Life Processes

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Life processes are the basic biological activities that are essential for maintaining life in living organisms. These processes include nutrition, respiration, transportation of materials, and excretion. Together, they ensure that an organism survives, grows, repairs itself, and reproduces.

Example:

Humans eat food (nutrition), breathe oxygen (respiration), circulate blood (transport), and remove wastes through urine and sweat (excretion).

Need for Life Processes

To maintain life, organisms must continuously perform certain functions such as:

- Taking in food (nutrition)
- Breaking down food to release energy (respiration)
- Transporting substances (circulation)
- Removing waste materials (excretion)

Without these processes, survival is not possible.

Autotrophs

Autotrophs are organisms that can prepare their own food from simple inorganic substances like carbon dioxide (CO_2) and water using sunlight and chlorophyll. This mode of nutrition is called autotrophic nutrition.

Example:

Green plants like grass, mango trees, and algae prepare their own food through photosynthesis.

Photosynthesis in Autotrophs

In autotrophs, carbon and energy requirements are fulfilled by photosynthesis. In this process, carbon dioxide and water are converted into carbohydrates (glucose) in the presence of sunlight and chlorophyll.

Equation:

$CO_2 + H_2O \rightarrow$ Glucose + Oxygen (in presence of sunlight and chlorophyll)

Example:

A sunflower plant uses sunlight to make its own food.

Heterotrophs

Heterotrophs are organisms that cannot make their own food and depend on other organisms for nutrition. This type of nutrition is called heterotrophic nutrition.

Example:

Humans, animals like lions, cows, and even fungi depend on plants or other organisms for food.

Digestive System in Humans

The human digestive system consists of the alimentary canal and digestive glands. Digestion is the process of breaking down complex food into simpler substances that can be absorbed by the body.

Food passes through different stages in the alimentary canal and is finally absorbed in the small intestine and transported to all body cells.

Example:

When we eat rice, it is broken down into glucose, which provides energy.

Respiration

Respiration is the process by which food (glucose) is broken down using oxygen to release energy.

Types of Respiration:

1. Aerobic Respiration – Occurs in the presence of oxygen and releases a large amount of energy.

Example: Humans breathing normally.

2. Anaerobic Respiration – Occurs in the absence of oxygen and releases less energy.

Example: Yeast producing alcohol or muscle cramps during heavy exercise.

Respiratory System in Humans

The respiratory system helps in the exchange of gases (oxygen and carbon dioxide). It includes:

- Nostrils
- Nasal passage
- Pharynx
- Larynx
- Trachea

- Bronchi
- Lungs

Example:

When we inhale, oxygen enters the lungs and is absorbed into the blood.

Mechanism of Respiration

Respiration occurs in two steps:

1. Inspiration (Inhalation): Taking in oxygen-rich air.

2. Expiration (Exhalation): Releasing carbon dioxide.

During respiration, energy is released in the form of ATP (Adenosine Triphosphate), which is used for all body activities.

Circulatory System

The circulatory system transports oxygen, nutrients, hormones, and waste materials throughout the body.

Components:

1. Heart – Pumps blood

2. Blood – Fluid that carries substances

3. Blood Vessels – Tubes through which blood flows

Heart

The heart is a muscular organ that pumps blood to all parts of the body.

Example:

It beats continuously to circulate oxygen-rich blood.

Blood

Blood is a fluid connective tissue consisting of plasma and blood cells:

1. Red Blood Cells (RBCs): Carry oxygen

2. White Blood Cells (WBCs): Fight infections

3. Platelets: Help in blood clotting

Blood Vessels

There are three types:

1. Arteries: Carry blood away from the heart

2. Veins: Carry blood towards the heart

3. Capillaries: Allow exchange of substances between blood and cells

Lymphatic System

The lymphatic system includes lymph, lymph vessels, and lymph nodes. It helps in transporting fluids and fighting infections.

Example:

Lymph carries white blood cells to fight pathogens.

Double Circulation

In humans, blood passes through the heart twice in one complete cycle:

- First: Deoxygenated blood → heart → lungs
- Second: Oxygenated blood → heart → body

This is called double circulation.

Transport in Plants

Plants have special tissues for transport:

1. Xylem: Transports water and minerals from roots to other parts.

Example: Water absorbed from soil reaches leaves.

2. Phloem: Transports food from leaves to other parts.

Example: Glucose made in leaves is sent to roots.

Transpiration

Transpiration is the loss of water in the form of vapor from aerial parts of plants (mainly leaves).

Example:

Water evaporating from leaf surfaces.

Excretory System

Excretion is the process of removing waste products from the body.

Human Excretory Organs:

1. Kidneys

2. Ureters

3. Urinary bladder

4. Urethra

Nephron

Nephrons are the structural and functional units of kidneys. They filter blood and remove nitrogenous wastes in the form of urine.

Example:

Urea is filtered out of the blood by nephrons.

Excretion in Plants

Plants remove waste in different ways:

- Storing waste in vacuoles
- Releasing substances like gum and resin
- Shedding leaves
- Excreting into soil

Example:

Dry leaves falling off contain waste substances.