SUPPORT MATERIAL
BIOLOGY
CLASS-X
LIFE PROCESSES

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

All the processes like respiration, digestion, which together keep the living organisms alive and perform the job of body maintenance are called life processes.

Examples :

Life Processes

Growth, Digestion, Respiration, Circulation, Excretion

I. Nutrition

(The whole process by which an organism obtain its food)

Nutrition in Plants	**Nutrition in Animals**
Plants are autotrophs.	Animals are hetrotrophs.
Can make their own food.	Depends on plants or other animals for their food.

Modes of Nutrition

Autrotrophic Hetrotrophic

Kind of nutrition in which Kind of nutrition in which inorganic materials like CO2, organisms do not possess water etc. are utilized to prepare the ability to synthesize their organic food by the process of own food. They depend on photosynthesis. autotrophs for their food

E.g., Green plants. supply directly or indirectly.

E.g., Animals, fungi.

Autotrophic Nutrition :

The organisms which carry out autotrophic nutrition are called autotrophs (green plants).

Autotrophs □□□ Simple inorganic material □□□□ Complex high energy molecules (Carbohydrates)

Autotrophic nutrition is ful□ lled by the process by which autotrophs take in CO2 and H2O and convert these into carbohydrates in the presence of chlorophyll, sunlight is called Photosynthesis.

Equations : 6CO2 + 12H2O □□□□□ C6H12O6 + 6O2 + 6H2O

Raw Materials for Photosynthesis :

- Sunlight
- 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.

Site of Photosynthesis :

Chloroplast in the leaf, chloroplast contain chlorophyll (green pigment).

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

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

Functions :

(a) Exchange of gases O_2/CO_2.

(b) Loses large amount of water (water vapour) during transpiration.

Hetrotrophic Nutrition

Holozoic, Saprophytic, Parasitic

Animals take in solid Organisms feed on Parasites live inside food and breakdown dead, decaying matter. or outside other inside the body. *E.g.,* Fungi. organism (host) and *E.g.,* Amoeba, animals. derive nutrition from it.

E.g., Cuscuta (plant parasites), Ticks etc

.How do organisms obtain their food

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

Example : (i) Amoeba

(ii) Paramaecium

(i) Amoeba

(ii) Paramaecium

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

(Present all over the body)

I. NUTRITION

NUTRITION

Ingestion, Digestion, Absorption Assimilation, Egestion

(Intake of (Breakdown (Movement (Utilisation (Removal of food) of complex of digested of food) waste material into food) products) simple ones)

Different organisms utilize different nutritional processes as it depends upon the source of carbon from where the food is taken.

Nutrition in Human Beings

Mouth Intake of whole food.

↓

Teeth Chewing/grinding of food.

↓

Tongue Rolling of food +

↓ Tasting of food +

Swallowing/Pushing down of the food.

Salivary Glands Secrete saliva + Mucus

↓ Starch [ ]

Salivay

amylase

Saliva

____
Sugar
Oesophagus Taking food from mouth to stomach by
Peristaltic movements. [Contraction and
↓ expansion of muscles of the oesophagus
Stomach Gastric glands
_*S*_*ecre*_*te*_ Gastric juice
Gastric Juice
PEPSIN HCl MUCUS
(Enzyme that (Makes medium (Protects
↓ breaks down acidic) inner lining
proteins) of the stomach)
Small Intestine (a) **Intestinal enzyme**
↓ convert
Carbohydrate Fats Proteins
↓ ↓ ↓
Glucose Fatty acid + Glycerol Amino acids
Small Intestine (b) Villi → Helps in absorption of
(finger like food into the blood
projections)
Small Intestine (c)
↓
Large Intestine → Absorb excess of water
→ The rest of the material is removed from the
body via the anus.

RESPIRATION

Respiration involves : (i) Gaseous exchange : Intake of oxygen from the atmosphere and release of CO_2 → **Breathing**
(ii) Breakdown of simple food in order to release energy inside the cell → **Cellular respiration**

Breakdown of Glucose by Various Pathways

Respiration

Aerobic Anaerobic

- Takes place in the presence • Takes place in the absence of oxygen 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 of energy is released

Human Respiratory System

Passage of air through the respiratory system :
Nostril
↓
Nasal Passage

↓
Nasal Cavity
↓
Pharynx
↓
Larynx
↓
Trachea
↓
Bronchi
↓
Bronchioles
↓
Alveoli
↓
Blood capillaries

Mechanism of Breathing

Inhalation	**Exhalation**
• During inhalation the thoracic cavity (chest cavity) expands.	• Thoracic cavity contracts.
• Ribs lift up.	• Ribs move downwards.
• Diaphragm become flat in shape.	• Diaphragm becomes dome shaped.
• Volume of lungs increases and air enters the lungs.	• Volume of lungs decreases and air exits from the lungs

Lungs

Exchange of gases between alveolus, blood and tissues

(i) Air (rich in O2) → Blood → Binds with haemoglobin in RBC → O2 is released in (in alveolus) (through blood vessels) tissues

(ii) CO2 → Released in blood → Dissolved in blood → Blood vessels → Released in alveolar sac → Sent out through nostrils
(from tissue) (in alveoli)

Terrestial organisms : Use atmospheric oxygen for respiration

Aquatic organisms : Use dissolved oxygen for respiration

Respiration in plants

Respiration in plants is simpler than the respiration in animals. Gaseous exchange occur through :

(a) Stomata in leaves

(b) Lenticels in stems

(c) General surface of the root

Transportation

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

The circulatory system in human beings consists of:

Heart, **Arteries an Veins** **Blood and lymph**
(A pumping organ) (Blood vessels) (A circulatory medium)

Double circulation

Blood travels twice through the heart in one complete cycle of the body.

- **Pulmonary Circulation :** Blood moves from the heart to the lungs and back to the heart.
- **Systemic Circulation :** Blood moves from the heart to rest of the body and back to the heart.

Lymph : A yellowish fluid escapes from the blood capillaries into the intercellular spaces contain less proteins than blood. Lymph flows from the tissues to the heart assisting in transportation and destroying germs.

Blood Vessels

Arteries	Veins
1. Carry oxygenated blood from heart to body parts except pulmonary artery.	1. Carry deoxygenated blood from body parts to heart except pulmonary vein
2. Also called distributing vessel.	2. Also called collecting vessel.
3. Thick and elastic.	3. Thin and less elastic.
4. Deep seated	4. Superficial as compared to arteries

Transportation in Plants

Transpiration is the process of loss of water as vapour from aerial parts of the plant.

Function :

(a) Absorption and upward movement of water and minerals by creating PULL.
(b) Helps in temperature regulation in plant.
Transport of food from leaves (food factory) to different part of the plant is calle

EXCRETORY SYSTEM IN MAN

Excretory/urinary system consists of :
(1) The kidneys : The excretory organ
(2) The ureters : The ducts which drain out urine from the kidneys
(3) The urinary bladder : The urinary reservoir
(4) The urethra : The channel to the exterior

The human excretory system

EXCRETION

1. The metabolic activities in the body generates many kinds of wastes including nitrogenous wastes which are harmful for the body and hence needed to be removed. Excretion is a process by which these wastes are removed from our body.
2. Unicellular organisms remove these wastes by simple diffusion.

Human Excretory System

Formation of Urine

- Each kidney contains many filtration units called as nephrons.

• Nephrons are made up of a cluster of thin walled capillaries called glomerulus which is associated with a cup like structure called as Bowman's capsule and the long tube which terminates through this capsule.
• The renal artery brings oxygenated blood to the kidneys along with the nitrogenous wastes like urea and uric acid and many other substances.
• The blood gets filtered through the glomerulus and this filtrate enters the tubular part of nephron.
• As this filtrate moves down the tubular part, glucose, amino acids, salts and excess of water gets selectively reabsorbed by the blood vessels surrounding these tubules.
• The amount of water reabsorbed depends upon :
* How much excess of water is there in the body and,
* How much nitrogenous wastes need to be excreted out.
• So the fluid now flowing in the tubular part is urine which gets collected in collecting ducts of nephrons.
• These collecting ducts together leave the kidney at a common point by forming the ureter.
• Each ureter drains the urine in the urinary bladder where it is stored until the pressure of expanded bladder leads to an urge to pass it out through urethra.
• This bladder is a muscular structure which is under nervous control.
• 180 litres of filtrate is formed daily but only 2 litres is excreted out as urine so the rest is reabsorbed in the body

Functions of Nephron

• Excretion of nitrogenous wastes.
• To maintain the water and ionic balance (osmic regulation).

Excretion in Plants

Plants use different strategies for excretion of different products :
• Oxygen and carbon dioxide is diffused through stomata.
• Excess water is removed by transpiration.
• Plants can even loose some of their old parts like old leaves and bark of tree.
• Other waste products like raisins and gums especially in old xylem cells which can also be lost by plants.
• Plants also secrete some waste substances into the soil around them.

Structure of a Nephron

The urine formation involves three steps :
1. Glomerular filtration : Nitrogenous wastes, glucose water, amino acid filter from the blood into Bowman Capsule of the nephron.
2. Tubular reabsorption : Now, useful substances from the filtrate are reabsorbed back by capillaries surrounding the nephron.
3. Secretion : Urea, extra water and salts are secreted into the tubule which open up into the collecting duct & then into the ureter.

Artificial Kidney

Haemodialysis : The process of purifying blood by an artificial kidney. It is meant for kidney failure patients.