The Skeletal System

Compare and contrast the different types of bones.

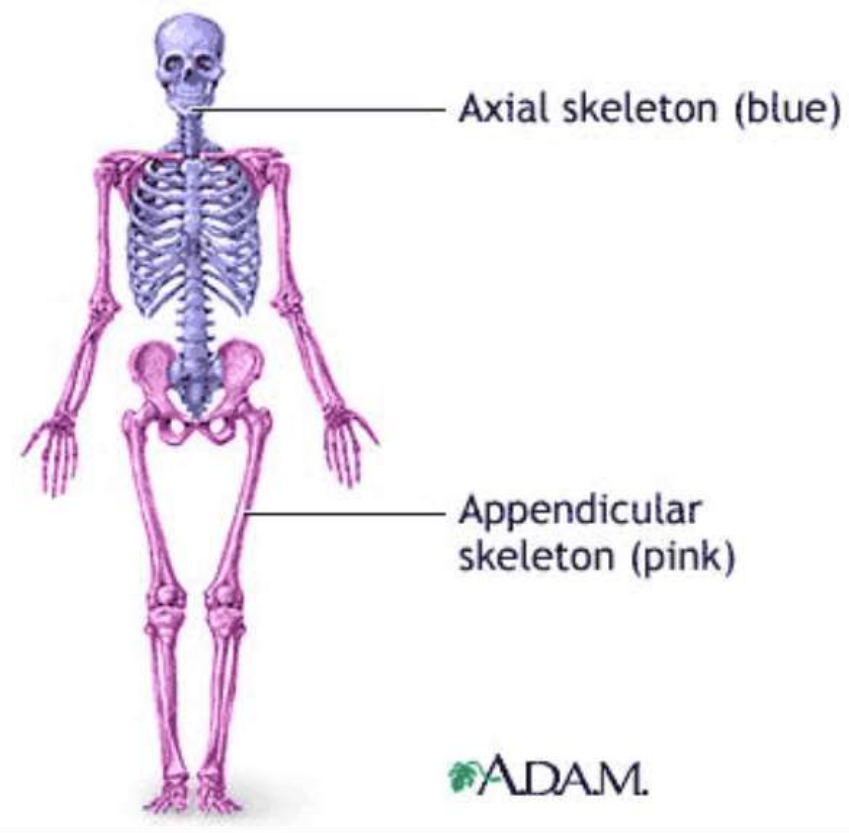
Photo Credit: Body Worlds

Functions of the Bones

- Bones are made of OSSEOUS TISSUE

- Support and Protection
- Body movement – due to muscles
- Blood cell formation (inside bone marrow)--hematopoeisis
- Storage of inorganic materials(salt, calcium, potassium….)

Two Divisions

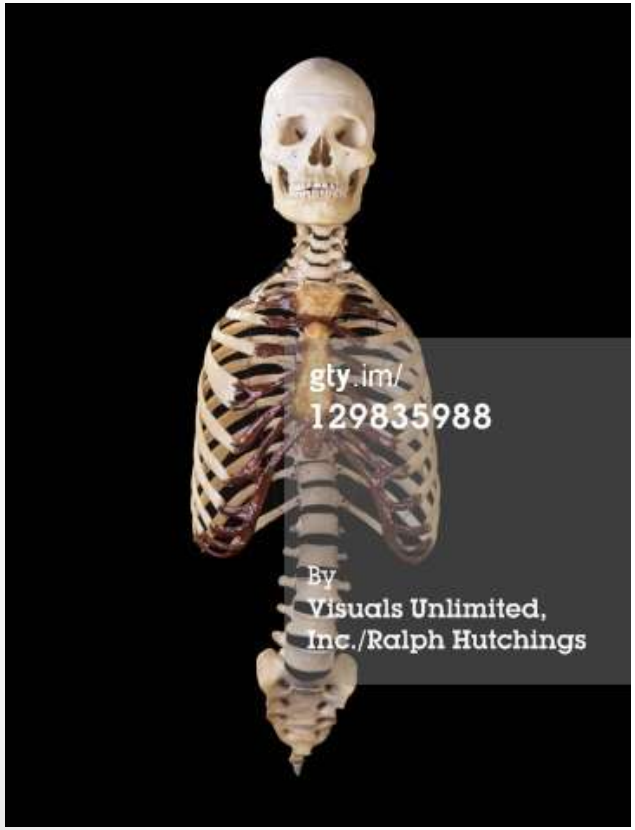


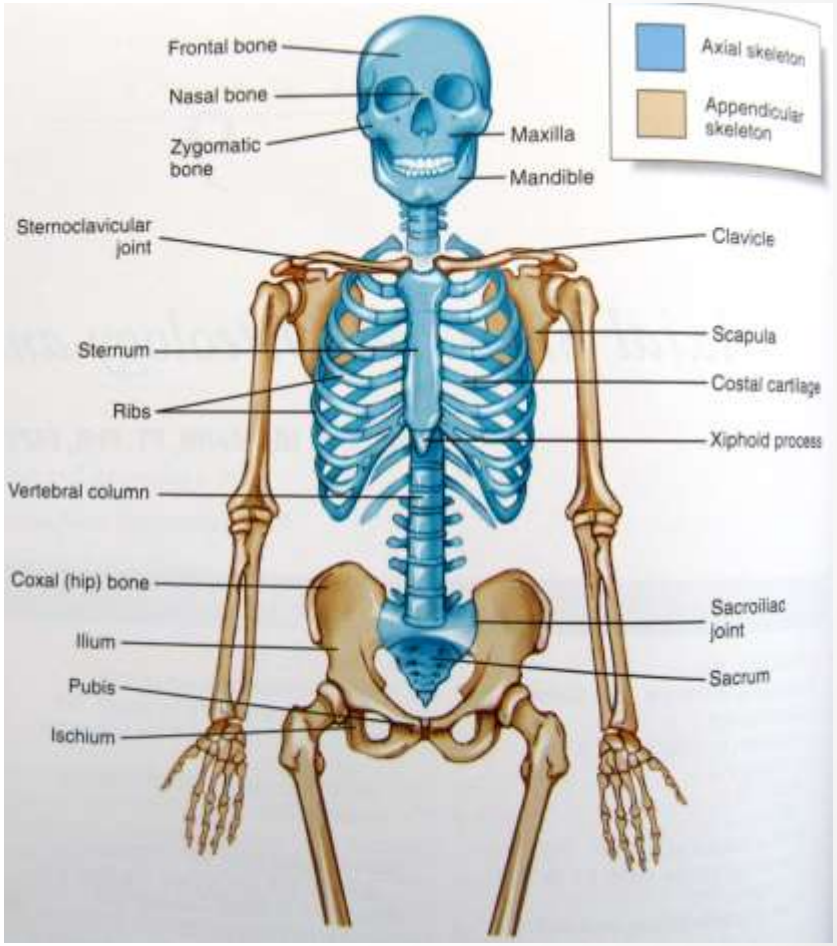
1. Axial Skeleton
2. Appendicular Skeleton

Around 206 bones in all

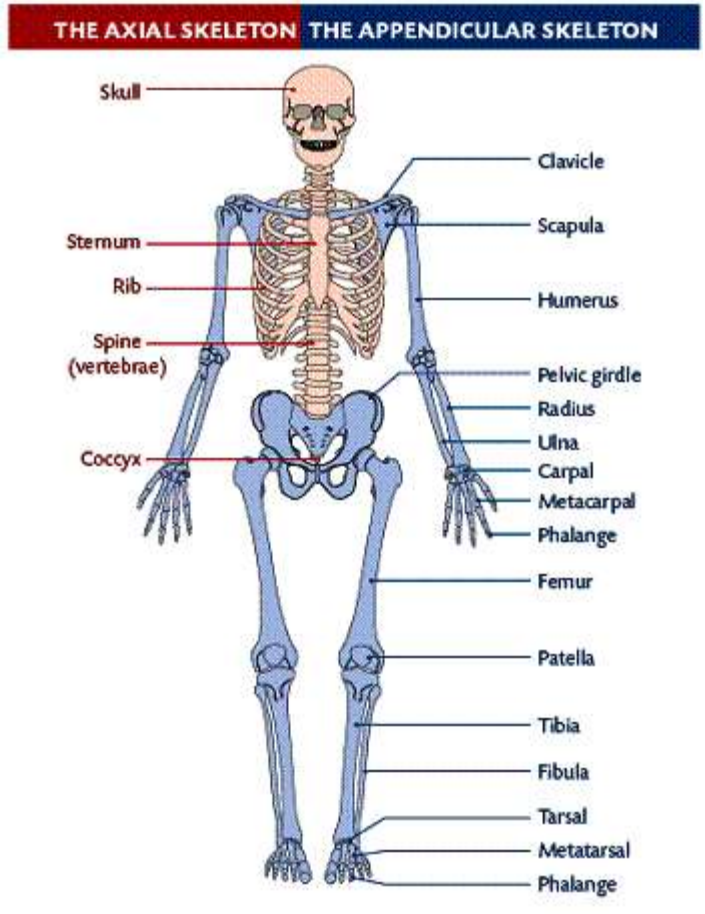
Axial Skeleton

- The long axis of the body…

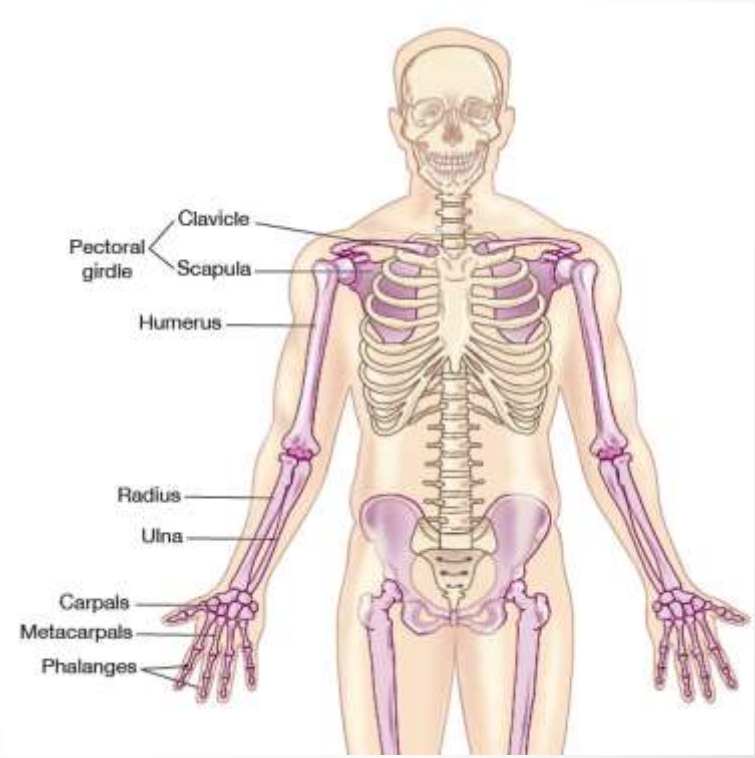




Appendicular Skeleton

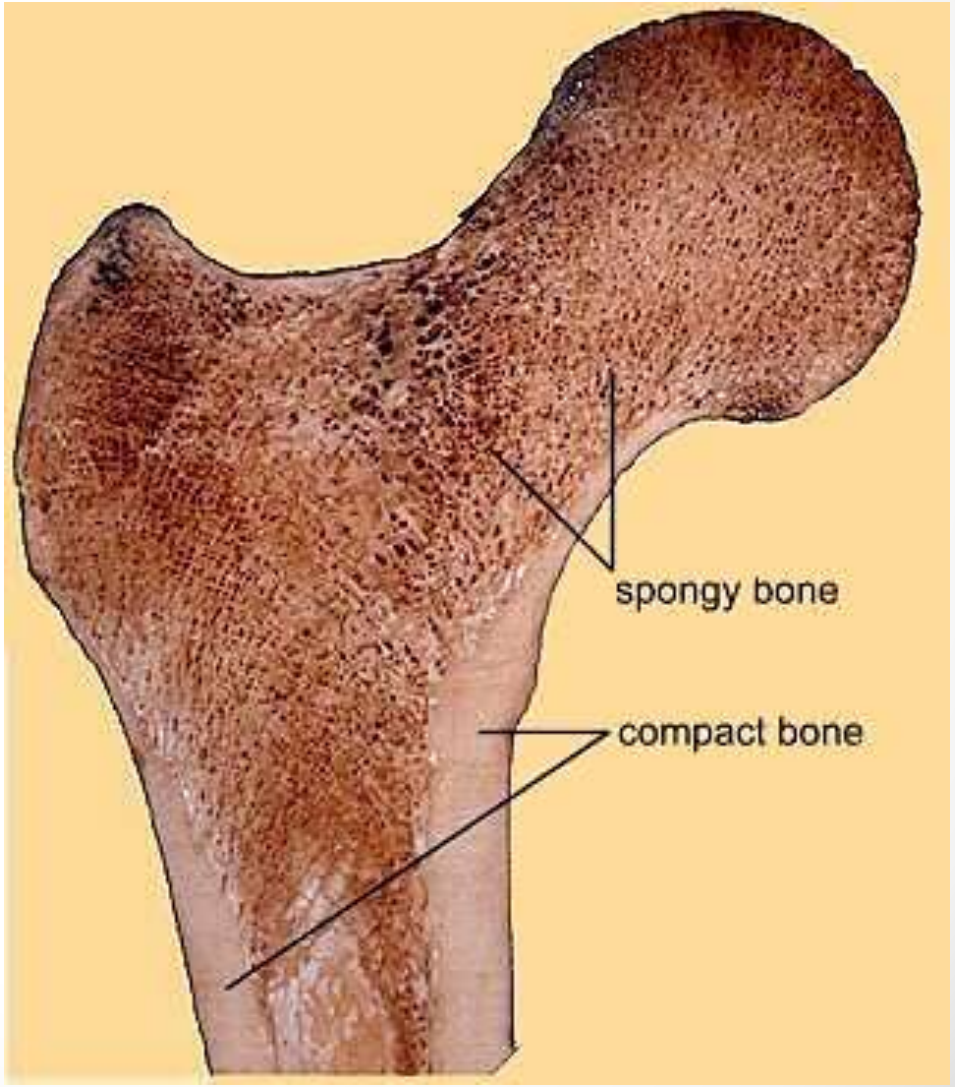


- The limbs and their supporting structures or girdles…

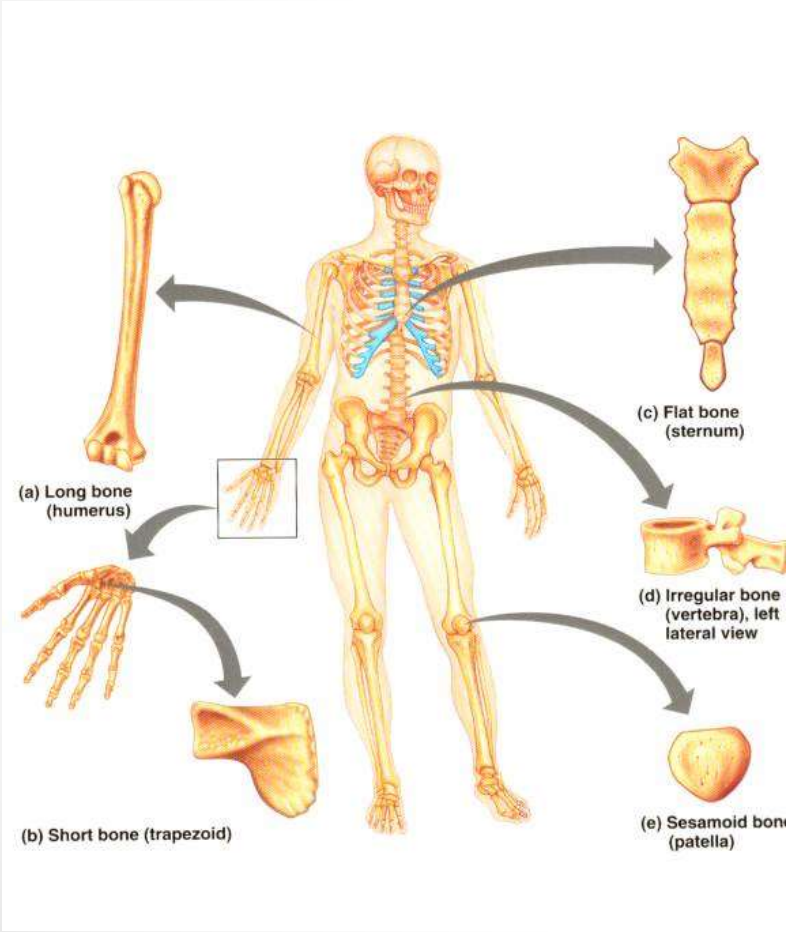


Bone Classification by Tissue

- Two Basic Types
  - Compact: dense and smooth
  - Spongy: looks like a "sponge"



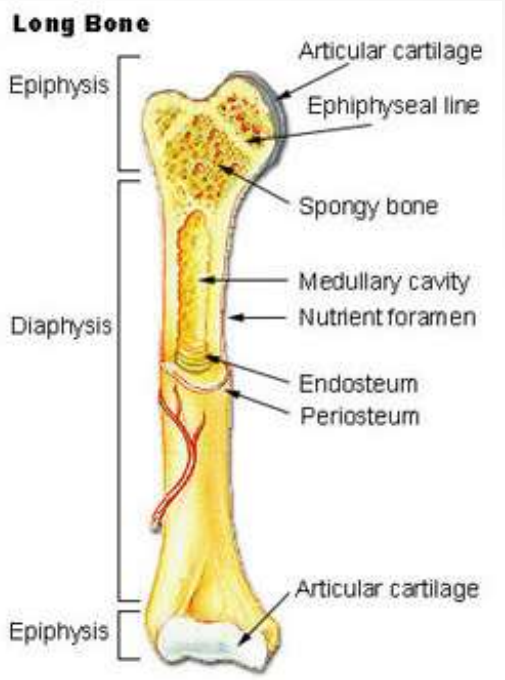
Bone Classification by Size

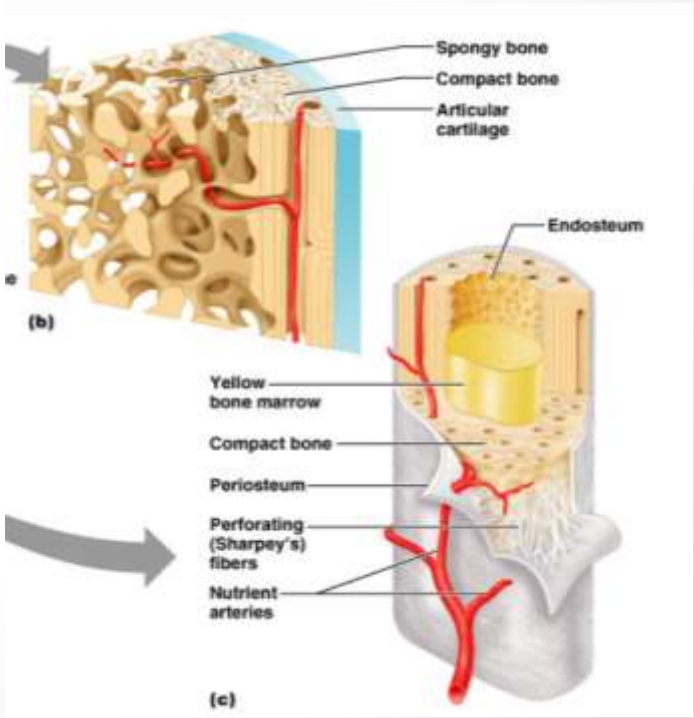


- Different Sizes
  - Long: all bones of the limbs, mostly compact bone
  - Short: think wrist & ankle, small, cuboid bones, mostly spongy bone. Sesamoid bones (grow inside tendons, fit here too)
  - Flat: spongy inside with compact outside. Think skull, sternum, ribs
  - Irregular: they just don't fit any of the above. Think vertebrae, and pelvic bones

Bone Structure

- The shaft or diaphysis is the most noticeable part of a long bone
- It's protected by a tough membrane called the periosteum
- The ends are called epiphysis
- Their ends are covered with glistening hyaline cartilage or articular cartilage

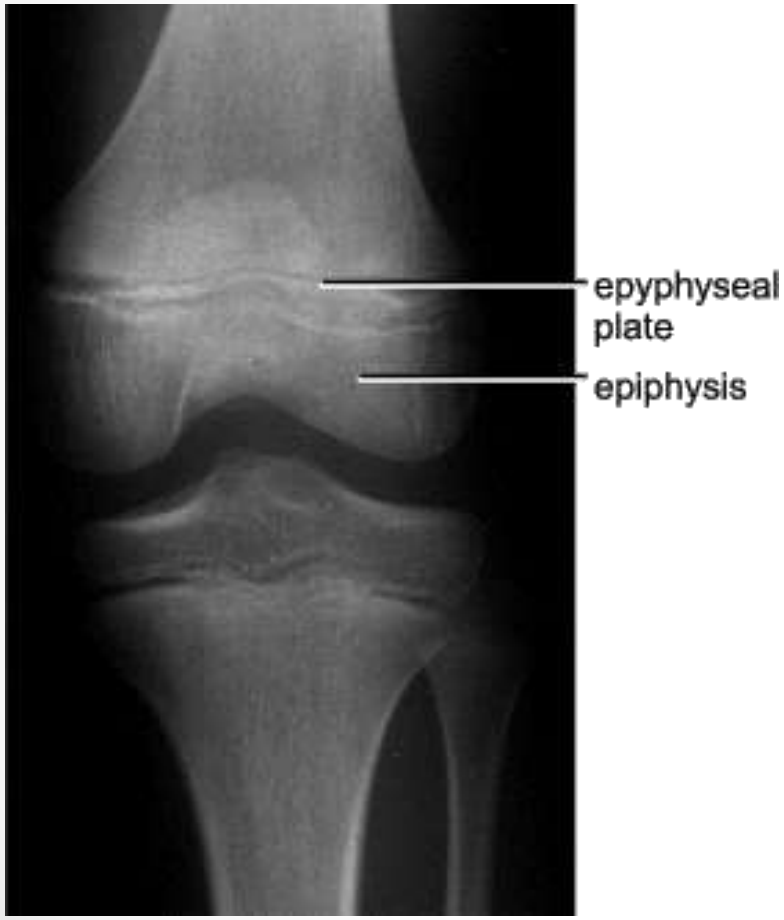




Going Inside the Long Bone

- Two types of marrow
  - Yellow: fat storage
  - Red: blood cell production
- In adults, most red marrow is in the spongy bone of flat bones

Epiphyseal line & Plate

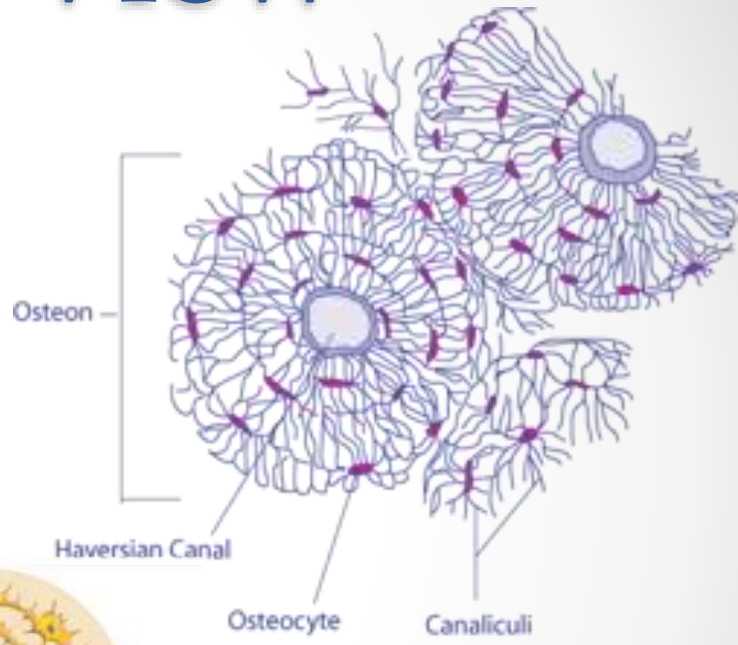


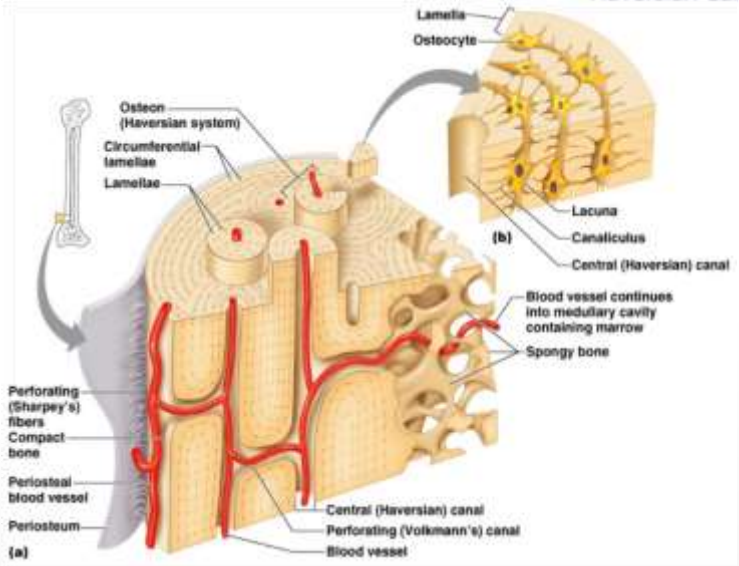
- Before puberty, you have a line of hyaline cartilage by the epiphysis – this is where the bone is growing or epiphyseal plate
- After puberty, just a solid line is left or epiphyseal line

Honors Only Information

Microscopic View

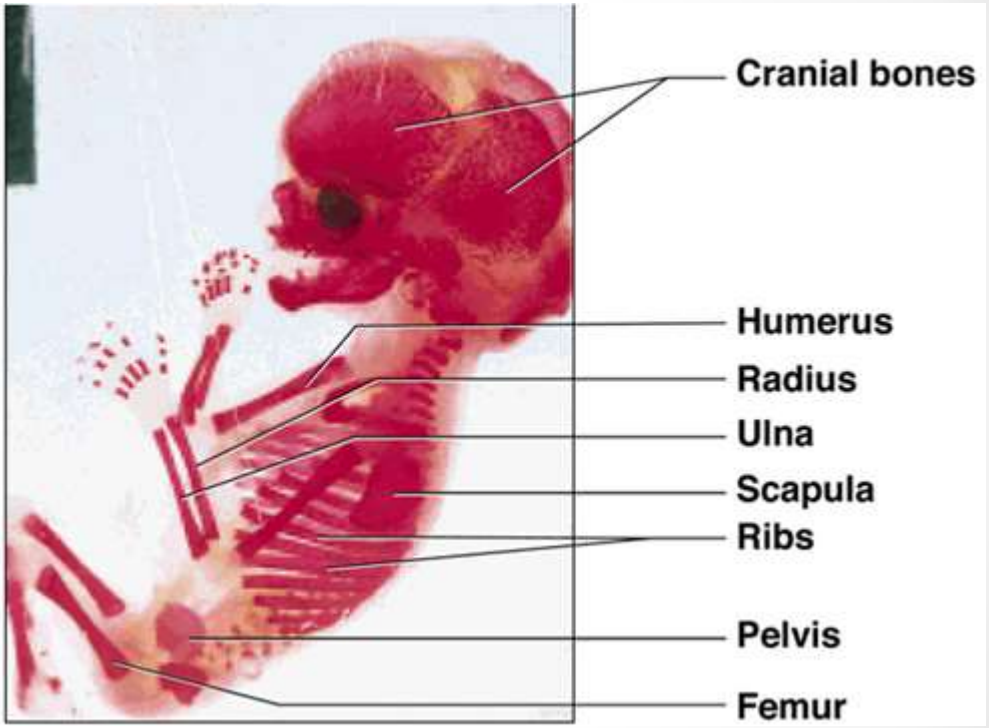
- Osteocytes: bone cells inside of chambers called lacunae
- Osteocytes form rings around the haversian canal – contains blood vessels/nerves
- Lacunae are connected by canaliculi



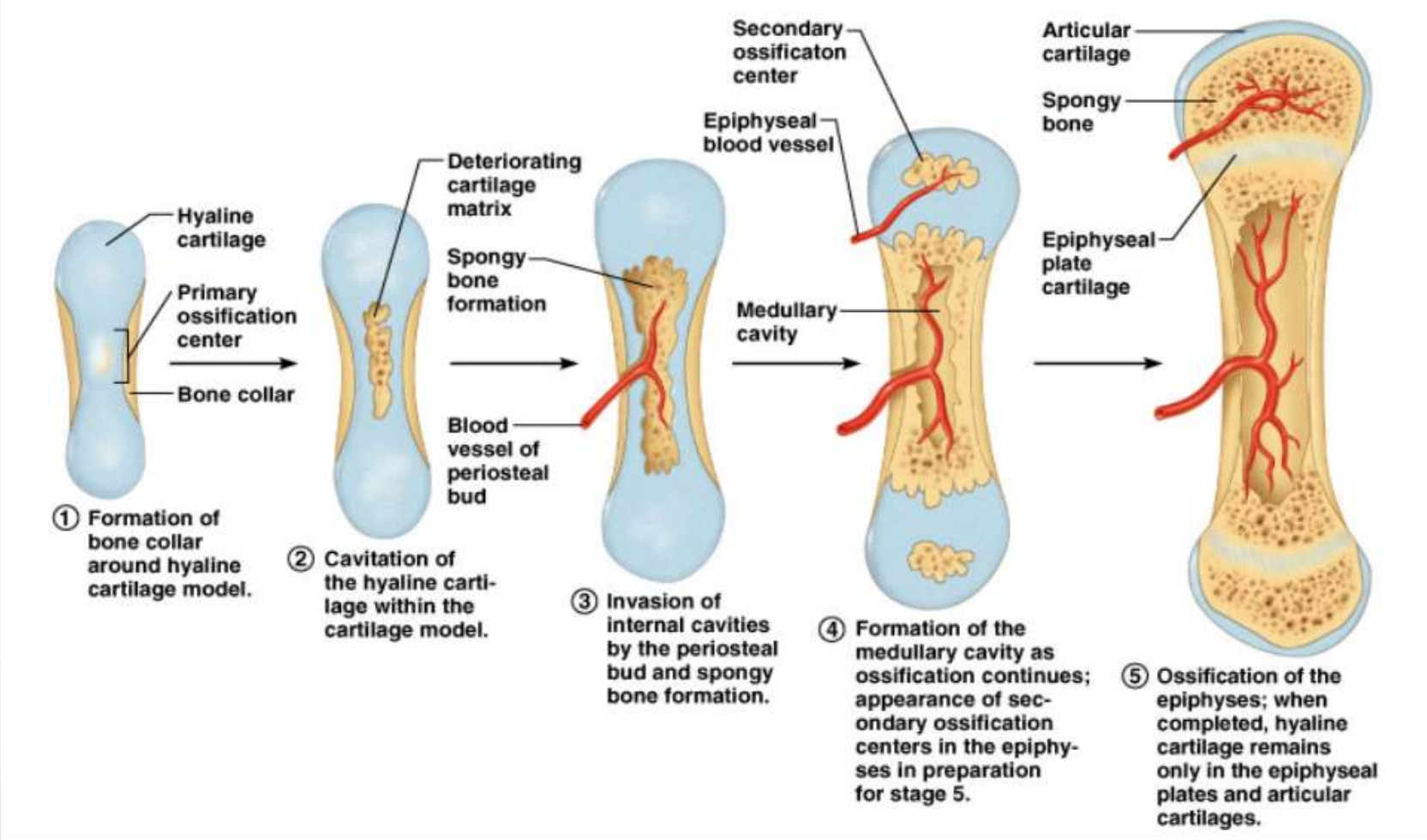


Bone Growth

- In the embryo the skeleton is mostly hyaline cartilage
- This cartilage is replaced by bone
- This bone formation is called ossification
- Bone formation is caused by osteoblasts – bone forming cells
- Osteoclasts dissolve bone



Bone Growth


Hyaline cartilage
Primary ossification center
Bone collar
① Formation of bone collar around hyaline cartilage model.
Deteriorating cartilage matrix
② Cavitation of the hyaline cartilage within the cartilage model.
Spongy bone formation
Blood vessel of periosteal bud
③ Invasion of internal cavities by the periosteal bud and spongy bone formation.
Secondary ossificaton center
Epiphyseal blood vessel
Medullary cavity
④ Formation of the medullary cavity as ossification continues; appearance of secondary ossification centers in the epiphyses in preparation for stage 5.
Articular cartilage
Spongy bone
Epiphyseal plate cartilage
⑤ Ossification of the epiphyses; when completed, hyaline cartilage remains only in the epiphyseal plates and articular cartilages.

Rickets

- Disease of children
- Bones don't calcify
- Rare in U.S. due to vitamin D added to dairy products