ANATOMY OF THE SKELETAL SYSTEM

For regular PC-I students 2024

INTRODUCTION

- The word skeleton comes from the Greek word 'skeletos' meaning "dried up".
- The skeletal system includes:- **bones, joints, cartilages and ligaments.**
- The joint give the body flexibility and allow movements to occur.

Functions of the skeleton

1. Provides a framework that supports the body; the muscles that are attached to bones move the skeleton.

2. Protects some internal organs from mechanical injury; the rib cage protects the heart and lungs, for example.

Function of skeleton….

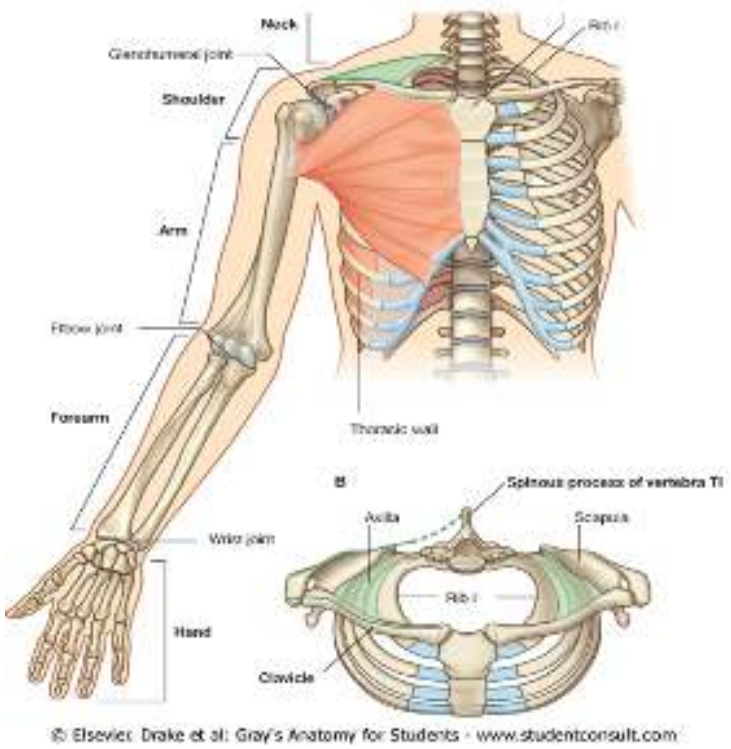
3. Contains and protects the red bone marrow, the primary hemopoietic (blood-forming) tissue.

4. Provides a storage site for excess calcium. Calcium may be removed from bone to maintain a normal blood calcium level, which is essential for blood clotting and proper functioning of muscles and nerves.

CLASSIFICATION OF bones(shape)

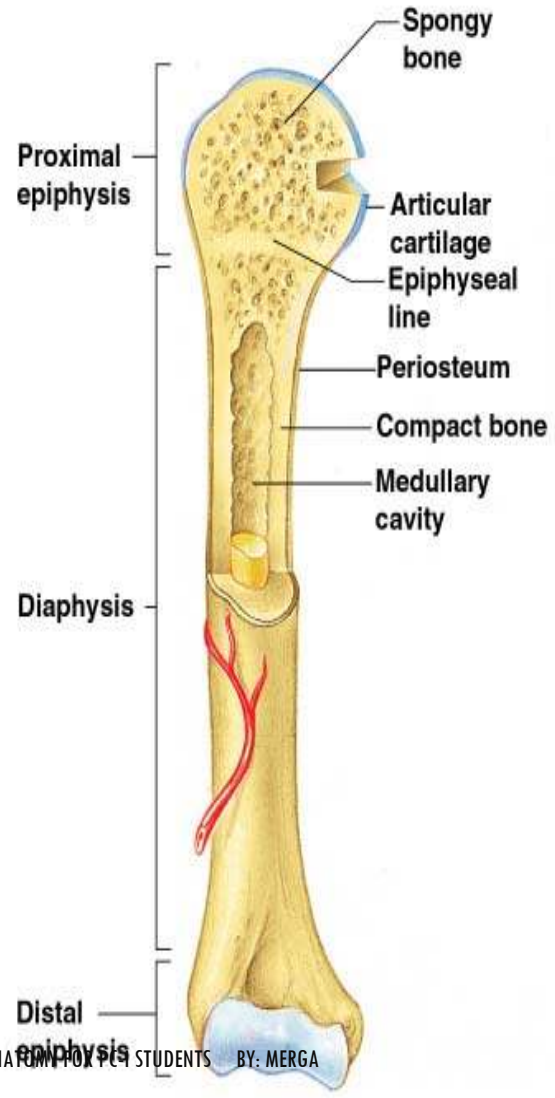
1.Long bones—the bones of the arms, legs, hands, and feet (but not the wrists and ankles).

- greater length than width

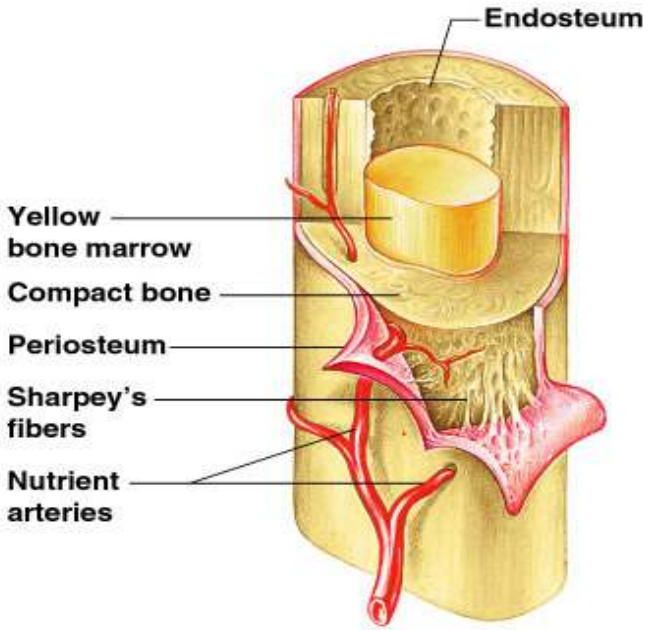


Gross anatomy of long bone

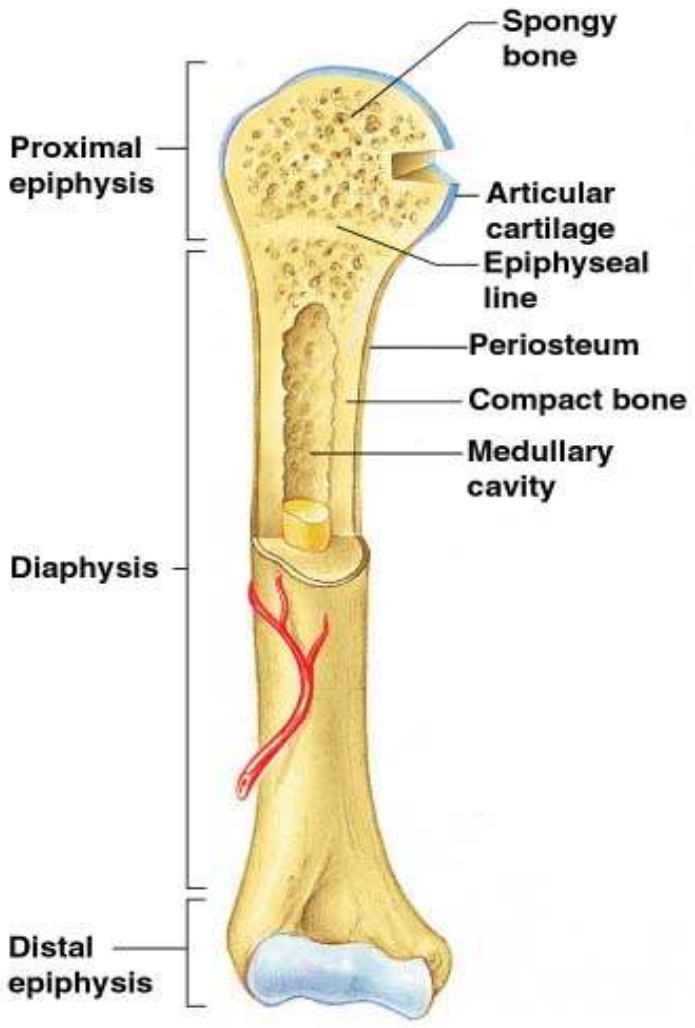
- **Diaphysis**
  - Shaft
  - Composed of compact bone
- **Epiphysis**
  - Ends of the bone
  - Composed mostly of spongy bone



- **Periosteum**
  - Outside covering of the diaphysis
  - Fibrous connective tissue membrane
- **Sharpey's fibers**
  - Secure periosteum to underlying bone
- **Arteries**
  - Supply bone cells with nutrients



- **Articular cartilage**
  - ✓ Covers the external surface of the epiphyses
  - ✓ Made of hyaline cartilage
  - ✓ Decreases friction at joint surfaces

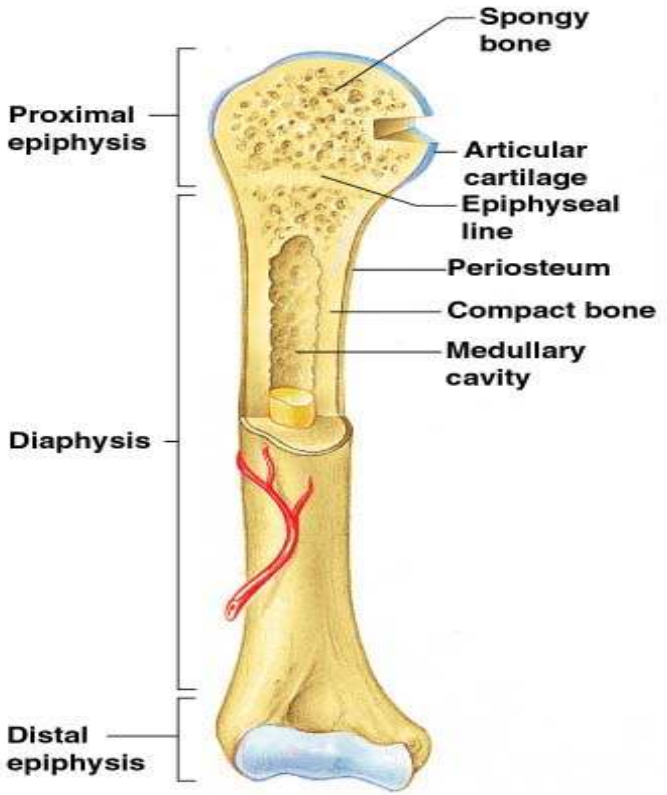


Structure of long bone……

- **Medullary cavity**
  - Cavity of the shaft
  - Contains yellow marrow

    (mostly fat) in adults
  - Contains red marrow

    (for blood cell formation) in infants



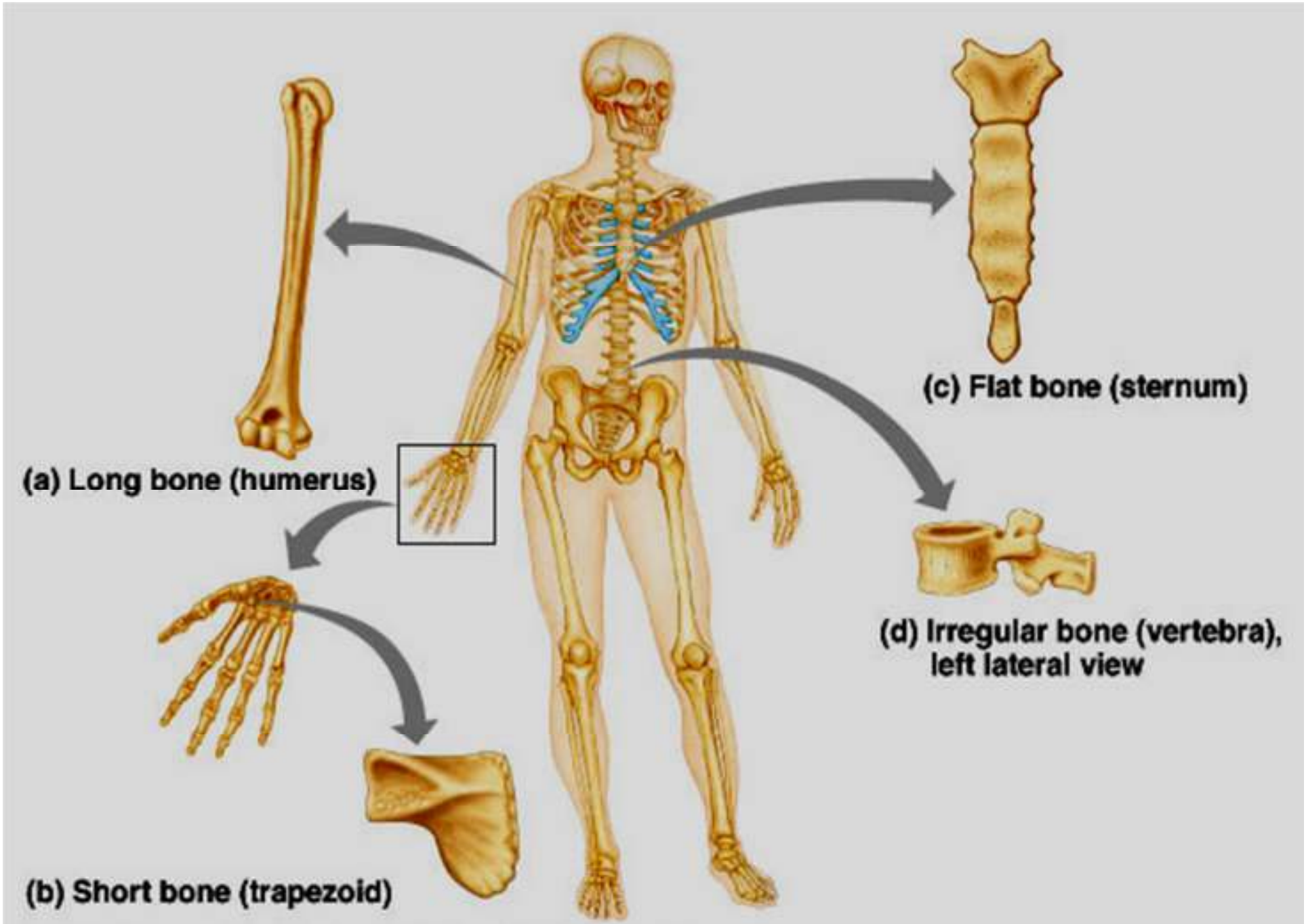
Classification cont'd…

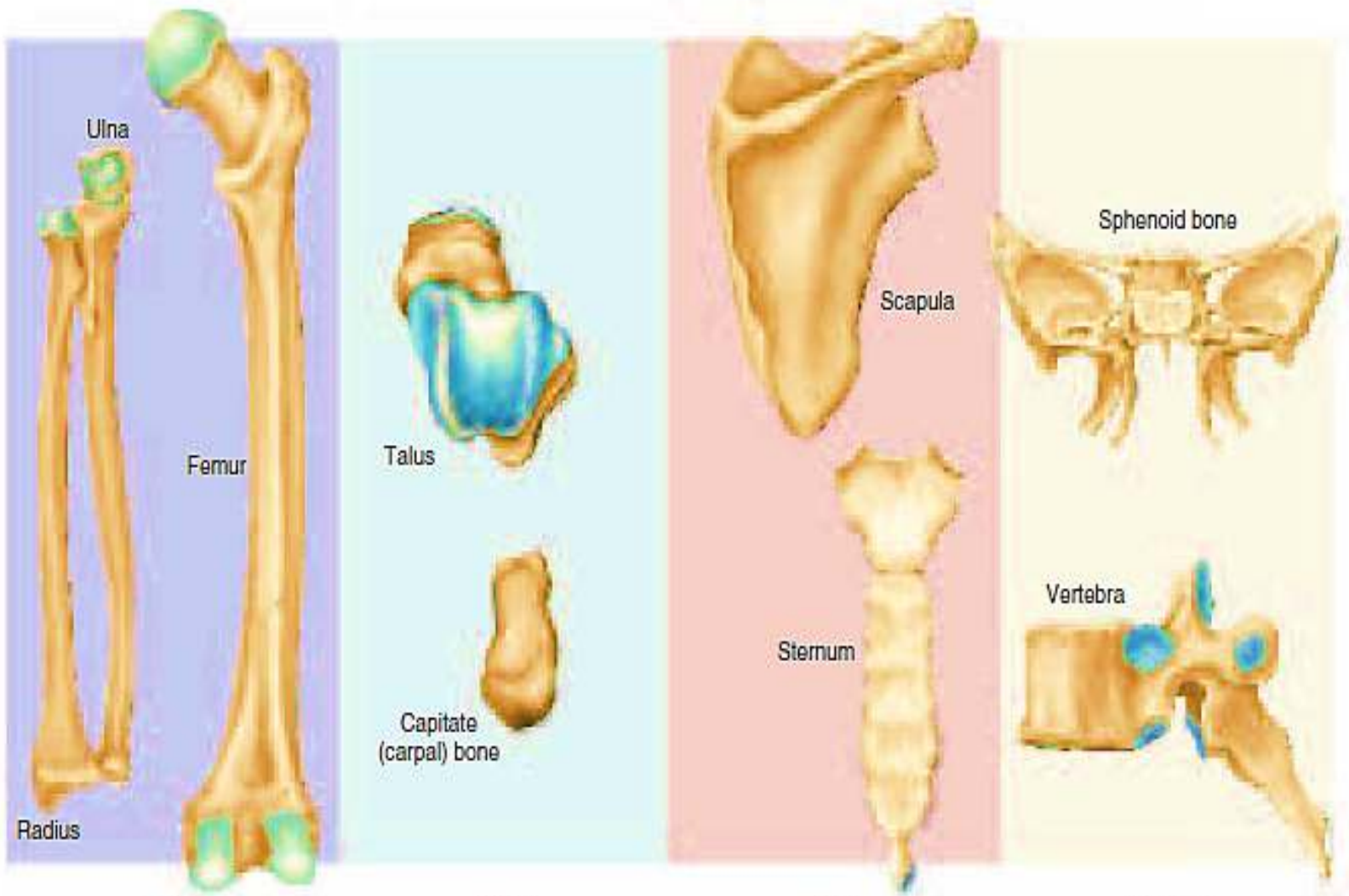
2. **Short bones—the bones of the wrists and ankles.**

About equal length , width

3. **Flat bones—the ribs, shoulder blades, hip bones,** and cranial bones.

4. **Irregular bones—the vertebrae and facial bones.**





Classification of Bones by Shape.

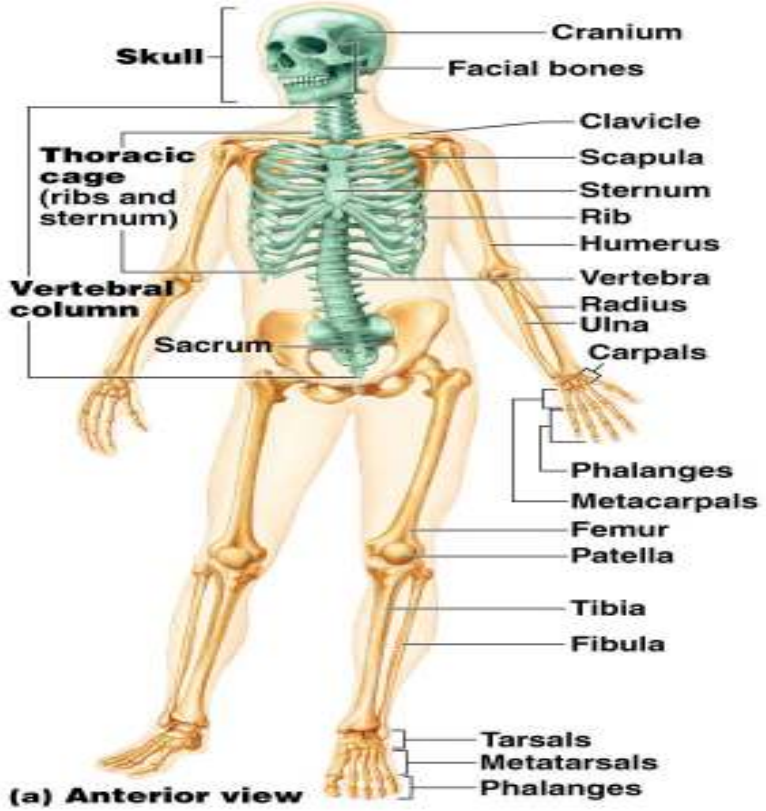
Bone tissue and cells

Refer bone tissue

THE SKELETAL SYSTEM

Composed of 206 named bones grouped into two divisions

- Axial skeleton (80 bones)
- Appendicular skeleton (126 bones



A. Skull ……29 bones

i. Cranium ……..8

Parietal (2)

Axial

Temporal (2)

Frontal (1)

Ethmoid (1)

Sphenoid (1)

Occipital (1)

Ii.Face ……14

Pectoral girdle ……...4 *bones*

a. Clavicle (2)

a. Scapula (2)

Appendicular

Upper extremities ……60 bones

i. Arm ……..2

♣ Humerus (2)

i. Forearm……..4

♣ Ulna (2)

♣ Radius (2)

Maxillary (2)

Zygomatic (2)

Lacrimal (2)

Nasal (2)

Inferior nasal conchii (2)

Palatine (2)

Mandible (1)

Vomer (1)

i. Ossicles of ear… *6*

Malleus (2)

Incus (2)

Stapes (2)

Hyoid…… ….1

Iii. Wrist ……..16

♣ Carpals (16)

iv. Hand and fingers ……38

♣ Metacarpals (10)

♣ Phalanges (28)

Pelvic girdle ……2 ***bones***

♣ Coxal bones (2)

A. Lower extremities …60 bones

Thigh……4

♣ Femur (2)

♣ Patella (2)

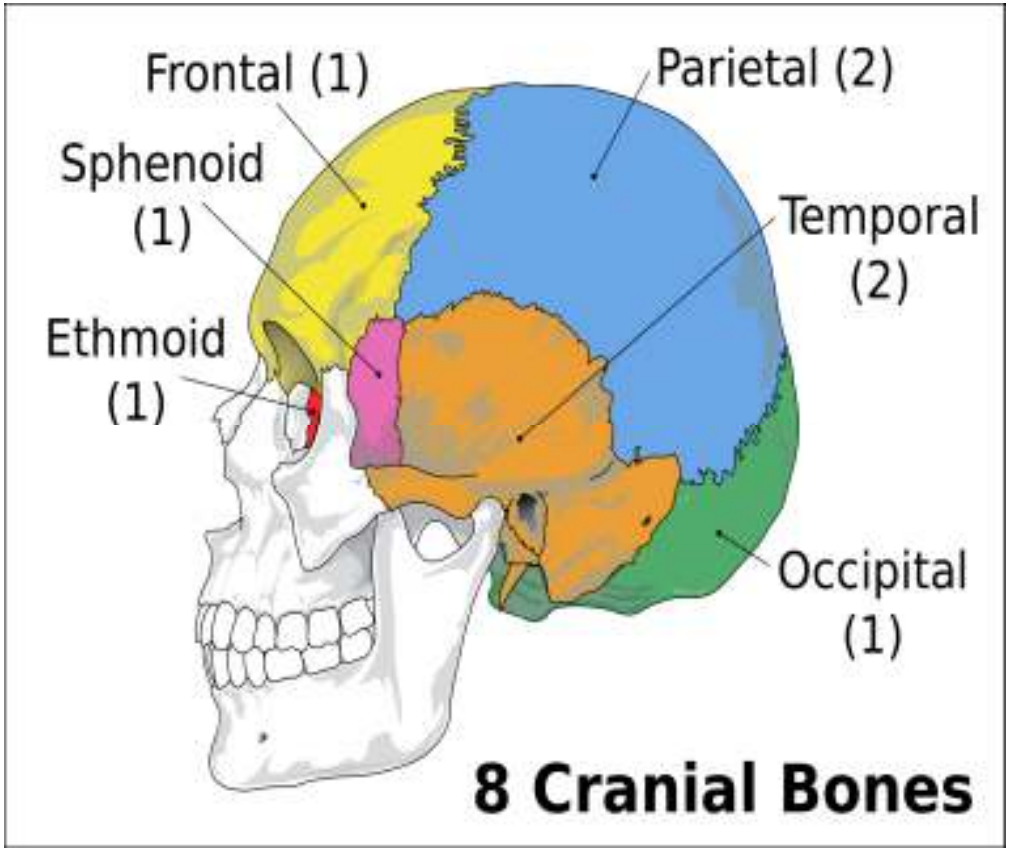
Leg ……4

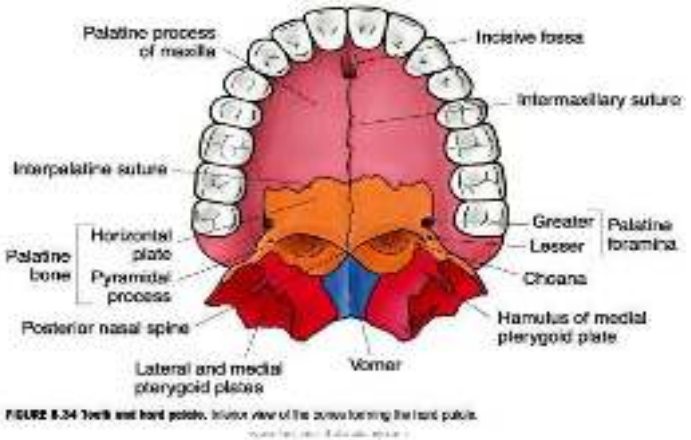
Tibia (2)

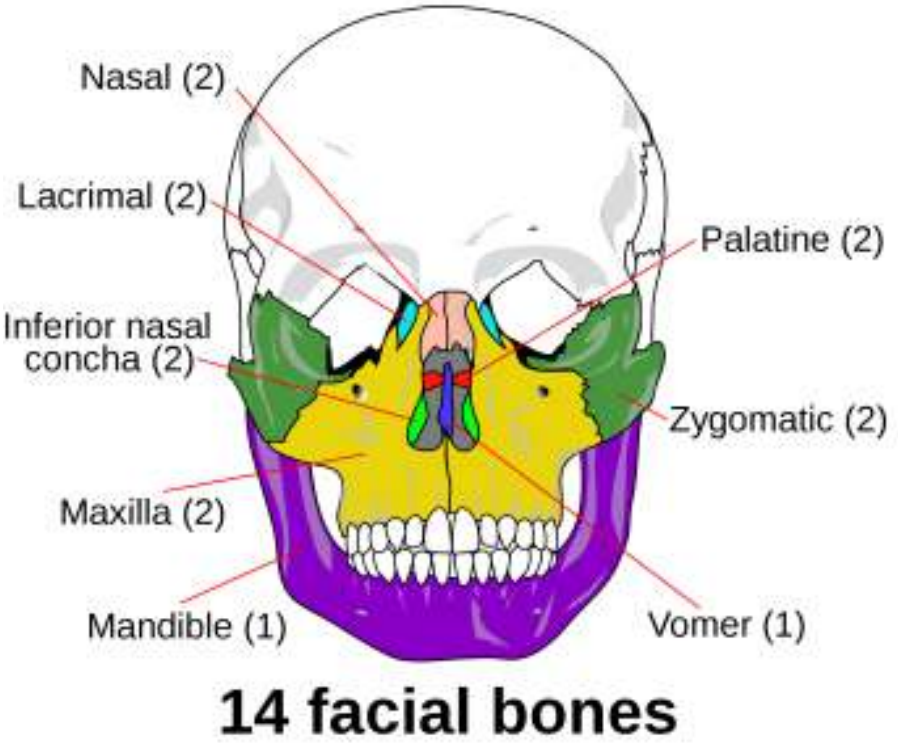
Fibula (2)

Vertebral column …26 bones	***Ankle…….*** **14**
Cervical vertebrae 7	♣ Tarsals (14)
Thoracic vertebrae 12	***Foot and toes……*** 38
Lumbar vertebrae 5	♣ Metatarsals (10)
Sacrum (5 fused bones) 1	♣ Phalanges (28)
Coccyx (3- 5 fused bones) 1	
Thorax ……25bones	
Ribs 24	
Sternum 1	**Total Appendicular bones…126**
Total axial bones ……80	

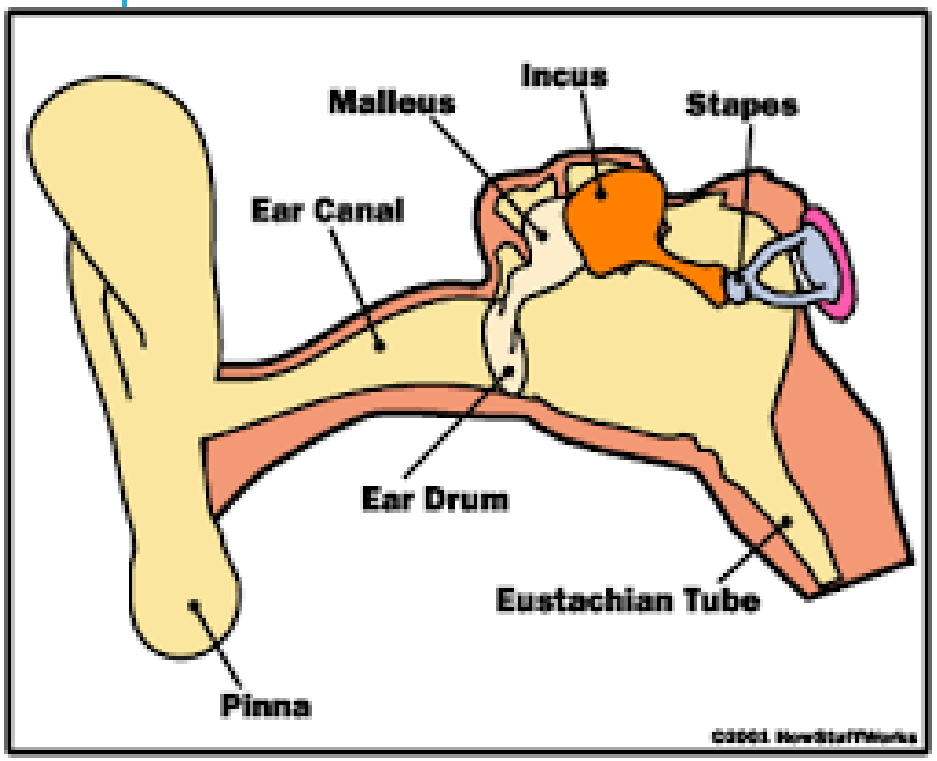
AXIAL SKELETON
BONE OF THE SKUL



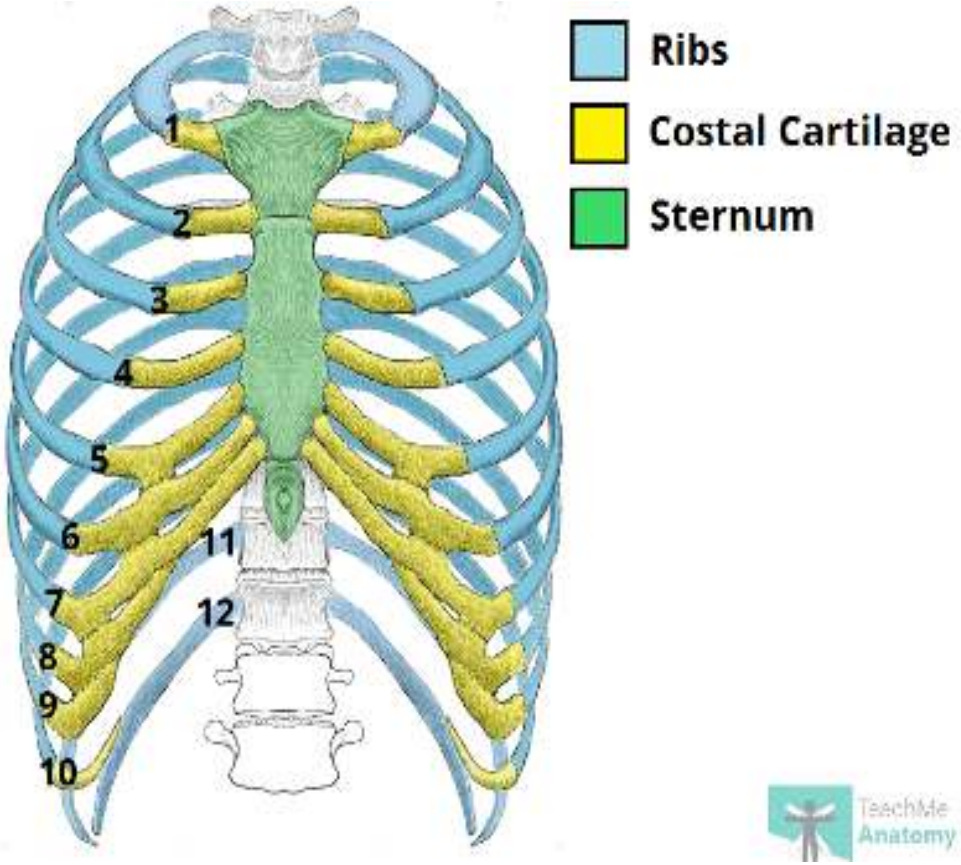


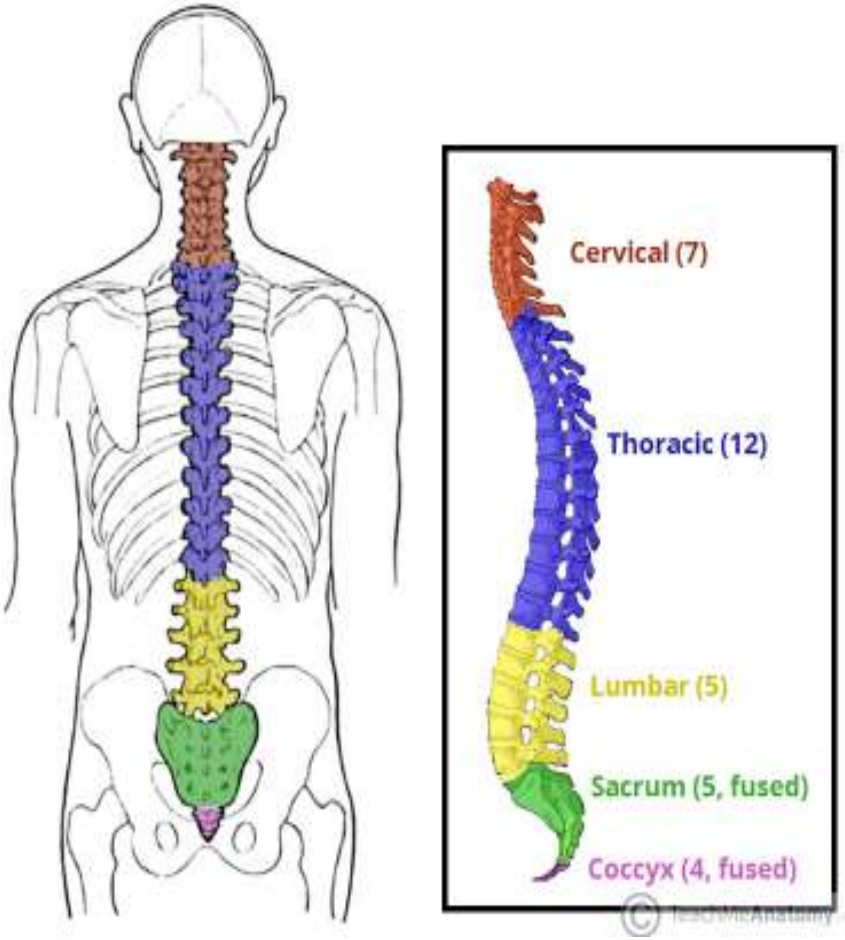


EAR OSSICLES AND HYOID BONE

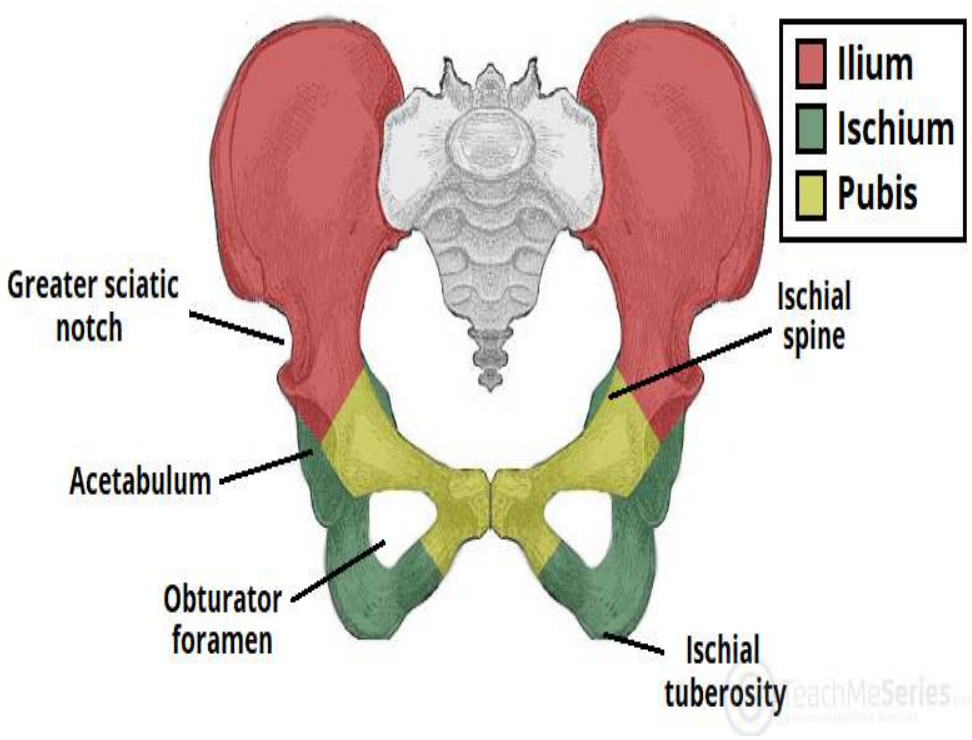


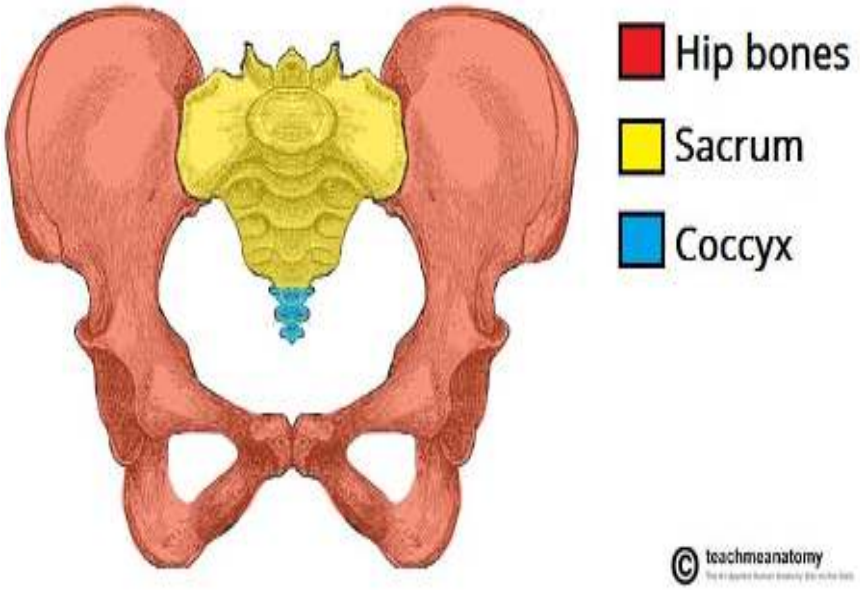
BONEY THORAX AND VERTEBRAL COLUMN



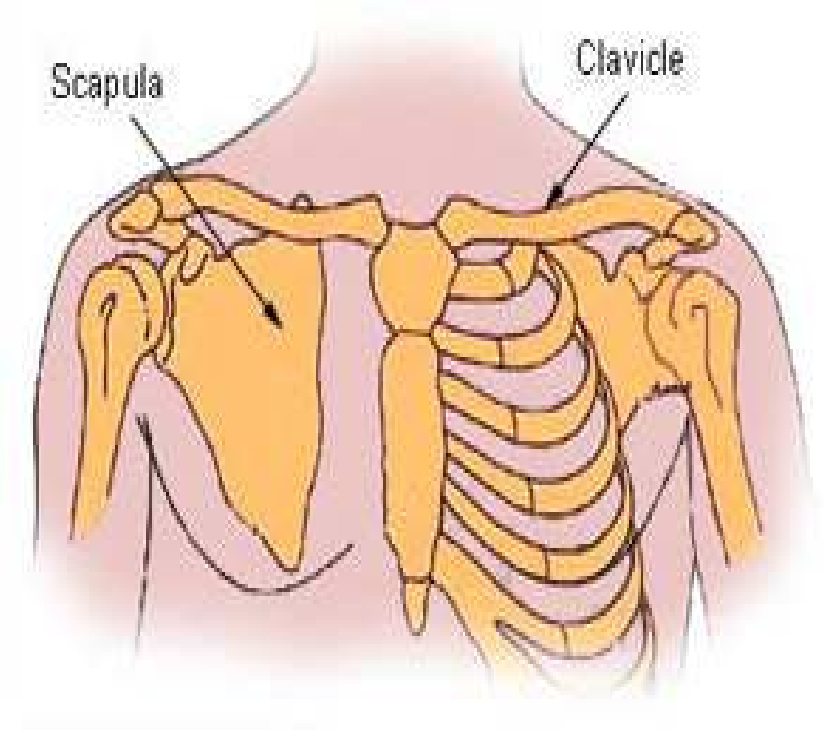


APPENDICULAR SKELETON
PELVIC GIRDLE

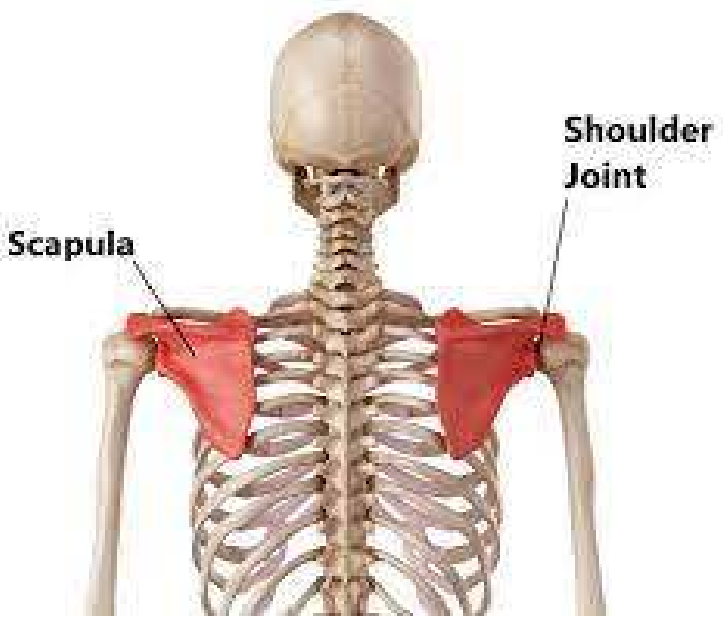


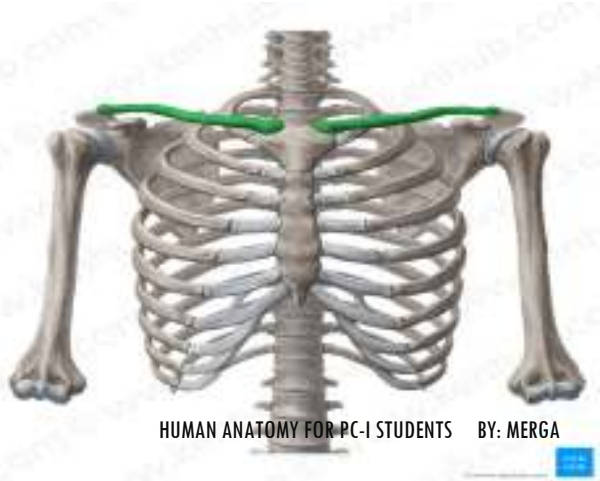


PECTORAL GIRDLE

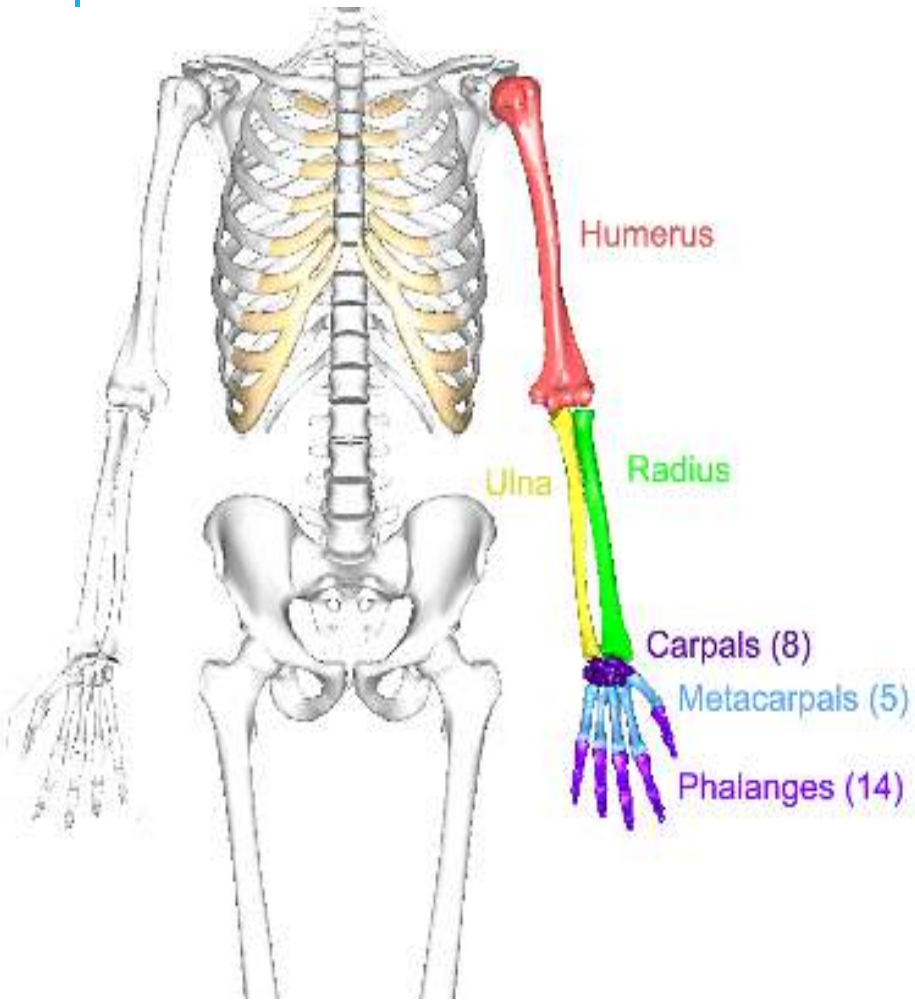


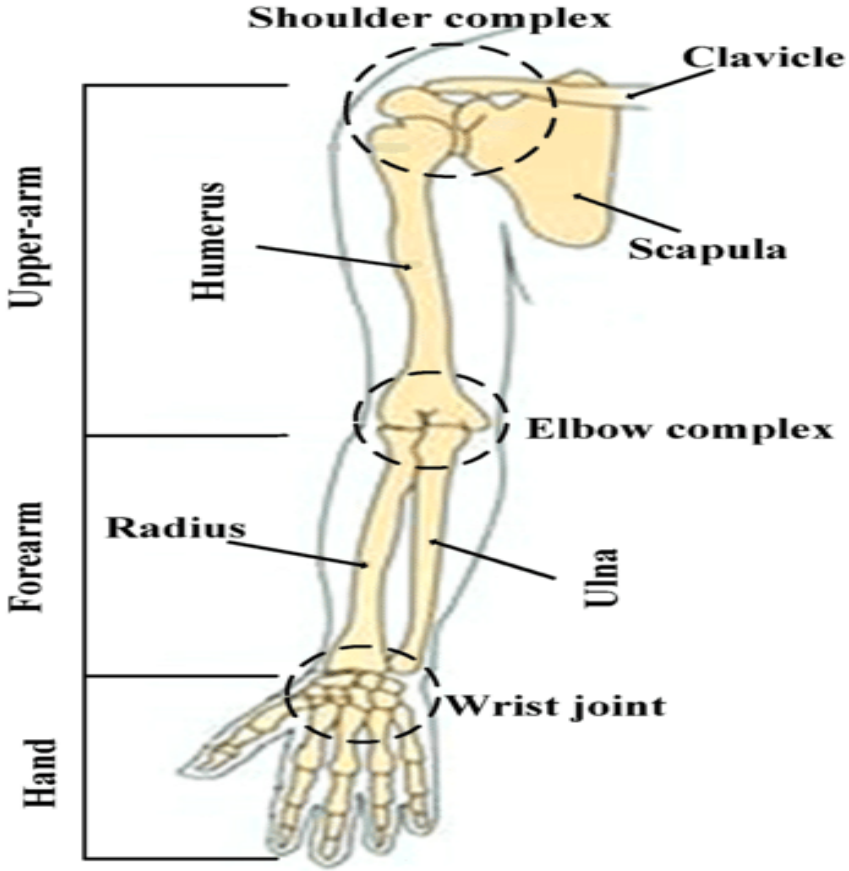
Pectoral Girdles



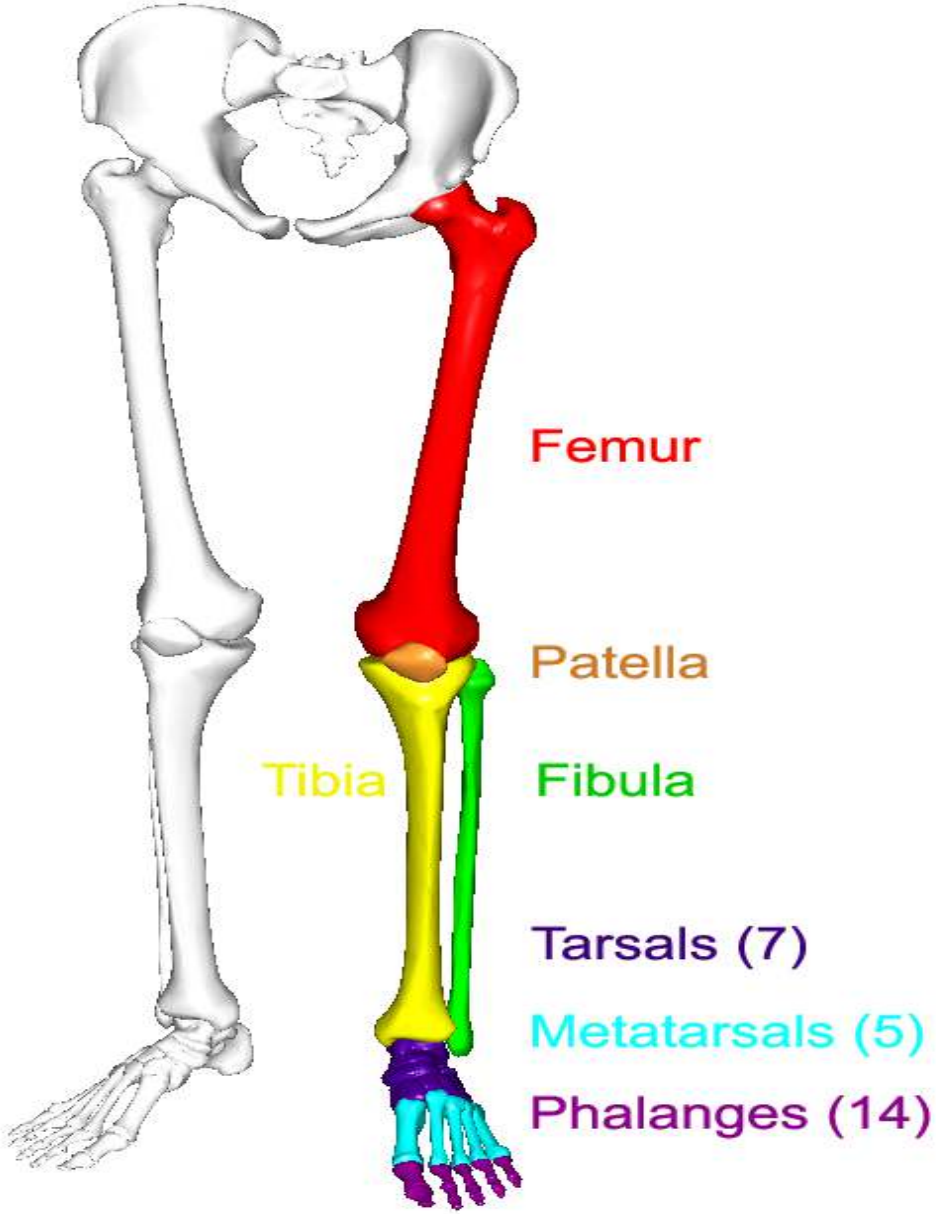


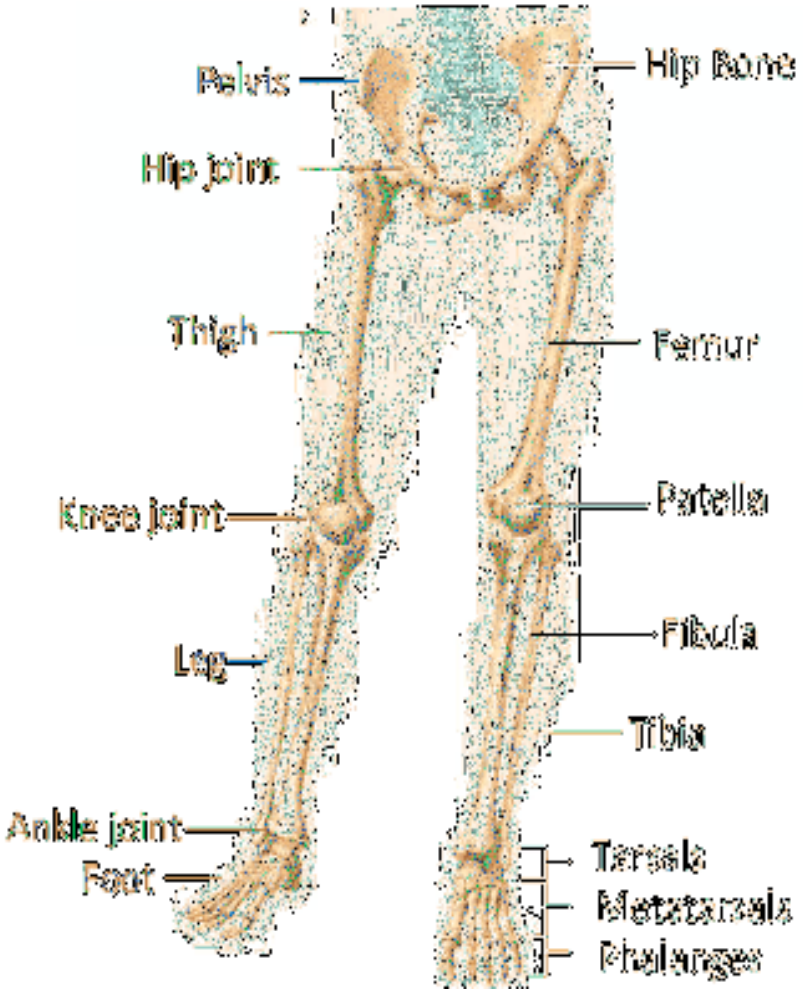
BONES OF UPPER LIMB





Bones of lower limb



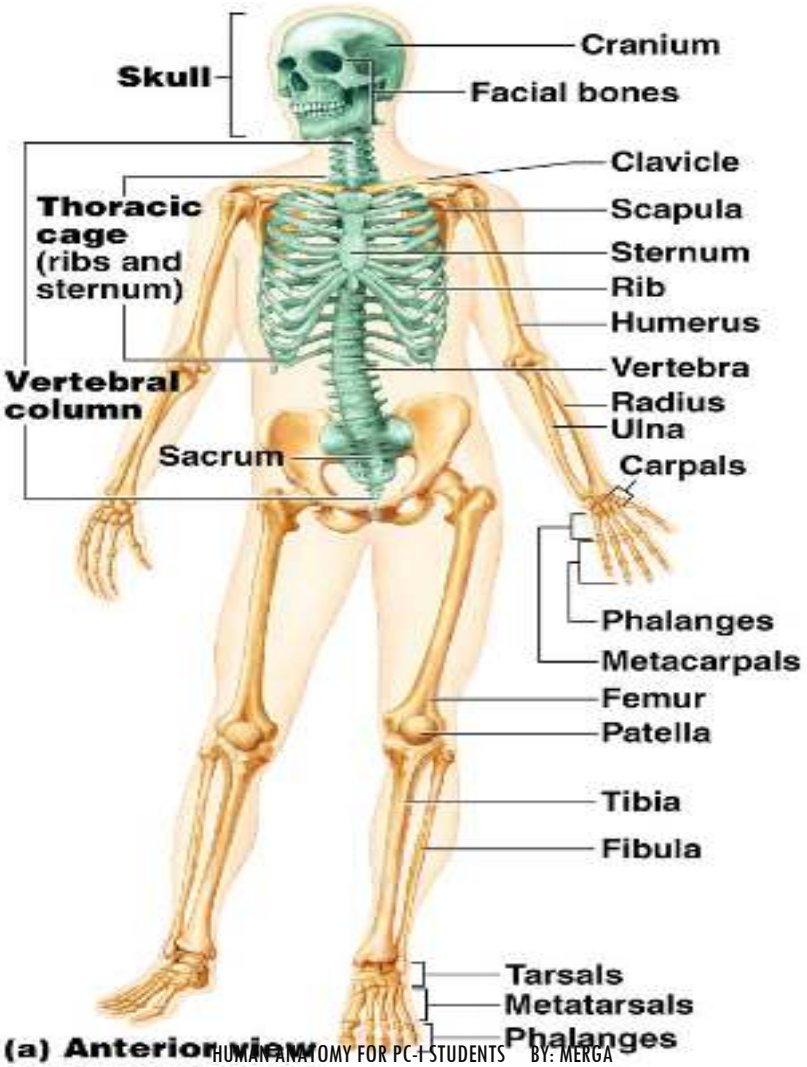


THE AXIAL SKELETON

Formed from 80 named bone

Consists of

- skull,
- vertebral column,
- bony thorax.



THE CRANIUM

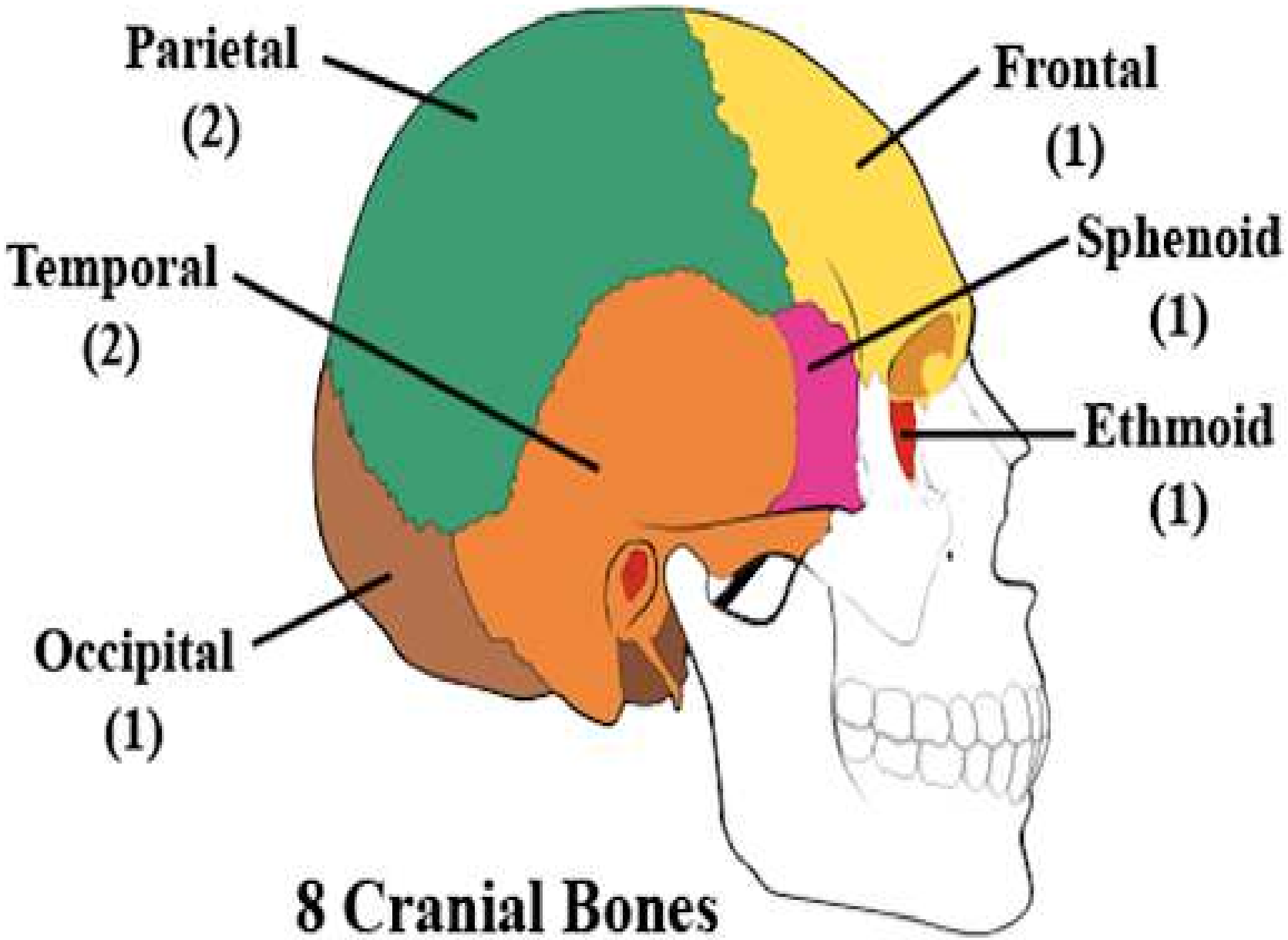
The cranium serves to

- Enclose brain
- Provide attachment sites for some head and neck muscles

THE CRANIUM

Formed from **eight** large bones

- Paired bones include
  - Temporal bones
  - Parietal bones
- Unpaired bones include
  - Frontal bone
  - Occipital bone
  - Sphenoid bone
  - Ethmoid bone


Parietal
(2)
Frontal
(1)
Temporal
(2)
Sphenoid
(1)
Ethmoid
(1)
Occipital
(1)
8 Cranial Bones

PARIETAL BONES AND SUTURE

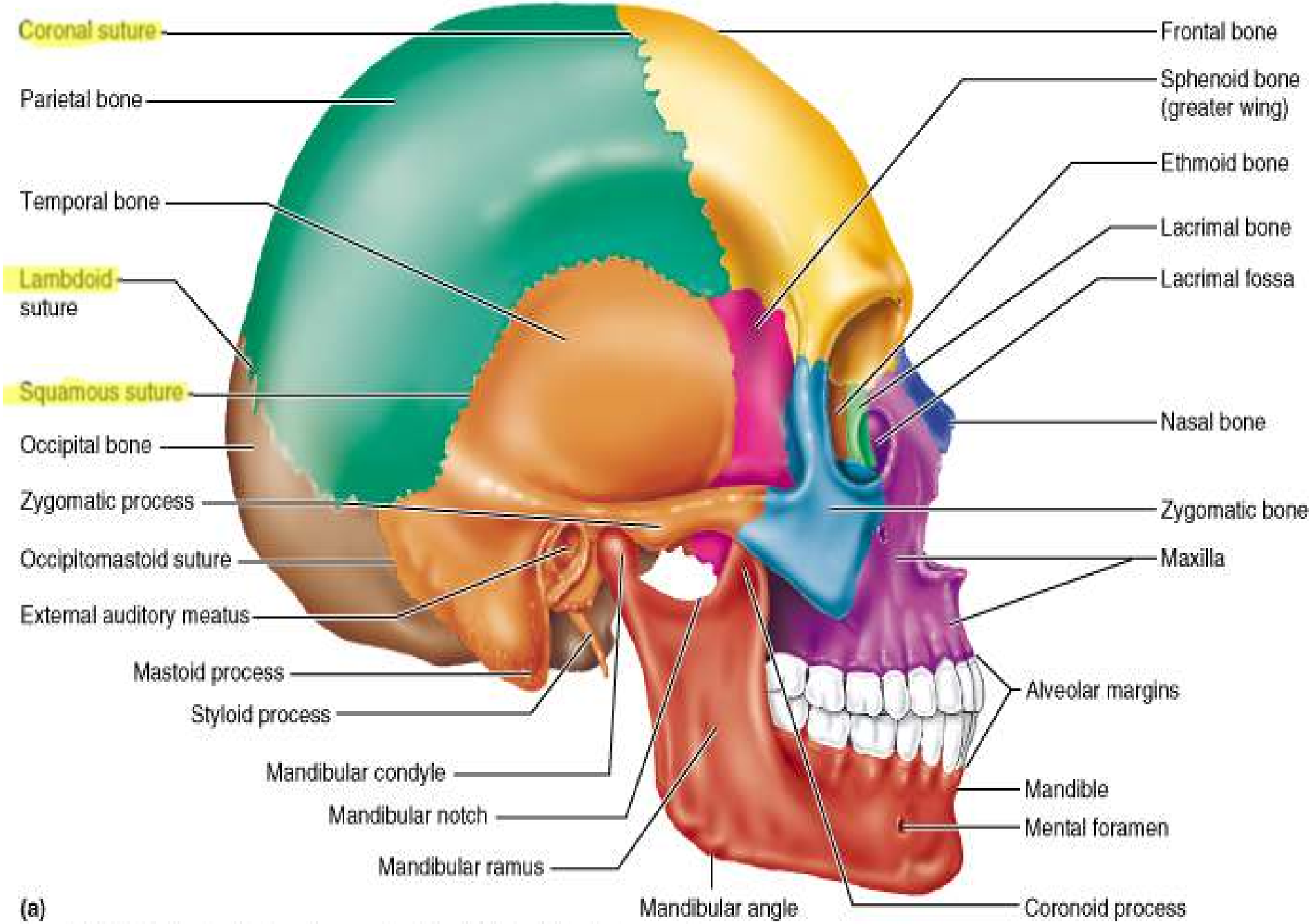
Parietal bones form superior and lateral parts of skull

Four sutures of the cranium

- **Coronal suture** – runs in the coronal plane
  - Located where parietal bones meet the frontal bone
- **Squamous suture** – occurs where each parietal bone meets a temporal bone inferiorly

Sutures of the cranium (continued)

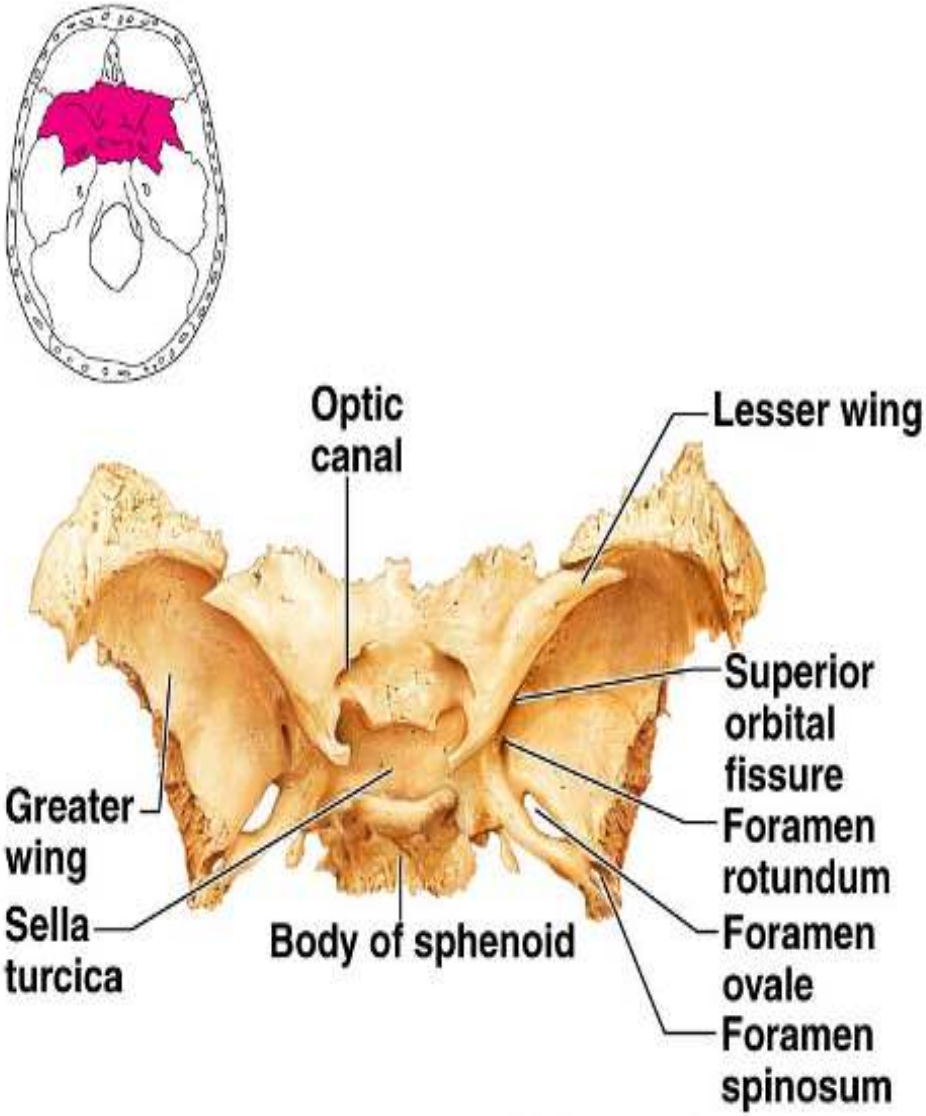
- **Sagittal suture** – occurs where right and left parietal bones meet superiorly
- **Lambdoid suture** – occurs where the parietal bones meet the occipital bone posteriorly



(a)

SPHENOID BONE

- Spans the width of the **cranial floor**
- Resembles a butterfly or bat
- Consists of a body and three pairs of processes
- The **sella turcika** is a bony saddle shaped structure on the superior surface of the body of the sphenoid.
- The sella turcika houses the pituitary gland
- Body of sphenoid is between the Ethmoid & occipital bone



(a) Superior view, as in Figure 7.4c

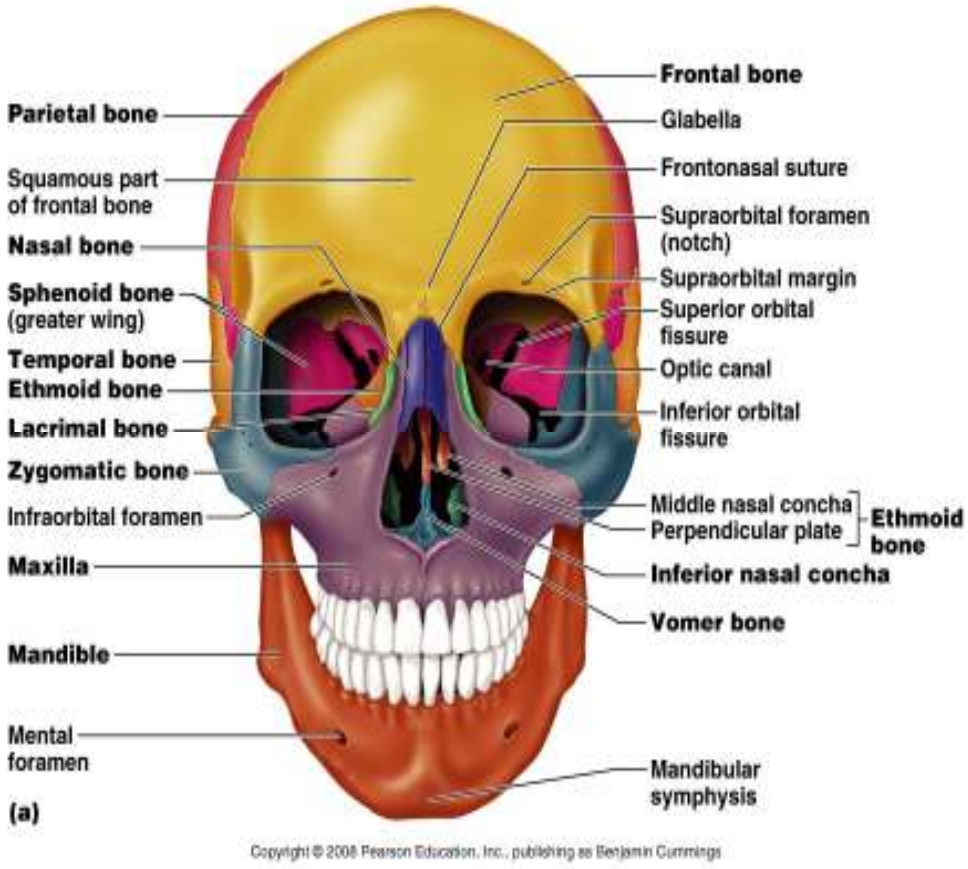
FACIAL BONE

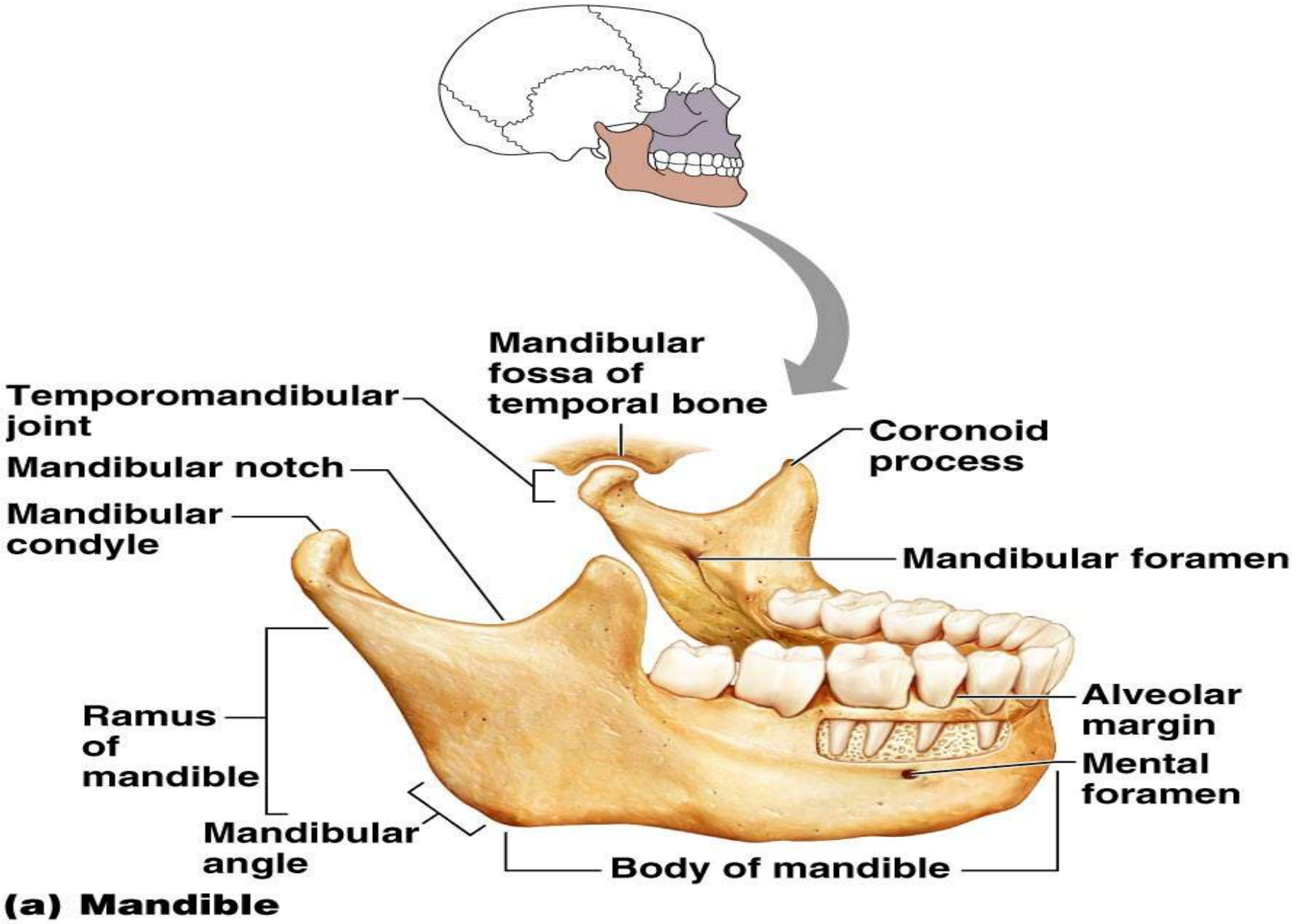
Unpaired bones

- Mandible and vomer

Paired bones

- Maxillae
- Zygomatic bones
- Nasal bones
- Lacrimal bones
- Palatine bones
- Inferior nasal conchae



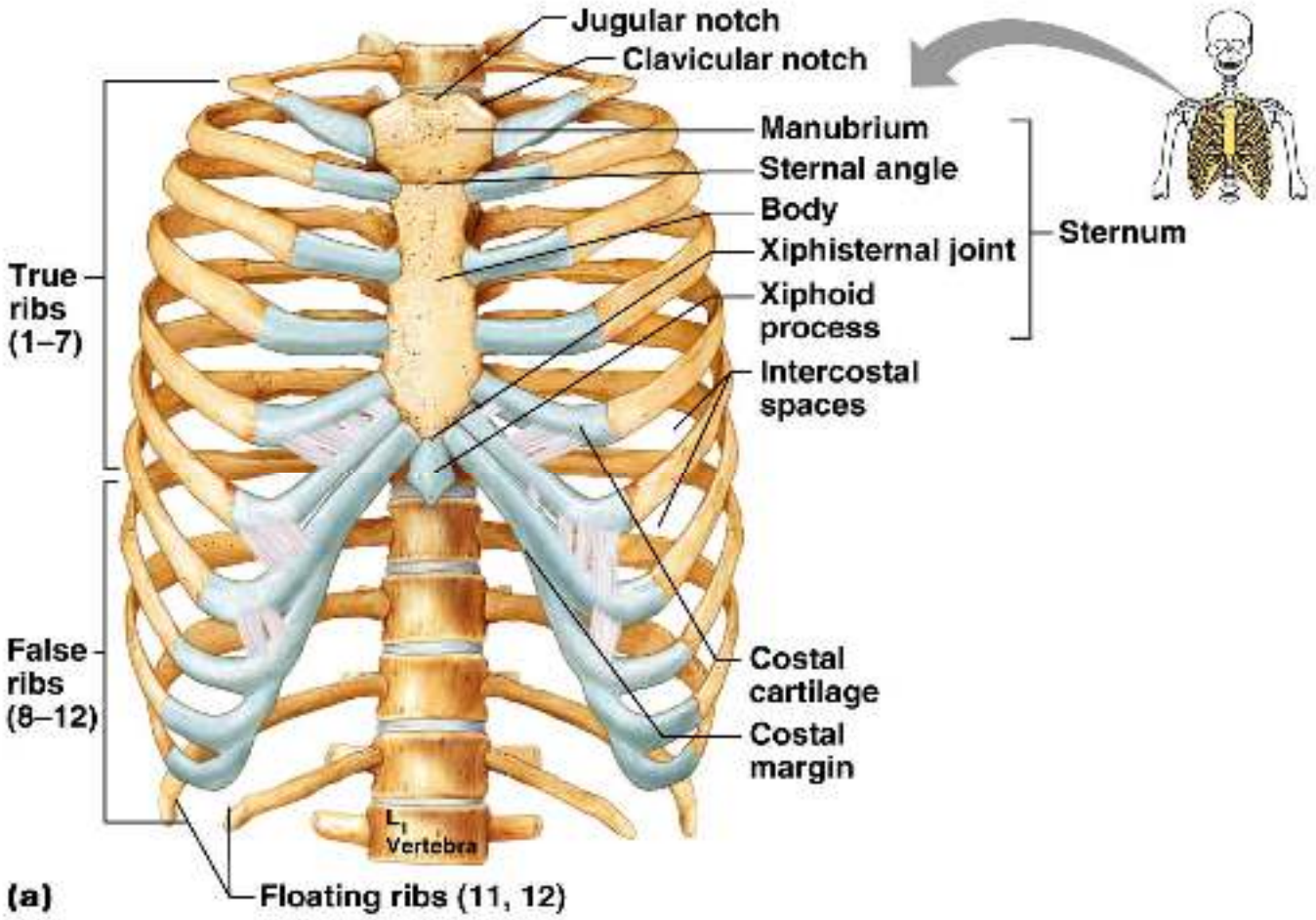


RIBS

On the basis of their attachment

All ribs attach to vertebral column posteriorly

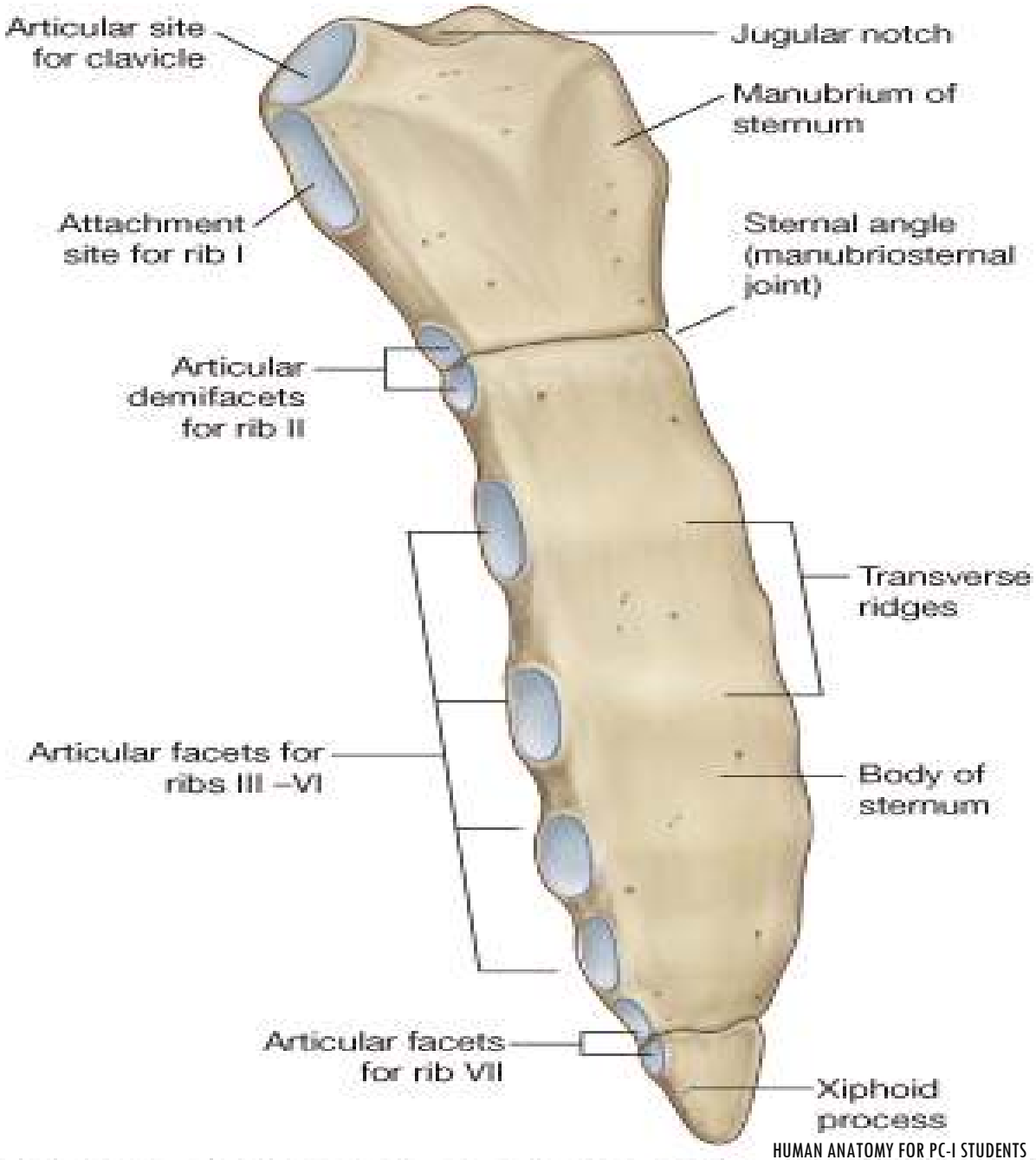
- **True ribs** - superior seven pairs of ribs
  - Attach to sternum by costal cartilage
  - directly to the s**ternum** through their own costal cartilages
- **False ribs** – inferior five pairs of ribs
- connected to the cartilage of the rib above them
- Ribs 11–12 are known as **floating ribs**
- do not connect even indirectly with the sternum



THE STERNUM

Formed from three sections

- **Manubrium** – superior section
  - Articulates with medial end of clavicles
- **Body** – bulk of sternum
  - Sides are notched at articulations for costal cartilage of ribs 2–7
- **Xiphoid process** – inferior end of sternum
  - Ossifies around age 40

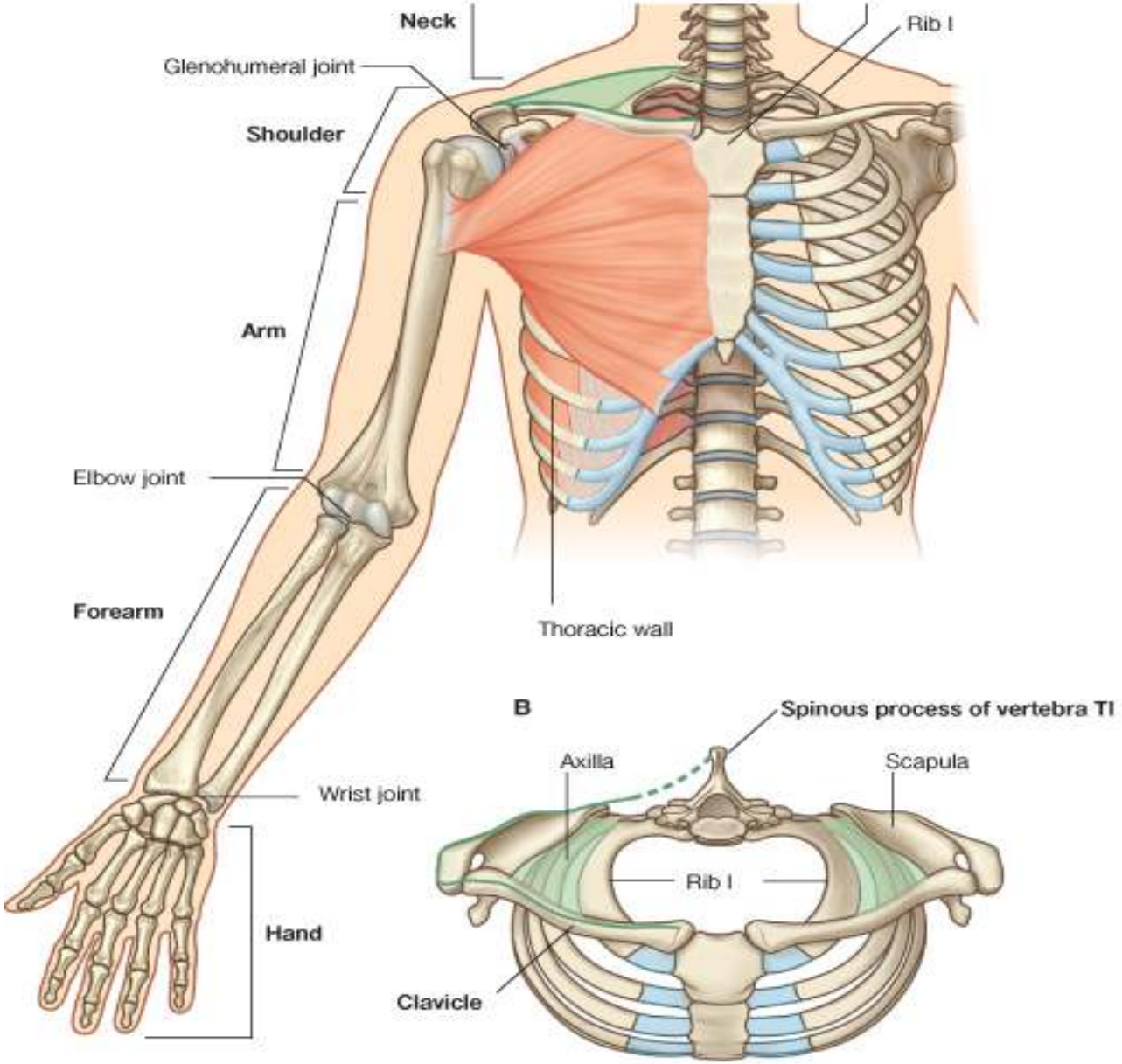


APPENDICULAR SKLETON
THE UPPER LIMB

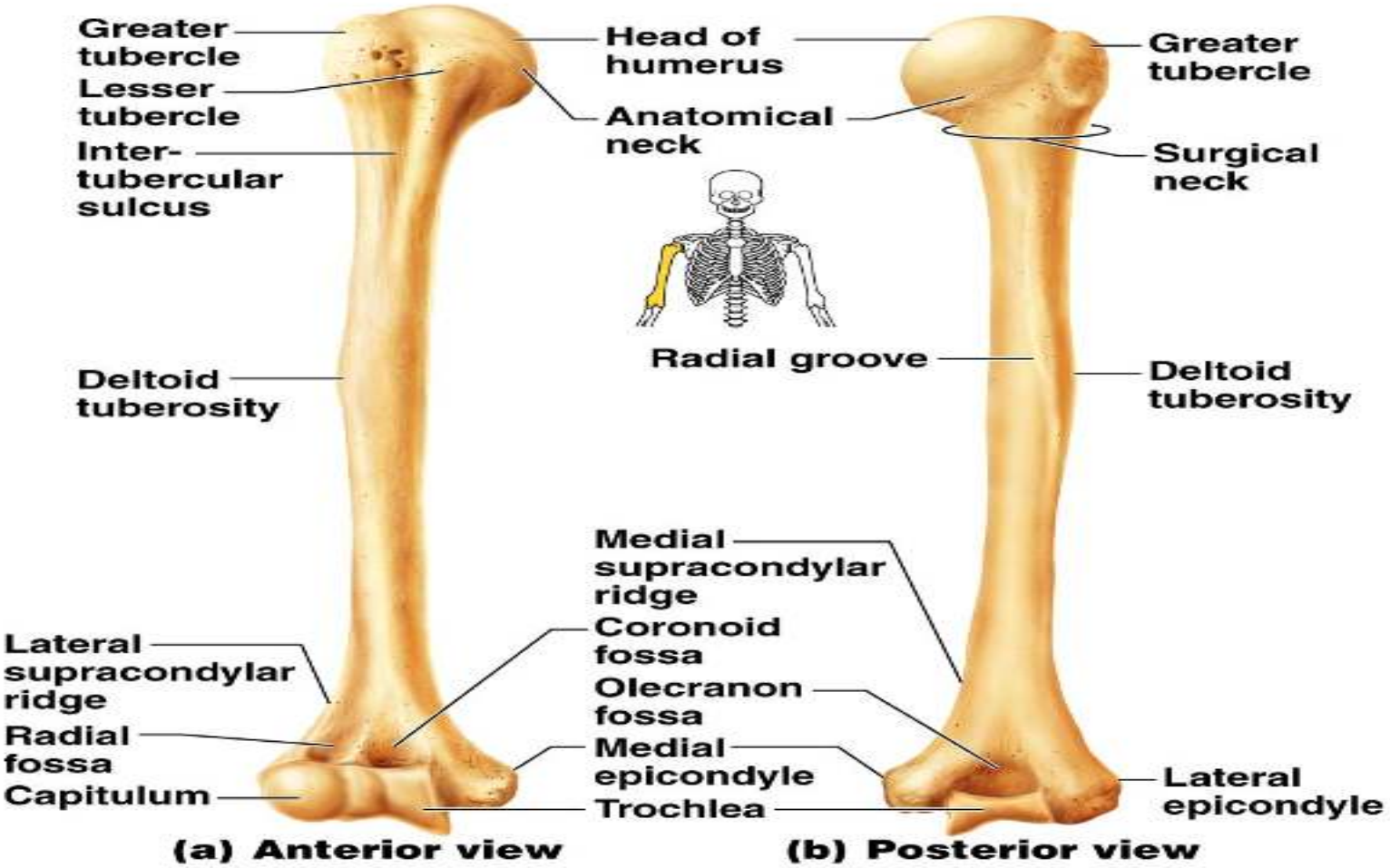
30 bones form each upper limb

Grouped into bones of the

- Arm
  - Humerus
- Forearm
  - Ulna
  - Radius
- Hand
  - Wrist (8 carpal bones)
  - Palm (5 metacarpal bones)
  - Fingers (14 phalanges)



STRUCTURES OF THE HUMERUS OF THE RIGHT ARM



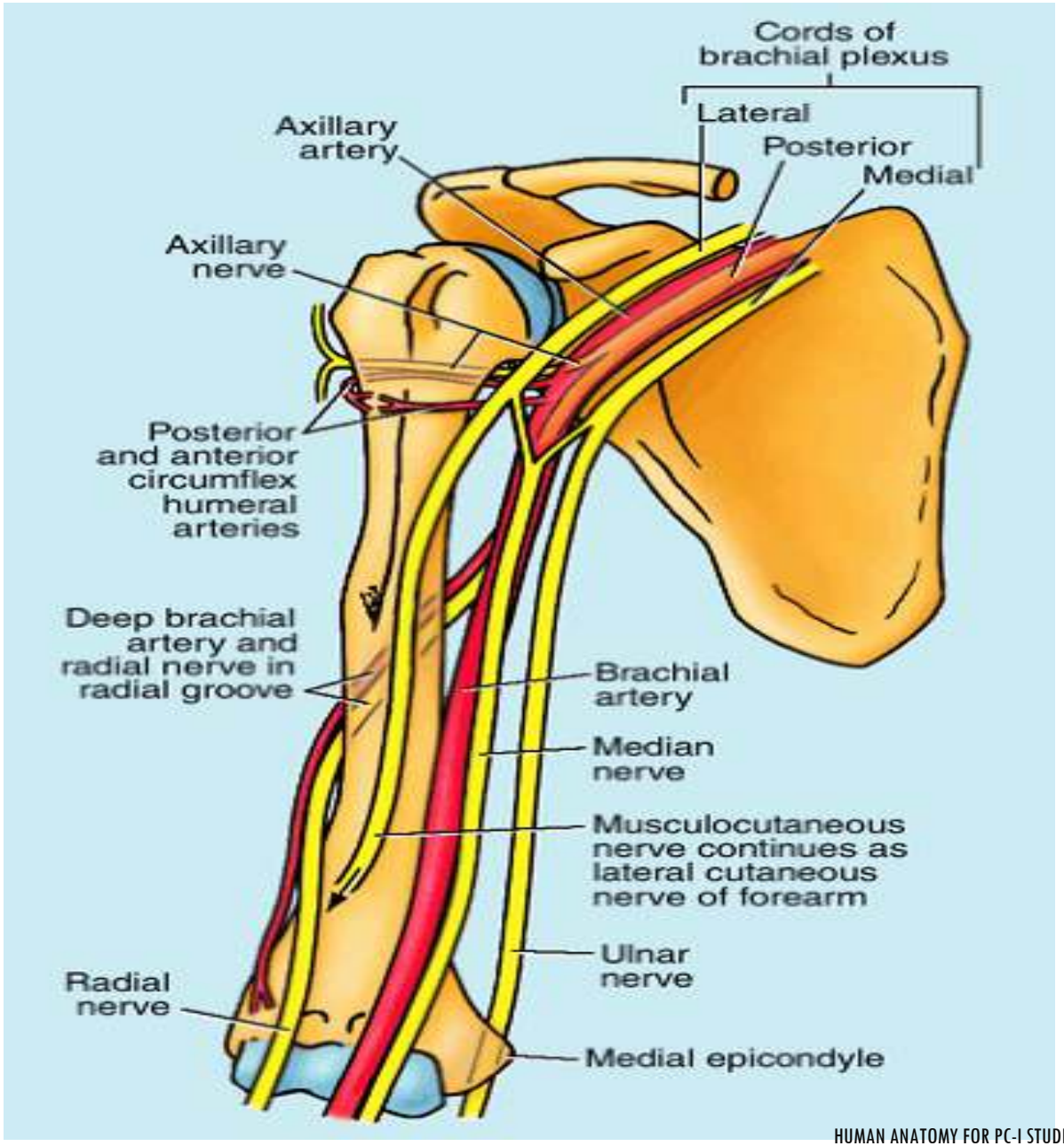
FRACTURE OF THE HUMERUS

Fractures of the surgical neck of the humerus

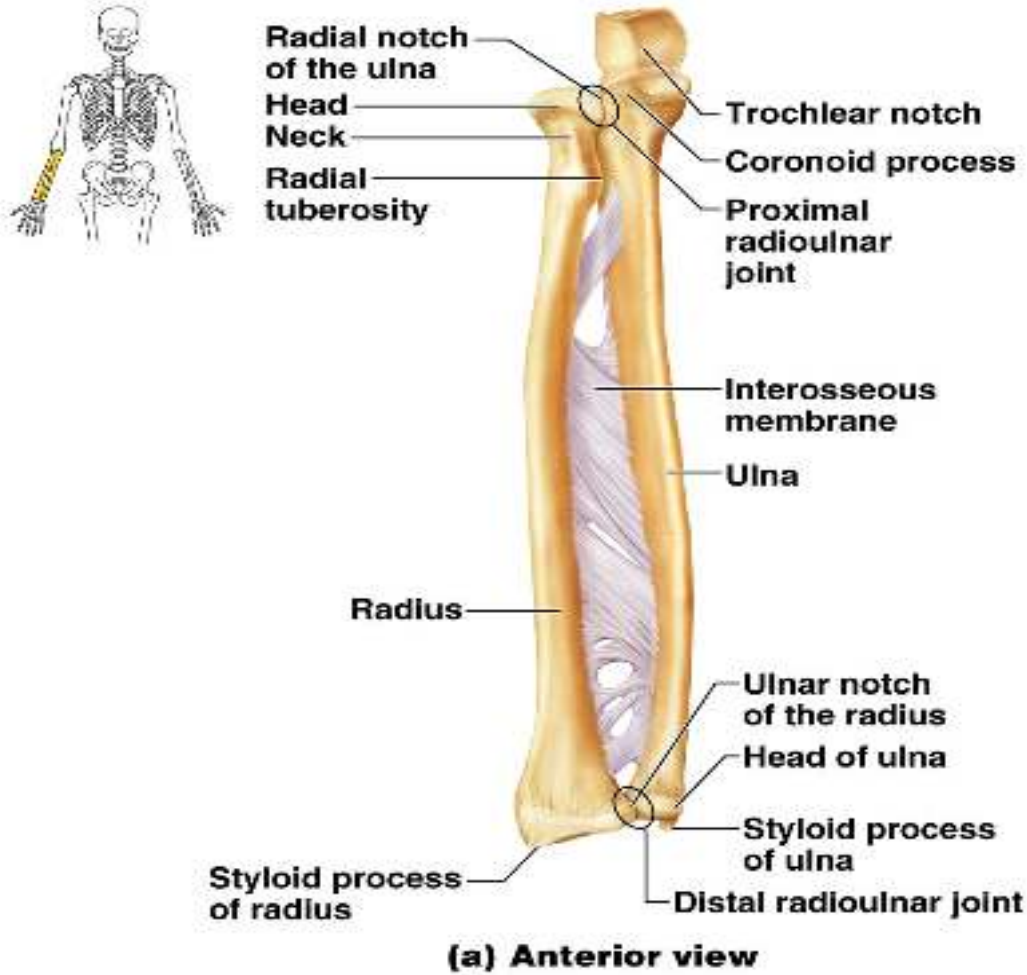
- **common in elderly people**
- **usually result from a fall on the hand**

Because nerves are in contact with the humerus, they may be injured when the associated part of the humerus is fractured

- **Surgical neck – axillary nerve**
- **Radial groove – radial nerve**
- **Distal humerus – median nerve**
- **Medial epicondyle – ulnar nerve**


Cords of brachial plexus
Lateral
Posterior
Medial
Axillary artery
Axillary nerve
Posterior and anterior circumflex humeral arteries
Deep brachial artery and radial nerve in radial groove
Brachial artery
Median nerve
Musculocutaneous nerve continues as lateral cutaneous nerve of forearm
Ulnar nerve
Radial nerve
Medial epicondyle

RADIUS AND ULNA

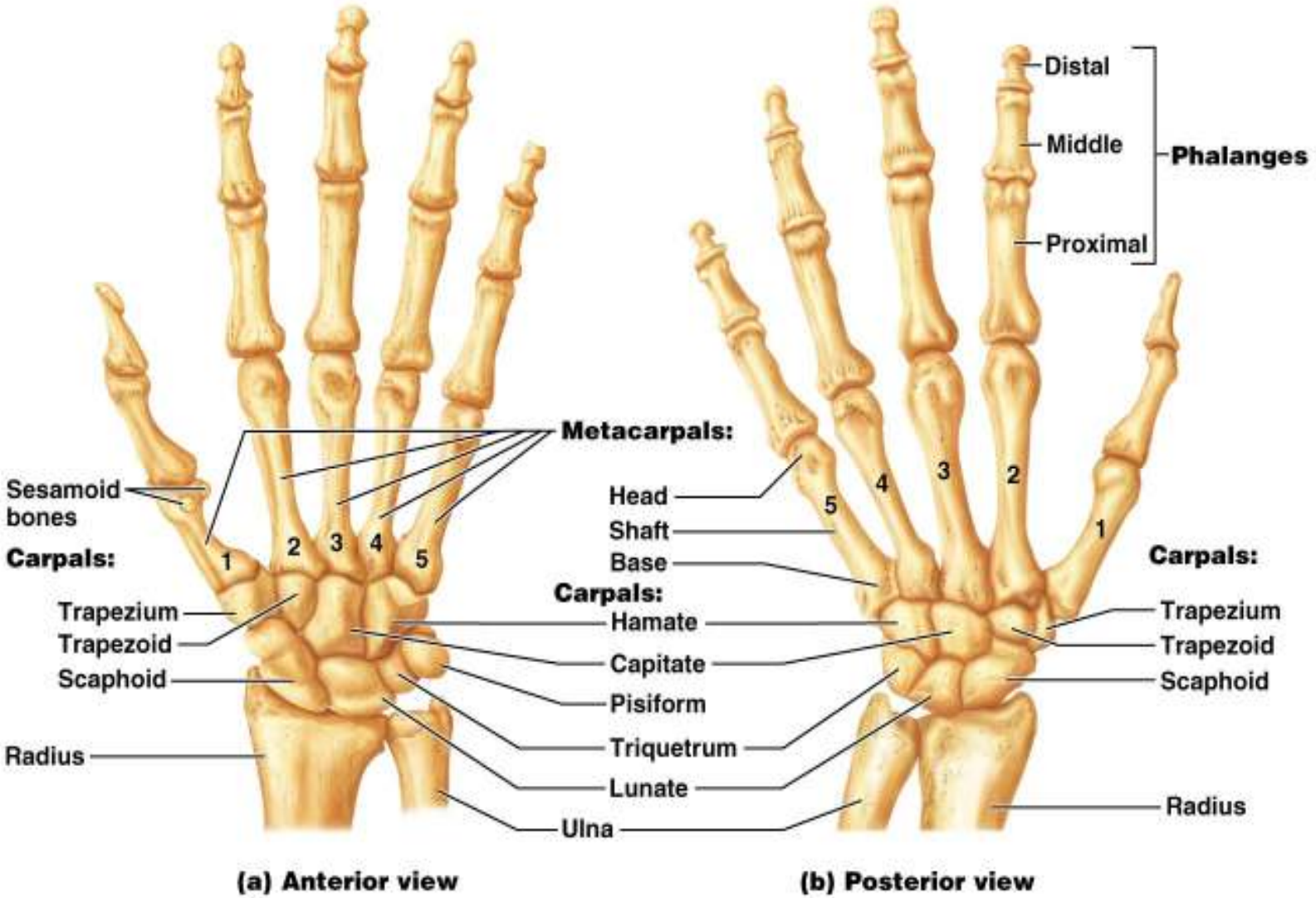


HAND

Includes the following bones

- **Carpus** – wrist
- **Metacarpals** – palm
- **Phalanges** – fingers

BONES OF THE HAND



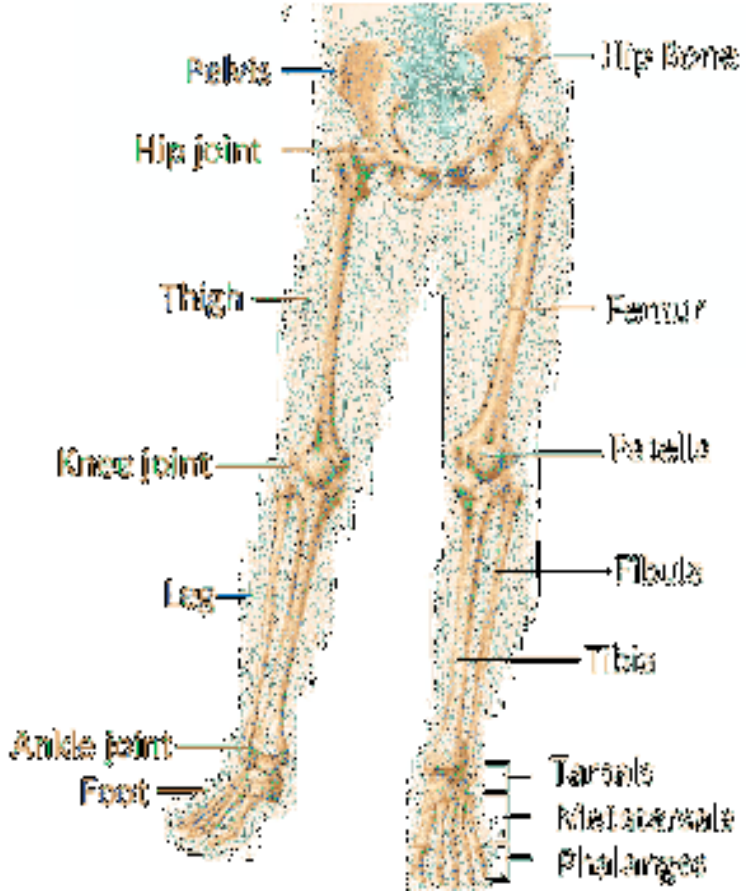
THE LOWER LIMB

Carries the entire weight of the erect body

Bones of lower limb are thicker and stronger than those of upper limb

Divided into **three** segments

- Thigh, leg, and foot

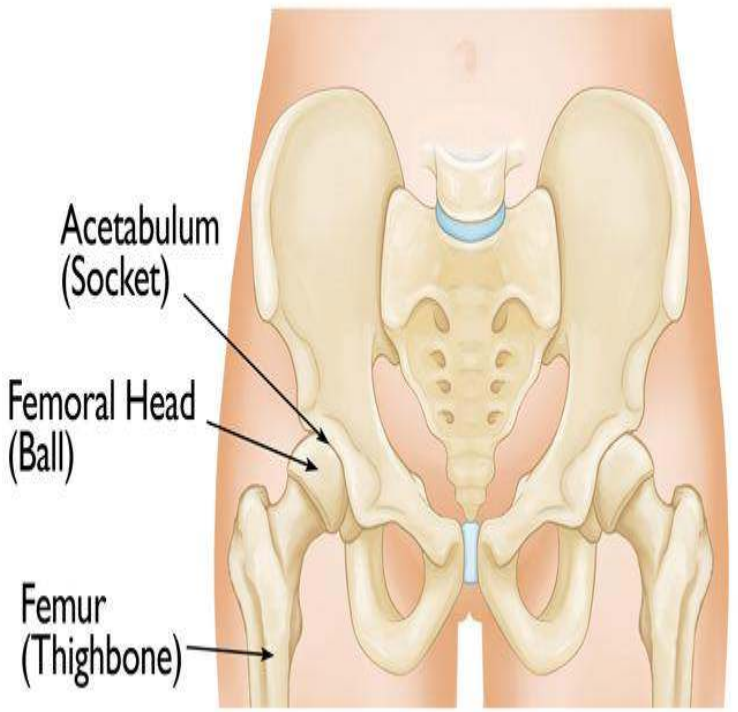


THIGH

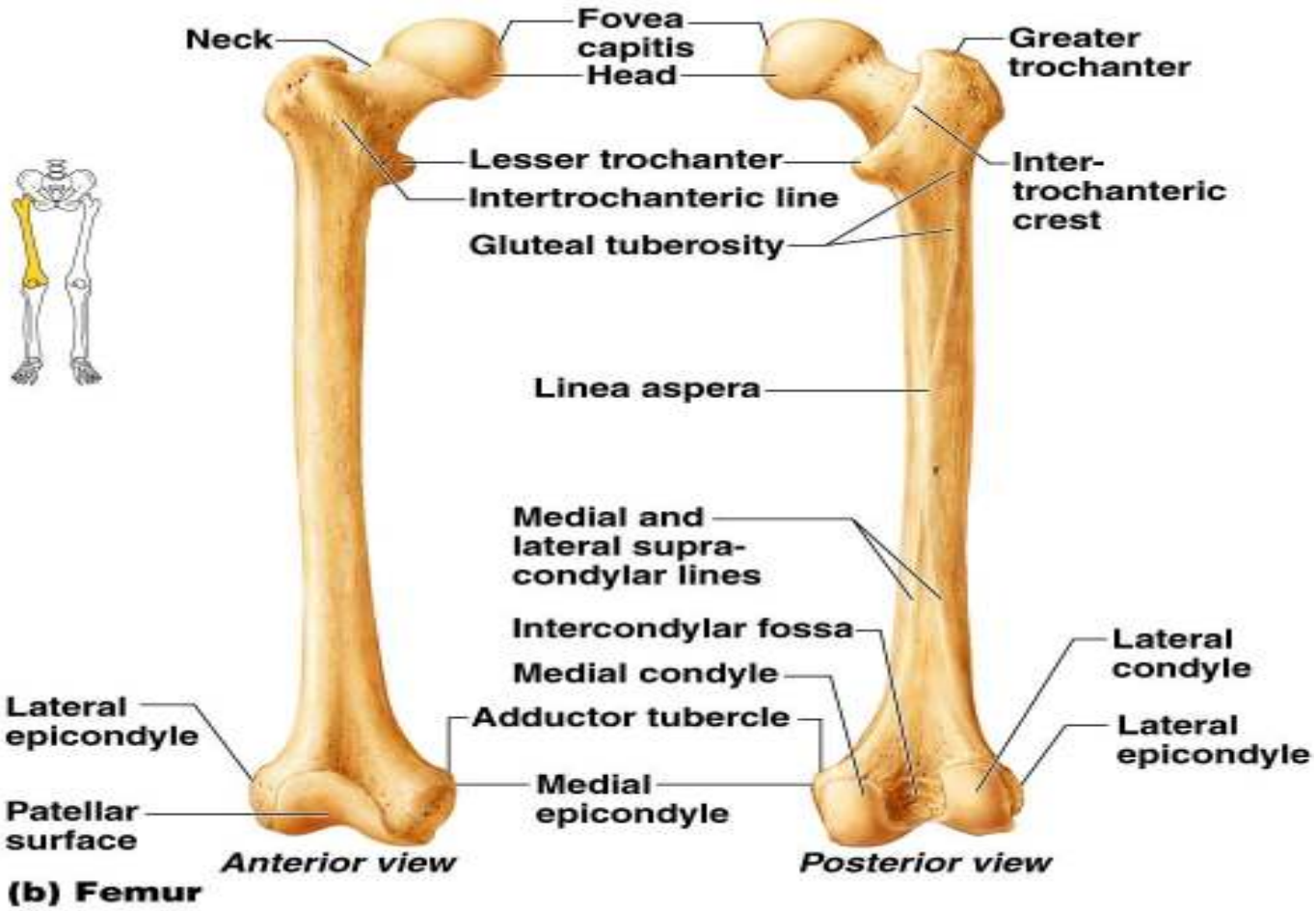
The region of the lower limb between the hip and the knee

Femur – the single bone of the thigh

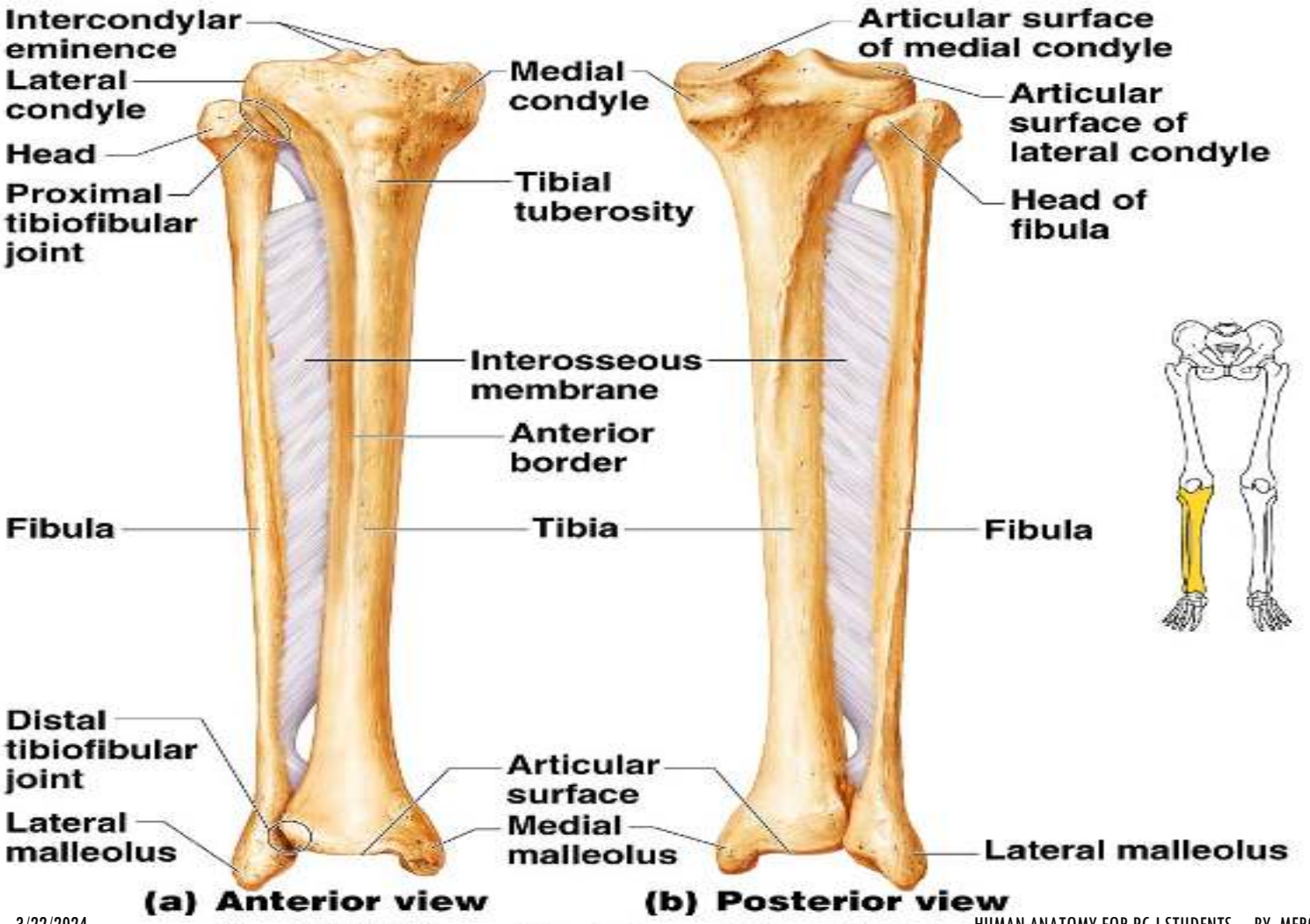
- Longest and strongest bone of the body
- Ball-shaped head articulates with the acetabulum



THIGH/STRUCTURES OF THE FEMUR



LEG/STRUCTURES OF THE TIBIA AND FIBULA



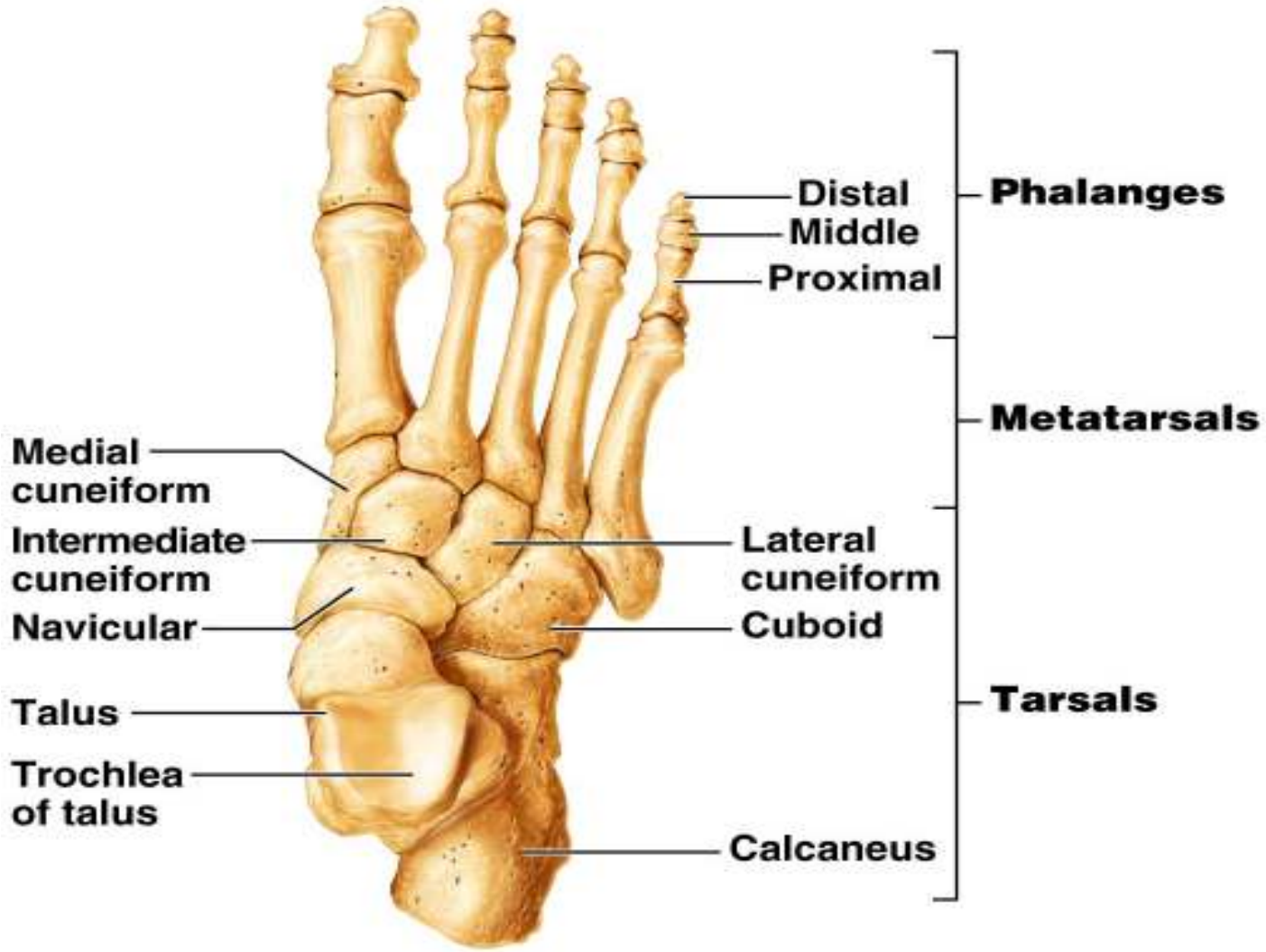
THE FOOT

Foot is composed of

- Tarsus, metatarsus, and the phalanges

Important functions

- Supports body weight
- Acts as a lever to propel body forward when walking
- Segmentation makes foot pliable and adapted to uneven ground



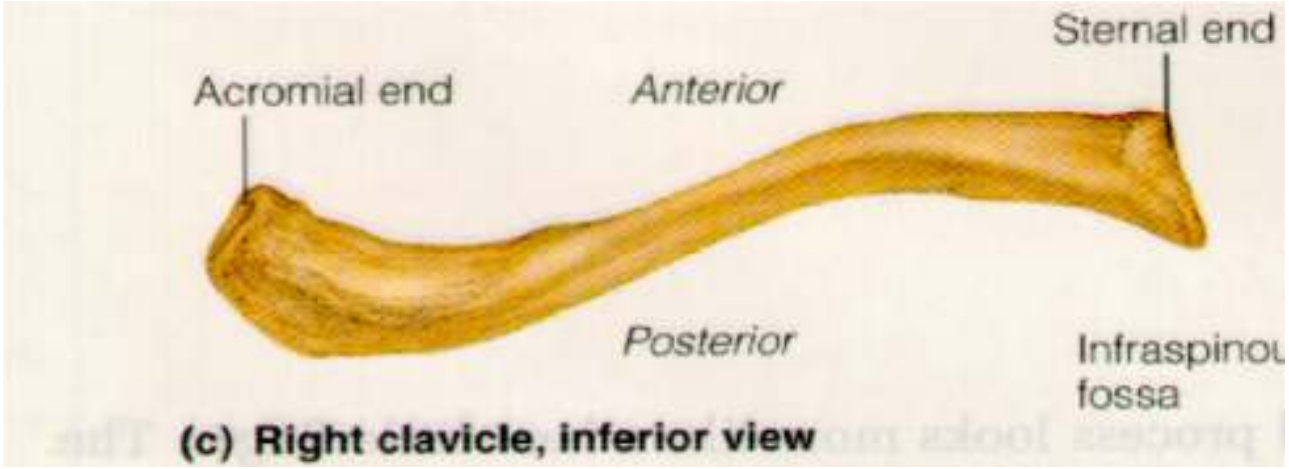
(a) Superior view

PECTORAL GIRDLE CLAVICLES

Extend horizontally across the superior thorax

Sternal end: articulates with manubrium of the sternum at the sternoclavicular (SC) joint.

Acromial end: articulates with acromion of scapula at the acromioclavicular (AC) joint.



FRACTURE OF THE CLAVICLE

Commonly caused by an indirect force transmitted from an outstretched hand during a fall

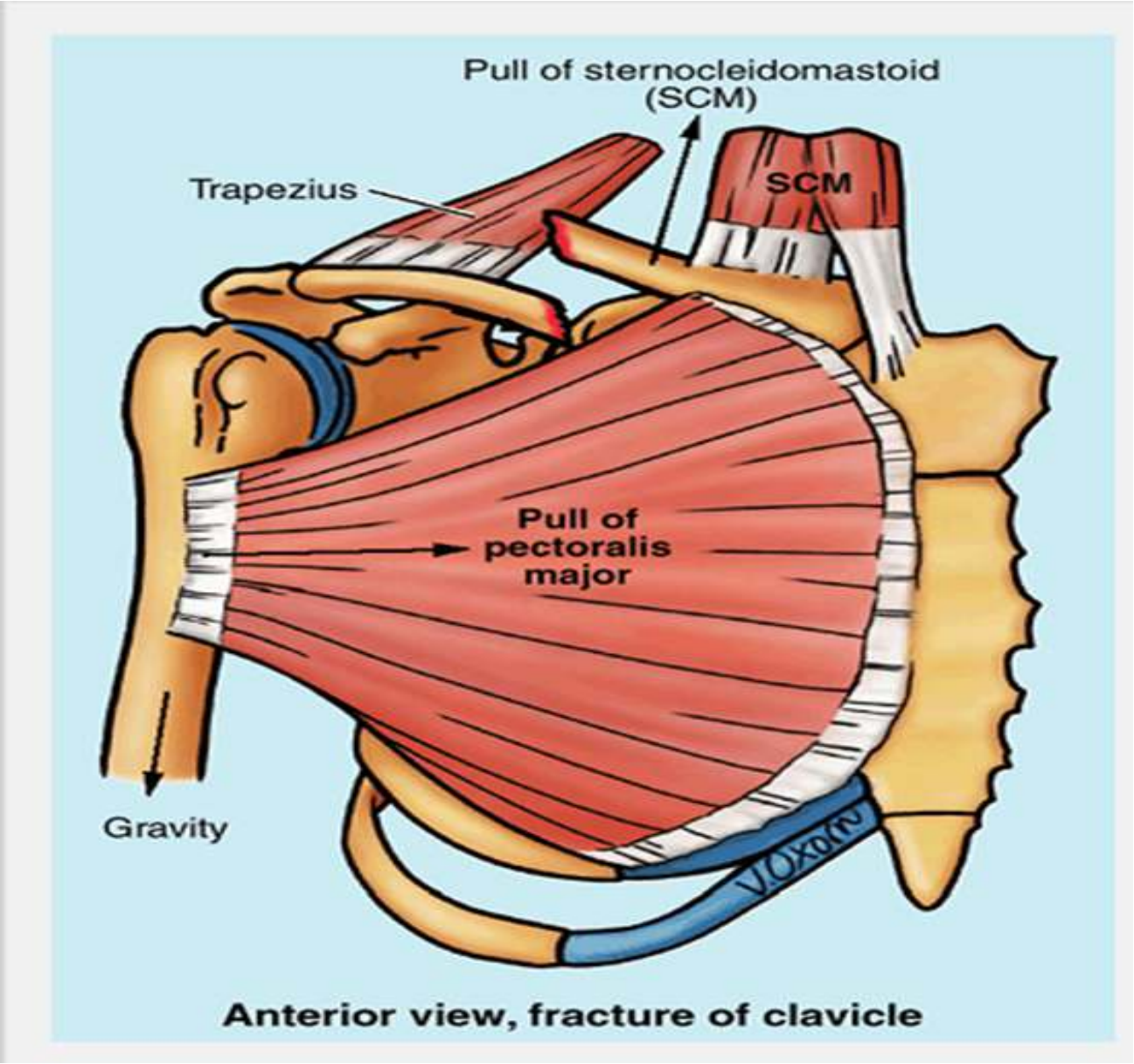
The weakest part is at the junction of its middle and lateral thirds.

After fracture;

Sternocleidomastoid (SCM) muscle elevates the medial fragment of bone.

Trapezius muscle is unable to hold up the lateral fragment owing to the weight of the upper limb.

- **Thus the shoulder drops**


Pull of sternocleidomastoid (SCM)
Trapezius
SCM
Pull of pectoralis major
Gravity
Anterior view, fracture of clavicle

SCAPULAE

Lie on the dorsal surface of the rib cage

Located between ribs 2 – 7

Have **three borders**

- Superior
- Medial (vertebral)
- Lateral (axillary)

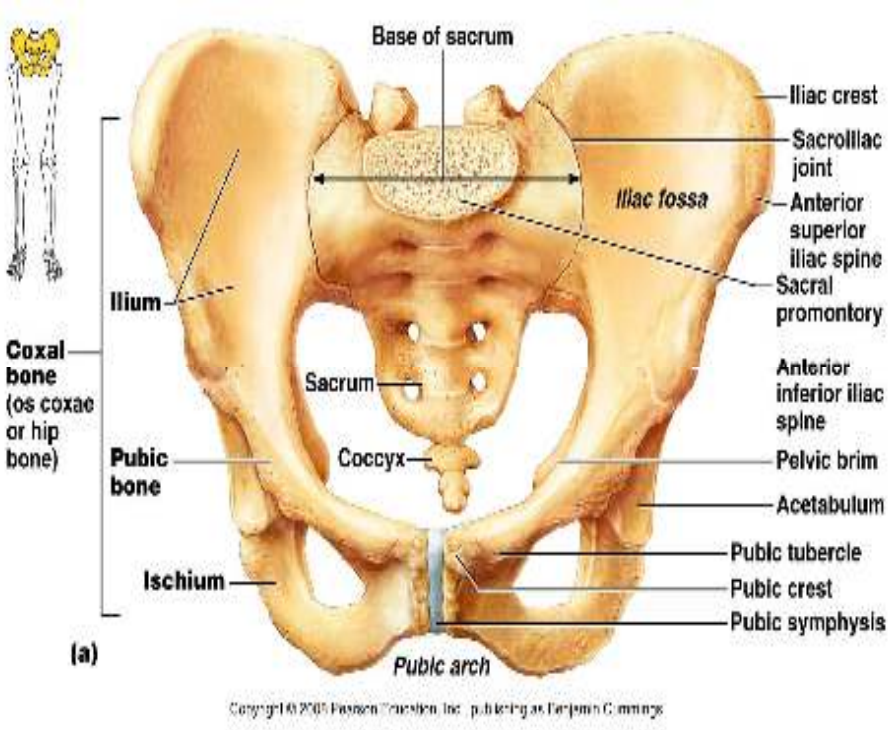
Have **three angles**

- Lateral, superior, and inferior

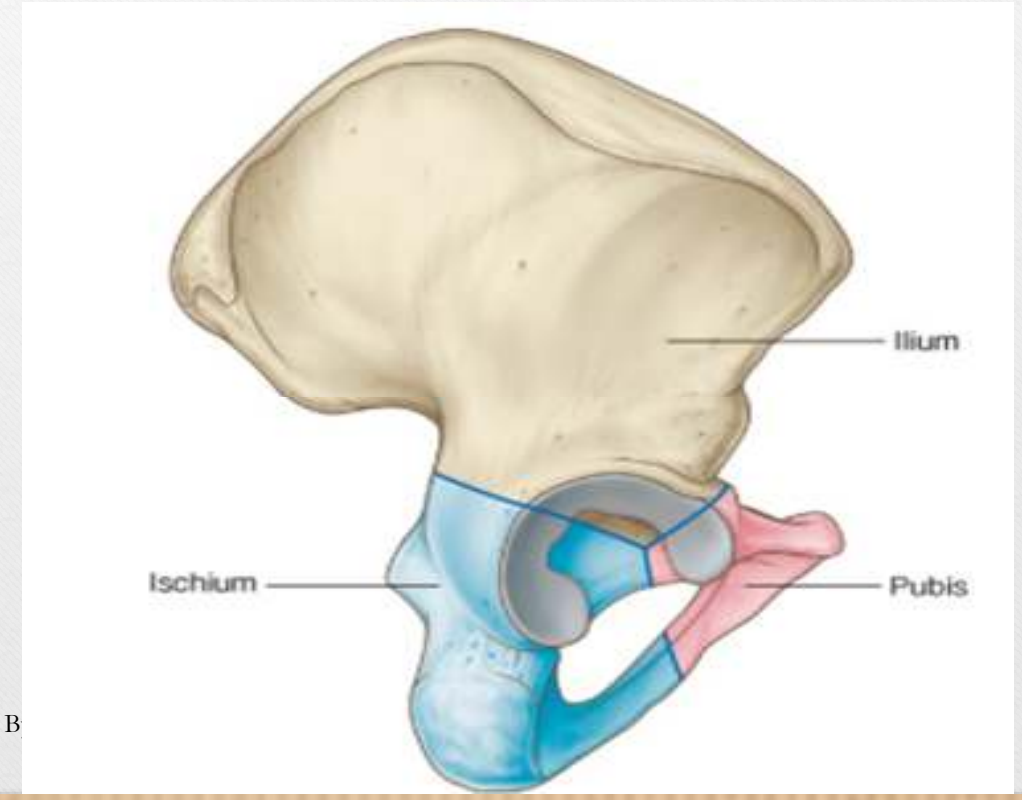
(a) Right scapula, anterior aspect

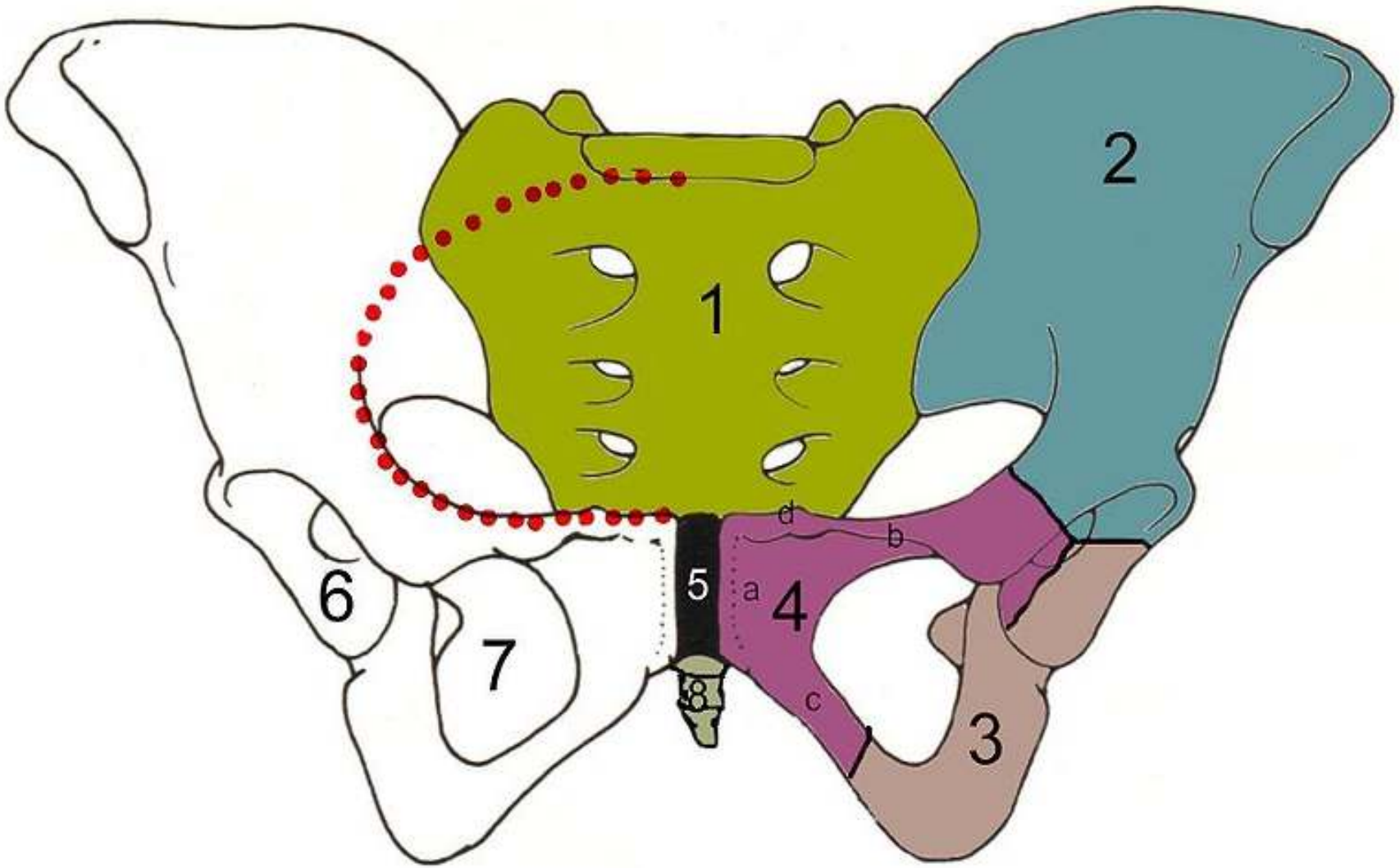
BONY PELVIS/PELVIC GIRDLE

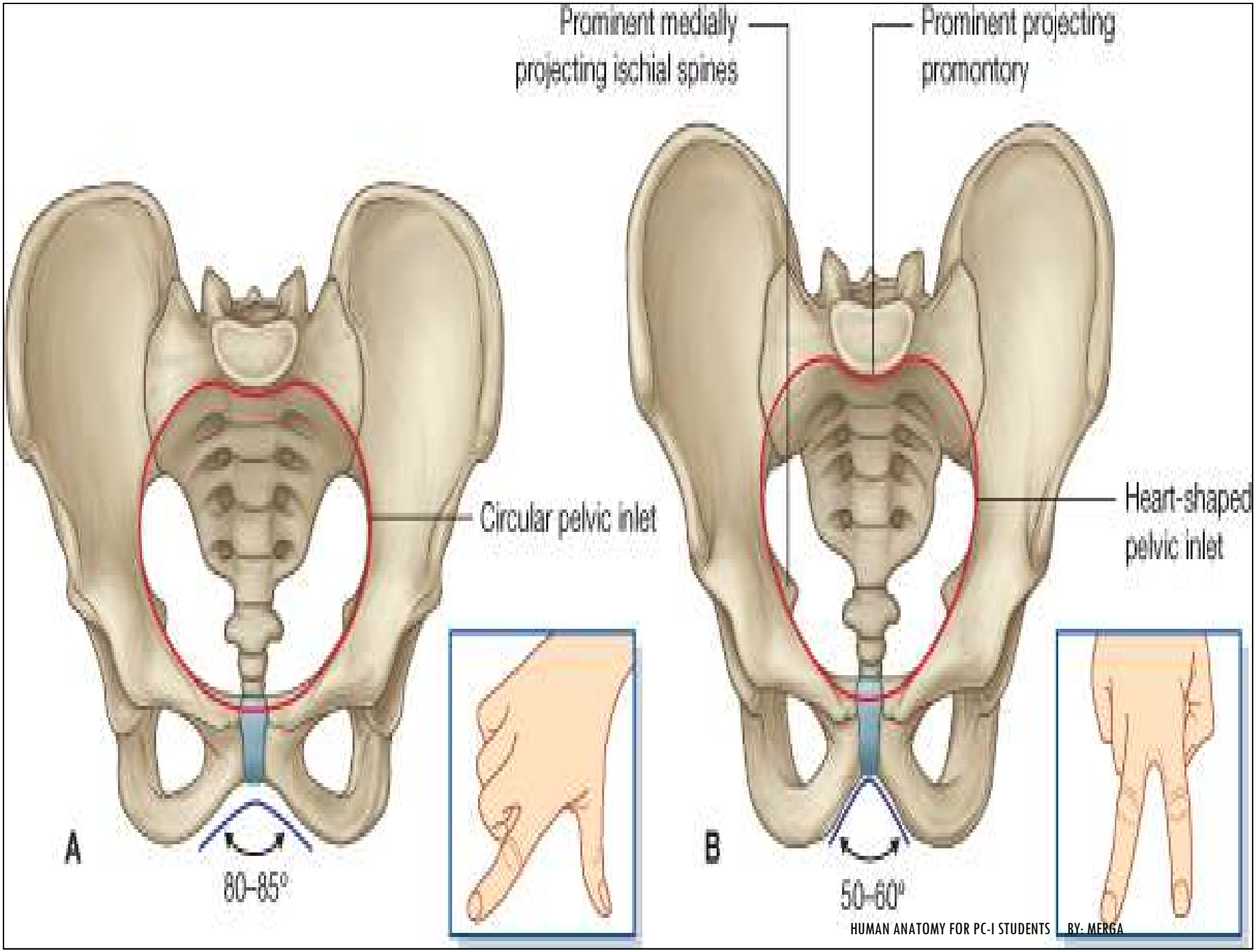
- The **bony pelvis** is formed by **4 bones** united by 4 joints
  - **Bones:** 2 hip bones, sacrum and coccyx
  - **Joints:** 2 sacroiliac joints, pubic symphysis and sacrococcygeal joint



- Each hip bone (os coxae) is formed by **3** bones fusing at the **acetabulum** (a cup-like articular depression on lateral aspect ,for the head of the femur) by a y-shaped cartilage/triradiate cartilage
- **Begin to fuse at 15-17 years and complete at 20-25 years of age**
- The 3 bones are:
  - Ilium
  - Ischium
  - Pubis




1
2
3
4
5
6
7
8
a
b
c
d


Prominent medially projecting ischial spines
Prominent projecting promontory
Circular pelvic inlet
Heart-shaped pelvic inlet
A
80–85°
B
50–60°

BONE FRACTURES

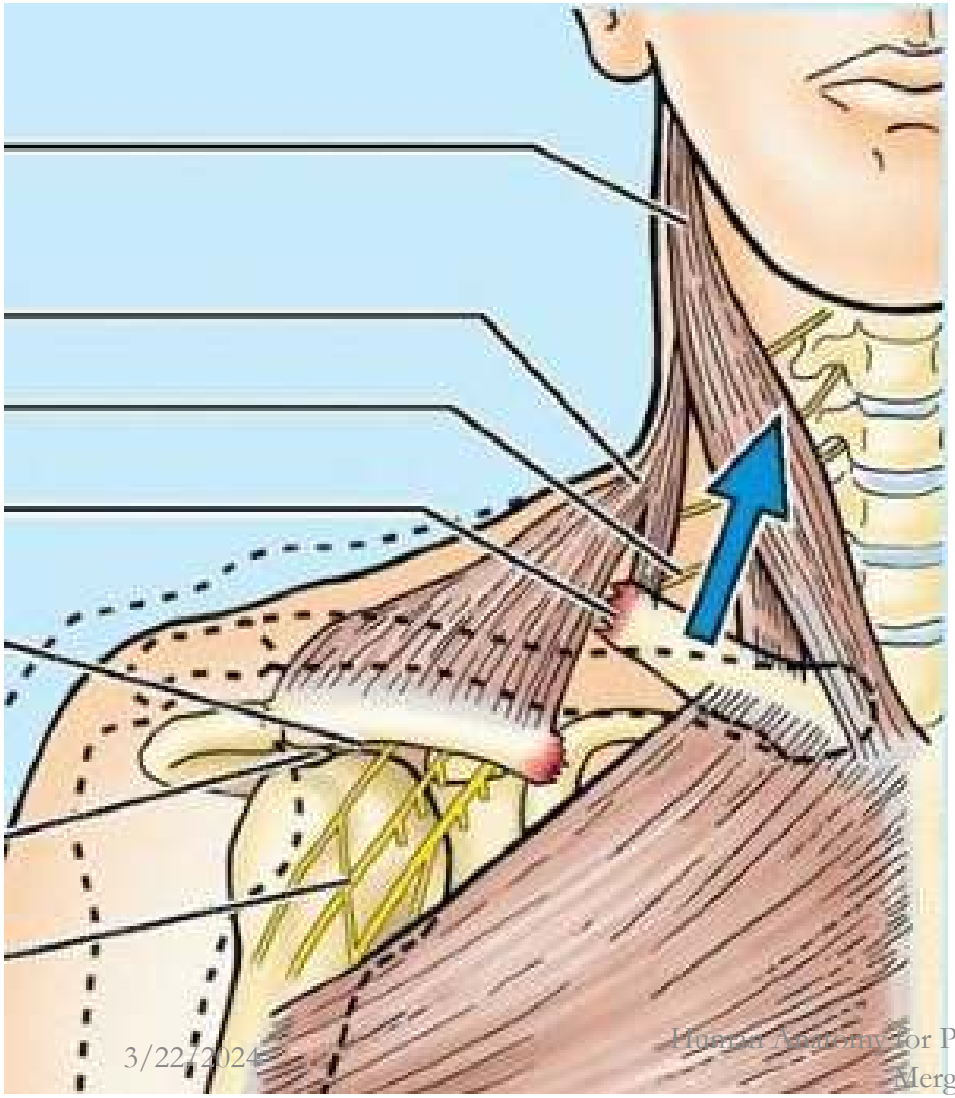
Partial (Incomplete): a fracture in which the break across the bone is incomplete.

Complete: a fracture in which the break across the bone is complete, so that the bone is broken into two or more pieces.

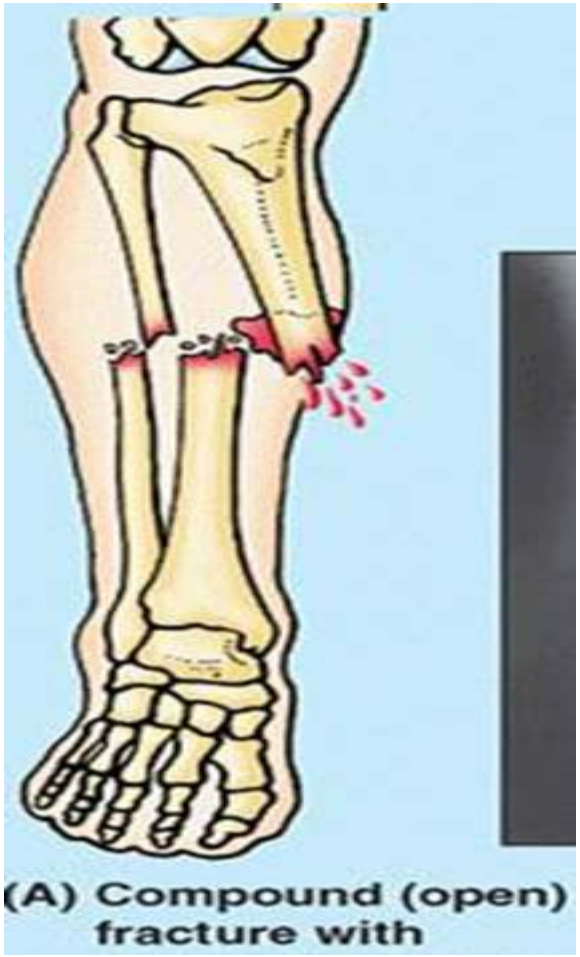
Closed (Simple): a fracture in which the bone does not open through the skin.

Open (Compound): a fracture in which the broken ends of the bone protrude through the **skin.**

Complete fracture



Open (Compound) fracture



ANY COMMENT????????!!!!!!!!!!

THANK U 4 YOUR ATTENTION!!