SKELETAL SYSTEM

Introduction:

The skeletal system is the body's framework, providing support, protection, and enabling movement. It's composed of bones, cartilage, and ligaments, and also plays a vital role in blood cell production and mineral storage.

Functions of the Skeletal System:

Support and Structure:

Bones provide the main framework that supports the body and gives it shape.

Protection:
The skeletal system protects vital organs. For example, the skull protects the brain, and the ribcage protects the heart and lungs.

Movement:
Bones act as levers, working with muscles to facilitate movement at joints.

Mineral Storage:
Bones store essential minerals like calcium and phosphorus.

Blood Cell Production:
Bone marrow, found within bones, is responsible for producing red and white blood cells.

Components of the Skeletal System:

Bones: The main structural component, composed of living tissue and minerals.

Cartilage: A flexible connective tissue that cushions joints and provides support.

Ligaments: Strong, fibrous tissues that connect bones to each other, stabilizing joints.

Tendons: Tough cords of tissue that connect muscles to bones, enabling movement.

Joints: Areas where two or more bones meet, allowing for different types of movement.

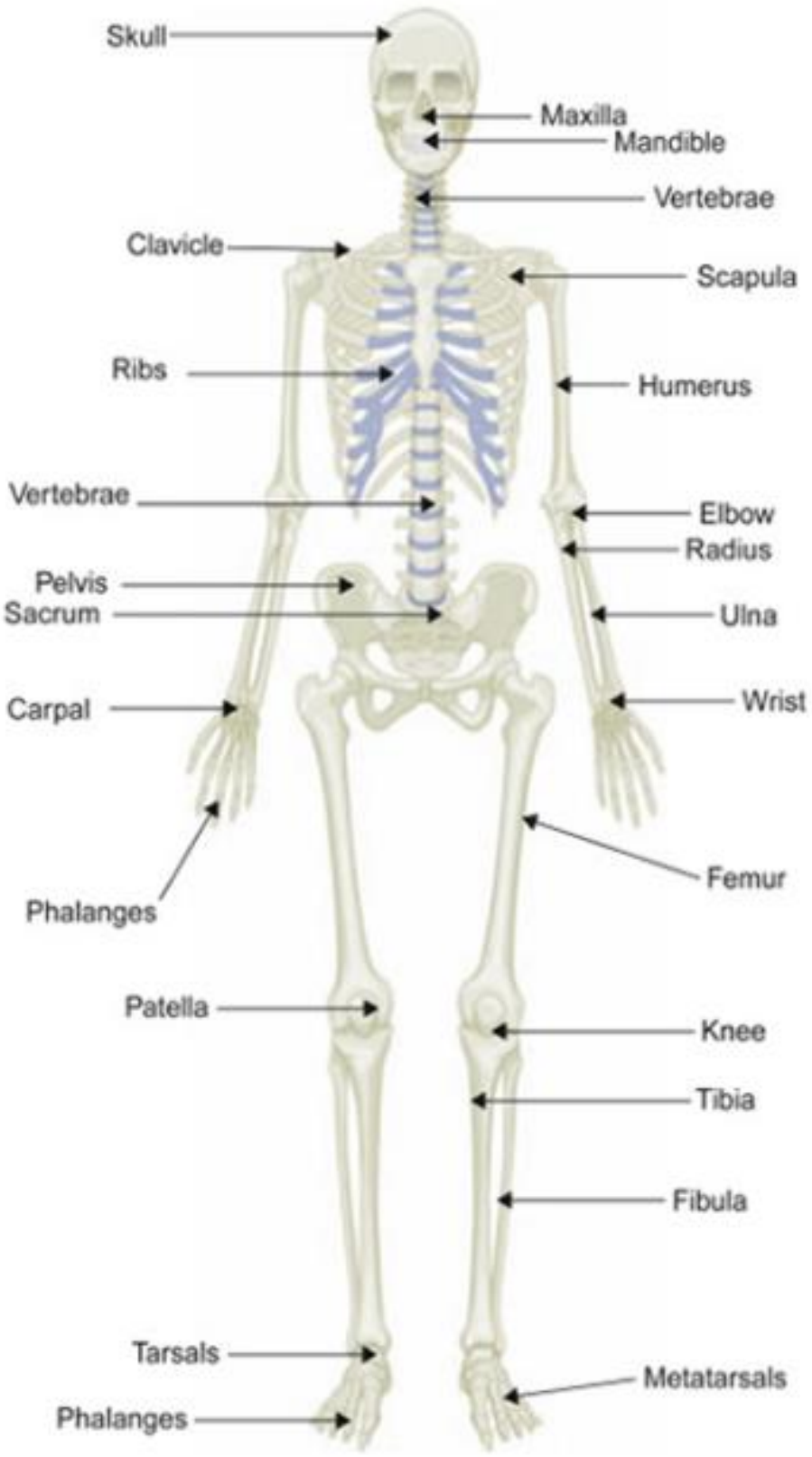
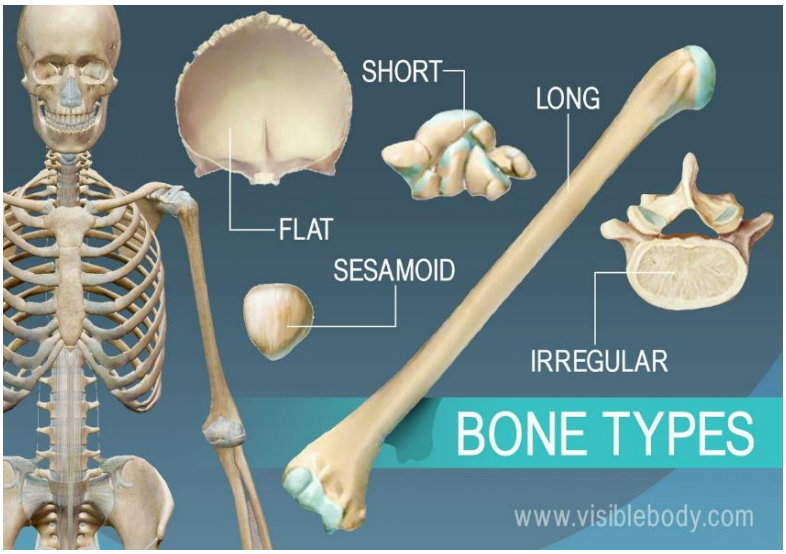


Fig: SKELETAL SYSTEM

TYPES OF BONE AND FUNCTION



Bones are made from three different kinds of cells and have three different layers. Their general structure is a combination of a protein called collagen and a molecule called calcium phosphate. These weave together to form their strong, lightweight structure.

The three cell types that form bones are:

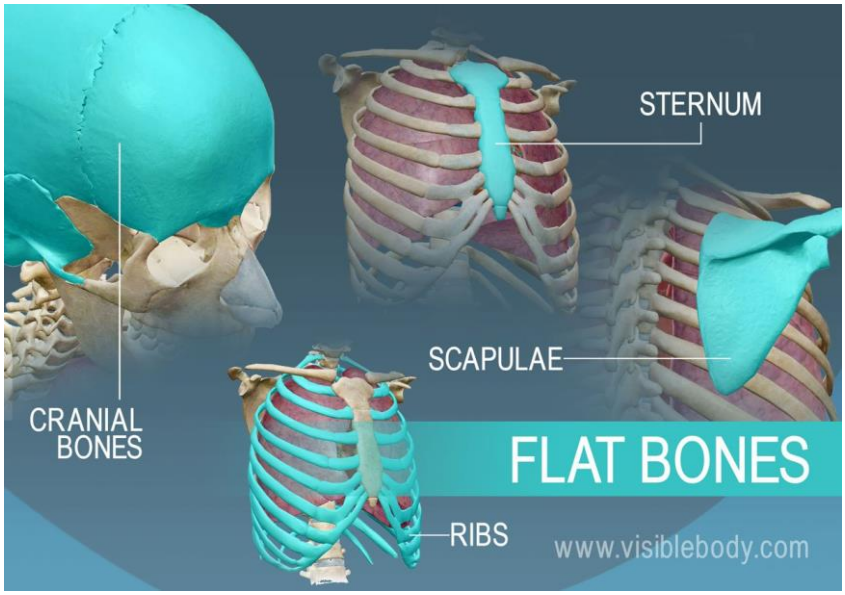
- **Osteoblasts.** These make new bone tissue and help repair damage to your bones.
- **Osteocytes.** These are mature bone cells that help the bones of newborns mature.
- **Osteoclasts.** These break down your bones and help form them into their correct shapes.

The three layers of a bone are:

- **Periosteum.** This is a tough outer coating to your bones that helps protect them.
- **Compact bone.** This is just under the periosteum. It's hard, white, and smooth. It's also the main part of the bone that lends firmness and support to your skeletal system.
- **Spongy bone.** This is the soft, inner layer of your bones. It's full of holes where bone marrow can fit. There are two types of marrow — one kind that makes blood cells and one kind that stores fat and minerals.

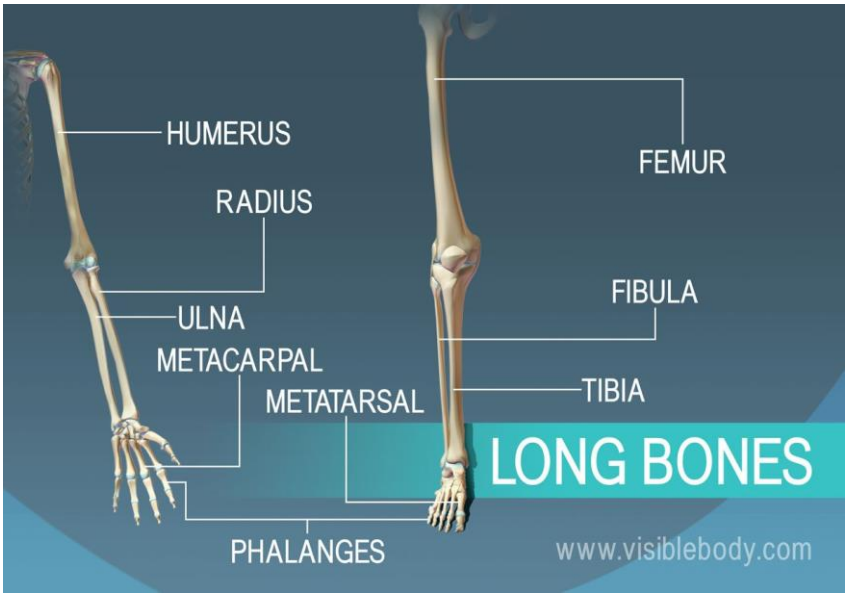
The human skeleton contains five main types of bones based on their shape: long, short, flat, irregular, and sesamoid. These bones differ in structure and function, contributing to movement, protection, and support.

1. Flat Bones Protect Internal Organs



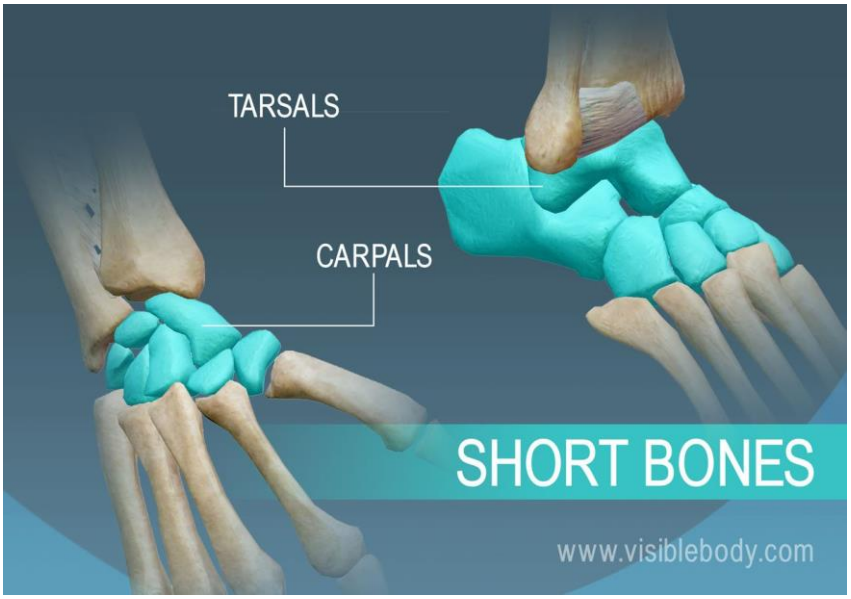
There are **flat bones** in the skull (occipital, parietal, frontal, nasal, lacrimal, and vomer), the thoracic cage (sternum and ribs), and the pelvis (ilium, ischium, and pubis). The function of flat bones is to protect internal organs such as the brain, heart, and pelvic organs. Flat bones are somewhat flattened, and can provide protection, like a shield; flat bones can also provide large areas of attachment for muscles.

2. Long Bones Support Weight and Facilitate Movement



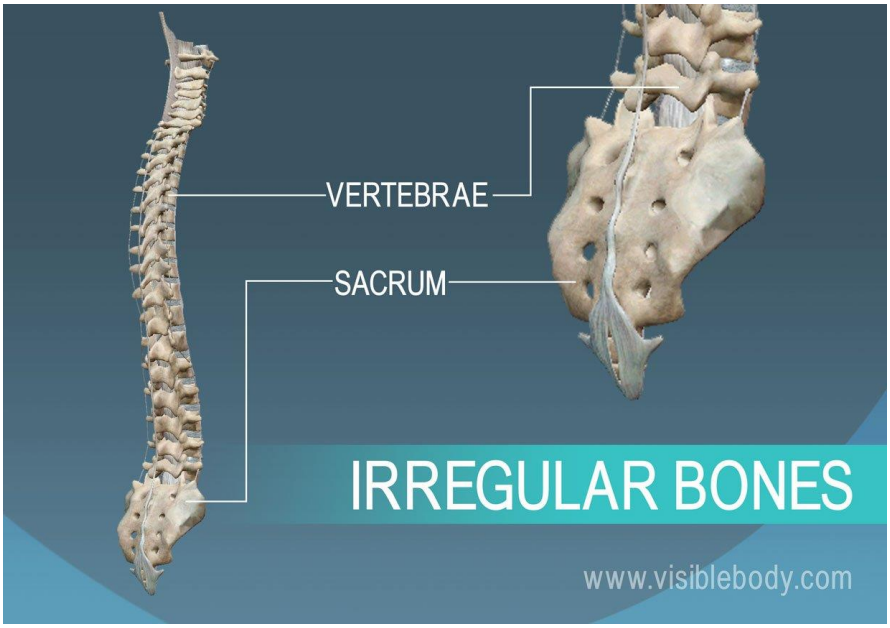
The **long bones**, longer than they are wide, include the femur (the longest bone in the body) as well as relatively small bones in the fingers. Long bones function to support the weight of the body and facilitate movement. Long bones are mostly located in the appendicular skeleton and include bones in the lower limbs (the tibia, fibula, femur, metatarsals, and phalanges) and bones in the upper limbs (the humerus, radius, ulna, metacarpals, and phalanges).

3. Short Bones Are Cube-shaped



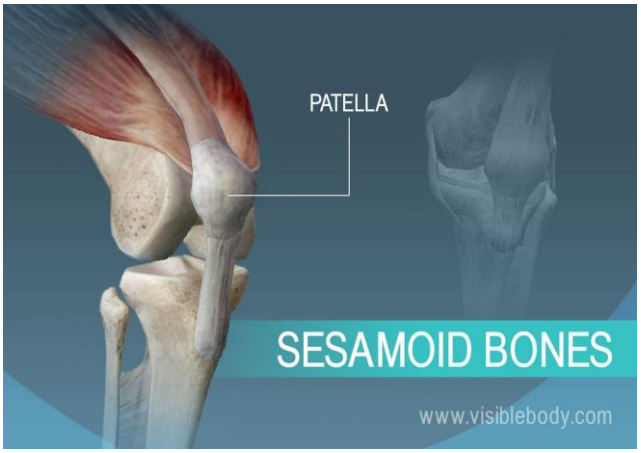
Short bones are about as long as they are wide. Located in the wrist and ankle joints, short bones provide stability and some movement. The carpals in the wrist (scaphoid, lunate, triquetral, hamate, pisiform, capitate, trapezoid, and trapezium) and the tarsals in the ankles (calcaneus, talus, navicular, cuboid, lateral cuneiform, intermediate cuneiform, and medial cuneiform) are examples of short bones.

4. Irregular Bones Have Complex Shapes



Irregular bones vary in shape and structure and therefore do not fit into any other category (flat, short, long, or sesamoid). They often have a fairly complex shape, which helps protect internal organs. For example, the vertebrae, irregular bones of the vertebral column, protect the spinal cord. The irregular bones of the pelvis (pubis, ilium, and ischium) protect organs in the pelvic cavity.

5. Sesamoid Bones Reinforce Tendons



Sesamoid bones are bones embedded in tendons. These small, round bones are commonly found in the tendons of the hands, knees, and feet. Sesamoid bones function to protect tendons from stress and wear. The patella, commonly referred to as the kneecap, is an example of a sesamoid bone.