

SKELETON – MOVEMENT AND LOCOMOTION

FUNCTIONS OF HUMAN SKELETON

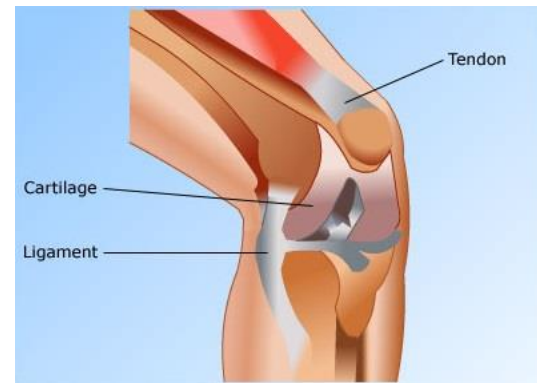
The skeleton in our body serves six main purposes:

1. **Support and shape:** The skeleton provides a support or framework to all the soft parts and gives the body and its parts a definite shape.
2. **Protection.** Several delicate and important organs are well protected by a casing of bones.
3. **Movement.** Many bones are joined to each other in a manner that one bone can be moved on another.
4. **Leverage.** Some bones and joints form levers that increase the speed and distance of movement by a muscle.
5. **Formation of blood cells.** Certain types of blood cells, including red and white blood cells are formed in the tissue of the central hollow space or the marrow of some of the long bones.
6. **The bones are a storehouse of calcium and phosphorus for the rest of the body.**

CONSTITUENTS OF SKELETON

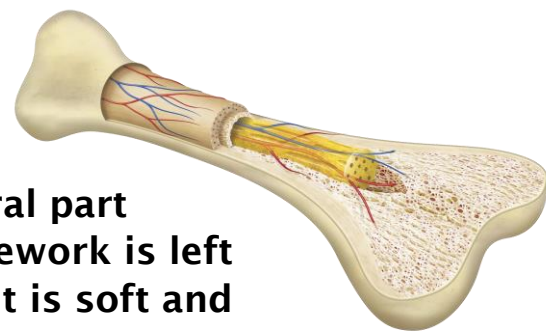
Our skeleton consists of bones, cartilages and ligaments.

- **Bones** comprise the hard framework of the body.
- **Cartilages** are the supporting and connecting structures.
- **Ligaments** bind the bones together.



BONE

Bone is the chief component of our skeleton. It consists of organic and inorganic material. If a bone is placed in weak hydrochloric acid, the mineral part is removed from it and the remaining organic framework is left behind. Such a bone is called decalcified bone and it is soft and flexible which can even be tied into a knot.

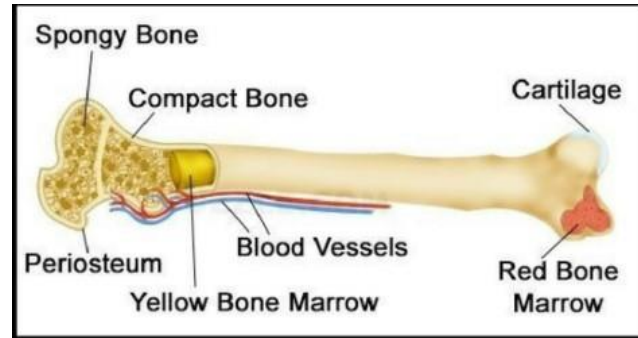


Classification of bone on the basis of shape

Shapewise bones are classified into : long, short, or flat and irregular bones, as given in the above scheme.

A long bone has a hollow cavity in the middle which is filled with bone marrow. Marrow is of two types

- (i) **yellow marrow**, made up of adipose tissue and blood vessels which give rise to white blood cells.
- (ii) **red marrow**, which is present at the ends and produces red blood cells.



THE HUMAN SKELETON

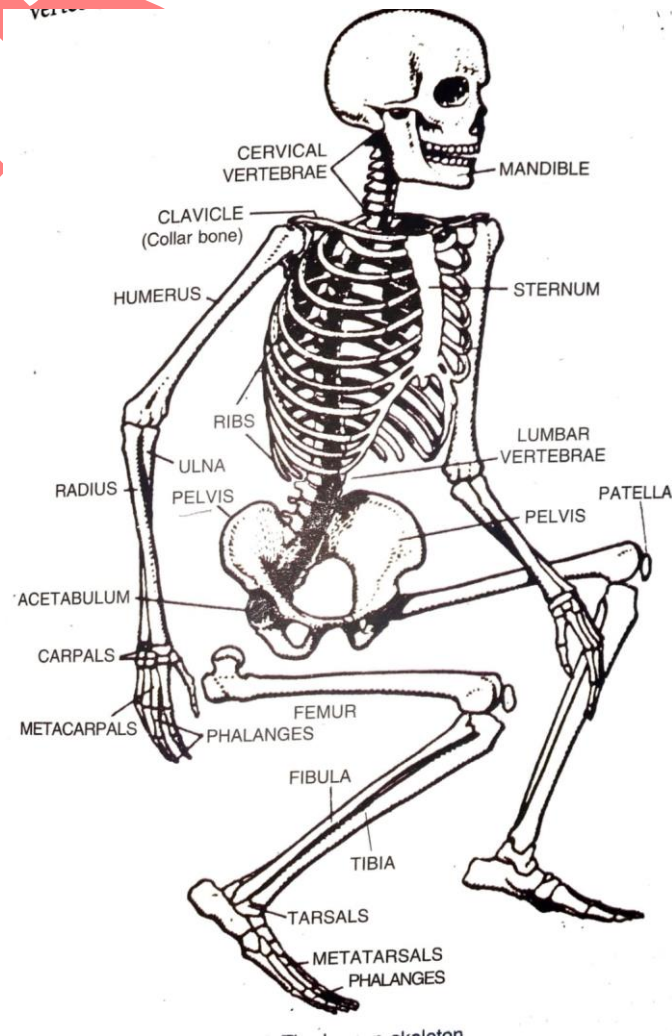
The human skeleton altogether consists of 206 bones including three very tiny bones in each ear.

The skeleton has two main divisions: the axial skeleton which includes the basic central framework of the body and the appendicular skeleton which includes the bones of the limbs and girdles.

Axial Skeleton: The axial skeleton consists of the skull, the vertebral column, the ribs and the sternum.

A. SKULL: The upper top part the cranium is made of eight bones which are so joined to each other that they are permanently fixed. The other part of the skull forms the face which contains a total of fourteen bones. The back part of the cranium contains a large hole, the foramen magnum, through which the spinal cord after emerging from the brain continues behind into the backbone.

B. VERTEBRAL COLUMN: The vertebral or spinal column is popularly called the backbone. It is composed of a total of 33 ring-like bones called vertebrae.



Vertebral column is curved to maintain balance of body in an erect position. The curve absorbs pressure and shock while walking, running and protects the column from breaking.

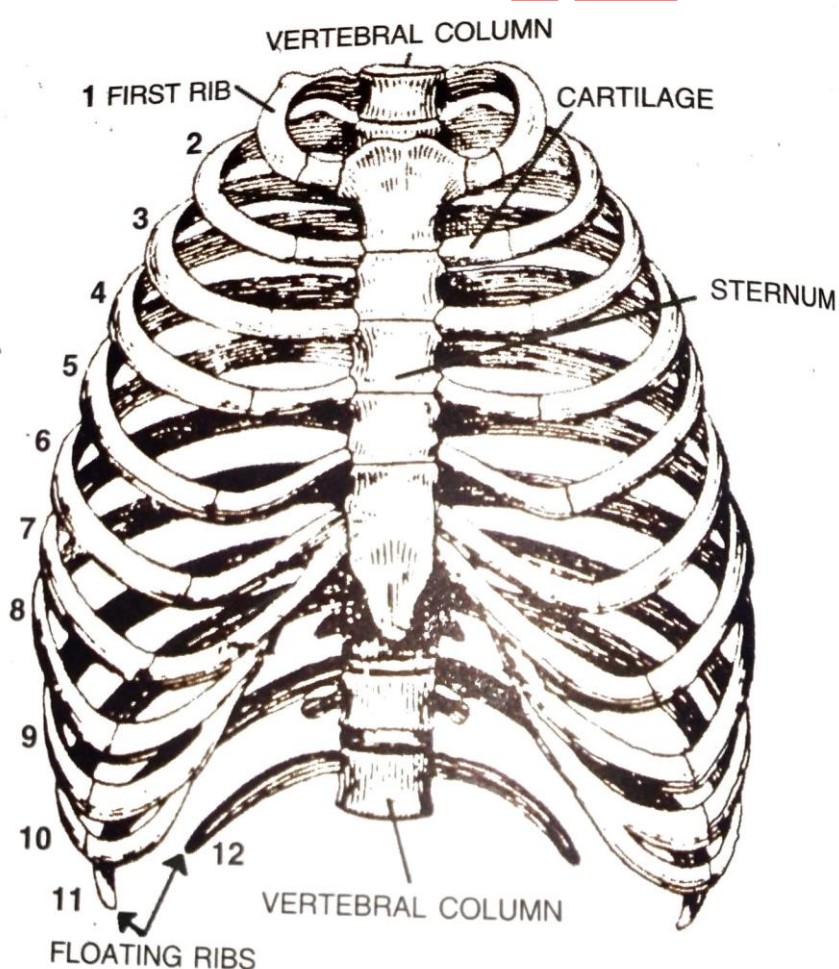
Structure of vertebra: Each vertebra is a somewhat ring-like structure. Its lower part is formed of a solid cylinder of bone called centrum.

Neck/cervical vertebrae:

The first cervical vertebra is called the atlas. The second vertebra is the axis. Coccyx is the last part of the backbone. It is made up of four fused vertebrae which represent the rudimentary tail of the human body.

C. RIBS: There are twelve pairs of ribs which along with the thoracic vertebrae and the breast bone constitute the bony cage or rib cage. The first seven pairs of ribs true ribs are attached in front to the sternum (breast-bone) with the help of hyaline cartilage. The 8th, 9th and 10th pairs of ribs do not articulate directly with the sternum but join the seventh rib with the help of hyaline cartilage. The last two, 11th and 12th pairs of ribs, are not attached to the sternum and are, therefore, known as floating ribs.

D. STERNUM: The sternum (breast-bone) is a long flat bone lying in the middle of the front of the chest.



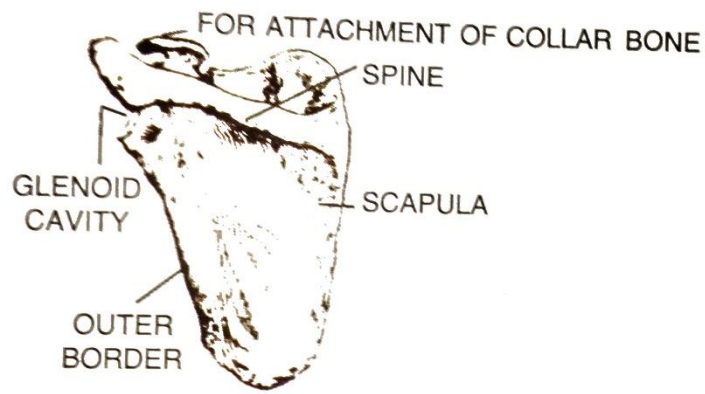
Appendicular Skeleton (Bones of Limbs and Girdles)

A. BONES OF THE LIMBS: The forelimbs consist of a single long bone humerus in the upper arm, two long bones in the lower arm, the radius on the side of the thumb and the ulna. Eight carpals or wrist bones in the wrist, five metacarpals in the palm and fourteen phalanges. The hind-limbs have an additional bone called patella (or the knee-cap) which is joined to the lower end of the femur. Knee-cap is a bone developed from a tendon.

B. GIRDLES:

Girdles are the parts of skeleton which help to articulate the limb bones to the main skeleton.

Its outer apex bears a large somewhat cup-shaped glenoid cavity into which fits the rounded upper head of the humerus.



JOINTS

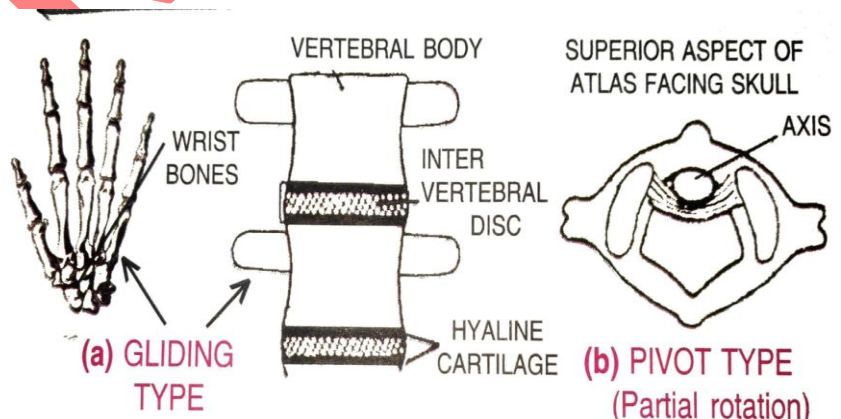
The point at which two separate bones meet is called a joint.

1. IMMOVABLE JOINTS: In this type of joint no movement is possible between the two bones.

2. PARTIALLY MOVABLE JOINTS: Here only very little (partial) movement occurs between the two bones.

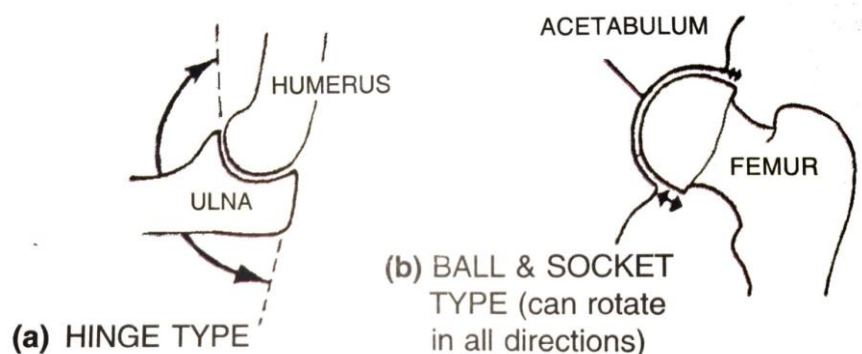
3. FREELY MOVABLE JOINTS: In this type, varying degrees of movement are possible between the two bones forming the joint. The four major types of movable joints are as follows:

(a) Gliding joint: It occurs between the bones of the wrist and also between the bones of the ankle as well as between vertebrae.



(b) Pivot joint: Here one bone is rotated over a pivot-like end of another bone. For example, the skull is rotated on the upper end of the axis vertebra.

(c) Hinge joint: This joint moves like a hinge in one plane only just like the hinge of a door.

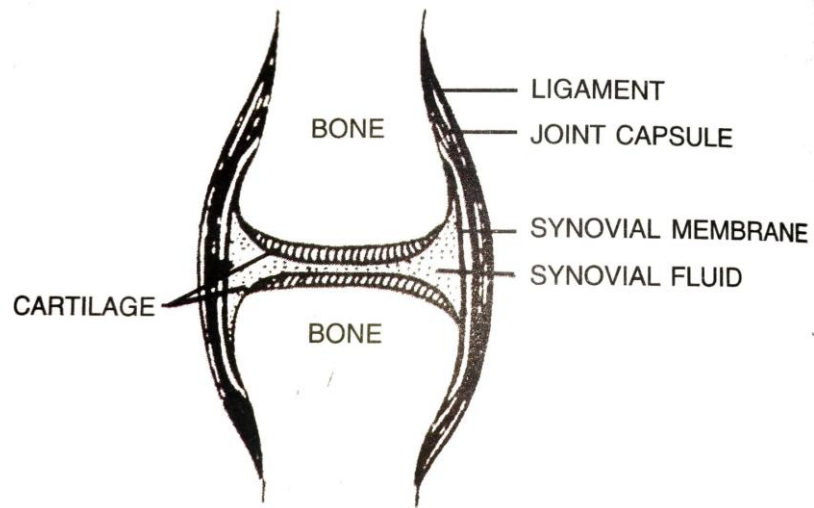


(d) Ball and socket joint: Here one end of a bone which is rounded and ball-like, fits into a cup-like depression of another bone.

SYNOVIAL JOINTS

The freely movable joints stated above, like the shoulder joint, the knee joint is also called synovial joints. They allow considerable degree of movement. The surfaces coming into contact should be well lubricated to remove friction.

The lubricating fluid wherever it occurs, is called the synovial fluid and hence the name synovial joint.



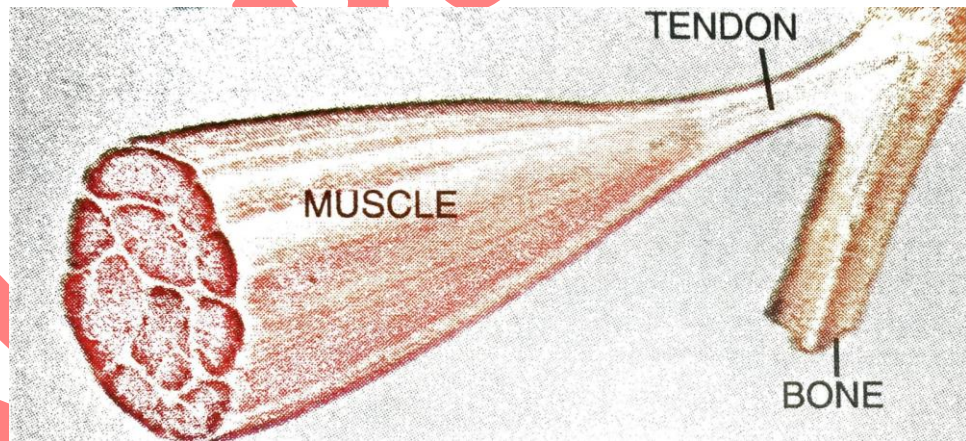
MUSCLES

. The muscles in the body provide the means of all movements.

. They cover the skeletal framework and also give contour (shape) to the body.

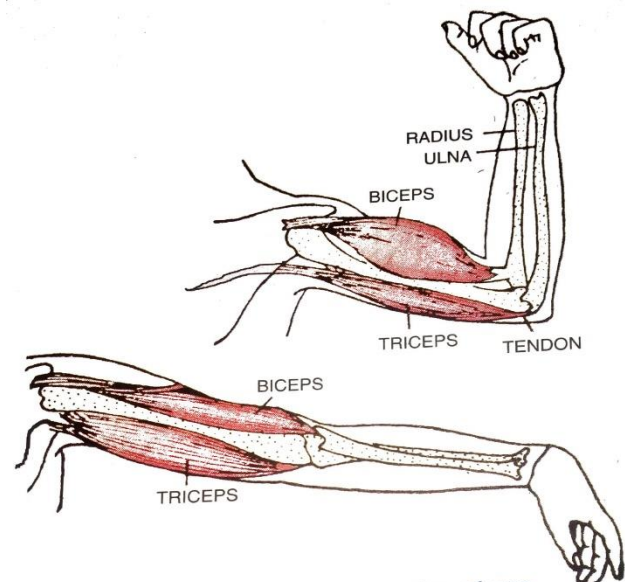
. Muscles help to maintain body posture while sitting, standing or walking.

Most muscles are long bundles of contractile tissue. Each muscle usually has two ends-a fixed end where the muscle originates and a movable end which pulls some other part.



Antagonistic muscles

A structure which has been moved by a muscle cannot return to its original position without the action of another muscle. Such muscles causing opposing movements are called antagonistic muscles.



Kinds of muscles - Voluntary, involuntary and cardiac

There are about 400 muscles in our body making up nearly one-half of the body weight. These muscles fall into two categories - voluntary muscles which are under control of our will and involuntary muscles which are not controlled by our will.

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