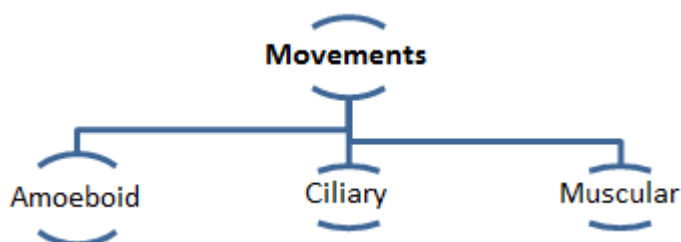


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**CBSE Quick Revision Notes (Class-11 Biology)**  
**CHAPTER- 20 LOCOMOTION AND MOVEMENT**

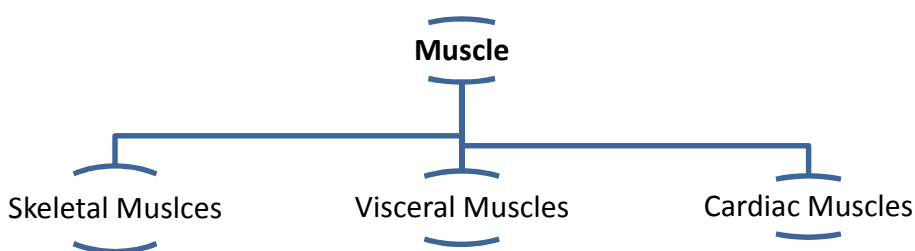
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**Locomotion** is the voluntary movement of an individual from one place to another. Walking, running, climbing, swimming are the example of locomotory motion. All locomotion are movement but all movements are not locomotion.



- Macrophages and leucocytes in blood exhibit amoeboid movements. Coordinated movement in cilia in trachea to remove dusts particles and passage of ova through fallopian tube is example of Ciliary movements.
- Movement of limbs, jaw, tongue and needs muscular movement. Contractile property of muscles is used in movement in higher organism including human beings.

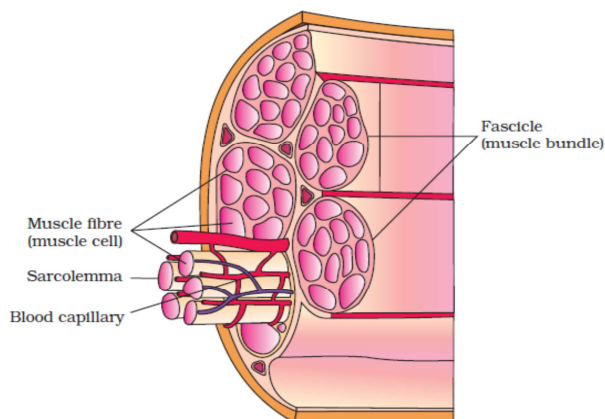
**Muscles** are specialized tissues of mesodermal origin. They have property like excitability, contractility, extensibility and elasticity.



		Cardiac
Associated with skeletal system, alternate light and dark bands (striated), voluntary and locomotory and change in body posture function.	Form inner wall of internal visceral organs, non-striated, involuntary muscle, assists in movement of food through digestive tract and gametes.	Muscles of heart, having branching pattern, alternate light and dark bands, involuntary in action.

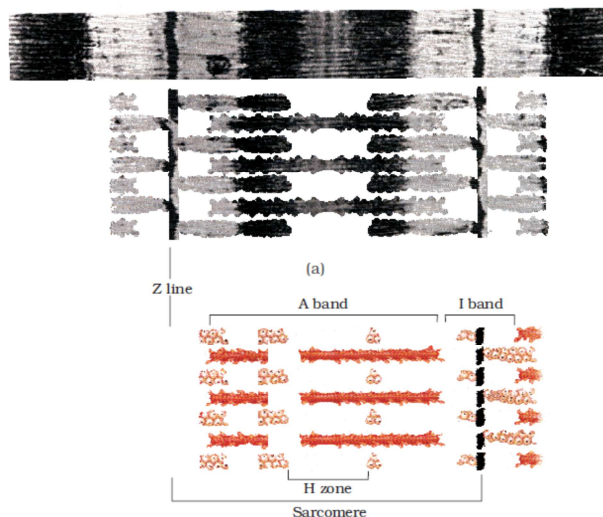
➤ **Skeletal Muscles** is made up of muscles bundles (fascicles), held together by collagenous connective tissue called fascia.

➤ Each muscle bundle contains a number of muscle fibres. Each muscle fibres is lined by plasma membrane sarcolemma inclosing sarcoplasm. Partially arranged myofibrils are present in muscles bundle having alternate



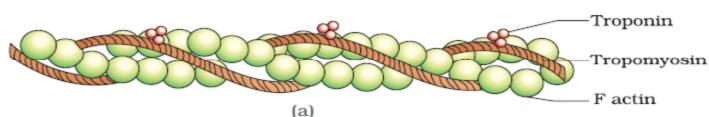
light and dark bands due to presence of protein actin and myosin.

- Light bands contain actin and is called I-band (isotropic band) and dark band is called contain myosin, called A-band (anisotropic band). Both bands are present parallel to each other in longitudinal fashion.
- In centre of each I-band is elastic fibre called 'Z' line. In the middle of A-band is thin fibrous 'M' line. The protein of myofibrils between two successive 'Z' lines is the functional unit of contraction called a **sarcomere**.
- At resting stage thin filament overlaps the thick filament. The part of thick filament not overlapped is called 'H' zone.



### Structure of contractile Protein

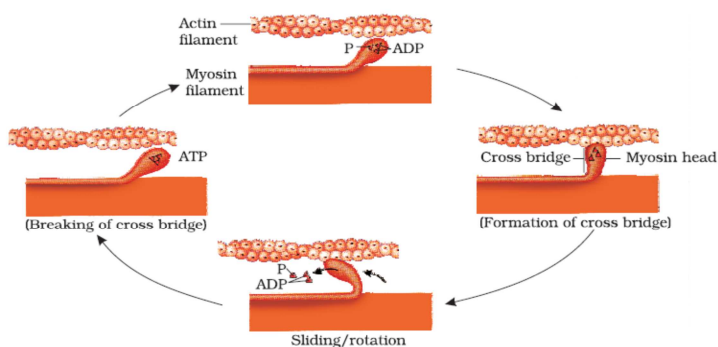
Each thin filament (actin) is made of two 'F' actins helically wound to each other.



Two filaments of other protein tropomyosin and troponin run parallel to each other.

Each meromyosin has globular head with short arm and tails. Globular head has ATP binding sites.

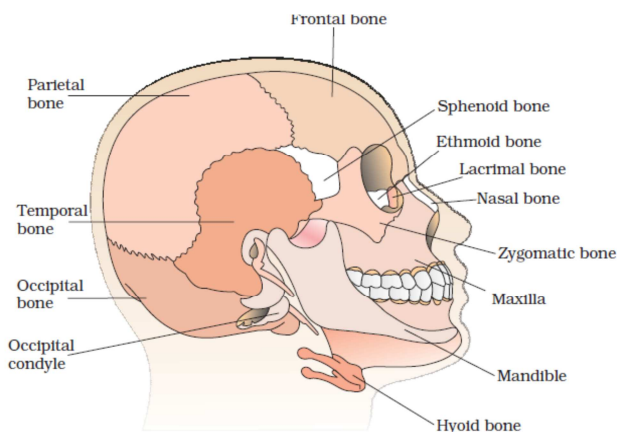
- ❖ The mechanism of muscle contraction is explained by sliding mechanism theory in which thin filament slide over thick filament.
- ❖ Muscle contraction start with signal sent by CNS via motor neuron. Neural signal release neurotransmitter (Acetylcholine) to generate action potential in the sarcolemma.
- ❖ Red fibres (aerobic muscles) contain myoglobin that has plenty of mitochondria to produce large amount of oxygen stored in them. The muscle fibres containing less number of myoglobin are called white fibres.



### Skeletal System

Framework of bones and cartilage forms the skeletal system. In human beings, it consists of 206 bones and some cartilage. The two principle division of skeletal system are

- axial Skeleton (80 bones)- includes skull, vertebral column, sternum and ribs constitute axial system.



- The skull (22 bones) is composed of cranial and facial bones. Cranial (8 bones) forms protective covering for brain (cranium). The facial region consists of 14 skeletal systems that form front part of skull. Hyoid bone (U-shaped) forms the base of buccal cavity.
- The middle ear bone (Malleus, Incus and Stapes) collectively called Ear Ossicles. Skull joins with vertebral column with two occipital condyle.
- Vertebral column consists of 26 serially arranged vertebrae. First vertebra is atlas that combines with occipital condyle other include Cervical-7, thoracic -12, lumbar -5, sacral – 1 coccygeal -1.
- 12 pairs of ribs connected dorsally to vertebral column and ventrally to sternum. 11<sup>th</sup> and 12<sup>th</sup> rib bones are not connected with sternum and are called floating bones.

**Appendicular Skeleton-** of bones of limbs and girdles. Each limb contains 30 bones.

	Lower Limb
Humerous, radius and ulna, 8-carpels, 5-metacarpals, 14-phalanges,	Femur, tibia and fibula, 7-tarsal, 5-metatarsal, 14-phalanges, cup shaped patella cover the knee.

**Joints** – are points of contact between bones, or between bones and cartilage.

- Fibrous joints-** do not allow any movements. Present in flat skull bones to form cranium.
- Cartilaginous joints-** bones are held together with the help of cartilage present in vertebrae. Permits limited movements.
- Synovial joints-** fluid field synovial cavity, provide considerable movements. Ball and socket joint, hinge joints, pivot joints, gliding joints etc.

### Disorders of Muscular and Skeletal System

- **Myasthenia gravis-** auto immune disorder affecting neuromuscular junction causing fatigue, weakening and paralysis of skeletal system.
- **Muscular Dystrophy-** degeneration of skeletal muscles due to genetic disorder.
- **Osteoporosis** – decreased bone mass in old age leading to chance of fracture due to decreased estrogen.
- **Arthritis-** inflammation of joints.
- **Gout-** inflammation of joints due to accumulation of uric acid crystals.

