

Chapter 17 : Locomotion and Movement

Biology Notes | Class 11



MOVEMENT, LOCOMOTION & BIOLOGICAL PURPOSE

1 MOVEMENT

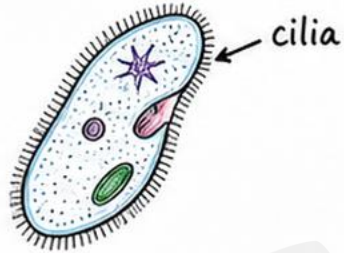
change in position of the whole body or one of its parts.

2 LOCOMOTION

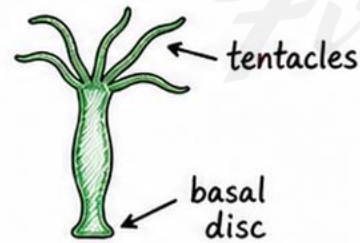
voluntary movement that changes an animal's place or location.

ALL LOCOMOTIONS ARE MOVEMENTS; NOT ALL MOVEMENTS ARE LOCOMOTIONS.

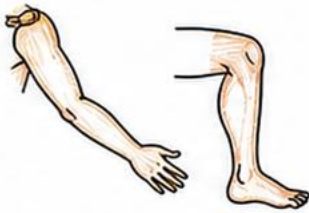
3 DUAL-USE STRUCTURES



Paramecium - cilia move food through the cytopharynx and also propel the organism.



Hydra - tentacles capture prey and also assist locomotion.



human limbs - posture and locomotion.

4 WHY ANIMALS LOCOMOTE

- search for food



- shelter



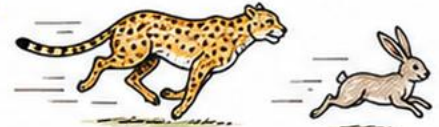
- mate



- suitable breeding grounds and favourable climate



- escape enemies or predators



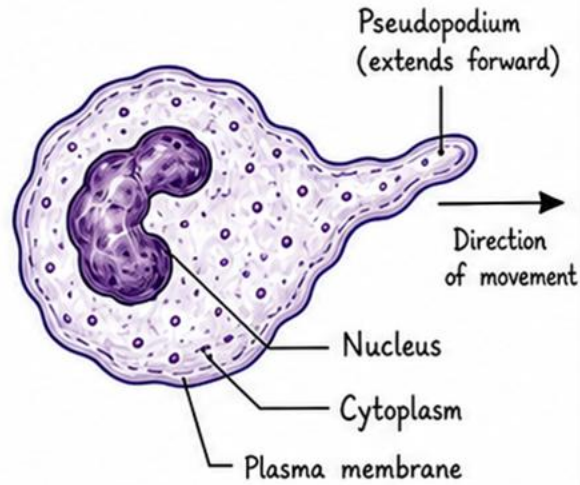
5 METHOD DEPENDS ON HABITAT + DEMAND OF THE SITUATION.

AMOEBOID, CILIARY, FLAGELLAR & MUSCULAR MOVEMENT

MAIN HUMAN CELL MOVEMENTS

1) AMOEBOID MOVEMENT

- Seen in macrophages and leucocytes.
- Temporary pseudopodia are formed by cytoplasmic streaming.
- Actin microfilaments participate in formation and movement.

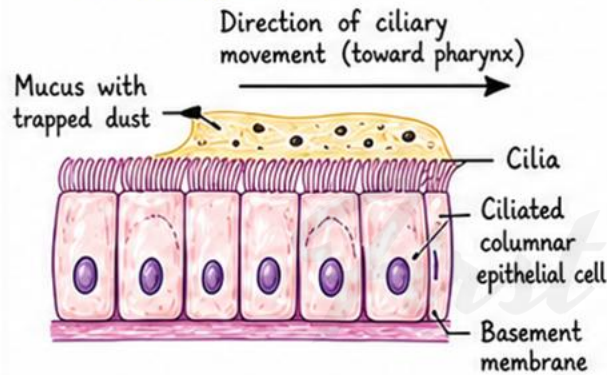


A crawling leucocyte showing one pseudopodium.

2) CILIARY MOVEMENT

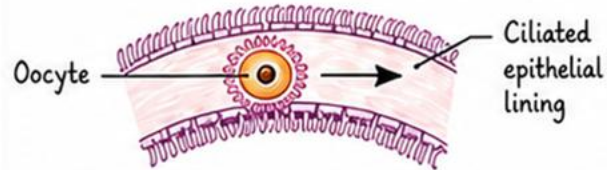
(A) In tracheal epithelium

Coordinated cilia move mucus with trapped dust toward the pharynx.



(B) In uterine (fallopian) tube

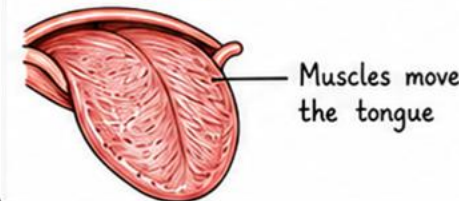
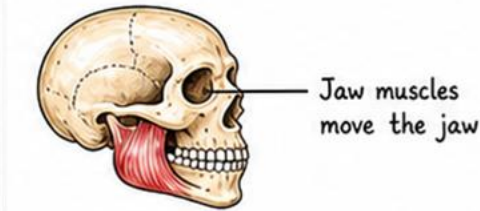
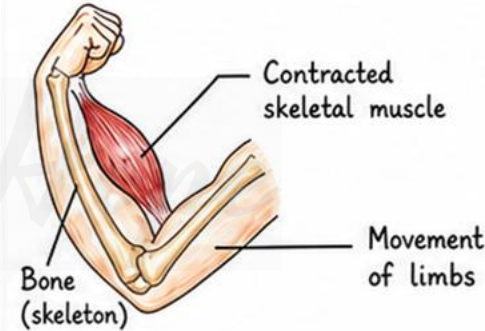
Cilia on the lining help in transport of oocyte toward the uterus.



Smooth-muscle contractions of the tube also assist the movement.

3) MUSCULAR MOVEMENT

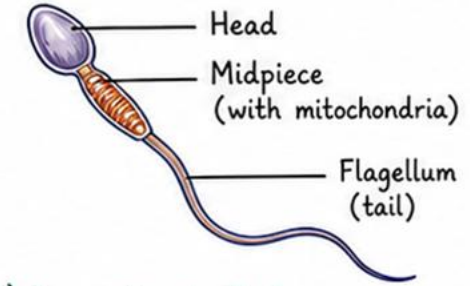
- Seen in limbs, jaws and tongue.
- Contractile muscle produces movement.
- Locomotion requires coordinated function of muscular, skeletal and neural systems.



RELATED FLAGELLAR MOVEMENT

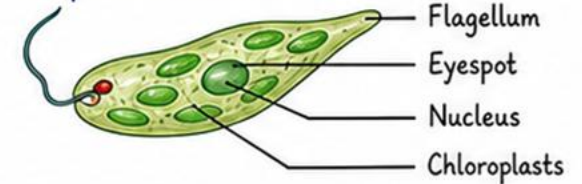
(A) Sperm motility

A single flagellum at the tail propels the sperm forward.



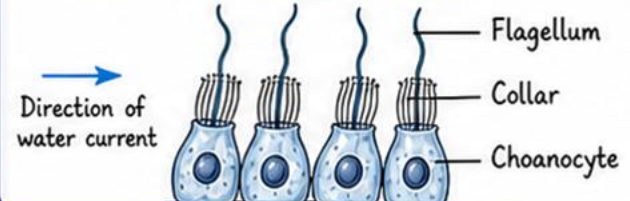
(B) Locomotion in Euglena

A long flagellum at the anterior end helps in locomotion.



(C) Water current in sponge canal systems

Flagella of choanocytes create water current for feeding and respiration.



CELLULAR STRUCTURE DETERMINES THE MODE OF MOVEMENT.

SKELETAL, SMOOTH & CARDIAC MUSCLES

MUSCLE = specialised mesodermal tissue; about 40-50% of adult body mass.

① **EXCITABILITY**

ability to respond to a stimulus.

② **CONTRACTILITY**

ability to shorten and develop tension (force).

③ **EXTENSIBILITY**

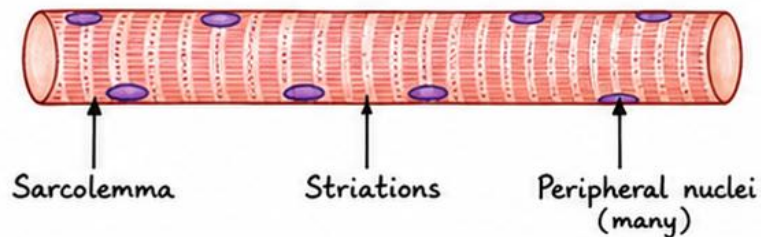
ability to be stretched without damage.

④ **ELASTICITY**

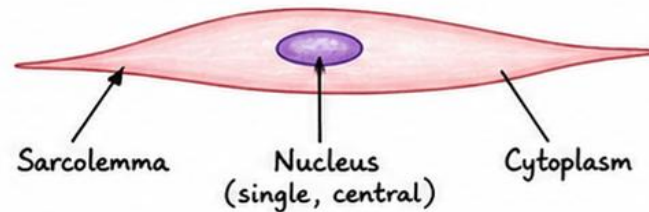
ability to recoil and resume original length.

	SKELETAL (STRIATED)	SMOOTH (VISCERAL)	CARDIAC (STRIATED)
LOCATION	Attached to skeletal elements (by tendons).	Walls of alimentary canal and reproductive tract.	Myocardium of heart.
CELL SHAPE	Long, cylindrical, unbranched fibres.	Spindle-shaped cells (tapered at both ends).	Short, branched, striated cells.
NUCLEI	Many nuclei, peripheral (just under sarcolemma).	Usually one nucleus, central.	Usually one nucleus, central.
STRIATIONS	Present; obvious transverse striations.	Absent; no striations.	Present; striated (less distinct than skeletal).
CONTROL	Voluntary (somatic nervous system).	Involuntary (smooth muscle of visceral organs).	Involuntary and intrinsically rhythmic; autonomic nerves modulate rate and force.
FUNCTION	Locomotion of body and maintenance of posture.	Moves food in alimentary canal and gametes in reproductive tract.	Pumps blood throughout the body.

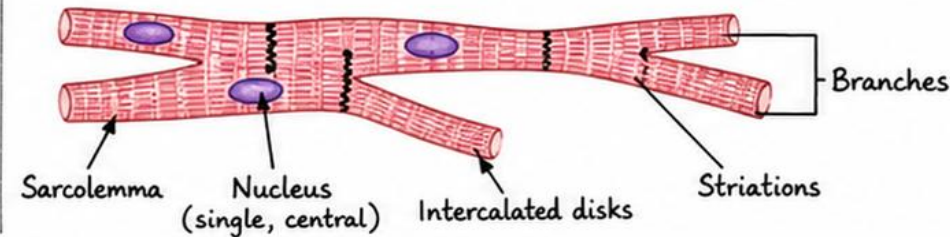
SKELETAL MUSCLE CELL (LONGITUDINAL VIEW)



SMOOTH MUSCLE CELL (LONGITUDINAL VIEW)

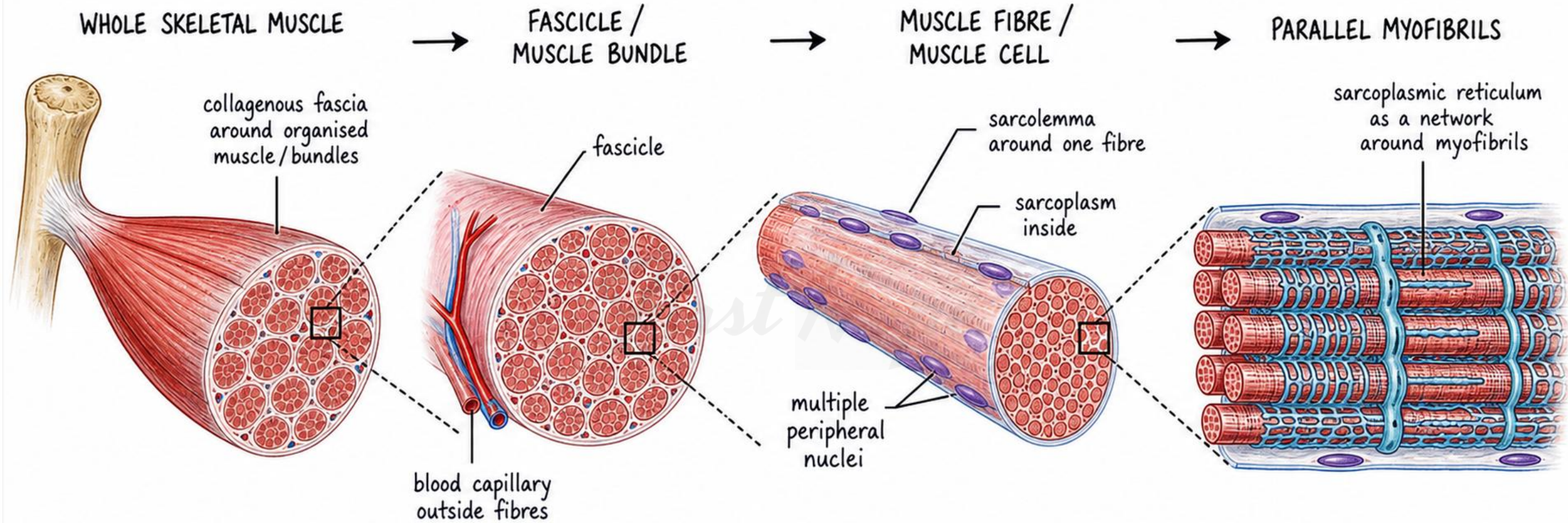


CARDIAC MUSCLE CELLS (LONGITUDINAL VIEW)



CLASSIFIED BY LOCATION + APPEARANCE + REGULATION.

SKELETAL MUSCLE: ORGANISATION FROM MUSCLE TO MYOFIBRIL



- Each muscle contains many fascicles.
- Each fascicle contains many muscle fibres.
- A skeletal muscle fibre is a long multinucleate syncytium.
- Sarcoplasmic reticulum stores Ca^{2+} .
- Myofibrils create the striated appearance.

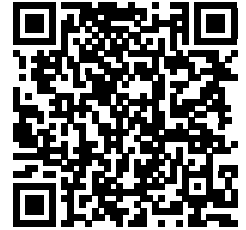


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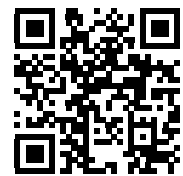


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