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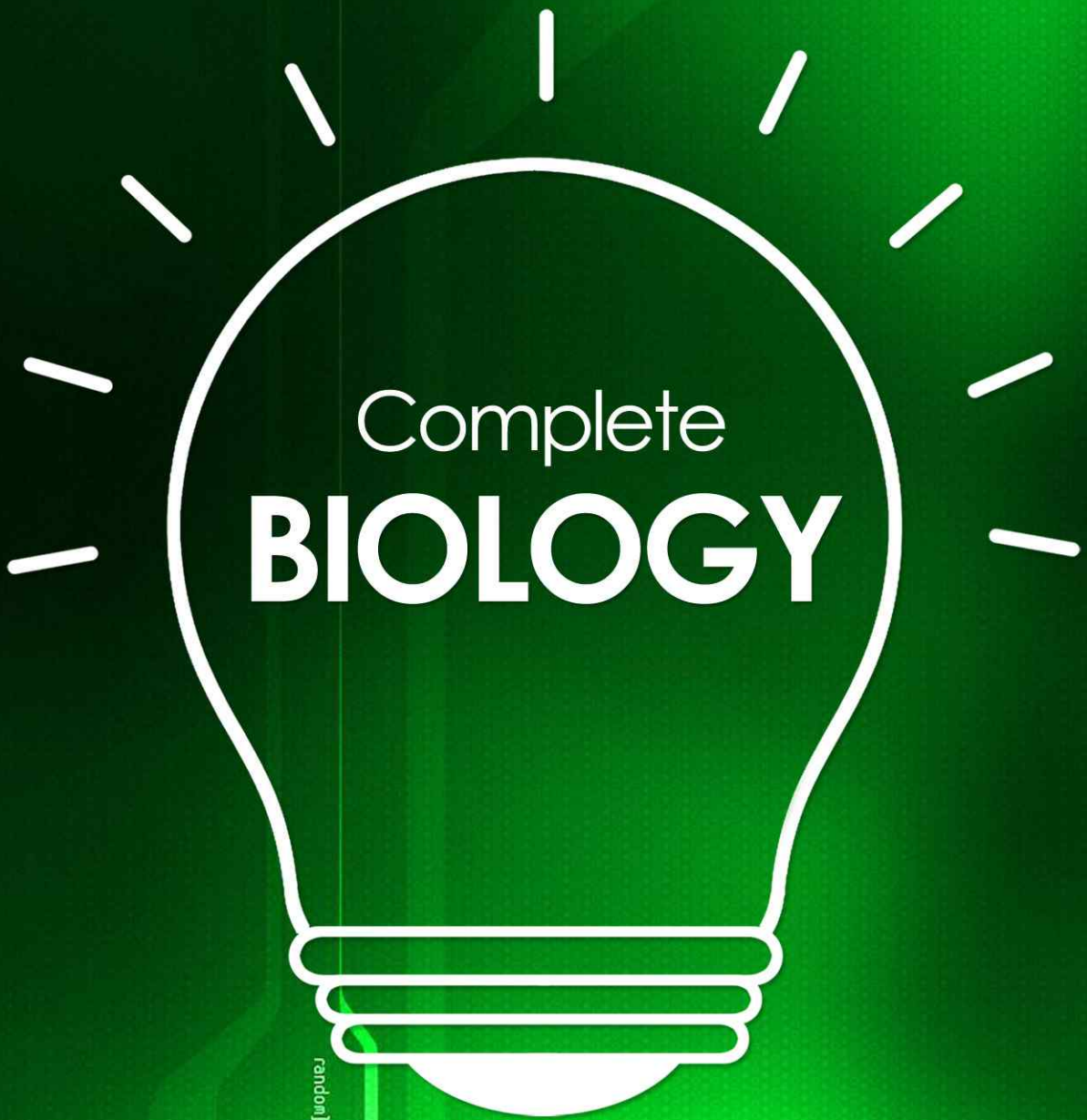

Complete BIOLOGY

NEET · CBSE eBOOKS

CLASS 11&12th

Learning Inquiry
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CLASS 11th

Locomotion and Movement

01. Introduction

Movement is a change in posture or position of any part of living organism. It is an essential and significant feature of living organisms. When movement results in change of place or location it is termed as locomotion. Animals show both movement and locomotion, while plants show movement only. Locomotion is rare in them.

02. Types of movements

(i) **Non-muscular Movements**

(a) **Amoeboid or Pseudopodial Movement :** It occurs with the help of pseudopodia, which are formed by cytoplasm. It is found in protozoans, leucocytes and macrophages

(b) **Ciliary Movement :** This type of movement occurs in protozoans and in the internal tubular organs of higher animals, which are lined by ciliated epithelium.

(c) **Flagellar Movement :** This type of movement occurs in protozoans like Trypanosoma, *Euglena*, etc., along with sponges.

(ii) **Muscular Movement**

It is the basic type of movement used in majority of vertebrates including humans. It takes place through muscle fibres of muscular tissue.

03. Types of Muscles

Based on their location and function muscles are of following types

(i) Visceral or smooth or unstriped or non-striated or involuntary muscles.

(ii) Cardiac muscles.

(iii) Skeletal or striped or striated or voluntary muscles.

04. Skeletal Muscles

Skeletal muscles are composed of elongated, narrow, cylindrical fibres called **muscle fibres**. The plasma membrane covering the fibre is called **sarcolemma** whereas their cytoplasm is called sarcoplasm. Sarcoplasm of each muscle fibre consists of long, proteinaceous fibrils called myofibrils. The mitochondria and SER present in sarcoplasm are called **sarcosomes** and **sarcoplasmic reticulum**, respectively. In the sarcoplasm of each muscle fibre, glycogen and myoglobin are found abundantly.

05. Special Features of Skeletal Muscles

(i) They show contraction only when stimulated, i.e. they do not have the potential of automatic contractions just like found in cardiac and visceral muscles.

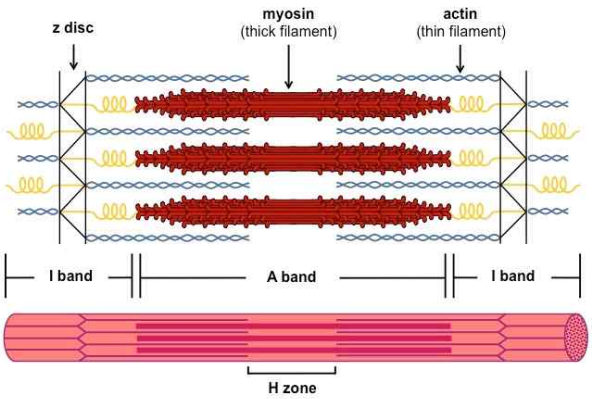
(ii) A skeletal muscle may show tonic contractions. Which include, isotonic contraction, isometric contraction, twitch contraction and tetanic contraction.

(iii) Skeletal muscles contract with varying degrees of strength at different times. It is a fact of practical importance.

(iv) Skeletal muscles produce movements by pulling on bones. A contracting muscle applies a pulling force on a bone (lever) at the point of the muscle's attachment to the bone. This causes the bone to move about its joint (fulcrum).

(v) Skeletal muscles almost always act in groups rather than singly. Most movements are produced by the coordinated action of several muscles. Some of the muscles in the group contract, while others relax.

06. Generalised Structure of Skeletal Muscle Fibres



The length of a sarcomere is about 2 to 3 μ. It comprises of a single A-band and half of each adjacent I-band. On both the sides of Z-line the N-line is present. It appears as dark, thin and transverse.

Myofibrils are surrounded by a network of sarcoplasmic reticulum and T-tubules. The tubules are transverse invaginations of sarcolemma. The arrangement of sarcoplasmic reticulum and T-tubules forms a triad. It is because this network consists of a single transverse tubule lined by two enlarged cisternae of saroplasmic reticulum.

The T-tubule and sarcoplasmic reticulum together forms the sarcotubular system. It helps to perform muscle contraction and relaxation. T-tubules are involved in rapid transmission of action potential from cell membrane to muscle fibres. On the other hand, sarcoplasmic reticulum aid in Ca^{2+} movement.

07. Molecular Structure of Skeletal Muscle Fibres

The myofibrils are composed of bundles of parallel protein microfilaments called **myofilaments**. These myofilaments are made up from four types of proteins *viz*, myosin, actin, tropomyosin and troponin. Out of these, myosin and actin are together called **contractile proteins**, because they are responsible for shortening of muscle fibre.