fluid is urine, containing waste products and extra water.
- **Transport:** Urine travels from the kidneys through the ureters to the urinary bladder.
- **Storage:** Urine is stored in the urinary bladder until it becomes full.
- **Excretion:** When the bladder is full, the nervous system triggers the urge to urinate, and urine is released from the bladder through the urethra and out of the body.

Excretion in Plants

Plants remove waste through various methods. Oxygen is released via transpiration, while stomata regulate gas exchange. Excess water is removed through transpiration. Waste is stored in vacuoles, old xylem as resins and gums, or in leaves that eventually fall off. Some waste is also excreted into the soil.

Chapter ka KAZAANA:

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

