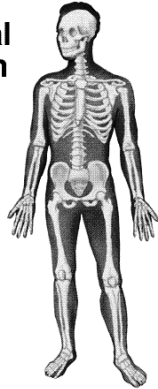


Skeletal System



Functions of the Bones

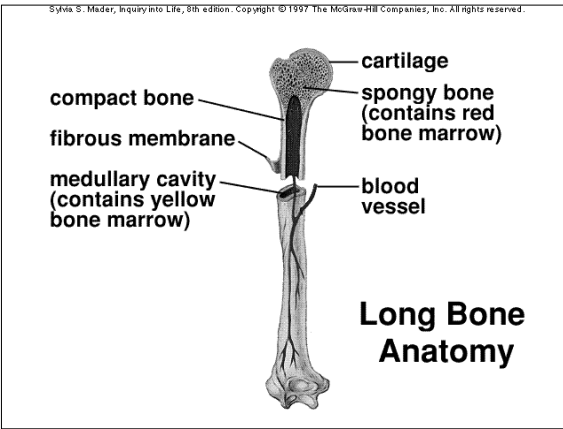
- Support
- Protection
- Movement
- Storage
- Blood cell formation

Classification of Bones by Type

- Compact
 - Dense
 - Smooth and homogeneous
- Spongy
 - Small needlelike pieces of bone
 - Lots of open space

Classification of Bones by Shape

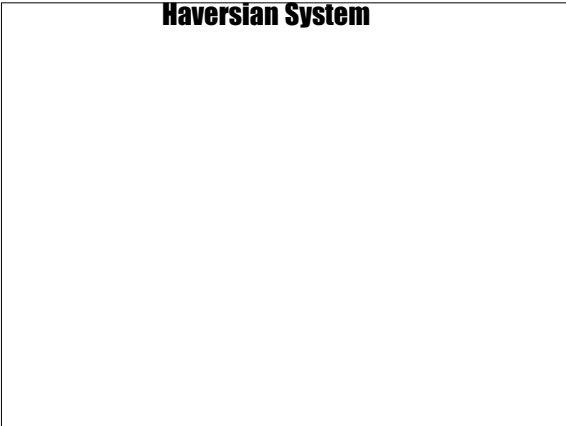
- Long bone
 - humerus of arm
- Short bones
 - carpals of wrist
- Flat bone
 - parietal bone of skull
- Irregular bone
 - vertebra



Compact Bone

- Haversian system (osteon)
 - Haversian canal
 - Lamellae
 - Lacunae
 - Osteocyte
 - Canaliculi

Haversian System



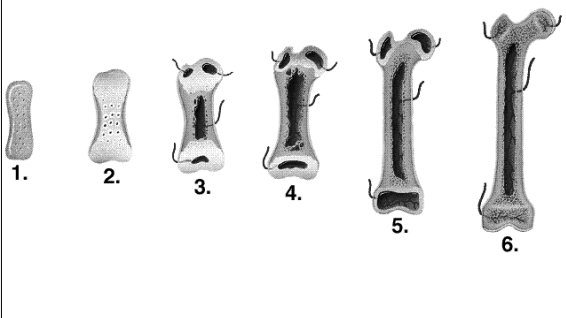
Bone Formation, Growth, and Remodeling

- **Ossification** - process of bone formation
- **Osteoblasts** - bone-forming cells
- **Osteoclasts** - bone-destroying cells



Stella S. Mader, Human Biology, 5th edition. Copyright © 1997 The McGraw-Hill Companies, Inc. All rights reserved.

Bone Formation — Overview



Repair of Bone Fractures

Stage 1. Hematoma formation

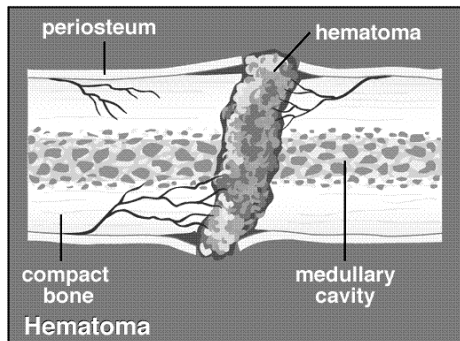
Stage 2. Fibrocartilage callus formation

Stage 3. Bony callus formation

Stage 4. Bone remodeling

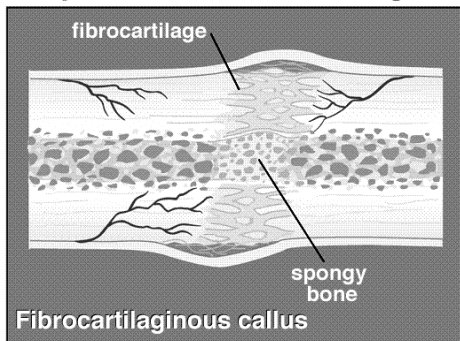
Stella S. Mader, Human Biology, 5th edition. Copyright © 1997 The McGraw-Hill Companies, Inc. All rights reserved.

Repair of Fracture—Stage 1

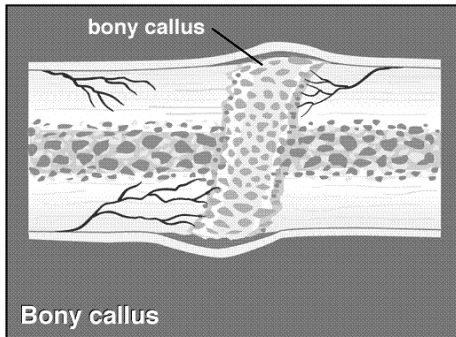


Stella S. Mader, Human Biology, 5th edition. Copyright © 1997 The McGraw-Hill Companies, Inc. All rights reserved.

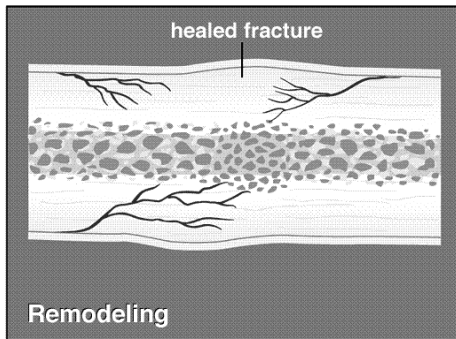
Repair of Fracture—Stage 2



Repair of Fracture — Stage 3



Repair of Fracture — Stage 4



Divisions of Adult Skeleton

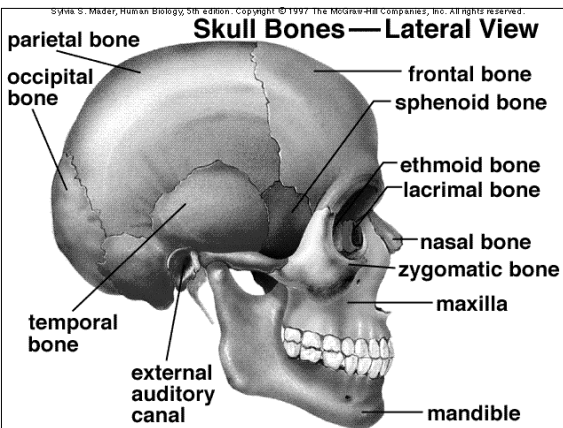
- Axial
- Appendicular

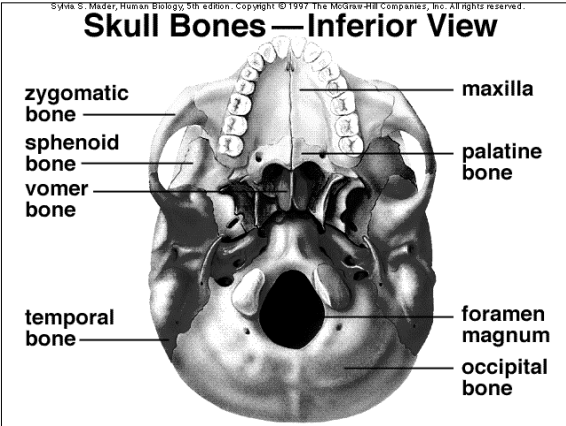
Axial Skeleton

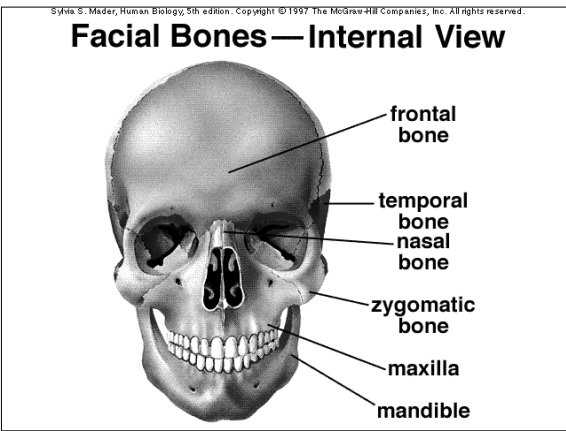
- Skull
- Middle ear bones
- Vertebrae
- Hyoid bone
- Ribs
- Sternum

The Skull

- Cranium
- Facial bones







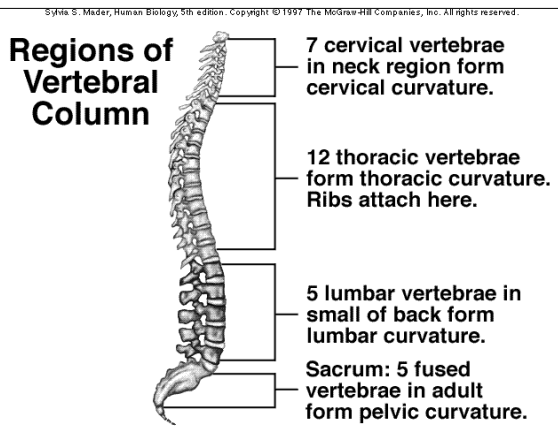
- ### Skull Bones
- | | |
|---|---|
| <ul style="list-style-type: none"> ▪ Frontal ▪ Parietal ▪ Temporal ▪ Occipital ▪ Sphenoid ▪ Ethmoid | <ul style="list-style-type: none"> ▪ Maxillae ▪ Palatine ▪ Zygomatic ▪ Lacrimal ▪ Nasal ▪ Vomer ▪ Mandible |
|---|---|

Bones of the Middle Ear

- **Malleus (hammer)**
- **Incus (anvil)**
- **Stapes (stirrup)**

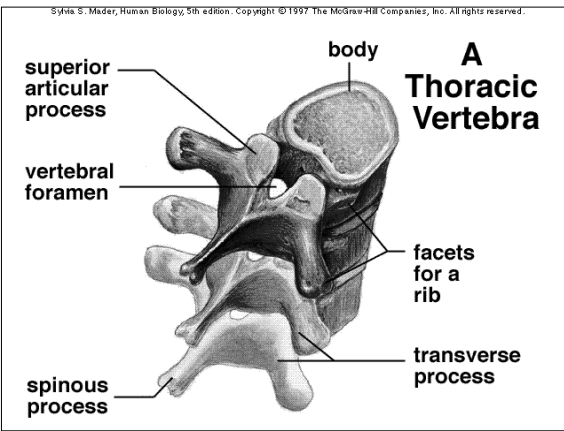
The Infant Skull

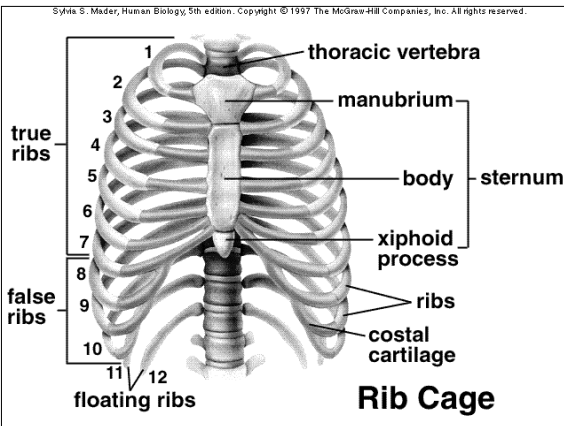
- **Fontanel**
 - **Anterior (frontal)**
 - **Sphenoid**
 - **Posterior (occipital)**
 - **Mastoid**



Vertebrae

- **Cervical (7)**
 - Atlas
 - Axis
- **Thoracic (12)**
- **Lumbar (5)**
- **Sacral (5 fused)**
- **Coccygeal (4 vestigial)**
 - Coccyx





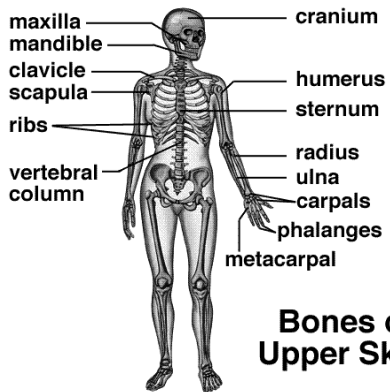
Ribs

- **“True” ribs (7 pairs)**
 - **Costal cartilage**
- **“False” ribs (5 pairs)**
 - **“Floating” ribs (2 pairs)**
- **Sternum (breastbone)**

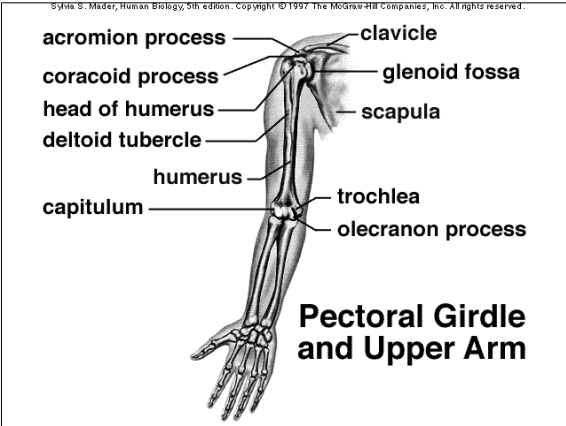
Appendicular Skeleton

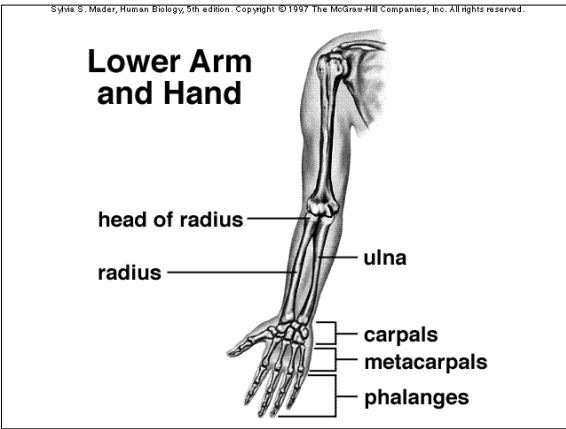
- **Shoulders**
- **Arms**
- **Hips**
- **Legs**

Sylvia S. Mader, Human Biology, 5th edition. Copyright © 1997 The McGraw-Hill Companies, Inc. All rights reserved.



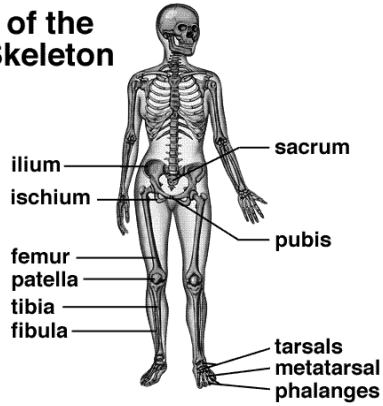
Bones of the Upper Skeleton





- Shoulder and Arm**
- **Clavicle - collarbone**
 - **Scapula - shoulder blade**
 - **Humerus - upper arm**
 - **Radius - lateral lower arm**
 - **Ulna - medial lower arm**
 - **Carpals - wrist bones**
 - **Metacarpals - palm bones**
 - **Phalanges - finger bones**

Bones of the Lower Skeleton

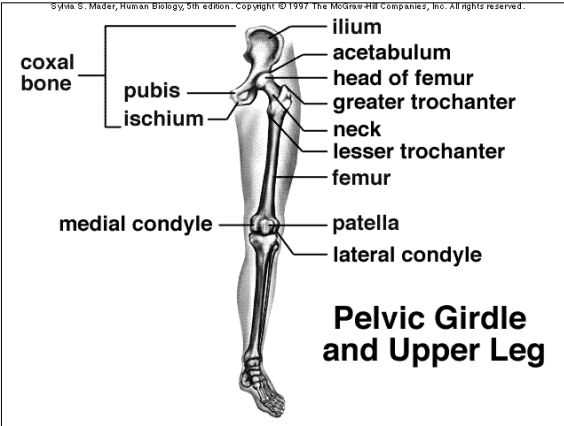


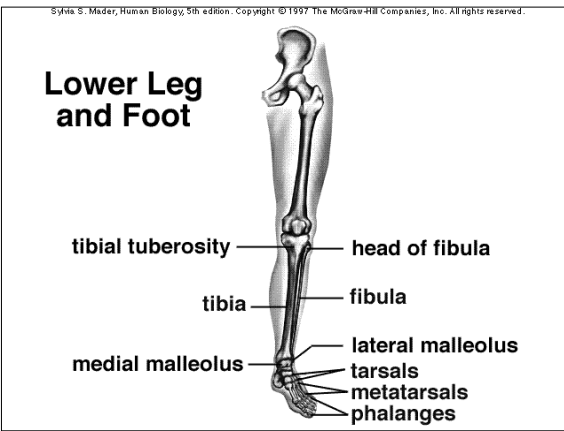
Pelvis

- Ilium
- Ischium
- Pubis
- Pubic symphysis
- Pubic arch
- Sacrum

Male vs Female Pelvis

- Male
 - Narrow, funnel-shaped
 - Coccyx curves forward
- Female
 - Wide, shallow, and basin-shaped
 - Coccyx more vertical





- Hip and Leg**
- Pelvis - hip bone
 - Femur - upper leg
 - Patella - kneecap
 - Tibia - medial lower leg
 - Fibula - lateral lower leg
 - Tarsals - ankle bones
 - Metatarsals - bones of sole
 - Phalanges - toe bones

Joints

Functions

- **Hold bones together**
- **Give skeleton mobility**

Classification

- **Functional**
- **Structural**

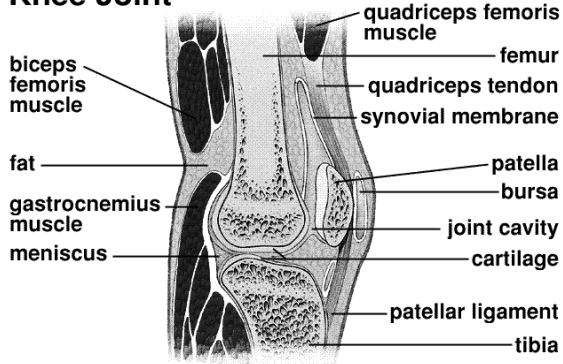
Classification of Joints by Function

- **Immovable**
- **Slightly movable**
- **Freely movable**

Classification of Joints by Structure

- **Fibrous joints**
 - **Sutures of skull**
- **Cartilaginous joints**
 - **Intervertebral joints**
- **Synovial joints**
 - **Elbows and knees**

Knee Joint



Types of Synovial Joints

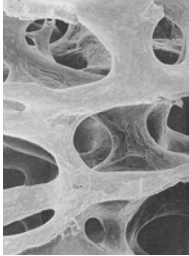
- **Ball and socket**
 - hip
- **Hinge**
 - elbow
- **Pivot**
 - atlas and axis
- **Gliding**
 - foot

Inflammatory Disorders of Joints

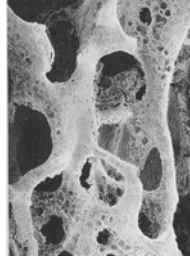
- **Arthritis**
 - Osteoarthritis
 - Gouty arthritis
 - Rheumatoid arthritis



Osteoporosis



Normal Bone



Osteoporotic Bone

The End
