

CHAPTER 6 -LIFE PROCESSES

KEY CONCEPTS & GIST OF THE LESSON

- ❖ Life processes – The processes that are necessary for an organism to stay alive. Eg. Nutrition, respiration, etc.
- ❖ Criteria of life- (i) Growth (ii) Movement
- ❖ Nutrition- The process in which an organism takes in food, utilizes it to get energy, for growth, repair and maintenance, etc. and excretes the waste materials from the body.

❖ Types of nutrition

1. **Autotrophic nutrition**(Auto =self: trophos = nourishment) E.g. Plants, Algae, blue green bacteria.

- Process – Photosynthesis(Photo=light; Synthesis= to combine)
- Raw materials- (i) Carbon dioxide (ii)Water
- Equation-
$$6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow[\text{Chlorophyll}]{\text{sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$$
- Energy conversion- Light/Solar energy to Chemical energy
- Role of Chlorophyll- To trap the sun's energy for photosynthesis
- Factors- (i) Carbon dioxide (ii) Water(iii) Light (iv) Temperature
- Events/ Steps of photosynthesis-
 - (i) Absorption of light energy by chlorophyll
 - (ii) Conversion of light energy to chemical energy & Splitting of water molecule into Hydrogen & oxygen
 - (iii) Reduction of Carbon dioxide to Carbohydrate
- Gaseous exchange- (i) Gas used- Carbon dioxide
 - (ii) By product - Oxygen
- Source of raw materials-
 - (i) Carbon dioxide –Land plants- Air, Aquatic plants- Water
 - (ii) Water & Minerals - Soil

2. **Heterotrophic nutrition** (Hetero =others: trophos = nourishment) Eg. Animals, plants lacking chlorophyll like fungi.

- (a) **Saprophytic nutrition**: Organisms feed on dead decaying plants or animals material. E.g. Fungi, Bacteria
- (b) **Parasitic nutrition**: Organisms obtain food from the body of another living (host)
- Endoparasite : Parasite lives inside the body of the host e.g. tapeworm, roundworm.

- Exoparasite: Parasite lives on the body of the host. E.g. lice, leech.

Note- The parasite benefits while the host is usually harmed e.g. Cuscutta-plant parasite (amar bel), plasmodium (malarial parasite).

(c) **Holozoic nutrition:** Organism (mostly animals) take in whole food and then digest it into smaller particles with enzyme. Eg. Amoeba, Paramoecium. Animals, human beings.

- Steps in Holozoic nutrition
 - (i) Ingestion: taking in of food.
 - (ii) Digestion: breaking down of complex food into simpler, absorbable form.
 - (iii) Assimilation: Utilization of digested food from the body.
 - (iv) Egestion: Removing undigested food from the body
- Nutrition in human beings
 - Alimentary canal-
Mouth → Oesophagus → Stomach → Small intestine → Large intestine
 - Important gland/juices

Organ	Gland	Enzyme/Juice	Function
Mouth	Salivary glands	Salivary Amylase	Converts starch into sugar
Stomach	Gastric glands	Gastric juice- (i) Hydrochloric acid → (ii) Pepsin → (iii) Mucus →	(a) Kills harmful bacteria that enters with the food. Makes the medium alkaline for the action of Pepsin Digests proteins Protects the inner lining of the stomach from the corrosive action of Hydrochloric acid.
Small intestine	1) Liver 2) Pancreas	(i) Bile juice → (ii) Pancreatic Juice Amylase → Trypsin → Lipase →	(a) Makes the medium acidic for the action of Pancreatic enzymes. (b) Breaks down large fat molecules into smaller globules so that enzymes can act upon them. Converts Carbohydrates to glucose Converts Proteins to Amino acids Converts Fats into Fatty acids & Glycerol

- Peristaltic movements- Rhythmic contraction of muscles of the lining of Alimentary canal to push the food forward.
- Sphincter muscle- Helps in the exit of food from the stomach.
- Villi- Small finger like projections on the walls of-
 - (v) Small intestine- To increase the surface area for the absorption of food.
 - (vi) Large intestine- For absorption of water.

❖ **Respiration**- The process by which digested food is broken down with the help of Oxygen to release energy.

- Types of respiration- (i) Aerobic respiration (ii) Anaerobic respiration

Aerobic respiration	Anaerobic respiration
1. Takes place in presence of Oxygen. 2. End products- Carbon dioxide & Water 3. More energy is released. 4. Takes place in Cytoplasm & Mitochondria 5. Complete oxidation of glucose takes place. 6. It occurs in most organisms. 7. Equation- Glucose → Pyruvate → CO ₂ + H ₂ O + Energy	1. Takes place in absence of Oxygen. 2. End products- Ethanol & Carbon dioxide 3. Less energy is released. 4. Takes place in only in Cytoplasm. 5. Incomplete oxidation of glucose takes place. 6. It occurs in certain bacteria, yeast & certain tissues of higher organisms. E.g. In humans during vigorous exercise, when the demand for Oxygen is more than the supply, muscle cells respire anaerobically for some time. 7. Equation- <u>In Yeast-</u> Glucose → Pyruvate → Ethanol + H ₂ O + Energy <u>In muscle cells -</u> Glucose → Pyruvate → Lactic acid + Energy

- Some common features of Respiratory organs-
 - (i) Large surface area- for greater rate of diffusion of respiratory gases.
 - (ii) Thin permeable walls – to ensure easy diffusion & exchange of gases.
 - (iii) Extensive blood supply- Respiratory organs are richly supplied with blood vessels for quick transport of gases.
- Gaseous exchange in plants-
 - Process – Diffusion
 - Direction of diffusion depends on- (i) Environmental conditions
(ii) Requirement of the plant.
 - Day time- Carbon dioxide given out during respiration is used for photosynthesis. Therefore only Oxygen is released, which is a major activity during the day.
 - Night time – Only respiration takes place. Therefore only Carbon dioxide is released, which is a major activity during the night.
- Gaseous exchange in animals-
 - Terrestrial animals- take Oxygen from the atmosphere.
 - Aquatic animals- take Oxygen dissolved in water. (Oxygen content is low in water, therefore they breathe faster.
- Human Respiratory system-

External nostrils → Nasal cavity → Trachea → Bronchi → Bronchioles → Alveoli

Rings of cartilage present in the throat ensure that the trachea (air passage) does not collapse when there is less air in it.

 - Lungs – (i) Present in the thoracic cavity.
(ii) They are spongy, elastic bags consisting of Bronchi, Bronchioles and Alveoli
Refer to figure 6.9 page no. 104 of N.C.E.R.T Text book)
- Respiration occurs in two phases-
- (i) External-Breathing, which is a mechanical process. (ii)
- Internal - Cellular respiration
- Mechanism of breathing – It includes : (i)Inhalation (ii) Exhalation
- Exchange of gases-
 - Unicellular organisms- By Diffusion
 - Animals-
 - (i) As the body size is large, diffusion alone is not enough.
 - (ii) Respiratory pigments also required.
 - (iii) Respiratory pigment in human beings is Haemoglobin, which is present in red blood corpuscles.
 - (iv) It has very high affinity for Oxygen.

(iv) Carbon dioxide is more soluble in water than Oxygen, so it gets dissolved in blood and is thus transported.

❖ Transportation

○ Transportation in human beings-

- Blood- (i) It is a fluid connective tissue.
 - (ii) Components- (1) Fluid medium- Plasma
 - (2) Red blood corpuscles
 - (3) White blood corpuscles
 - (4) Platelets suspended in plasma
 - (iii) Plasma transports food, Oxygen, Carbon dioxide, Nitrogenous wastes, etc.
- Functions of blood- (i) Transport of respiratory gases.
 - (ii) Transport of nutrients.
 - (iii) Transport of waste products.
 - (iv) Defence against infection
- Blood vessels- (i) Arteries (ii) Veins (iii) Capillaries

Arteries	Veins
1. Thick walled.	1. Thin walled.
2. Deep seated.	2. Superficial.
3. Carry blood away from the heart.	3. Carry blood to the heart.
4. Carry Oxygenated blood.	4. Carry Deoxygenated blood.
5. Valves absent.	5. Valves present

Heart- (Refer to figure 6.10 page no. 106 of N.C.E.R.T Text book)

- (i) It is a muscular organ, which works as a pump in the circulatory system.
- (ii) It is the size of our fist.
- (iii) It has two sides, which are separated by a partition so that the oxygenated and deoxygenated blood do not get mixed up.
- (iv) It has four chambers-

Two upper chambers called Atria.

Two lower chambers called Ventricles.

Working of heart-

Left side- (i) Left atrium relaxes & the Oxygenated blood enters it from the lungs through the pulmonary vein.

(ii) Left atrium contracts & the blood enters the left ventricle through the valve.

(iii) Left Ventricle contracts and the blood is pumped into the largest artery 'Aorta' and is carried to all parts of the body.

Right side- (i) Right atrium relaxes & the deoxygenated blood from the body enters it through superior and inferior Vena cava.

(ii) Right atrium contracts & the blood enters the right Ventricle through the valve.

(iii) Right Ventricle contracts and the blood is pumped into the Pulmonary artery and is carried to lungs.

Valves- Unidirectional to prevent the backward flow of blood.

Pulmonary vein is the only vein that carries Oxygenated blood.

Aorta is the only artery that carries Deoxygenated blood.

Double circulation in man- because the blood passes through the heart twice in one complete cycle of the circulation.

Capillaries- (i) Form the connection between arteries & veins (ii) Walls are one cell thick only for easy exchange of blood.

- Platelets- Plug the leaks of arteries and veins by clotting the blood.
- Lymph- Extracellular fluid similar to plasma but colourless with lesser protein.

Function of lymph-

- (i) Transportation of digested & absorbed fats from the small intestine.
- (ii) Drains excess fluid from the intercellular spaces back in the blood.

Higher animals- E.g., birds, mammals.

- (i) Oxygenated blood & Deoxygenated blood are completely separate for efficient Oxygen supply.
- (ii) This is to fulfil higher energy needs and to maintain body temperature (warm blooded animals).

Amphibians & reptiles-

They have 3 chambered heart where little mixing of Oxygenated blood & Deoxygenated blood takes place. Therefore their body temperature varies with the temperature of the environment. (cold blooded animals)

Transportation in plants-

a) Plants need less energy needs- because they do not move and therefore have a slow transport system

b) Transport of water-

- (i) Takes place by xylem tissue present in roots, stem, leaves and is therefore interconnected.
- (ii) Root cells take up ions from the soil, which creates a concentration difference between root and soil.

Column of water therefore rises upwards.

@ In very tall plants- transpiration creates a suction pressure, which pulls the water upwards.

@ Importance of transpiration-

- (i) Helps in upward movement of water in plants. (ii) It regulates the temperature in plants.

Transport of food-

- (i) Takes place by phloem tissue. (ii) Movement of prepared food in plants is called translocation.

Excretion

The biological process of removal of harmful metabolic wastes in living organisms.

Excretion in human beings- (Refer to figure 6.13 page no. 110 of N.C.E.R.T Text book)

Organs of excretory system-

(i) Kidneys (iii) Urinary bladder (ii) Ureters (iv) Urethra

Kidneys- (a) Two in number (b) Bean shaped (c) Present in abdomen on either side of the backbone

Basic unit is nephron.

a) Glomerulus- Group of capillaries (cluster) present in Bowman's capsule to receive blood from renal artery and filters it.

b) Bowman's capsule- Cup shaped structure, which contains glomerulus.

c) Convolted tubule-is long and reabsorbs vital nutrients like glucose, amino acids, salts, urea and water.

Note-Vital functions of kidneys- (a) Filtration & removal of Nitrogenous wastes

(b) Reabsorption of vital nutrients

- Ureters- Transport the urine formed in the kidneys to the urinary bladder.
- Urinary bladder- Muscular bag like structure to store urine.
- Urethra- Helps in removal of urine when the Urinary bladder is full.
- Artificial kidney- Principle: Dialysis

❖ Excretion in plants-

- Gaseous wastes- CO_2 in respiration & O_2 in photosynthesis are removed by the process of diffusion.
- Excess water- is removed by transpiration.
- Other wastes- (i) Stored in cellular vacuoles or in leaves, which fall off or as gums, resins, etc. in old xylem. (ii) Excreted in soil.