CHAPTER 5: LIFE PROCESSES

Introduction

All living organisms perform certain basic functions to maintain life. These functions are necessary for the survival and proper functioning of the body. The processes that are required to maintain life are called **life processes**.

Examples of life processes include **nutrition, respiration, transportation, and excretion**. These processes help organisms obtain energy, transport substances within the body, and remove waste materials.

What are Life Processes?

Life processes are the basic activities performed by living organisms to maintain their life.

Examples of life processes:

- Nutrition
- Respiration
- Transportation
- Excretion

These processes help organisms to **grow, repair their body and maintain proper functioning of organs**.

Nutrition

Nutrition is the process by which organisms obtain food and utilize it for energy, growth, and repair of the body.

Food is necessary because it provides:

- Energy
- Materials for growth
- Materials for repair of damaged tissues

Types of Nutrition

There are two main types of nutrition:

1. Autotrophic Nutrition

Autotrophic nutrition is the mode of nutrition in which organisms **prepare their own food from simple inorganic substances** like carbon dioxide and water using sunlight.

Organisms that follow this type of nutrition are called **autotrophs**.

Examples:

- Green plants
- Algae

Photosynthesis

The process by which green plants prepare their own food using **sunlight, carbon dioxide, and water** in the presence of chlorophyll is called **photosynthesis**.

Equation of photosynthesis:

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

presence of sunlight and chlorophyll)

Role of stomata:

Stomata are small pores present on the surface of leaves that help in **exchange of gases** during photosynthesis.

Conditions Necessary for Photosynthesis

1. Sunlight
2. Chlorophyll
3. Carbon dioxide
4. Water

2. Heterotrophic Nutrition

Heterotrophic nutrition is the mode of nutrition in which organisms **depend on other organisms for food.**

Organisms that follow this type are called **heterotrophs.**

Examples:

- Animals
- Human beings
- Fungi

Types of Heterotrophic Nutrition

1. **Holozoic nutrition** – organisms eat solid food (humans, animals)
2. **Saprophytic nutrition** – organisms feed on dead organic matter (fungi)
3. **Parasitic nutrition** – organisms obtain food from living hosts (tapeworm)

Nutrition in Amoeba

Amoeba shows **holozoic nutrition**.

Steps of nutrition in Amoeba:

1. **Ingestion** – Amoeba engulfs food using pseudopodia
2. **Digestion** – Food is digested in food vacuole
3. **Absorption** – Digested food is absorbed into cytoplasm
4. **Assimilation** – Food is used for energy and growth
5. **Egestion** – Undigested food is removed from body

Nutrition in Human Beings

The human digestive system helps in digestion of food.

Main parts of digestive system:

- Mouth
- Oesophagus
- Stomach
- Small intestine
- Large intestine
- Anus

Working of Nutrition in Human Beings

The process of nutrition in human beings takes place through the **digestive system**. It involves several steps that help in the intake, digestion, absorption and removal of food.

1. Ingestion

It is the process of **taking food into the body through the mouth**. Food is chewed with the help of teeth and mixed with saliva.

2. Digestion

Digestion is the process of **breaking down complex food substances into simpler and soluble forms**.

- Saliva in the mouth begins the digestion of starch.
- In the stomach, digestive juices such as **hydrochloric acid and enzymes** help in digestion of proteins.

3. Absorption

The digested food is **absorbed into the bloodstream through the walls of the small intestine**. The small intestine contains **villi**, which increase the surface area for absorption.

4. Assimilation

In this step, the absorbed nutrients are **transported to different cells of the body and used for energy, growth and repair of tissues**.

5. Egestion

The process of **removal of undigested food from the body through the anus** is called egestion.

Respiration

Respiration is the process by which living organisms break down food to release energy.

Energy released during respiration is used for various life activities.

Types of Respiration

Aerobic Respiration

Respiration that takes place **in the presence of oxygen** is called **aerobic respiration**.

Example: respiration in humans and most animals.

Equation:

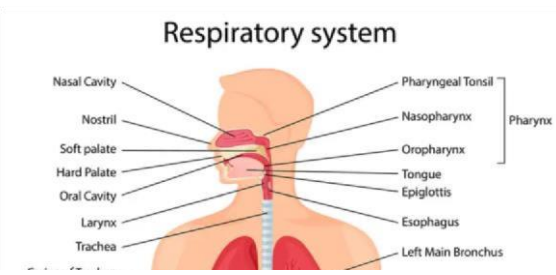
Glucose + Oxygen → Carbon dioxide + Water + Energy

Anaerobic Respiration

Respiration that takes place **in the absence of oxygen** is called **anaerobic respiration**.

Examples:

- Yeast
- Some bacteria



In yeast:

Glucose → Alcohol + CO_2 + Energy

Respiration in Human Beings

Human respiratory system includes:

- Nose
- Nasal cavity
- Trachea
- Bronchi
- Lungs
- Diaphragm

Gas exchange occurs in **alveoli** present in lungs.

Working of Respiration in Human Beings

Respiration in human beings takes place through the **respiratory system**, which includes the **nose, nasal cavity, trachea, bronchi and lungs**. The main function of respiration is to **take in oxygen and release carbon dioxide**.

1. **Inhalation (Breathing in)**
   During inhalation, the **diaphragm contracts and moves downward**, and the ribs move upward and outward. This increases the volume of the chest cavity, allowing **oxygen-rich air to enter the lungs** through the nose and trachea.

2. **Exchange of Gases**
   Inside the lungs, there are tiny air sacs called **alveoli**. Oxygen from the air passes through the walls of the alveoli into the **blood in the capillaries**, while carbon dioxide from the blood moves into the alveoli. 3. **Transport of Oxygen**

   The oxygen is carried by **red blood cells (RBCs)** to all parts of the body. In the cells, oxygen helps in the **breakdown of food to release energy**.

4. **Exhalation (Breathing out)**
   During exhalation, the **diaphragm relaxes and moves upward**, and the ribs move downward. This decreases the chest cavity volume and **carbon dioxide is expelled from the lungs**.

Transportation

Transportation is the process by which **food, oxygen, water and other substances are transported to different parts of the body**.

Transportation in Human Beings

The human circulatory system consists of:

- Heart
- Blood
- Blood vessels

Heart

The **heart** is a muscular organ that pumps blood throughout the body.

It has **four chambers**:

- Right atrium
- Right ventricle
- Left atrium
- Left ventricle

Circulation of Blood in the Heart

The **heart is a muscular organ** that pumps blood throughout the body. It has **four chambers**:

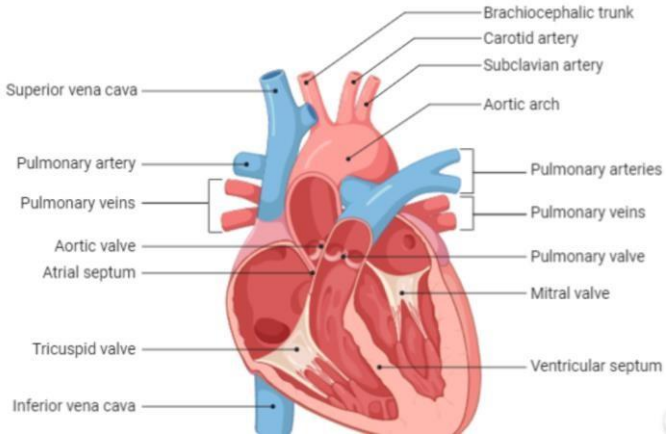
- Right atrium
- Right ventricle
- Left atrium
- Left ventricle

The circulation of blood in the heart occurs as follows:

1. **Deoxygenated blood** from different parts of the body enters the **right atrium** through the **vena cava**.
2. From the right atrium, the blood moves into the **right ventricle**.
3. The right ventricle then pumps this blood to the **lungs through the pulmonary artery**. In the lungs, **carbon dioxide is removed and oxygen is added** to the blood.

4. The **oxygenated blood** from the lungs returns to the **left atrium** through the **pulmonary veins**.
5. From the left atrium, the blood moves into the **left ventricle**.
6. The left ventricle then pumps the oxygen-rich blood to the **entire body through the aorta**.

This process of blood passing **twice through the heart during one complete cycle** is called **double circulation**.



Blood

Blood transports substances in the body.

Components of blood:

1. Red blood cells (RBC)
2. White blood cells (WBC)
3. Platelets
4. Plasma

Blood Vessels

There are three types of blood vessels:

VESSEL	FUNCTION
ARTERIES	Carry blood away from heart
VEINS	Carry blood towards heart
CAPILLARIES	Exchange substances with cells

Transportation in Plants

Plants need a system to transport **water, minerals, and food** from one part of the plant to another. This transportation occurs through special tissues called **vascular tissues**.

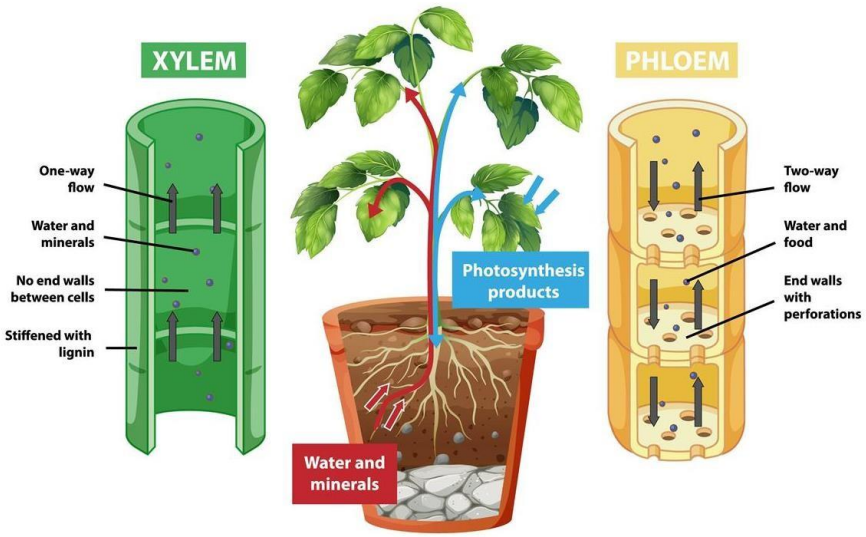
There are **two main types of vascular tissues** in plants: **xylem and phloem**.

1. Xylem

Xylem is responsible for the **transport of water and minerals** from the roots to the stem**,** leaves and other parts of the plant. Water absorbed by the roots moves upward through the xylem vessels. This movement mainly occurs due to transpiration pull, root pressure and capillary action.

2. Phloem

Phloem is responsible for the transport of food prepared in the leaves during photosynthesis to other parts of the plant such as roots, stems, and fruits. This process is called **translocation**. Unlike xylem, the movement of food in phloem can occur **in both upward and downward directions** depending on the plant's needs.



Transpiration

Transpiration is the loss of water in the form of water vapour from the surface of leaves through small pores called **stomata**. This process helps in **pulling water upward from the roots and also helps in cooling the plant**.

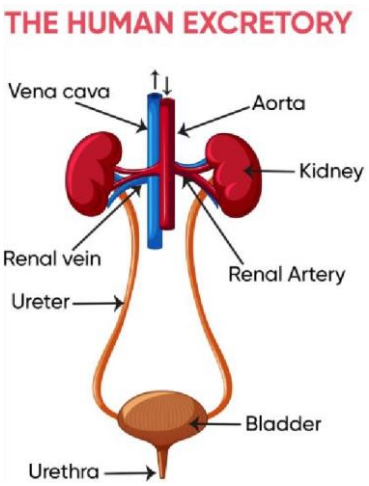
Thus, transportation in plants ensures that water, minerals, and food reach all parts of the plant for proper growth and functioning.

Excretion

Excretion is the process of removing waste materials produced in the body.

These wastes can be harmful if they accumulate in the body.

Excretion in Human Beings



The human excretory system includes:

- Kidneys
- Ureters
- Urinary bladder
- Urethra

Nephron

The **nephron** is the structural and functional unit of the kidney.

Functions:

- Filtration of blood
- Reabsorption of useful substances
- Formation of urine

Artificial Kidney (Dialysis)

When kidneys fail to function properly, an **artificial kidney machine** is used to filter blood. This process is called **dialysis**.

Excretion in Plants

Plants remove waste by:

- Storing wastes in leaves, bark, fruits
- Releasing gases through stomata
- Removing wastes through resin and gums