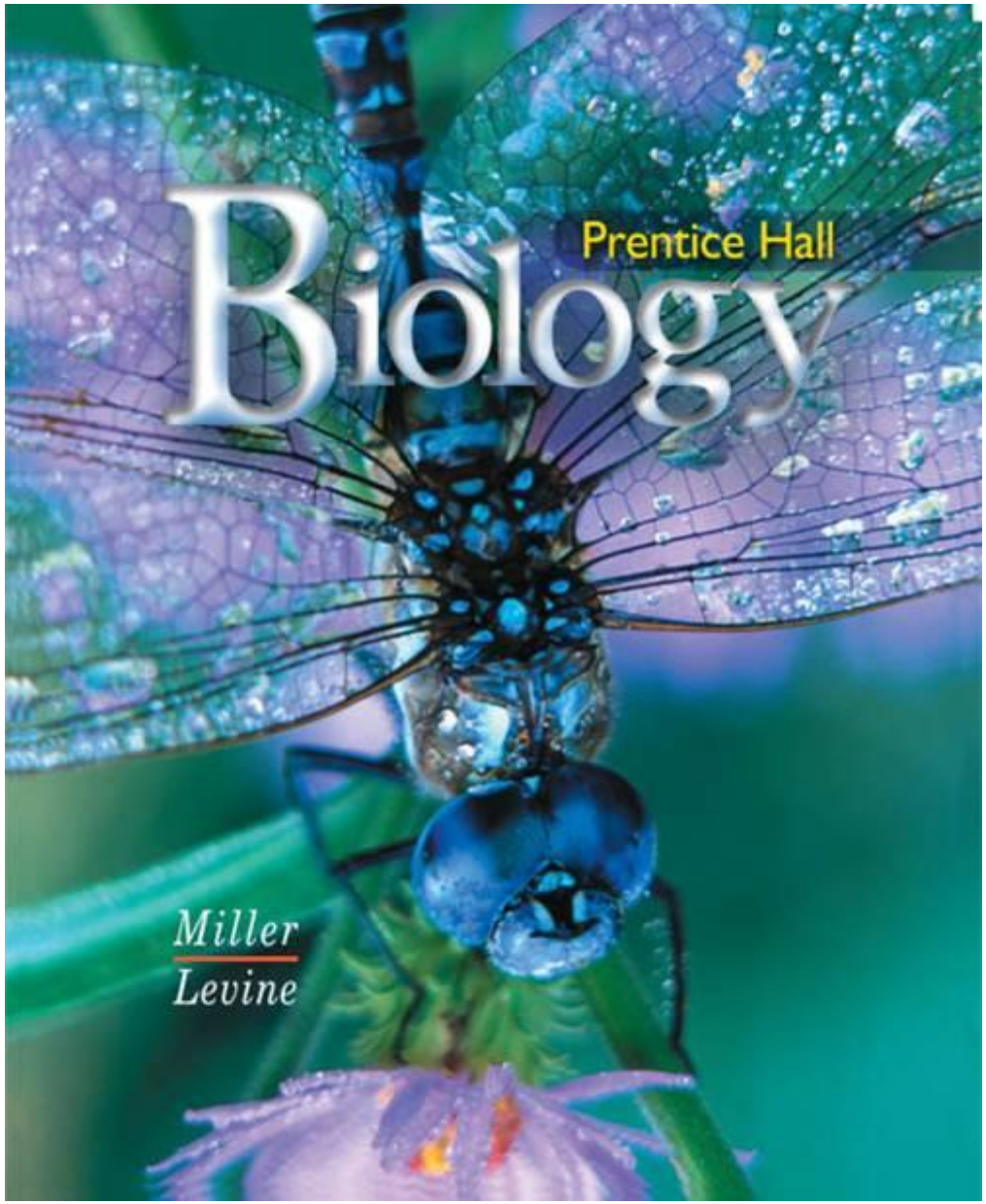
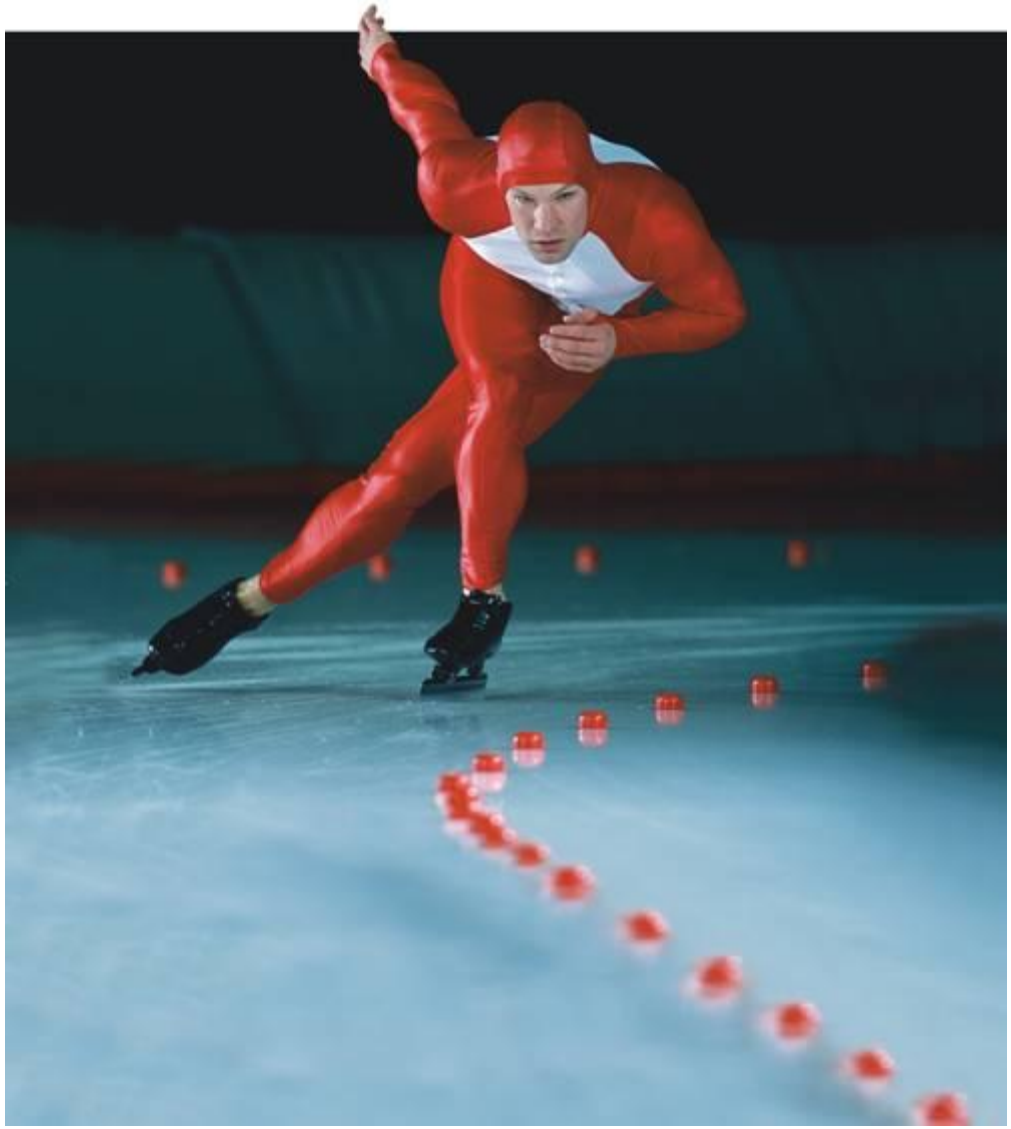


36–1 The Skeletal System



(All organisms need structural support.

Unicellular organisms have a cytoskeleton.

Multicellular animals have either an **exoskeleton** (arthropods) or an **endoskeleton** (vertebrates).)

(The human skeleton is composed of bone.

Bones and other connective tissues, such as cartilage and ligaments, form the skeletal system).

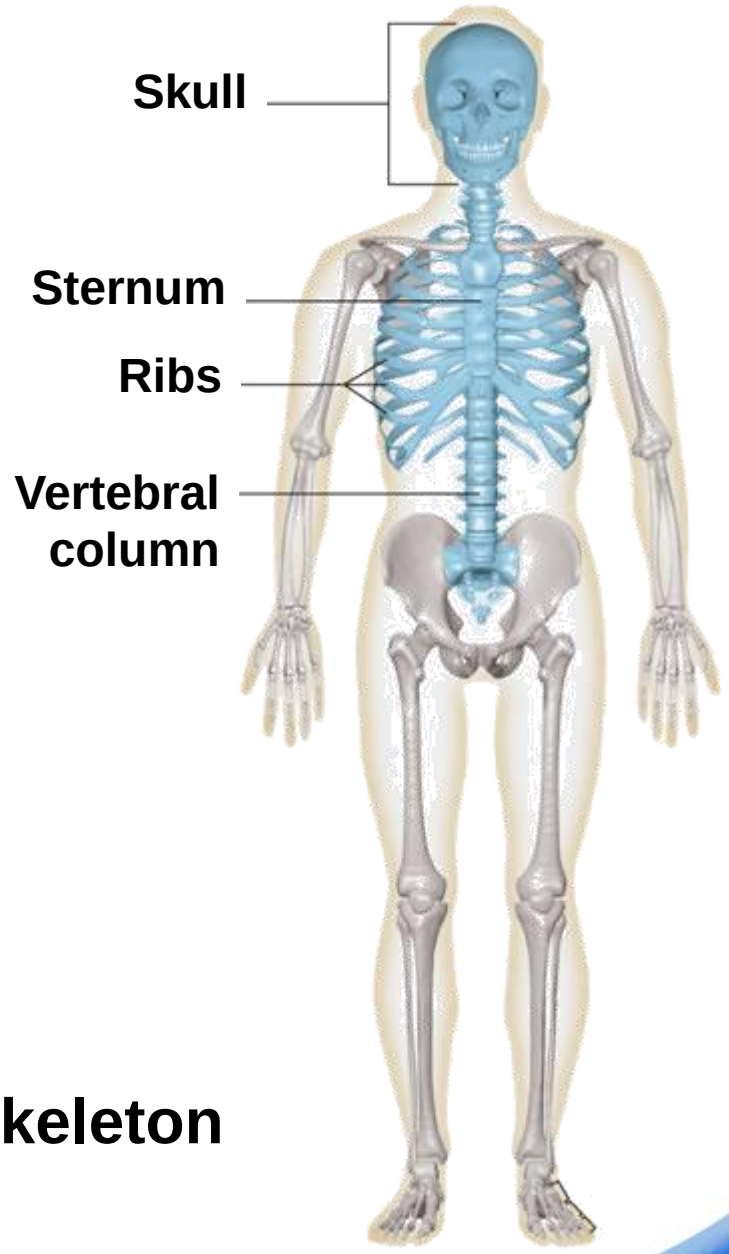
What are the functions of the skeletal system?

A. The skeleton:

- 1. supports the body.
- 2. protects internal organs.
- 3. provides for movement.
- 4. stores mineral reserves.
- 5. provides a site for blood cell formation.

- Osteo=bone

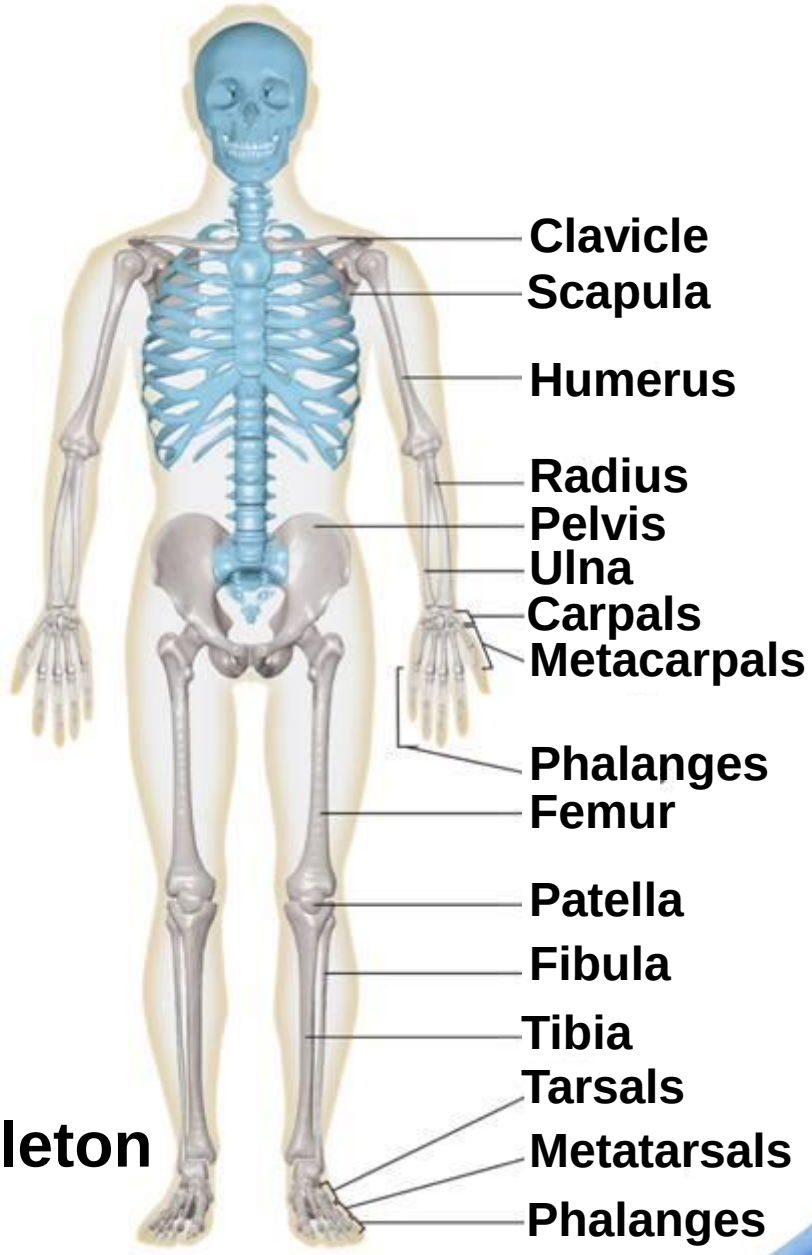
B. axial skeleton: (blue) supports central axis of body.



Axial Skeleton

C. Appendicular Skeleton (grey):

bones of arms and shoulder area; pelvis and legs



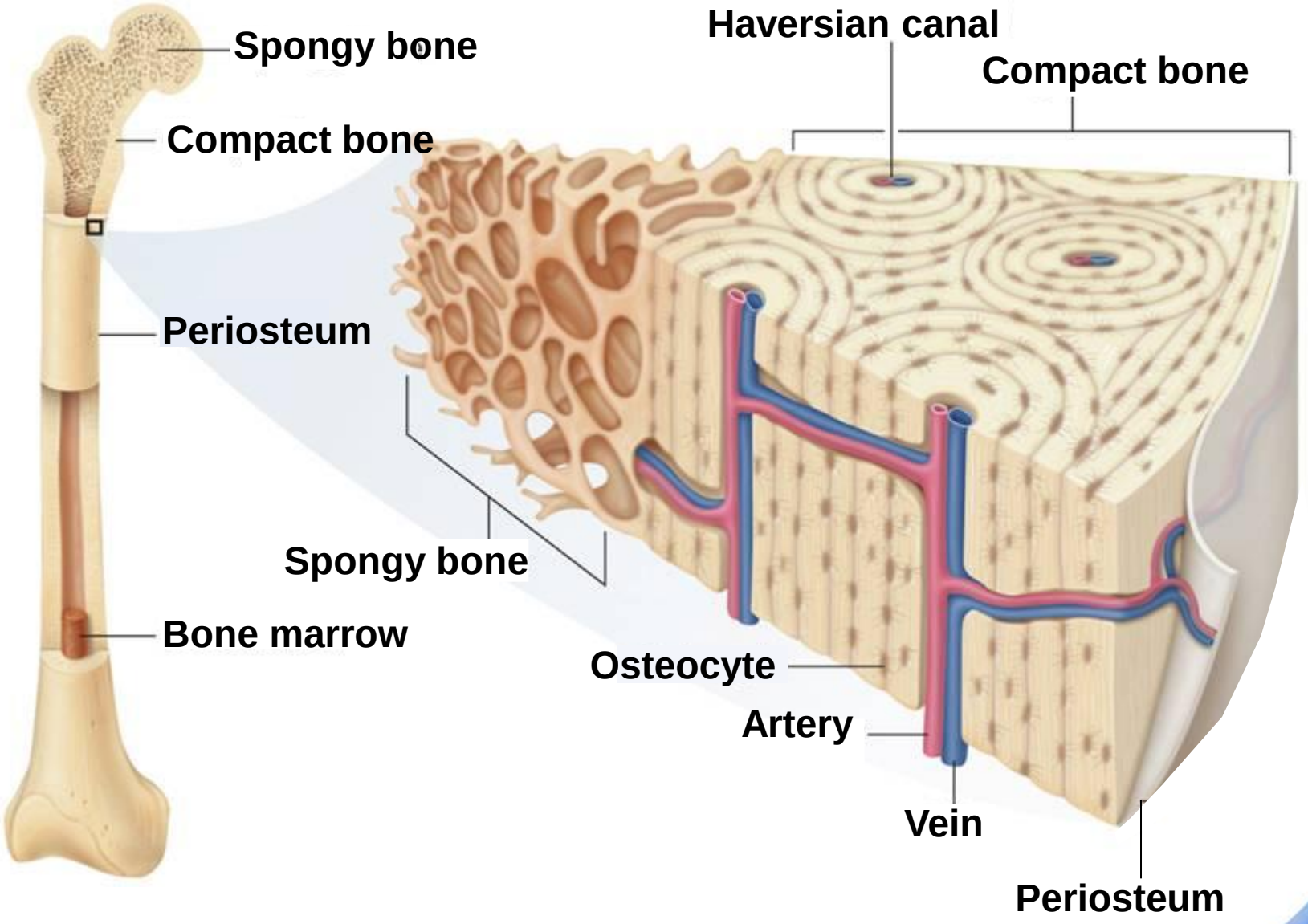
Appendicular Skeleton

Structure of Bones

What is the structure of a typical bone?

D. Bone Structure:

1. solid network of living cells
2. protein fibers surrounded by deposits of calcium salts.



(The bone is surrounded by a tough layer of connective tissue called the **periosteum**.

Blood vessels in the periosteum carry oxygen and nutrients to the bone.)

(Beneath the periosteum is a thick layer of compact bone.

Running through compact bone is a network of tubes called **Haversian canals** that contain blood vessels and nerves.)

(Spongy bone is found inside the outer layer of compact bone.

Spongy bone is also found in the ends of long bones and in the middle of short, flat bones.

Spongy bone adds strength without adding mass.)

(Osteocytes, or mature bone cells, are embedded in the bone matrix.

Other bone cells—osteoclasts and osteoblasts—line the Haversian canals and the surfaces of compact and spongy bone.

- Osteoclasts break down bone.
- Osteoblasts produce bone.)

E. Bone marrow:

soft tissue inside the cavities of bones.

F. 2 types of bone marrow:

- 1. Yellow marrow is made up of fat cells.
- 2. Red marrow produces red blood cells, some kinds of white blood cells, and platelets.

G. Development of Bones

1. skeleton of an embryo is composed of cartilage.

2. Cartilage:

* strong connective tissue that supports the body

* softer and more flexible than bone.

H. **Ossification**:

Cartilage is replaced by bone

(Bone tissue forms as osteoblasts secrete mineral deposits.

When the osteoblasts become surrounded by bone tissue, they mature into osteocytes.)

I. **Growth plates**:

area at either end of long bone that cartilage grows.

(Growth of cartilage at these plates causes bones to lengthen. Gradually, this cartilage is replaced by bone tissue.

By early adulthood, cartilage in the growth plates is replaced by bone, the bones become ossified, and growth stops.)

J. Types of Joints

1.Joint:

place where one bone attaches to another bone

* permit bones to move without damaging each other.

What are the three different kinds of joints?

K. 3 kinds of joints:
(Classified depending on type of movement)

1. Immovable Joints

a. allow no movement.

b. bones are interlocked and held together by connective tissue, or they are fused together.

c. example: skull bones.

2. Slightly Movable Joints

a. small amount of restricted movement.

b. example: adjacent vertebrae.

3. Freely Movable Joints

a. movement in 1 or more directions.

b. 4 types freely movable joints:

1. ball-and-socket joints
2. hinge joints
3. pivot joints
4. saddle joints

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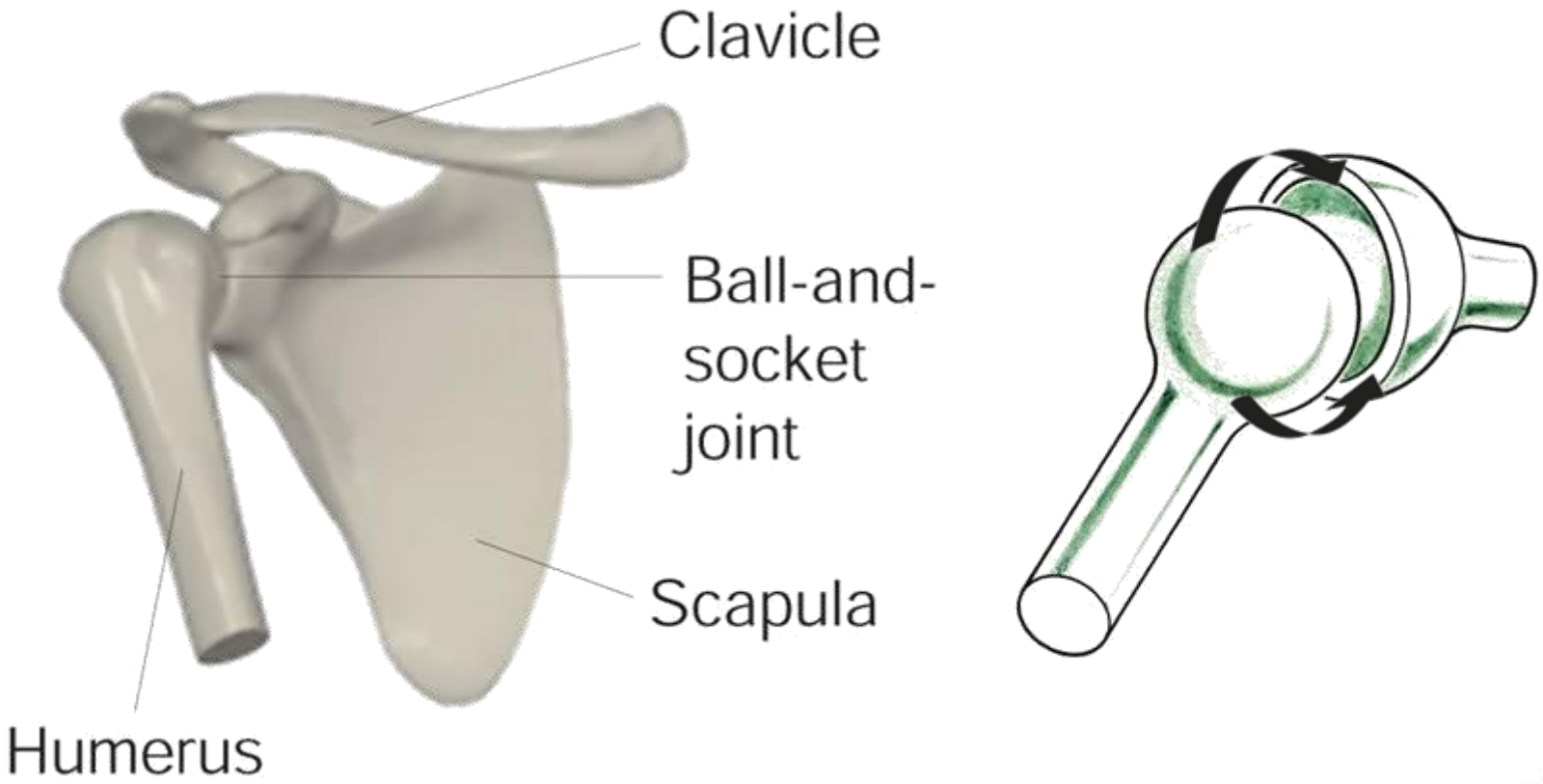
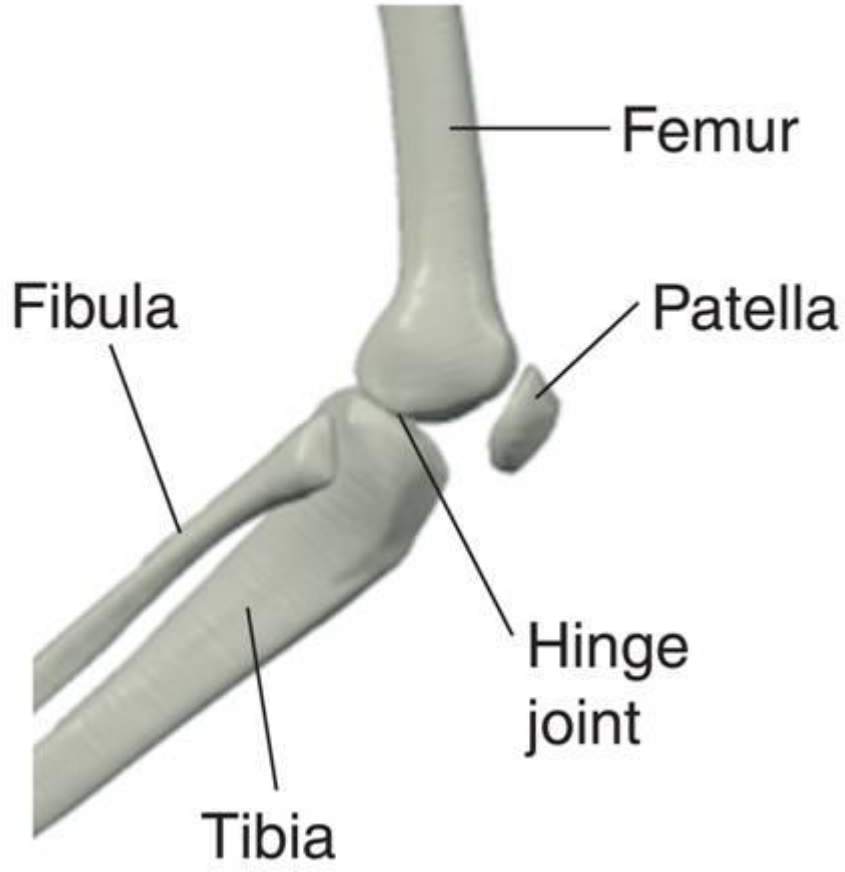
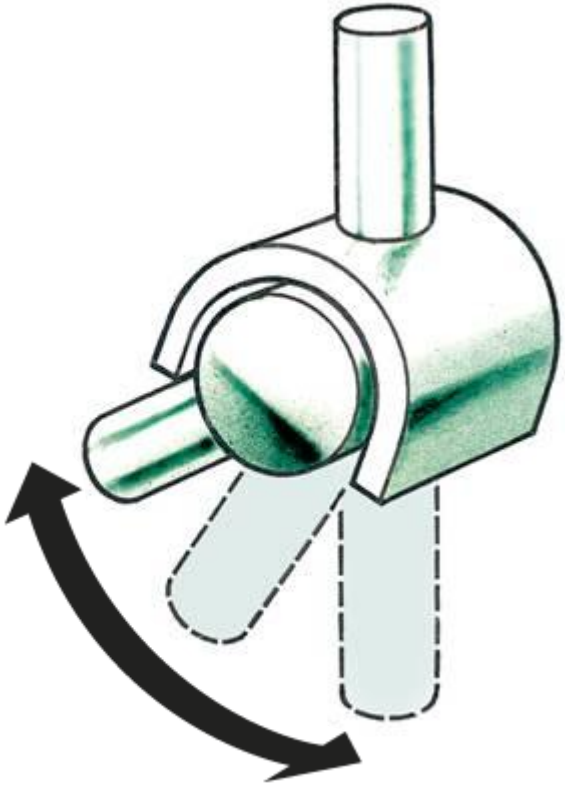
Ball-and-socket joints permit movement in many directions.

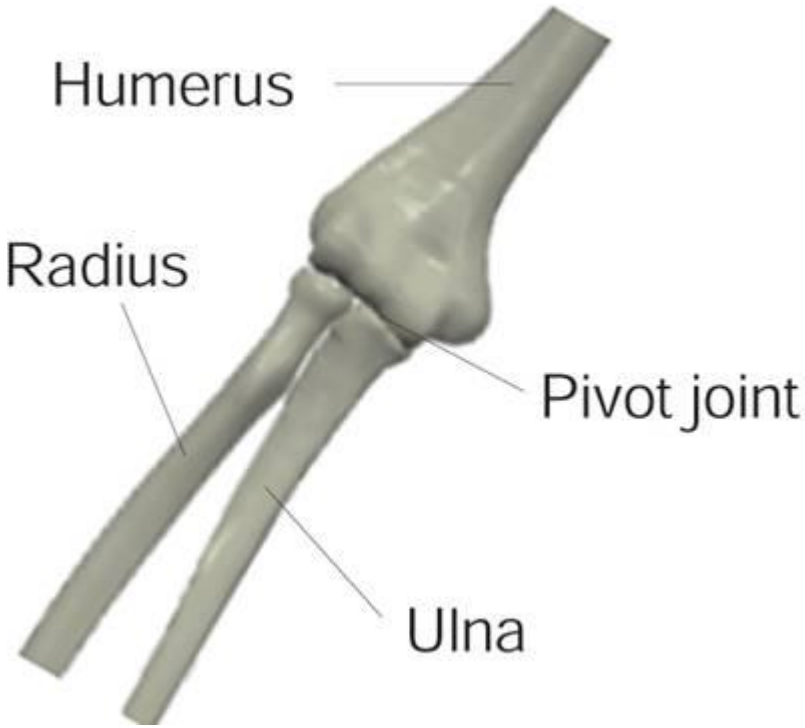


Hinge joints permit back-and-forth motion.

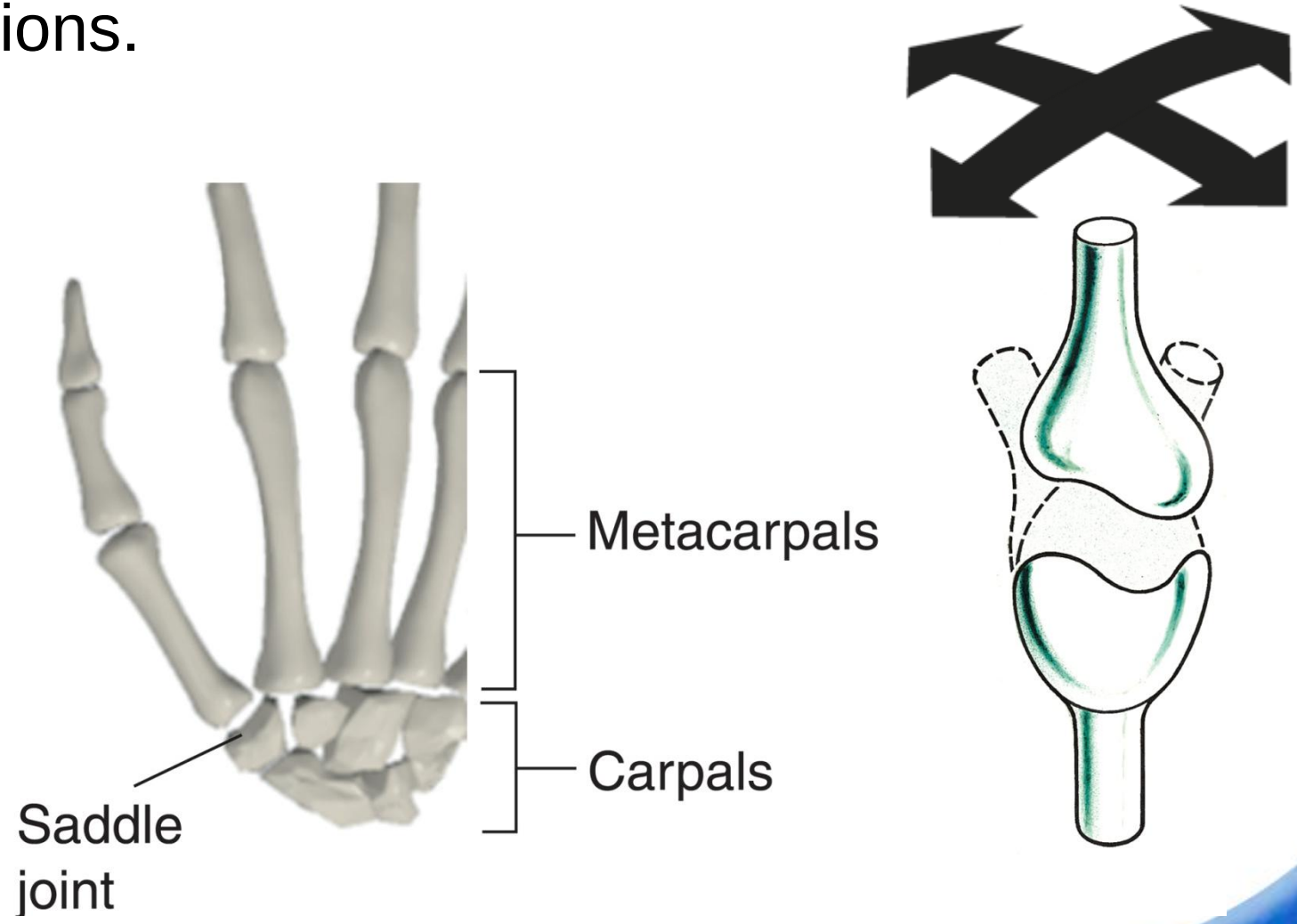




Pivot joints allow one bone to rotate around another.



Saddle joints permit one bone to slide in two directions.

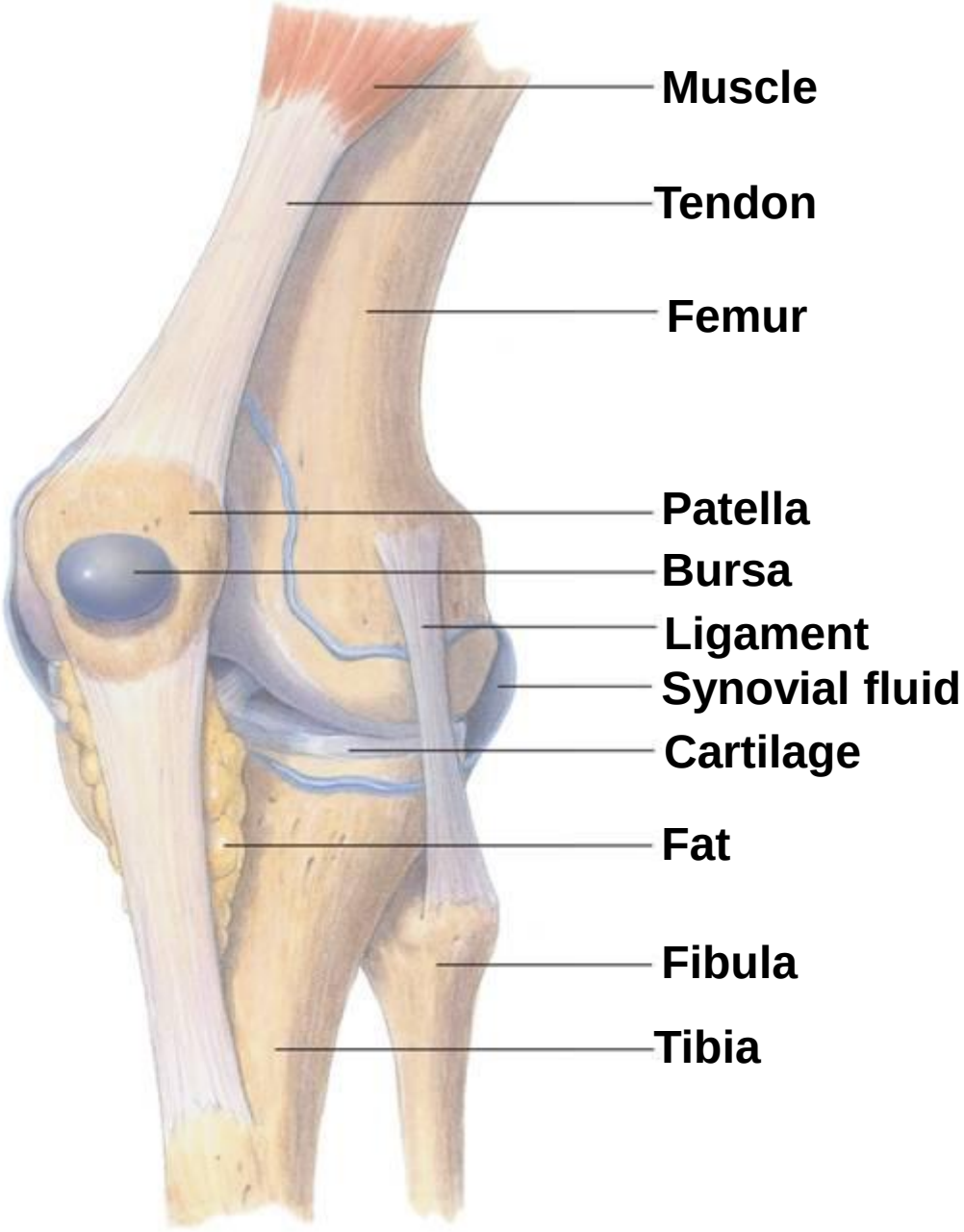


(Structure of Joints

In freely movable joints, cartilage covers the surfaces where two bones come together.

Joints are also surrounded by a fibrous capsule that holds the bones together while still allowing them to move.)

Knee Joint



C. **ligaments:** hold bones together in joints

(Synovial fluid forms a thin lubricating film over the surface of the joint.

Synovial fluid enables the bones to slide past each other more smoothly.)

(In some freely movable joints small sacs of synovial fluid called bursae form.

A bursa reduces the friction between bones of a joint and also acts as a shock absorber.)

4. Skeletal System Disorders

A.Excessive strain on a joint may produce inflammation,

(in which excess fluid causes swelling, pain, heat, and redness.)

B. Bursitis: Inflammation of a bursa

C. Arthritis: Inflammation of the joint

D. Osteoporosis: is caused by a loss of calcium in the bone.

36–1 Section QUIZ

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36–1 Section QUIZ

1 Red blood cells, some kinds of white blood cells, and platelets are produced by

A a. red marrow.

b. cartilage.

c. yellow marrow.

d. osteocytes.

2 Mature bone cells are called

a. periosteum.

A b. osteocytes.

c. bone marrow.

d. Haversian canals.

3 In freely movable joints, what covers the surfaces where the two bones come together?

a. ligaments

A b. cartilage

c. bursae

d. tendons

4 During ossification, cartilage is replaced by

A a. bone.

b. ligament.

c. marrow.

d. tendon.

5 The shoulder joint is an example of a

A a. ball-and-socket joint.

b. hinge joint.

c. pivot joint.

d. saddle joint.

END OF SECTION