

CLASS 9 Unit 4

Behind the Movements

1. Human Skeletal & Muscular System

- Total Bones: 206 bones in the adult human body.
 - Axial Skeleton (80 bones):
 - Skull: 29
 - Vertebral Column: 24
 - Ribs: 24
 - Sternum: 1
 - Appendicular Skeleton (126 bones):
 - Pectoral Girdle: 4
 - Upper Limbs: 60
 - Pelvic Girdle: 2
 - Lower Limbs: 60
- Muscle Proteins: Actin and Myosin (responsible for muscle contraction and relaxation).
- Bone Structure & Growth:
 - Periosteum: Outer covering containing blood vessels, nerves, lymph vessels, and osteoblast cells.
 - Hardness Factors: Calcium, phosphorus, collagen protein, and minerals.
 - Osteoblast Cells: Deposit minerals, aid bone growth and injury repair.
 - Key Growth Factors: Calcium (strength), Vitamin D (absorption from sunlight), Protein (development).
- Cartilage: Softer, flexible connective tissue without blood vessels or nerves (slow growth; reduces joint friction).

2. Connective Tissues & Joints

- Connective Tissue Connectors:
 - Tendons: Connects bone to muscle.
 - Ligaments: Connects bone to bone.
- Types of Joints & Movement:

- Pivot Joint: First vertebra joining the skull (rotational movement).
- Ball and Socket Joint: Shoulder girdle & arm bone, hip joint (movement in all planes).
- Hinge Joint: Elbow, knee, fingers (movement in one direction only).
- Gliding Joint: Wrist and ankle regions.
- Joint Protection: Synovial fluid and cartilage prevent friction.

3. Locomotory Systems in Organisms

- Hydroskeleton: Water-filled body cavity (e.g., Jellyfish, Earthworm, Snail).
- Exoskeleton: External covering made of calcium carbonate (Crabs, Clams) or chitin (Cockroaches).
- Endoskeleton: Internal framework of bone and cartilage (Vertebrates, Humans).

Important Organism Locomotory Organs (High-Yield PSC Questions)

- Bacteria: Flagellum
- Amoeba: Pseudopodia
- Paramecium: Cilia
- Earthworm: Setae
- Bird: Wings, tail
- Frog: Hind limbs
- Whale: Flipper, tail

4. Bone & Muscle Disorders and First Aid

- Osteoporosis: Lack of calcium, vitamins, and protein causing bone porosity and loss of hardness.
- Rheumatoid Arthritis: Immune cells destroy cartilage and synovial membrane (joint pain/swelling).
- Muscular Dystrophy: Muscles weaken due to genetic mutations.
- Sprain: Stretching or tearing of ligaments.
- First Aid Devices:
 - Splint: Temporarily restricts movement for fractured arms or legs.
 - Sling: Supports and immobilizes the arm during fractures or sprains.

- Muscle Fatigue: Caused by oxygen shortage during continuous work, leading to anaerobic respiration and lactic acid accumulation.

5. Movements in Plants

- Phototropism: Growth towards or away from the direction of light.
- Geotropism: Growth towards or away from the direction of gravity.
- Hydrotropism: Growth in response to water.
- Nastic Movements: Immediate response to touch or darkness (e.g., Touch-me-not plant drooping when touched, leaves closing when it gets dark).