Locomotion And Movement

Locomotion and Movement

- **Movement** is one of the fundamental characteristics of living organisms.
- Both animals and plants exhibit a wide range of movements, although the type and purpose may vary.

Types of Movements in Organisms

A. In unicellular organisms (e.g., *Amoeba*):

- Movement occurs through streaming of **protoplasm**, a simple form of internal movement.

B. In other organisms:

- Movement is exhibited through specialized structures like **cilia**, **flagella**, and **tentacles**.

C. In humans:

- Movements include the motion of **limbs, jaws, eyelids, tongue**, etc.

Locomotion

- Some movements result in a change of place or position and are known as **locomotion**.
- Examples of **locomotory movements** include:
  - Walking
  - Running
  - Climbing
  - Flying
  - Swimming

- **Locomotion** is a voluntary movement and is performed using specialized body parts.
- However, locomotory structures may also function in other types of movements.

Shared Structures for Movement and Locomotion

- In many organisms, the same structures are used for both movement and locomotion:
  - In **Paramecium**, cilia help in locomotion and also in moving food through the cytopharynx.

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- In **Hydra**, tentacles are used for both capturing prey and locomotion.
- In **humans**, limbs are involved in changing body posture as well as in locomotion.

Relationship Between Movement and Locomotion

- All locomotions are movements,
- But not all movements are locomotions.
  - Thus, the two concepts are closely related and often interdependent.

Purpose of Locomotion in Animals

- Animals perform locomotion based on their **habitats** and **situational needs**.
- **Common** purposes include:
  - Searching for food
  - Finding shelter
  - Locating mates
  - Reaching suitable breeding grounds
  - Seeking favorable climatic conditions
  - Escaping from predators or enemies

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Types of Movement

- Cells in the human body exhibit **three** primary types of movement:
    1. Amoeboid Movement
    2. Ciliary Movement
    3. Muscular Movement

Amoeboid Movement

Observed in:

- Specialized cells such as **macrophages** and **leucocytes** (white blood cells) in the blood.

Mechanism:

- Movement is brought about by the formation of **pseudopodia**.
- This involves the streaming of protoplasm, similar to that seen in *Amoeba*.
- Cytoskeletal elements, particularly microfilaments, play a crucial role.

Ciliary Movement

Observed in:

- Cells of internal tubular organs lined with **ciliated epithelium**.

Examples:

Trachea:

- Coordinated beating of cilia helps in **removing** dust particles and foreign substances inhaled with atmospheric air.

Female reproductive tract:

- **Ciliary movement** assists in the transport of ova through the fallopian tubes.

Muscular Movement

Observed in:

- Organs and body parts such as **limbs, jaws, tongue**, etc.

Mechanism:

- Based on the contractile property of muscles.
- Requires coordinated action of the muscular, skeletal, and neural systems.

Functions:

- Enables **locomotion**.

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- Facilitates both voluntary and involuntary movements in humans and most multicellular organisms.

Coordination of Systems in Locomotion

- Effective locomotion in humans requires a coordinated effort among the following systems:
  - **Muscular system** – provides the force for movement
  - **Skeletal system** – gives structure and support
  - **Neural system** – controls and regulates movement

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Muscle

Introduction

- In Chapter 8, it was discussed that cilia and flagella are outgrowths of the cell membrane.
- Flagellar movement plays important roles in:
    - Swimming of spermatozoa
    - Maintaining water current in the canal system of sponges
    - Locomotion in protists like *Euglena*

Muscle: A Specialized Tissue

- **Muscle** is a specialized mesodermal tissue.
- It accounts for approximately **40–50%** of an adult human's body weight.
- Muscles possess four special properties:
    - **Excitability** – ability to respond to stimuli
    - **Contractility** – ability to shorten and generate force
    - **Extensibility** – ability to stretch
    - **Elasticity** – ability to return to original shape after contraction or extension

Classification of Muscles

- Muscles are classified based on:
    - Location
    - Appearance
    - Nature of regulation (voluntary or involuntary control)
- Based on **location**, there are **three** types of muscles:

1. Skeletal Muscles

Location:

- Enables **locomotion**.

Appearance:

- Have a **striped (striated)** appearance under a microscope.

Control:

- **Voluntary** – regulated consciously by the nervous system.

Function:

- Involved in **locomotion**

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