YAKEEN NEET 2.0

2026

20.08.2025

LOCOMOTION AND MOVEMENT

ZOOLOGY | Lecture – 1

By- SAMAPTI MAM

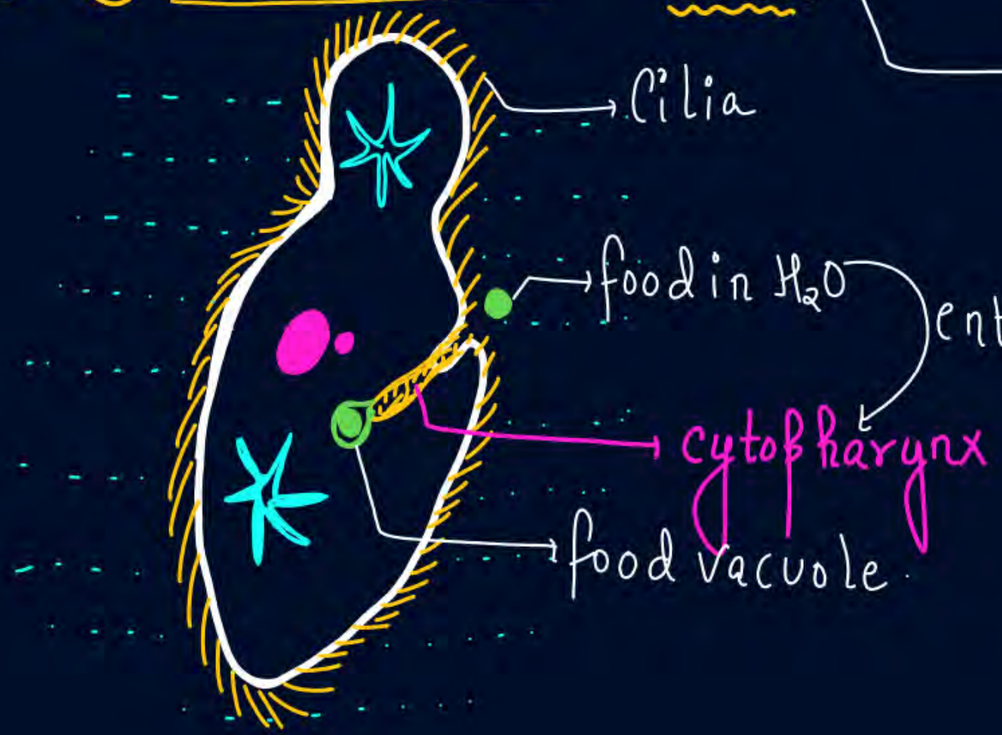
Topics to be covered

1. TYPES OF MOVEMENT, MUSCLES-1
2.
3.
4.

Question: Why LOCOMOTION is required?

Answer: Capturing food,
Search of mating Partner,
Shelter,
Defense from enemies

Note ① Paramecium (Kingdom: Protista) : 'Cilia' → Capturing of food through cytopharynx
→ Locomotion.



* Hydra (Phylum Coelentrata): Tentacles → Locomotion
→ Capturing of food (prey)

→ Tentacles (has Stinging Cell → inject poison)

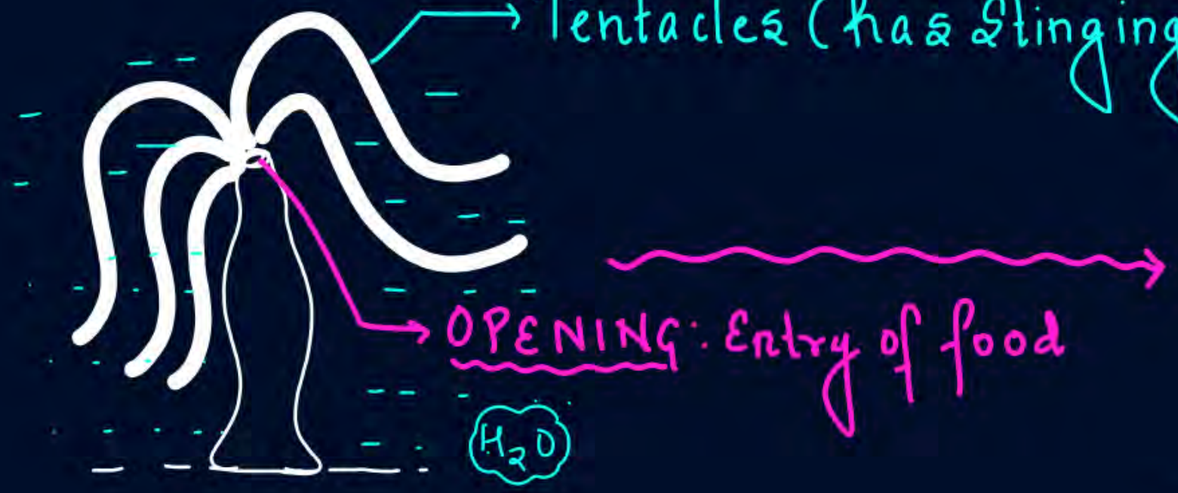


fig: Hydra

Hydra bent

(Somersault in Hydra)

- Methods of Locomotion: DEPENDS on → Habitat
→ Demand of situation.

Types of movement

Amoeboid movement

- Movement with the help of PSEUDOPODIA (false feet) by extention of protoplasm (with the help of cytoskeletal filament (microfilament) (made up of Actin)

eg: Macrophages, Some WBCs Like Neutrophils, Monocytes (PHAGOCYTIC CELL)
Amoeba

Ciliary movement

- Tubular structures are lined with 'CILIA' that helps in movement

eg: fallopian tube (movement of ova),

Trachea (mucus movem.)

Muscular movement

- Movement with the help of muscles in coordination with the help of nervous system

eg: movement of limbs.

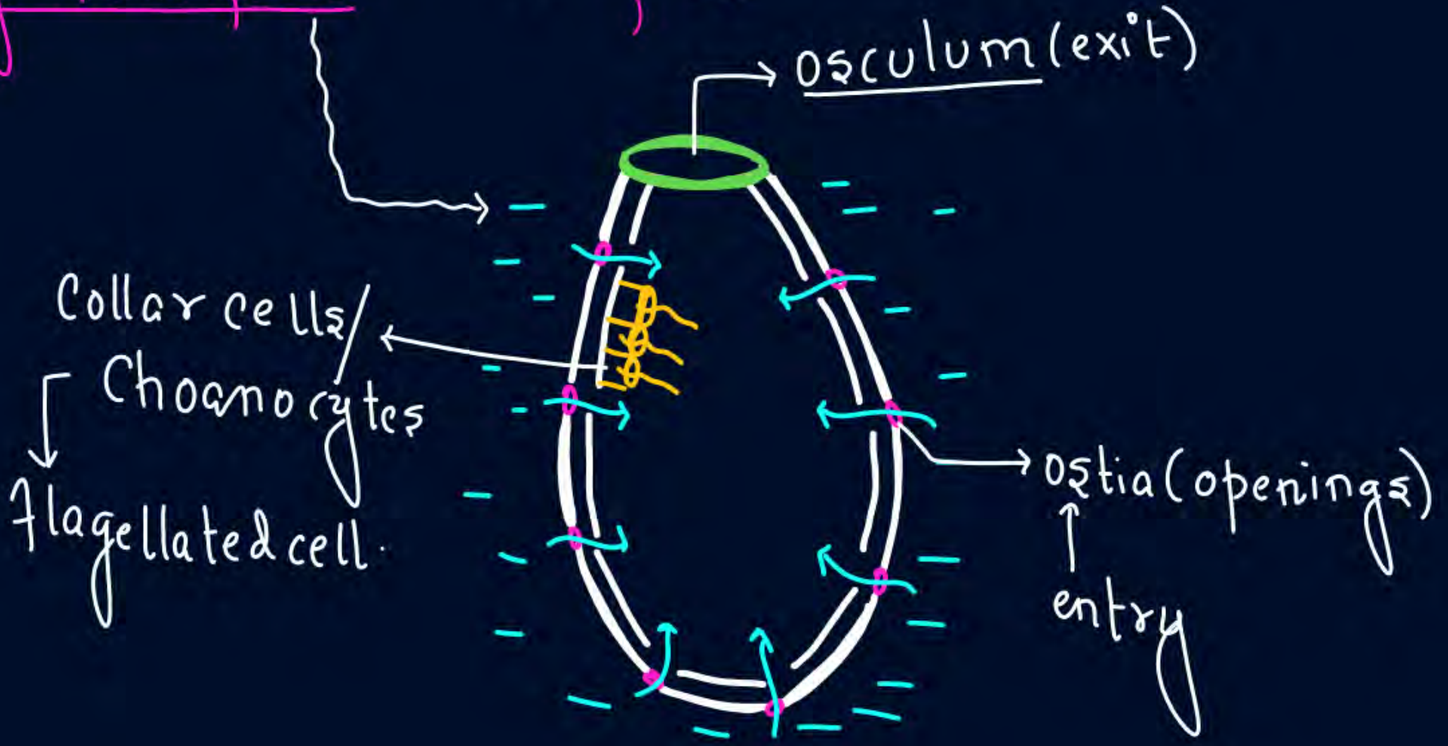
Note

Flagellar movement: With the help of flagella

eg: Euglena,

Spermatozoa,

Sponges / Porifera



Movement is one of the significant features of living beings. Animals and plants exhibit a wide range of movements. Streaming of protoplasm in the unicellular organisms like *Amoeba* is a simple form of movement. Movement of cilia, flagella and tentacles are shown by many organisms. Human beings can move limbs, jaws, eyelids, tongue, etc. Some of the movements result in a change of place or location. Such voluntary movements are called **locomotion**. Walking, running, climbing, flying and swimming are all some forms of locomotory movements. Locomotory structures need not be different from those affecting other types of movements. For example, in *Paramoecium*, cilia helps in the movement of food through cytopharynx and in locomotion as well. *Hydra* can use its tentacles for capturing its prey and also use them for locomotion. We use limbs for changes in body postures and locomotion as well. The above observations suggest that movements and locomotion cannot be studied separately. The two may be linked by stating that all locomotions are movements but all movements are not locomotions.

Methods of locomotion performed by animals vary with their habitats and the demand of the situation. However, locomotion is generally for search of food, shelter, mate, suitable breeding grounds, favourable climatic conditions or to escape from enemies/predators.

Locomotion & Movement:

Movement: Change in postures

↳ movement: Jaw, eyelids, tongue etc

Locomotion: Movements that results in change in position.

↳ walking, running, flying, swimming, climbing etc.

* ALL 'Locomotions' ARE 'Movement' BUT ALL 'Movements' ARE NOT 'LOCOMOTION'

17.1 Types of Movement

Cells of the human body exhibit three main types of movements, namely, amoeboid, ciliary and muscular.

Some specialised cells in our body like macrophages and leucocytes in blood exhibit amoeboid movement. It is effected by pseudopodia formed by the streaming of protoplasm (as in *Amoeba*). Cytoskeletal elements like microfilaments are also involved in amoeboid movement.

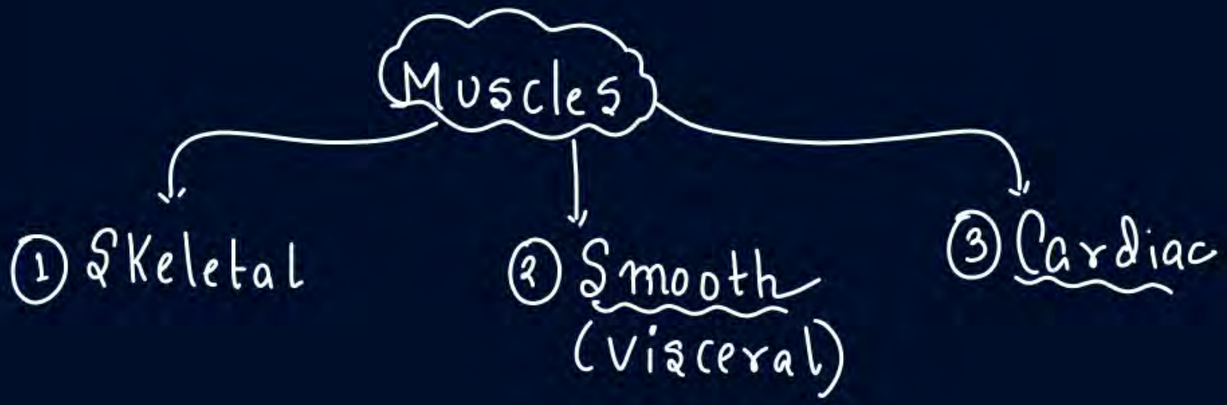
Ciliary movement occurs in most of our internal tubular organs which are lined by ciliated epithelium. The coordinated movements of cilia in the trachea help us in removing dust particles and some of the foreign substances inhaled along with the atmospheric air. Passage of ova through the female reproductive tract is also facilitated by the ciliary movement.

Movement of our limbs, jaws, tongue, etc, require muscular movement. The contractile property of muscles are effectively used for locomotion and other movements by human beings and majority of multicellular organisms. Locomotion requires a perfect coordinated activity of muscular, skeletal and neural systems. In this chapter, you will learn about the types of muscles, their structure, mechanism of their contraction and important aspects of the skeletal system.

Muscles:

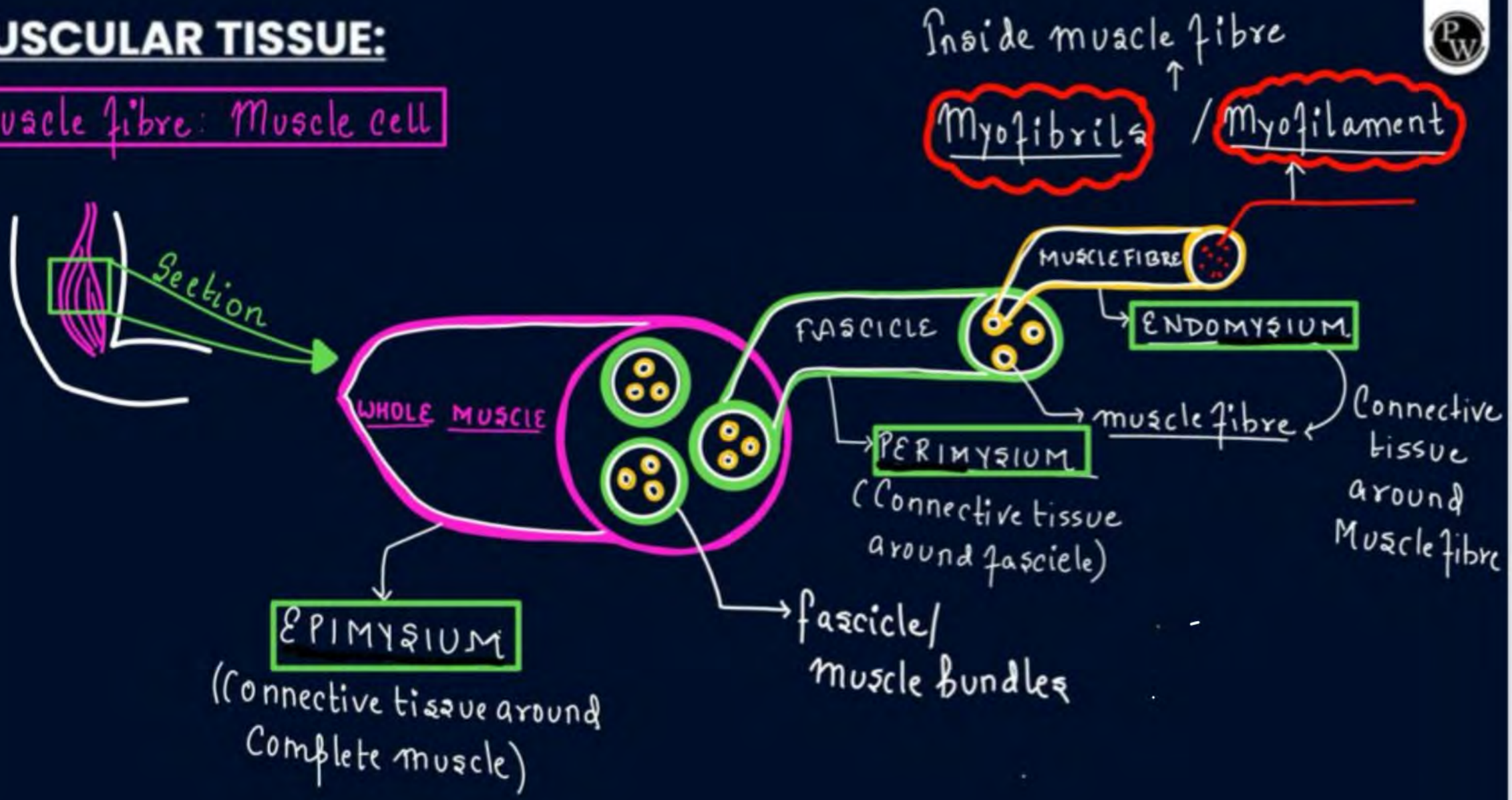
- Mesodermal (except ciliary body muscle, iris muscle)
- 40-50% weight: Muscles
- ≃ 639 muscles

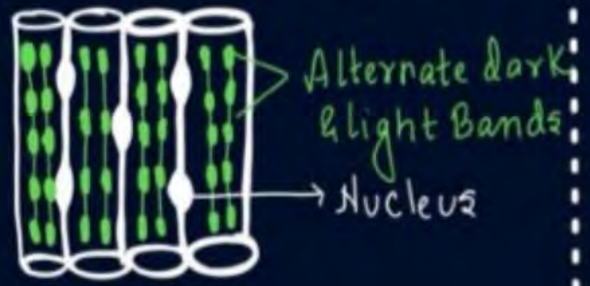
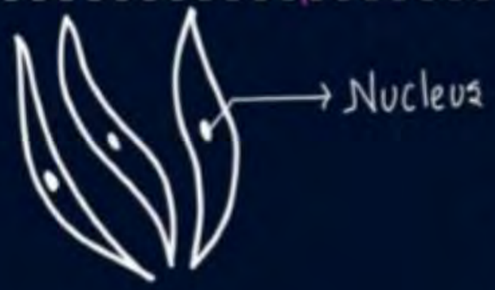
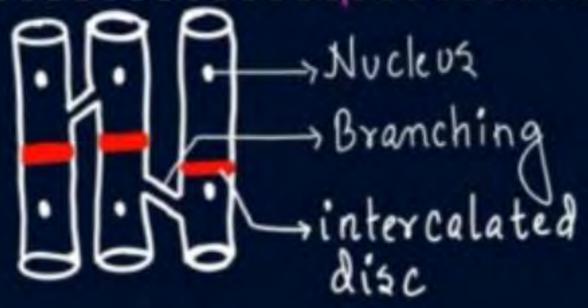
Properties
- Contractile
- Elasticity
- Excitable
- Extensible



MUSCULAR TISSUE:

Muscle fibre: Muscle cell



Skeletal muscle fibre	Smooth muscle fibre	Cardiac muscle fibre
		
1) Cylindrical muscle fibre	1) SPINDLE / FUSIFORM	1) CYLINDRICAL
2) Unbranched "	2) Unbranched	2) Branched
3) Multinucleated, nucleus in periphery	3) Uninucleated, centre	3) Uninucleated, centre
4) Alternate Dark & light Bands c/a STRIATIONS are prominantly seen hence c/a STRIATED (Striped) muscle	4) No Striations	4) Faint Striations present but also k/a Striated muscles.

Skeletal muscle fibre	Smooth muscle fibre	Cardiac muscle fibre
5. Voluntary control of NS	5. Involuntary control of NS	5) Involuntary
6. Fast contraction	6. Slow contraction	6) Fastest contraction
7. Rich Blood supply	7. Low Blood supply	7) Abundant Blood supply
8. Easily fatigue	8. Slowly fatigue	8) Never fatigue
9. Intercalated disc X	9. Intercalated disc X (Gap junctions & adhering junction (which holds them together) present	9) Intercalated disc ✓ (Gap + Adhering)
eg: Biceps, triceps, facial muscle	eg: Blood vessels, iris, Ciliary muscle, intestine, stomach etc.	eg: Heart
Note: Skeletal muscle in close association with Bone bring movement		

Section of muscle:

Epimysium
whole muscle
myofilament / myofibrils (Actin & myosin)
Perimysium
fascicles
Endomysium
muscle fibre / muscle cell

* fascia: Common
Collagenous substance that holds the fascicles together
(connective tissue)

17.2 MUSCLE

You have studied in Chapter 8 that the cilia and flagella are the outgrowths of the cell membrane. **Flagellar movement** helps in the swimming of spermatozoa, maintenance of water current in the canal system of sponges and in locomotion of Protists like *Euglena*. Muscle is a specialised tissue of mesodermal origin. About 40-50 per cent of the body weight of a human adult is contributed by muscles. They have special properties like excitability, contractility, extensibility and elasticity. Muscles have been classified using different criteria, namely location, appearance and nature of regulation of their activities. Based on their location, three types of muscles are identified : (i) Skeletal (ii) Visceral and (iii) Cardiac.

Skeletal muscles are closely associated with the skeletal components of the body. They have a striped appearance under the microscope and hence are called **striated muscles**. As their activities are under the voluntary control of the nervous system, they are known as voluntary muscles too. They are primarily involved in locomotory actions and changes of body postures.

Visceral muscles are located in the inner walls of hollow visceral organs of the body like the alimentary canal, reproductive tract, etc. They do not exhibit any striation and are smooth in appearance. Hence, they are called **smooth muscles (nonstriated muscle)**. Their activities are not under the voluntary control of the nervous system and are therefore known as involuntary muscles. They assist, for example, in the transportation of food through the digestive tract and gametes through the genital tract.

As the name suggests, **Cardiac muscles** are the muscles of heart. Many cardiac muscle cells assemble in a branching pattern to form a cardiac muscle. Based on appearance, cardiac muscles are striated. They are involuntary in nature as the nervous system does not control their activities directly.

Let us examine a skeletal muscle in detail to understand the structure and mechanism of contraction. Each organised skeletal muscle in our body is made of a number of **muscle bundles** or **fascicles** held together by a common collagenous connective tissue layer called **fascia**. Each muscle bundle contains a number of muscle fibres (Figure 17.1). Each

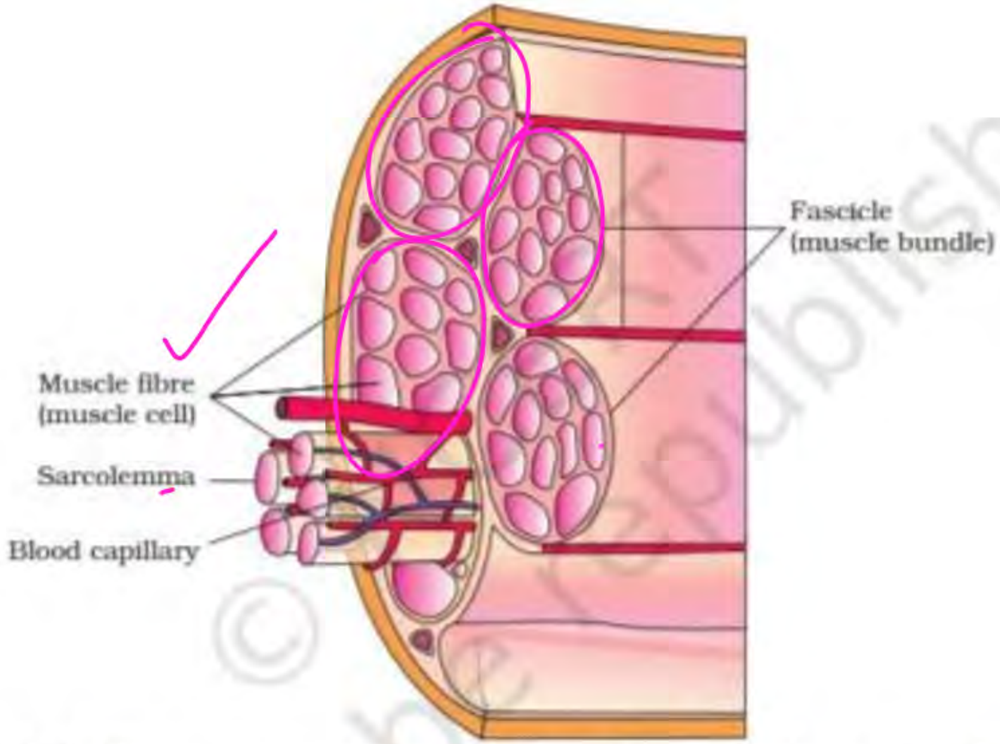


Figure 17.1 Diagrammatic cross sectional view of a muscle showing muscle bundles and muscle fibres

muscle fibre is lined by the plasma membrane called sarcolemma enclosing the sarcoplasm. Muscle fibre is a syncitium as the sarcoplasm contains many nuclei. The endoplasmic reticulum, i.e., sarcoplasmic reticulum of the muscle fibres is the store house of calcium ions. A characteristic feature of the muscle fibre is the presence of a large number of parallelly arranged filaments in the sarcoplasm called myofilaments or **myofibrils**. Each myofibril has alternate dark and light bands on it. A detailed study of the myofibril has established that the striated appearance is due to the distribution pattern of two important proteins – **Actin** and **Myosin**. The light bands contain actin and is called I-band or Isotropic band, whereas the dark band called 'A' or Anisotropic band contains

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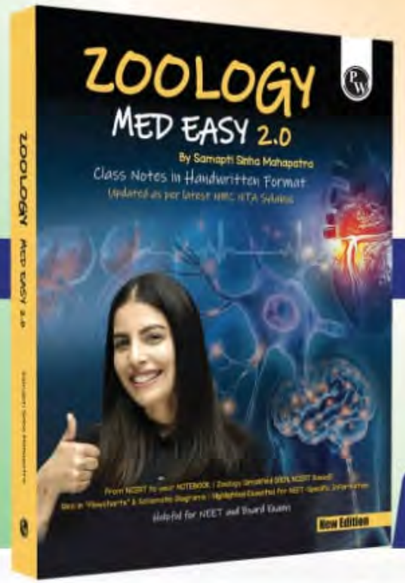

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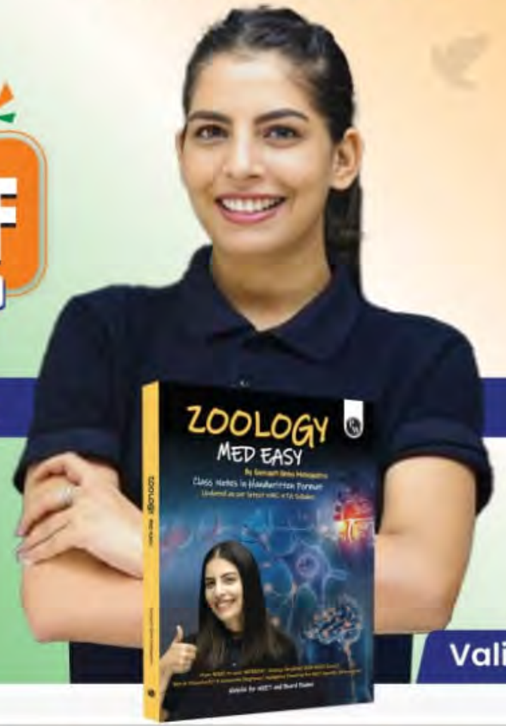

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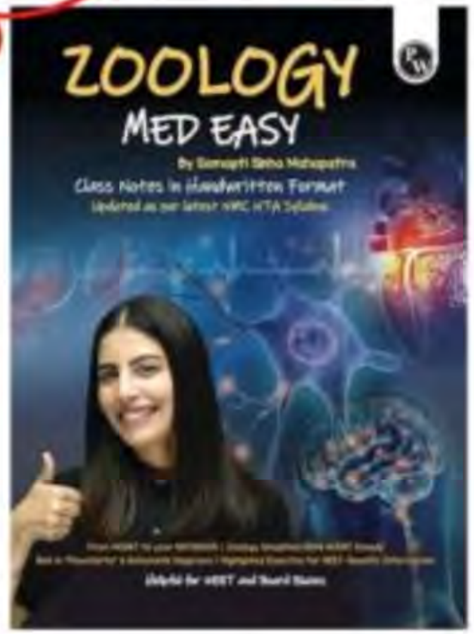

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