


# **SKELETAL SYSTEM**

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1. General concepts about skeleton
  2. The skeleton
  3. Bone as an organ
  4. Functions of bone
  5. Classification of bones

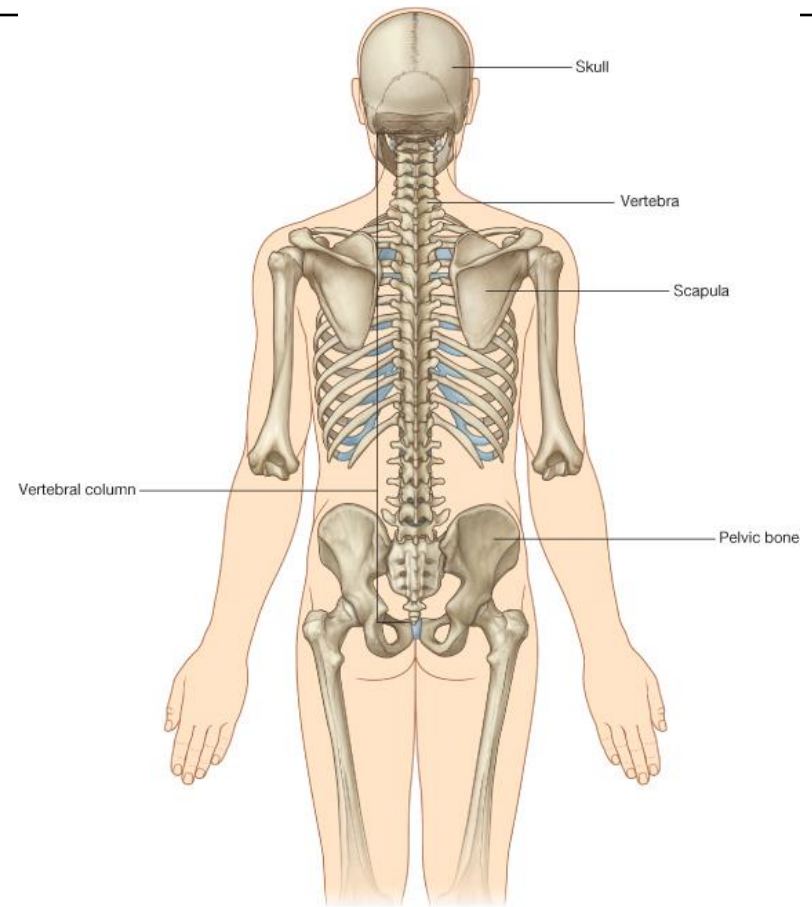
# The locomotor apparatus

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- ❑ The skeleton is a complex of hard structures of mesenchymal origin and possesses a mechanical significance.
- ❑ Composed of bones & cartilages
- ❑ The term skeleton comes from a Greek word *skeletos* meaning “dried up”.
- ❑ Forms the main supporting framework of the body.
- ❑ Designed for effective production of movements by the attached muscles.

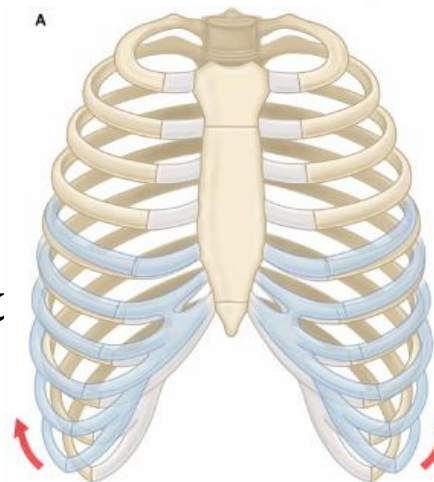
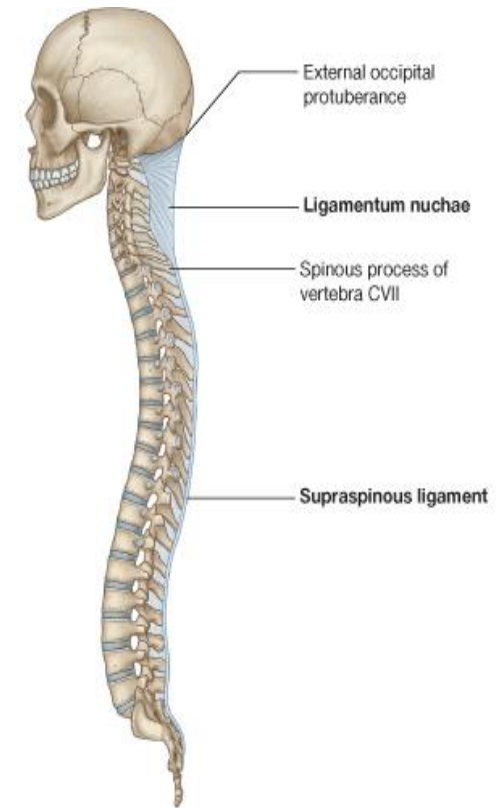
# The Skeleton

- The science concerned with the study of bones is termed **osteology**.
- The skeletal system of an adult is composed of approximately **206 bones**.
- 2 parts of the skeleton:
  - a) Axial
  - b) Appendicular

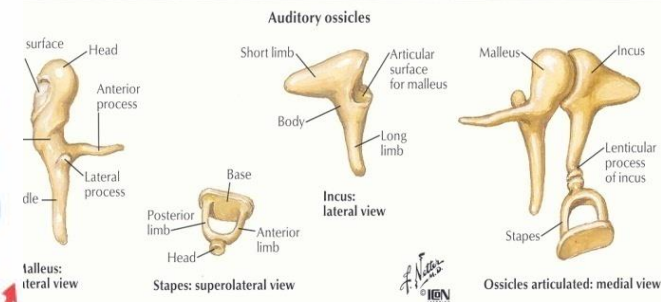


# The axial skeleton

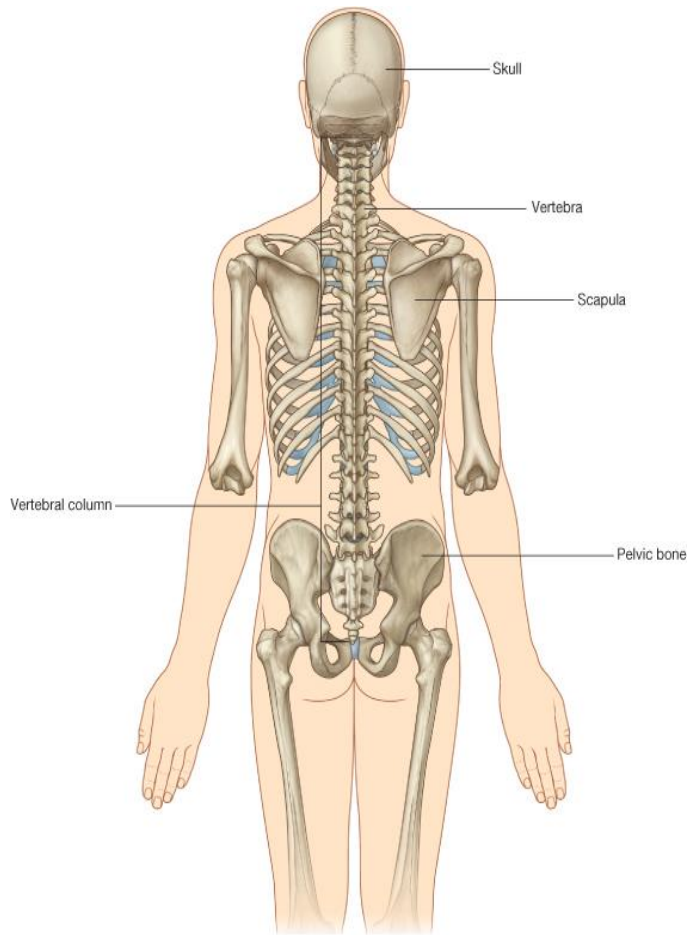
- ❑ Consists of **80 bones** that form the axis of the body which supports and protects the organs of the head, neck and trunk:
  - Skull (Cranium & face-22)
  - Auditory ossicles (6)
  - Hyoid bone (1)
  - Vertebral column (26)
  - Thoracic cage (Ribs-24 & sternum-1)



er Ltd. Drake et al: Gray's Anatomy for Students [www.studentconsult.com](http://www.studentconsult.com)



# The appendicular skeleton



- ❑ Composed of **126 bones** of the upper (64) and lower limbs (62) and the bony girdles, which anchor the appendages to the axial skeleton.
- ❑ **The shoulder girdle** (the scapula and clavicle)
- ❑ **The upper limb** (the humerus, ulna, radius and bones of the hand)
- ❑ **The pelvic girdle** (the hip bone)
- ❑ **The lower limb** (the femur, tibia, fibula and bones of the foot)

# Bone as an organ

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- ❑ **Synonyms:** Os (L); Osteon (G)
- ❑ **Bone** is one of the hardest structures of the body.
- ❑ Highly vascular mineralized connective tissue consisting of cells and dense intercellular organic matrix impregnated with inorganic salts.
- ❑ Organic part (1/3)- collagen fibres: resilience
- ❑ Inorganic part (2/3)-  $\text{Ca}^{++}$  salts: hardness & rigidity



# Functions of bone

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- ❑ Rigid framework
- ❑ Surface for attachment of muscles, tendons & ligaments
- ❑ Serve as levers for muscles for movement
- ❑ Protection of viscera
- ❑ Contain marrow which is factory of blood cells
- ❑ Storehouse of calcium & phosphorus
- ❑ Paranasal air sinuses affect the timber of voice





**Calcium**

**Phosphate**

**Magnesium**

**Sodium**

**Potassium**



# Classification of bones

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- According to shape
- Structural classification
- Developmental classification
- Regional classification



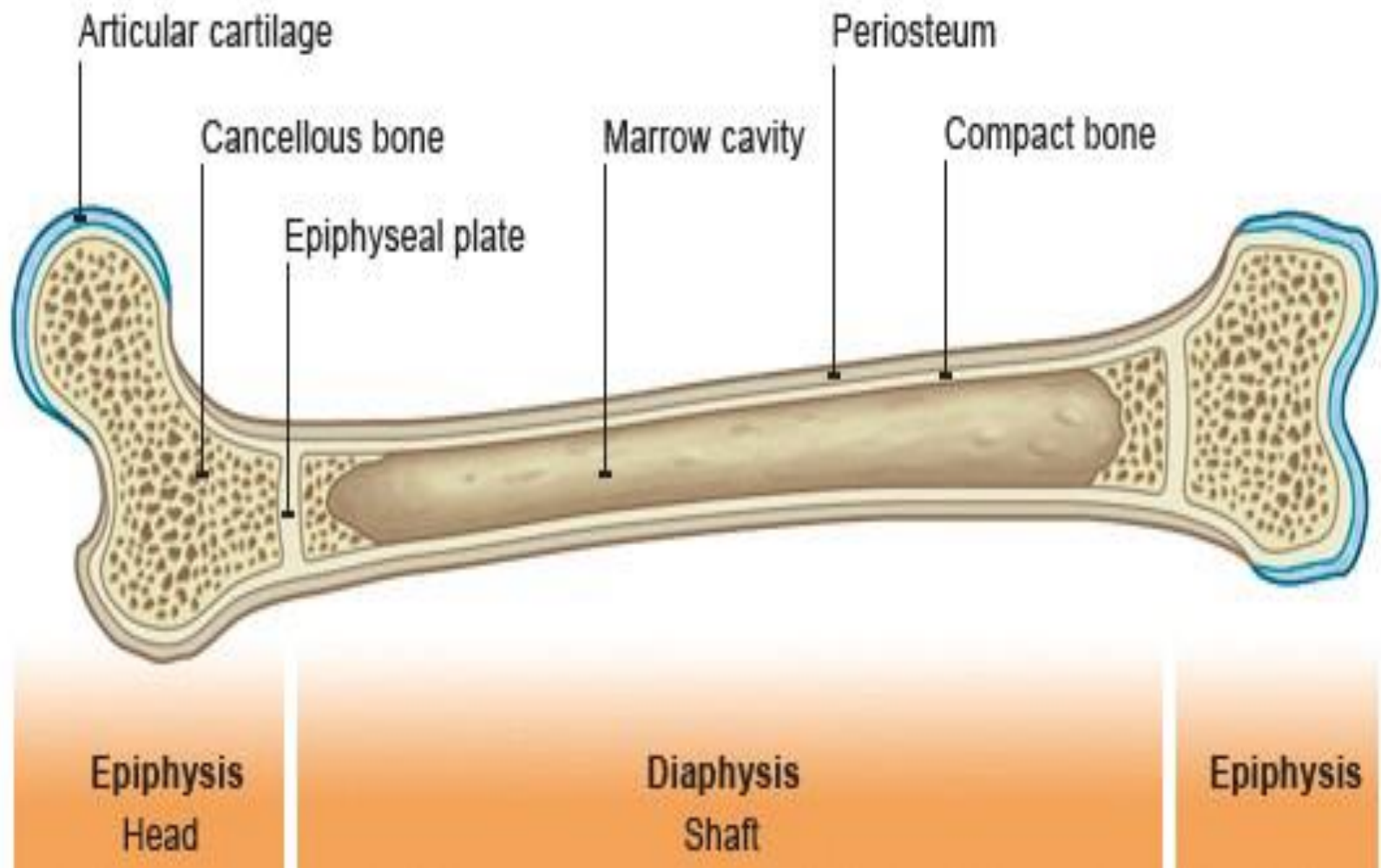
# According to shape

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- ❑ Long bones
- ❑ Short bones
- ❑ Flat bones
- ❑ Irregular bones
- ❑ Pneumatic bones
- ❑ Sesamoid bones
- ❑ Accessory bones
- ❑ Heterotopic bones

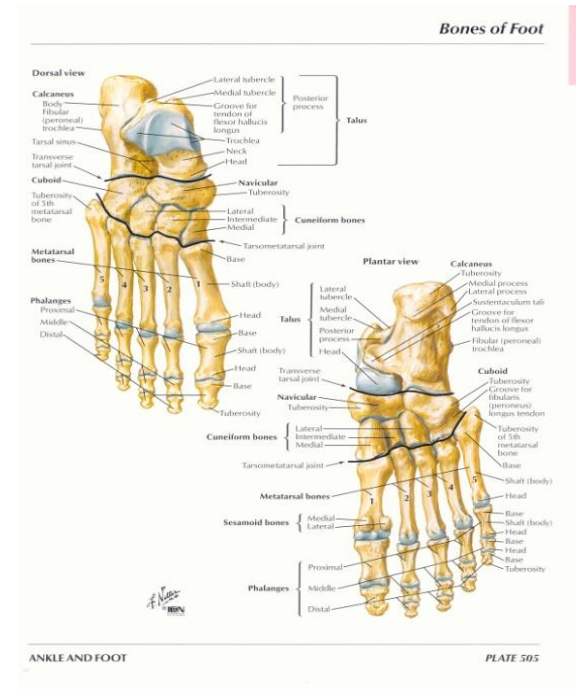
- humerus,
- radius, ulna,
- femur,
- tibia, fibula

- metacarpal,
- metatarsal bones and phalanges



# Short bones

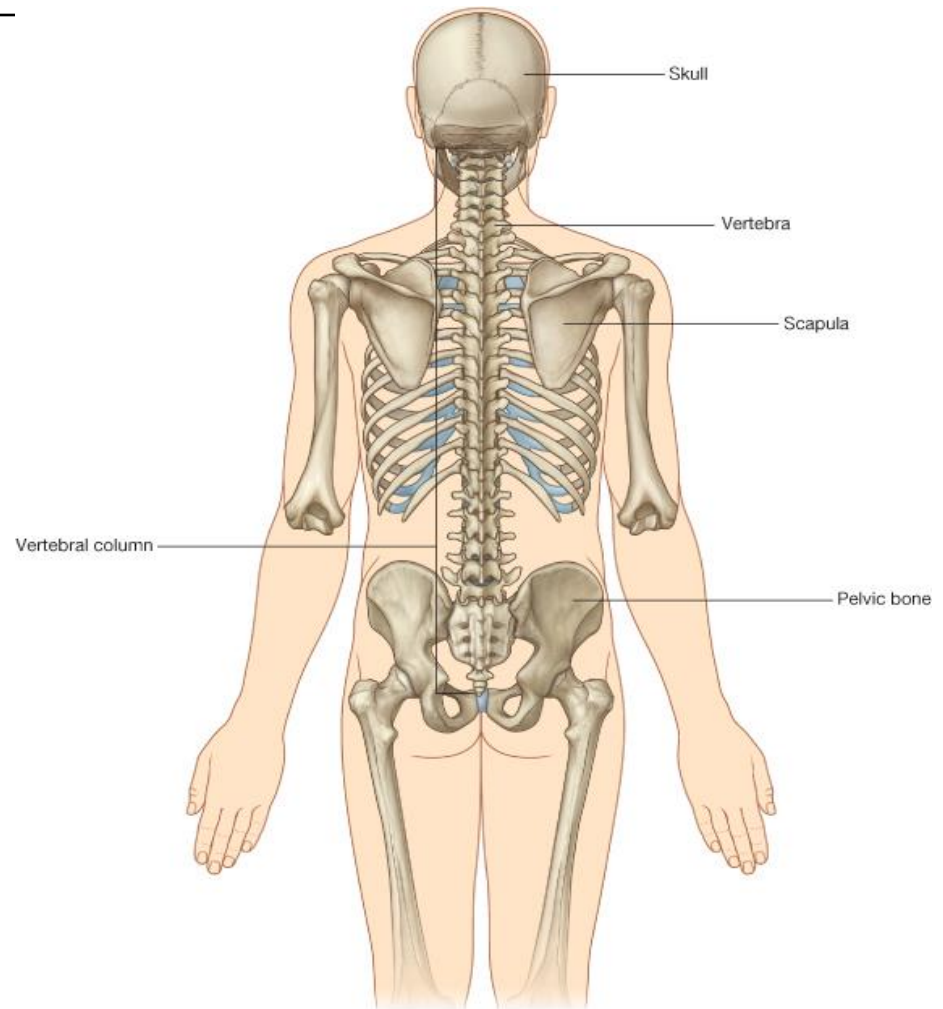
## □ Carpal and tarsal bones



# Flat bones

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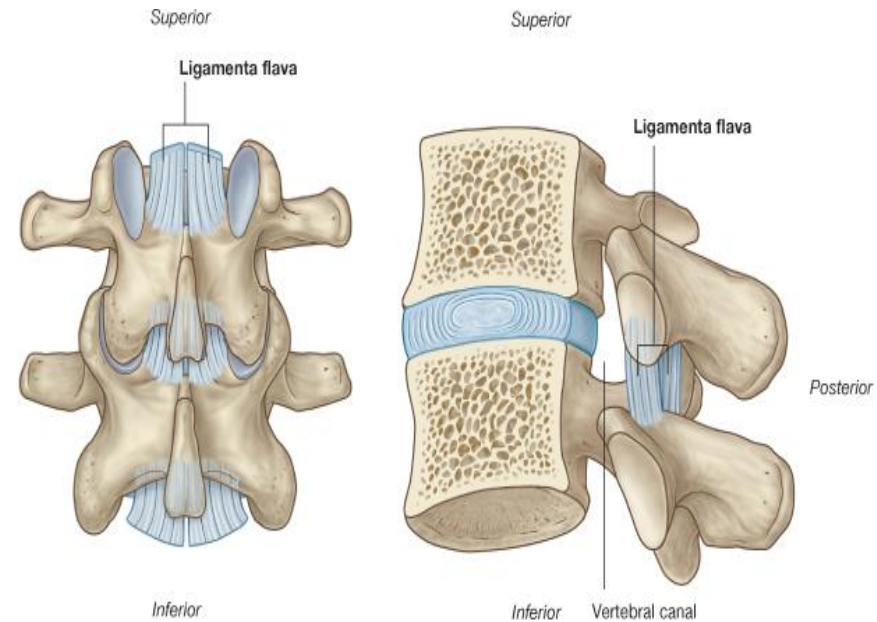
- ❑ Bones in the vault of the skull
- ❑ Ribs
- ❑ Sternum
- ❑ Scapula



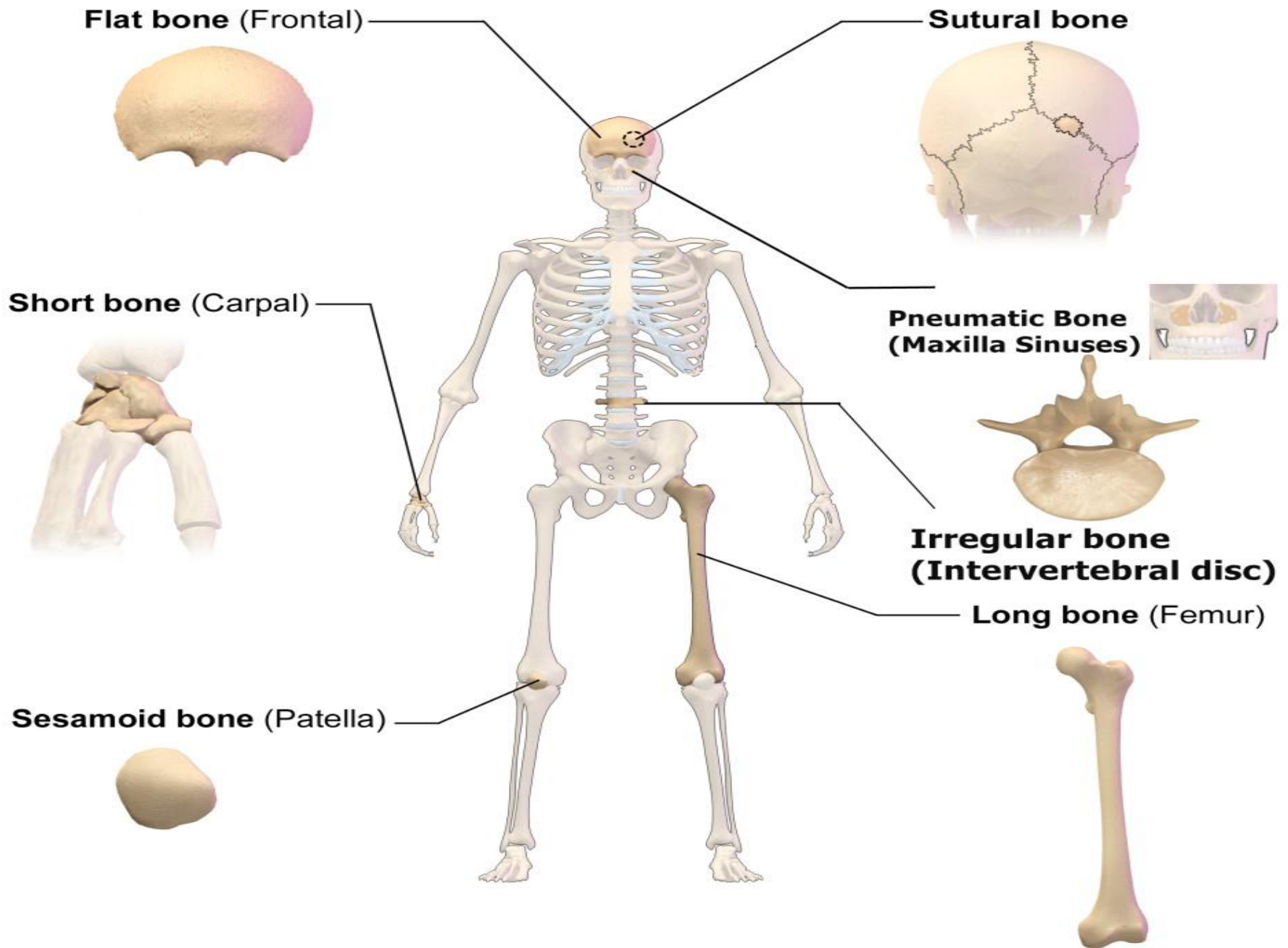


# Irregular bones

- ❑ Vertebrae
- ❑ Hip bone
- ❑ Bones at the base of skull







## Classification of Bones by Shape



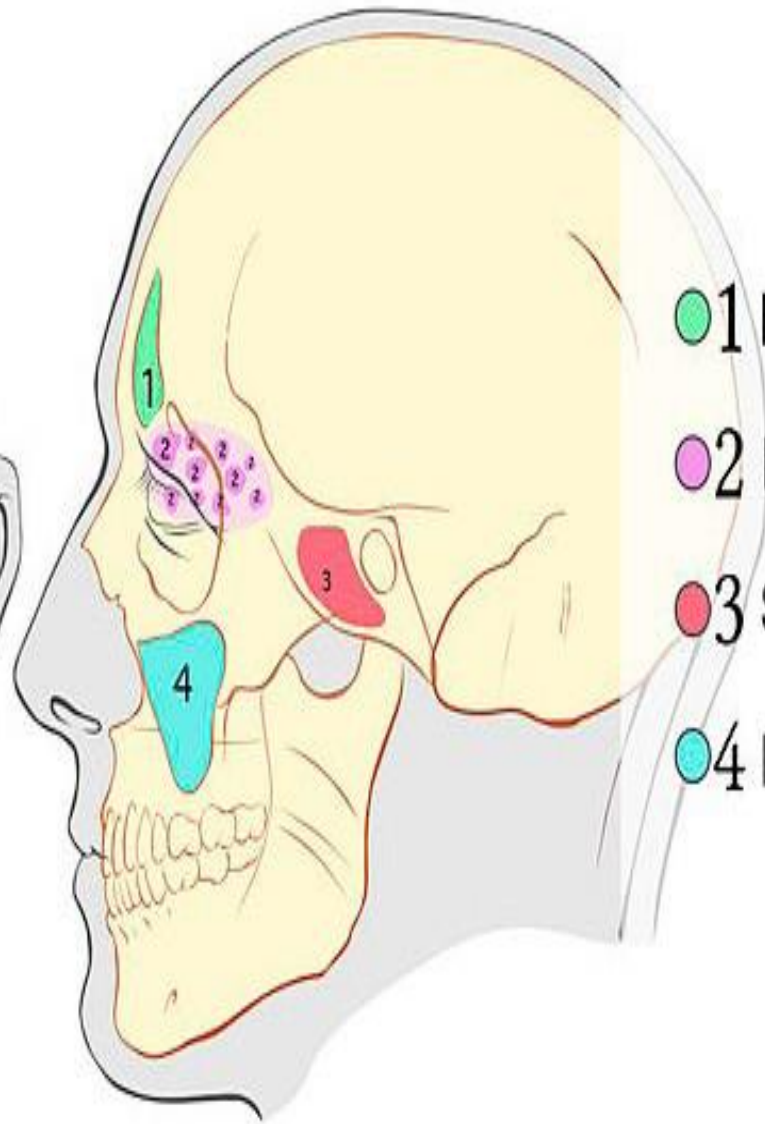
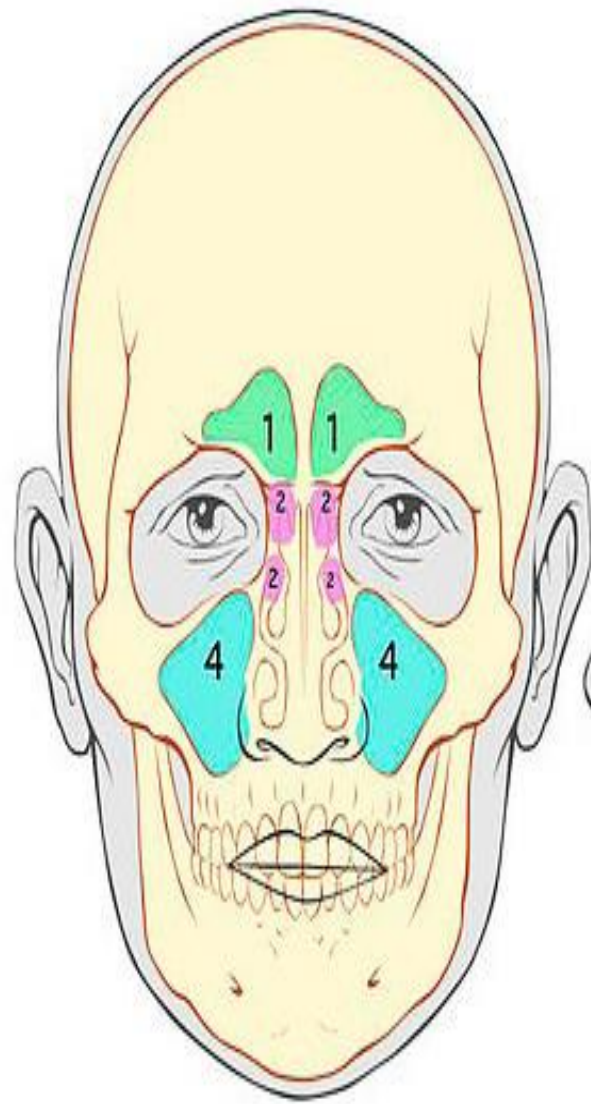
# **Pneumatic bones**

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- ☐ Maxilla
- ☐ Sphenoid
- ☐ Ethmoid

## **Sesamoid bones:**

- ☐ Patella
- ☐ Pisiform
- ☐ Fabella



- 1 Frontal sinuses
- 2 Ethmoid sinuses
- 3 Sphenoid sinus
- 4 Maxillary sinuses

Anterolateral view  
of the knee



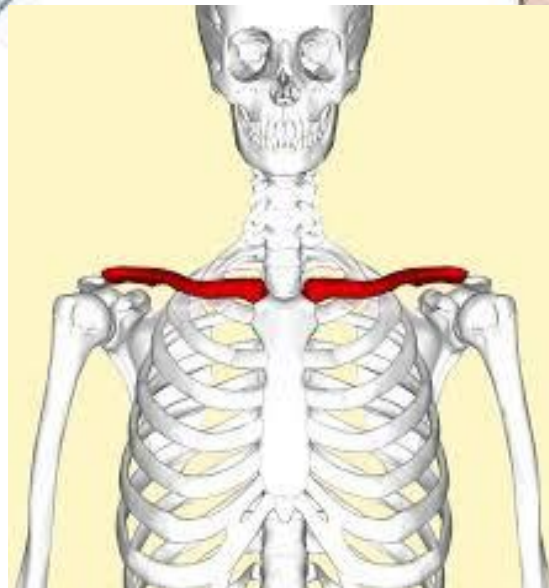
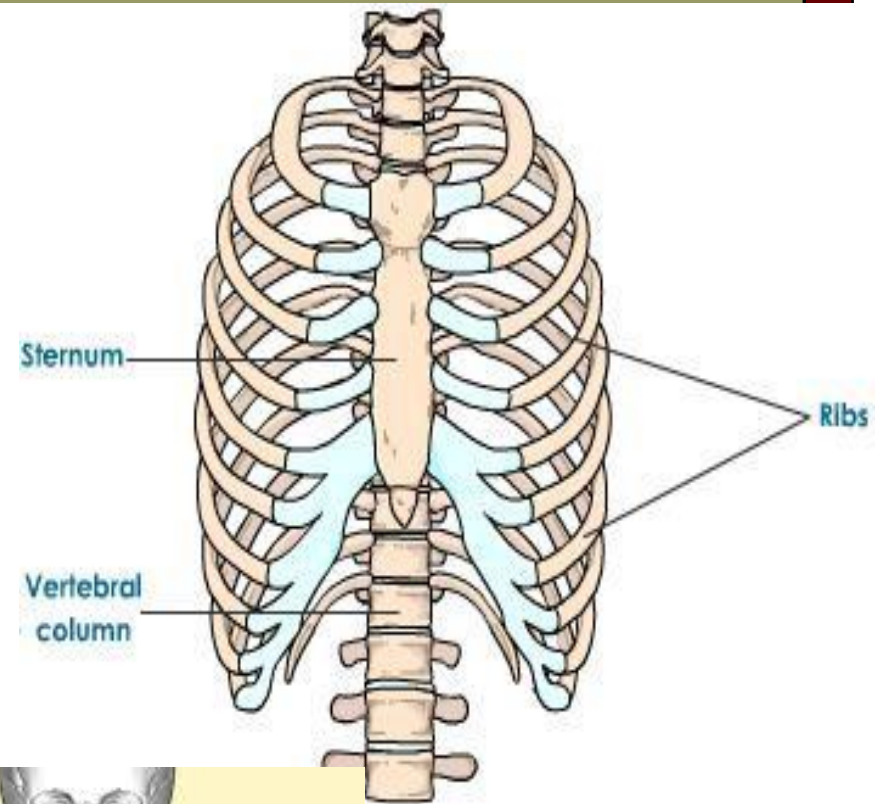
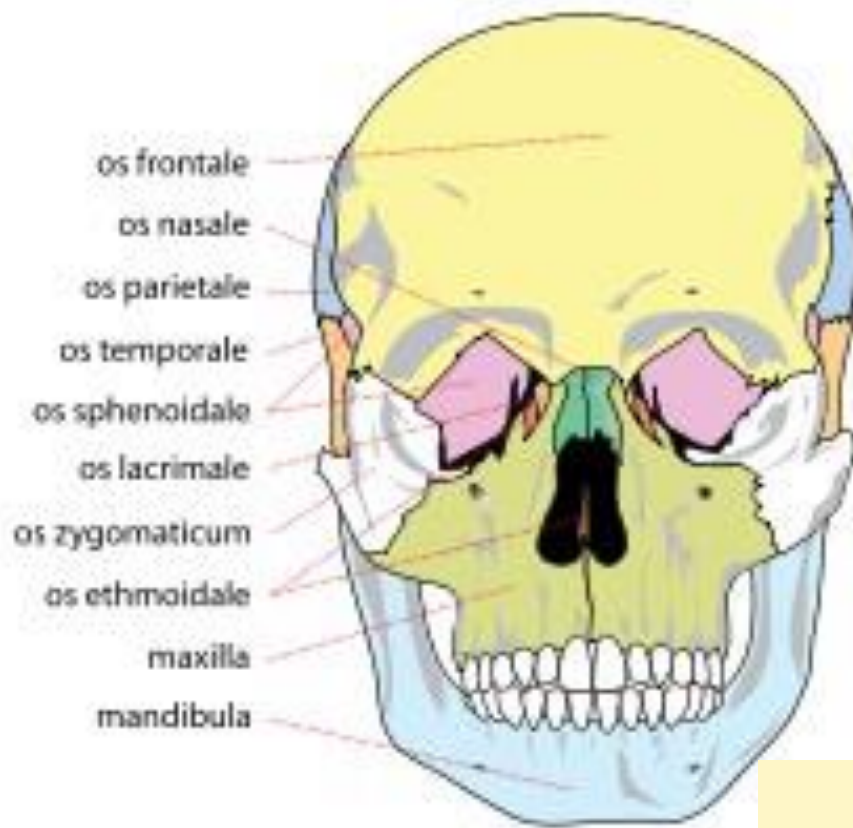


# Developmental classification

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- ❑ **Membrane bones-** skull & facial bones
- ❑ **Cartilaginous bones-** limb bones, vertebral column, thoracic cage
- ❑ **Membrano-cartilaginous bones-** clavicle, mandible, occipital, temporal, sphenoid







# Regional classification

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- Axial skeleton
- Appendicular skeleton

# Structural classification

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## ❑ Macroscopically-

1. Compact bone
2. Cancellous or Spongy bone

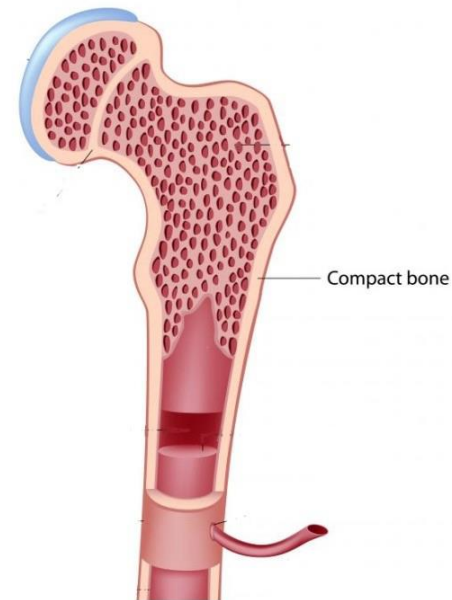
## ❑ Microscopically-

1. Lamellar bone
2. Woven bone
3. Fibrous bone
4. Dentine
5. Cement



## a. Compact Bone:

- Compact bone is dense in texture but is
- extremely
- porous.
- Example: In the cortex of long bones.

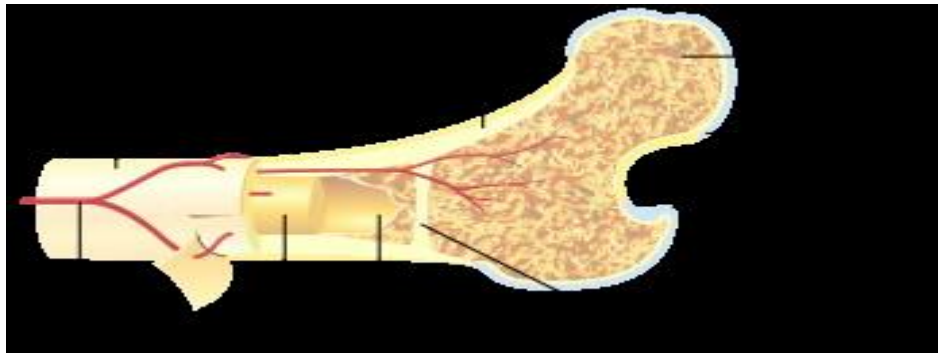


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**b. Cancellous OR Spongy Bone:**

The part of bone where there is more empty space  
and  
less bone tissue.

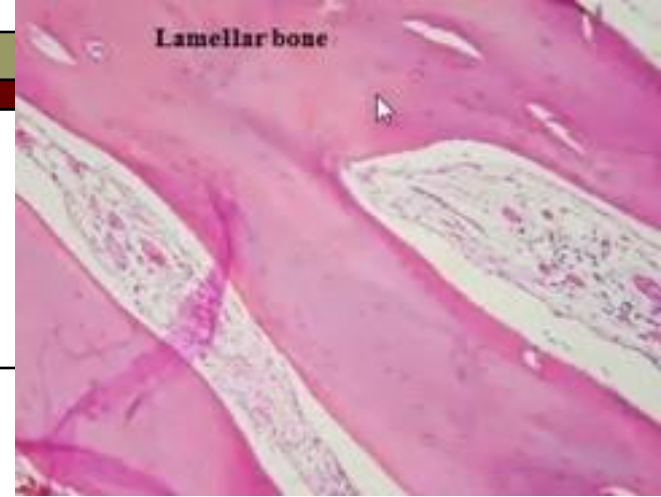
Example: The inner part of Long  
Bones.



## **b. Lamellar Bone:**

Most of the mature human bones, whether compact or Cancellous, are composed of thin plates of bony tissue called lamellae.

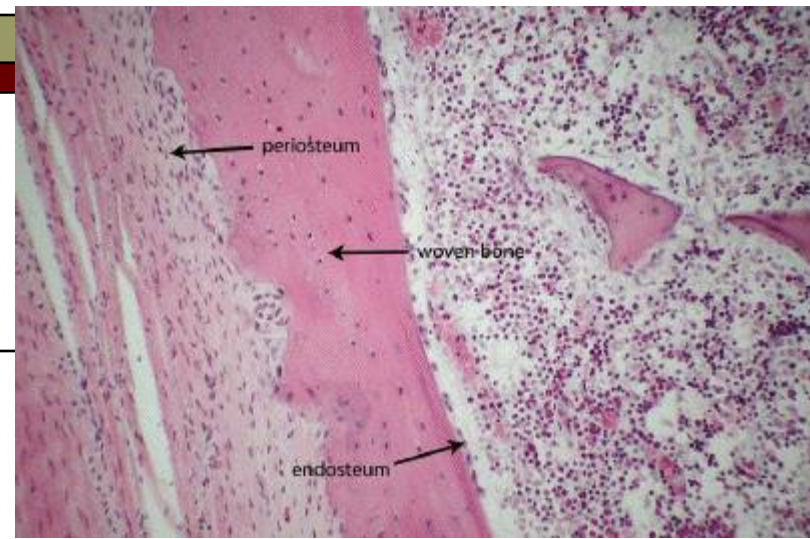
Example: Formed on the periosteal surface of diaphysis.



### **c. Woven Bone:**

Occurs initially in fetal bones. In adults woven bone is created after fractures.

Example: Seen in fetal bone, fracture repair and in cancer of bone.



## **d. Cementum and Dentine:**

Cementum is a specialized calcified substance covering the root of a tooth. It hardens to act as an adhesive glue.

Dentine is one of the hard tissues of the teeth which constitutes most of its bulk.

Example: Occur in teeth.

