

BONES LAB

Macroscopic and Microscopic Bone Structure

Without the skeletal system we would be unable to perform the simplest movements such as walking, sitting, or grasping objects. The slightest jar to the head or chest would damage the brain or heart. The framework of bones and cartilage that protects our internal organs and allows us to move is called the skeletal system.

The skeletal system performs five major functions. It:

- * Supports soft tissue
- * Protects soft tissue
- * Allows for movement (along with the muscular system)
- * Provides storage for calcium, phosphorus, and fat
- * Produces blood cells (in red marrow)

The skeletal system is divided into two main parts. The **axial** skeleton consists of the skull, auditory ossicles, hyoid bone, vertebral column, sternum, and ribs. The **appendicular** skeleton consists of the shoulder girdles, arms, wrists, hands, the pelvic girdles, legs, ankles, and feet.

The Four Bone Types

1. **Long bones** have a greater length than width, and are slightly curved for strength. Curved bones are designed to absorb the stress of the body weight at several points, so that the stress is evenly divided. Otherwise, the weight of the body could easily fracture the long bones.

Examples - the bones of the arms and legs

2. **Short bones** are cube-shaped. Examples - the wrist and ankle bones

3. **Flat bones** are thin. They provide protection, and also areas for muscle attachment.

Examples - the ribs and skull.

4. **Irregular bones** have complex shapes. Examples - the vertebrae and some facial bones

Spongy and Compact Bone

Bone is not completely solid. In fact, all bone has some spaces between its hard components. The spaces provide channels for nerves, and blood vessels that supply the bone with nutrients. The spaces also make the bone lighter. Bone may be classified as spongy or compact depending on the size and distribution of the spaces.

Spongy bone contains many large spaces filled with red marrow. It makes up most of the bone tissue of short, flat, and irregular bone, and most of the ends of long bones. Spongy bone tissue provides a storage area for marrow. In contrast, **compact bone** tissue contains few spaces between the mineral matrix. It is deposited in a layer over the spongy bone tissue. The layer of compact bone is thicker in the middle, or shaft, of a long bone. Compact bone provides protection and support, and helps the long bones resist the weight placed upon them.

Macroscopic Structure of a Long Bone

The enlarged end of a long bone is called the epiphysis. The articular surface is covered in very smooth hyaline cartilage to reduce friction as bone moves over bone. These bone ends are made primarily of spongy bone, covered with a thin layer of compact bone. The shaft, or diaphysis, of a long bone is made up of compact bone, with a large central canal (the medullary canal) containing marrow. The diaphysis is covered with a tough vascular covering, the periosteum. The periosteum is continuous with tendons and ligaments.

Microscopic Structure of Compact Bone

When looking at compact bone with a microscope it becomes apparent that even this bone is not solid. Rather, there is a system of microscopic canals laid out in a very orderly pattern. This is the osteon. These microscopic canals are filled with tiny capillaries that deliver nutrients to the living bone cells.

Lab Procedures and Questions

1. Observe, sketch and label a long bone. Include:
 - a. diaphysis
 - b. epiphysis
 - c. articular cartilage
 - d. periosteum

2. Observe, sketch and label a cross section of a long bone. Include:
 - a. periosteum
 - b. compact bone
 - c. medullary canal
 - d. marrow (red or yellow?)

3. Look at a prepared slide of compact bone. You will be observing the osteon. Sketch and label what you see. (See pg. 165 in your text)
 - a. osteon
 - b. osteocyte
 - c. central canal
 - d. lacunae

4. Look at the human skeleton in the room. Some of the bones are numbered. Identify each bone and classify it as long, short, flat, or irregular.

a.	f.
b.	g.
c.	h.
d.	i.
e.	j.