BONES OF THE UPPER and LOWER LIMBS

OBJECTIVES

- ***At the end of the lecture the students should be able to:***
- **Classify the bones** of the three regions of the upper and lower limb.
- **Memorize the main features of the**
  - Bones of the arm (humerus), of the thigh (femur & patella)
  - Bones of the forearm (radius & ulna), of the leg (tibia & Fibula).
  - Bones of the hand (carpal, metacarpal, phalanges), of the foot (tarsals, metatarsals and phalanges)
- **Recognize the side and position of each bone**

The Bones of UL are:

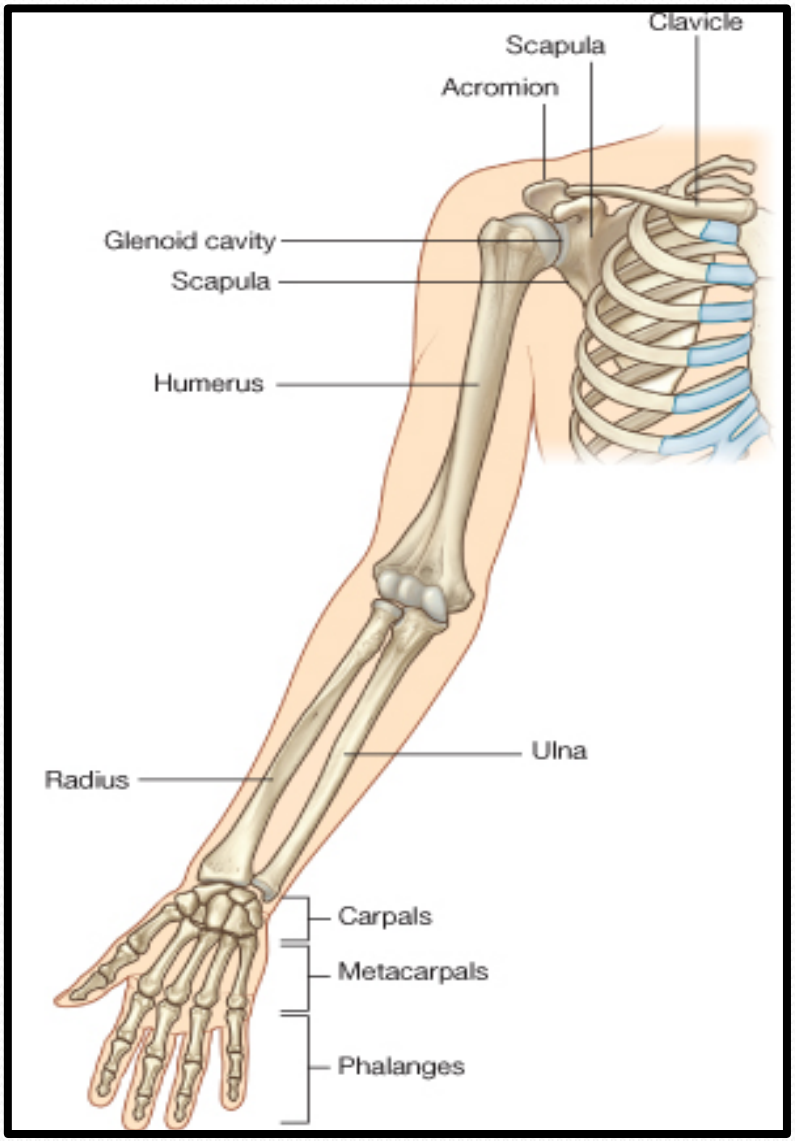
Pectoral Girdle.

Arm : Humerus.

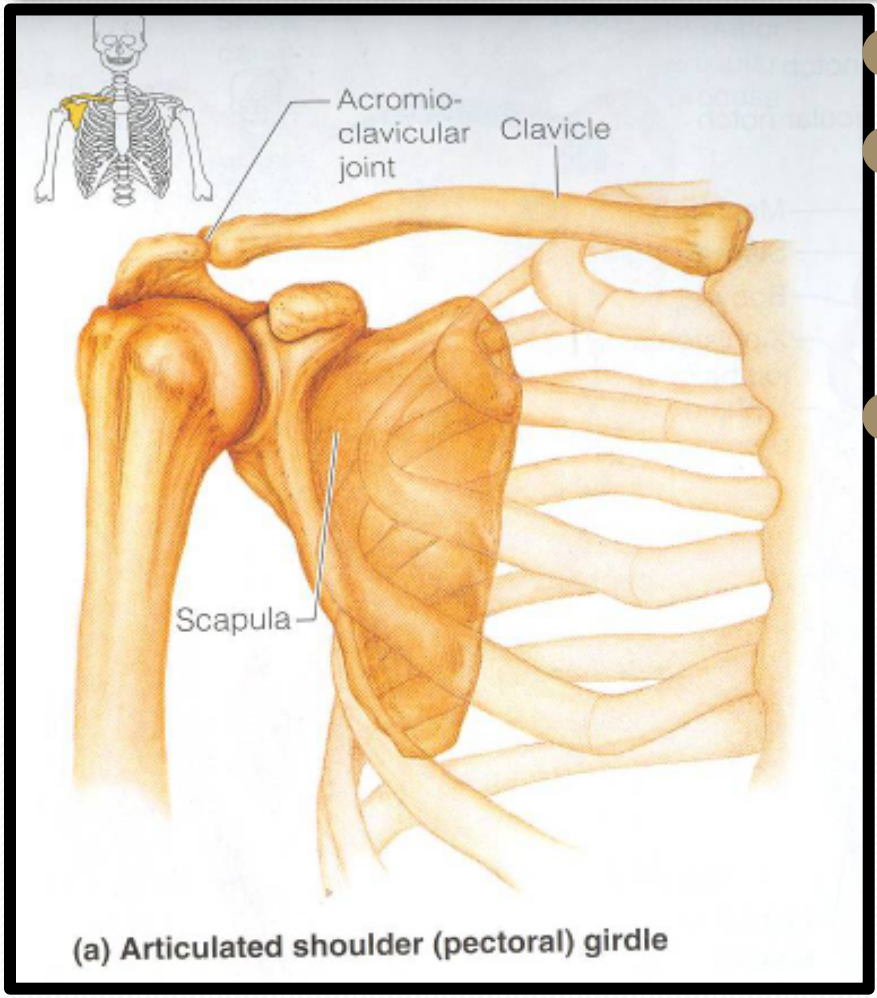
Forearm : Radius & Ulna.

Wrist : Carpal bones

Hand: Metacarpals & Phalanges

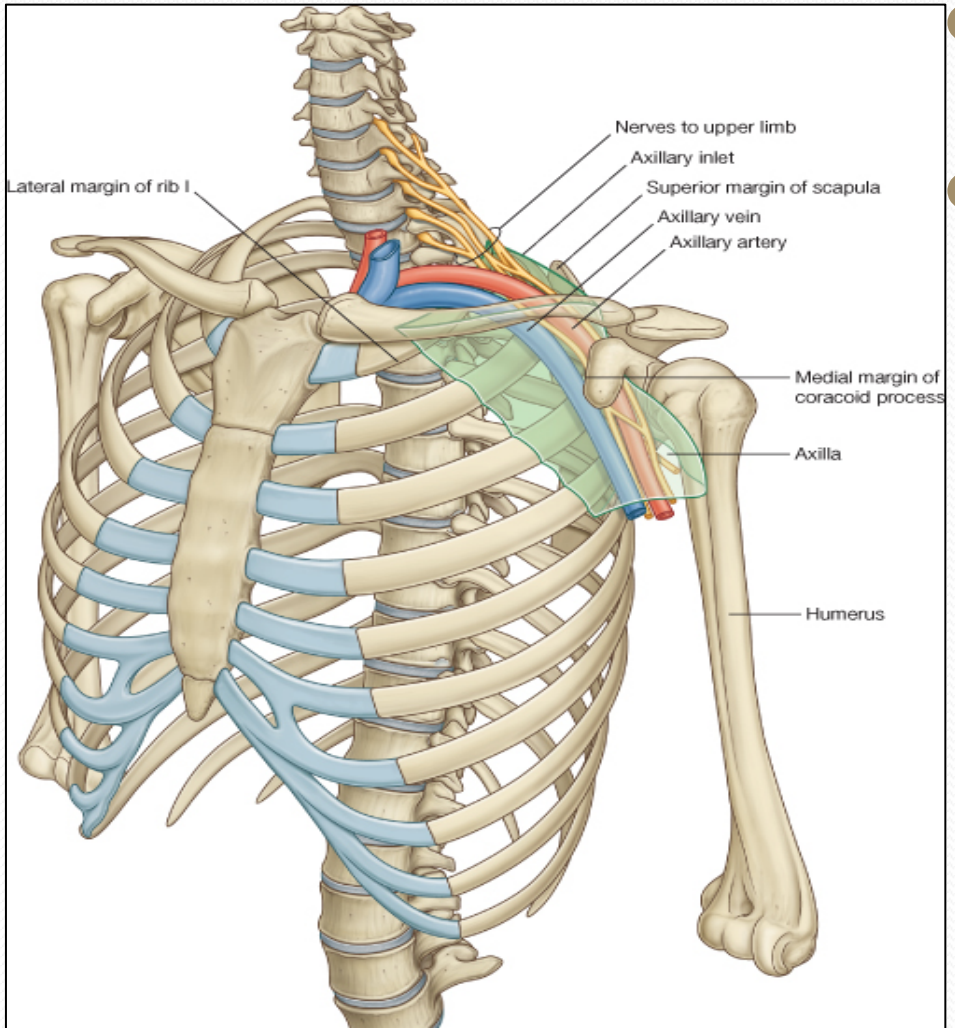


Pectoral Girdle



- **Formed of Two Bones:**
- **Clavicle (anteriorly) and Scapula (posteriorly).**
- **It is very light and allows the upper limb to have exceptionally free movement.**

Clavicle



- It is a doubly curved long bone lying horizontally across the root of the neck
- It is subcutaneous throughout its length.

It has Two Ends:

Medial (Sternal) : enlarged & triangular.

Lateral (Acromial) : flattened.

Body (shaft):

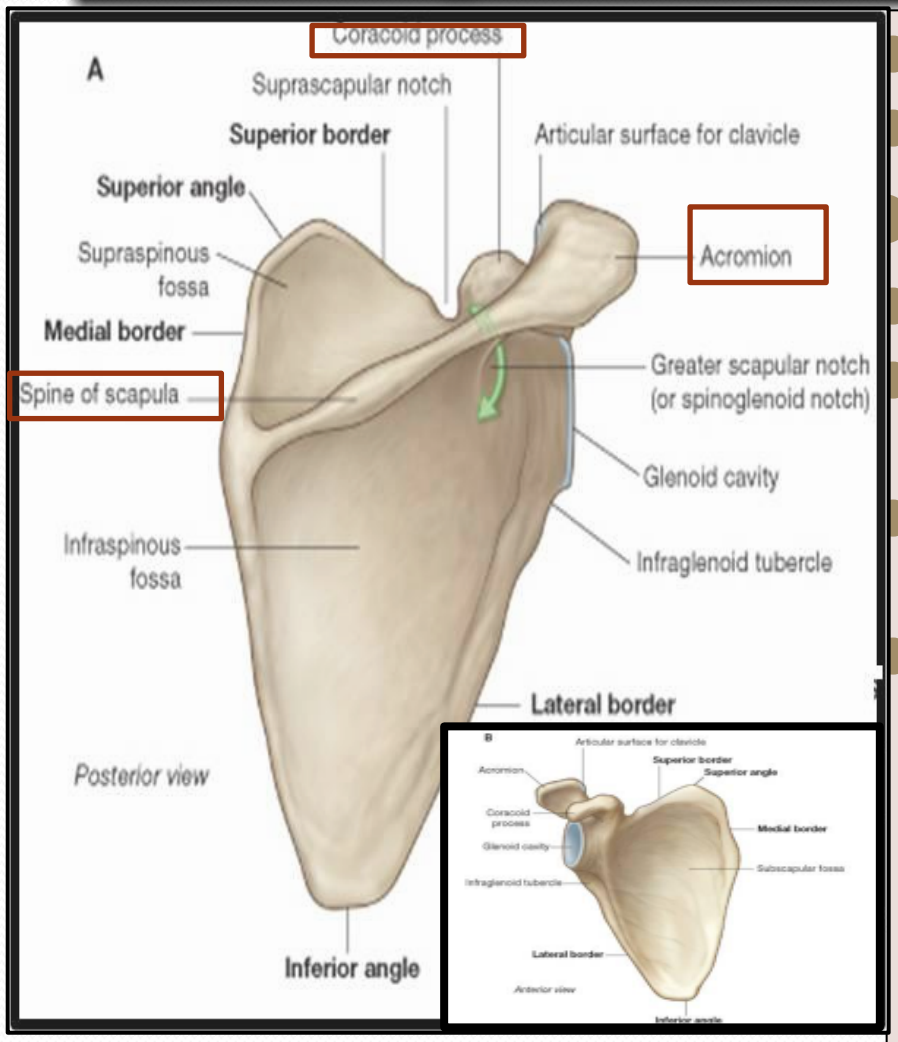
Its medial 2/3 is convex forward.

Its lateral 1/3 is concave forward.

Surfaces: Superior : smooth as it lies just deep to the skin.

Inferior : rough because strong ligaments bind it to the

Scapula (Shoulder Blade)

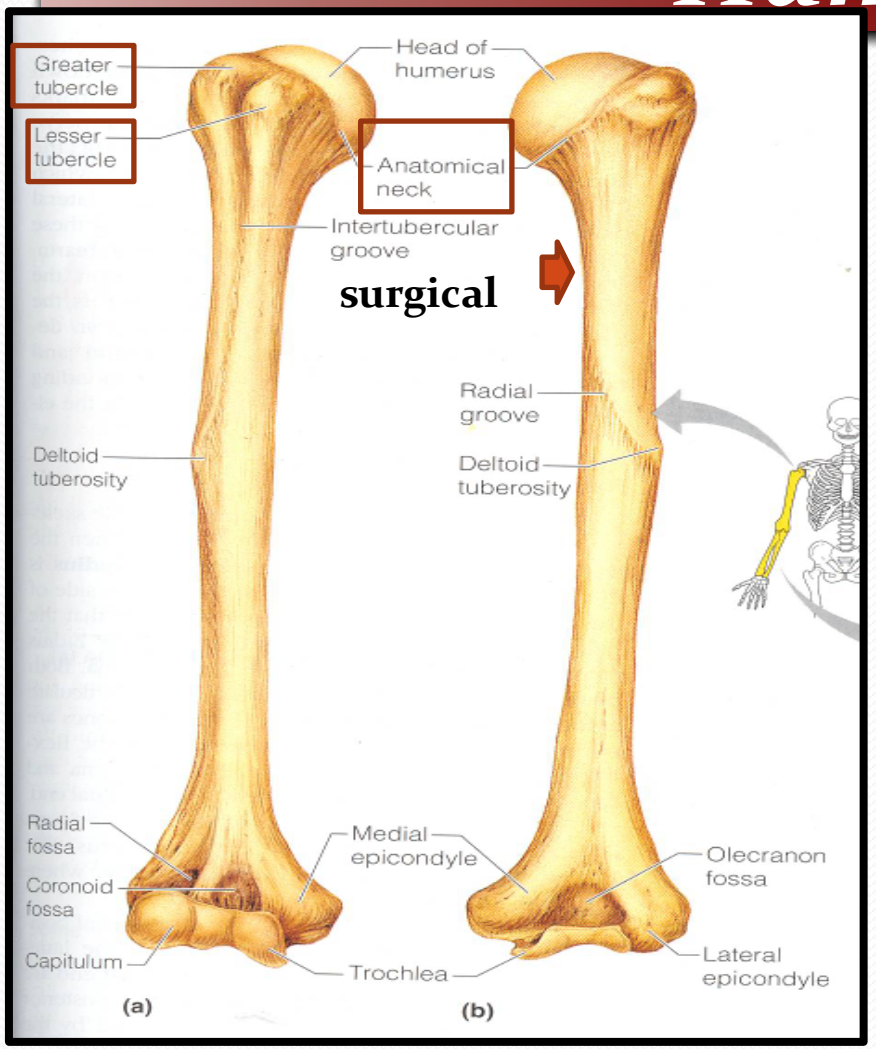


- It is a triangular Flat bone.
- Extends between the 2nd _ 7th ribs.
- It has :
- Three Processes:
- (1)Spine, (2) Acromion, (3) Coracoid
- Three Borders: Superior, Medial (Vertebral) & Lateral (Axillary)
- Three Angles: Superior, Lateral (forms the Glenoid cavity), Inferior.

Two Surfaces:

Convex Posterior, Smaller Supraspinous Fossa (above the spine) and the larger

Humerus



Typical Long bone.

Proximal End: Head, Neck, Greater & Lesser Tubercles.

Intertubercular Groove.

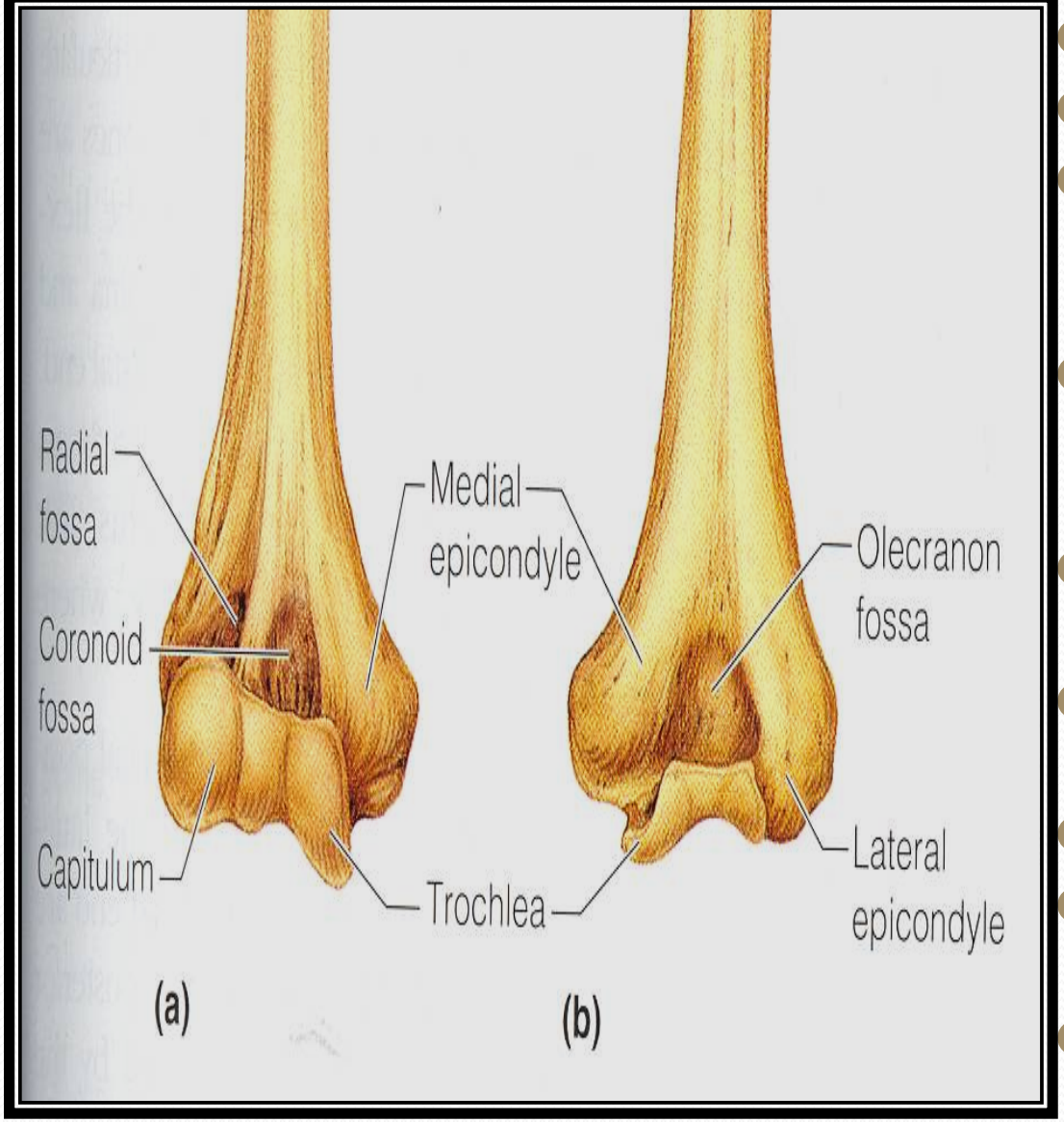
Anatomical neck: formed by a groove separating the head from the tubercles.

Surgical Neck: a narrow part distal to the tubercles.

Shaft (Body): Has two prominent features:

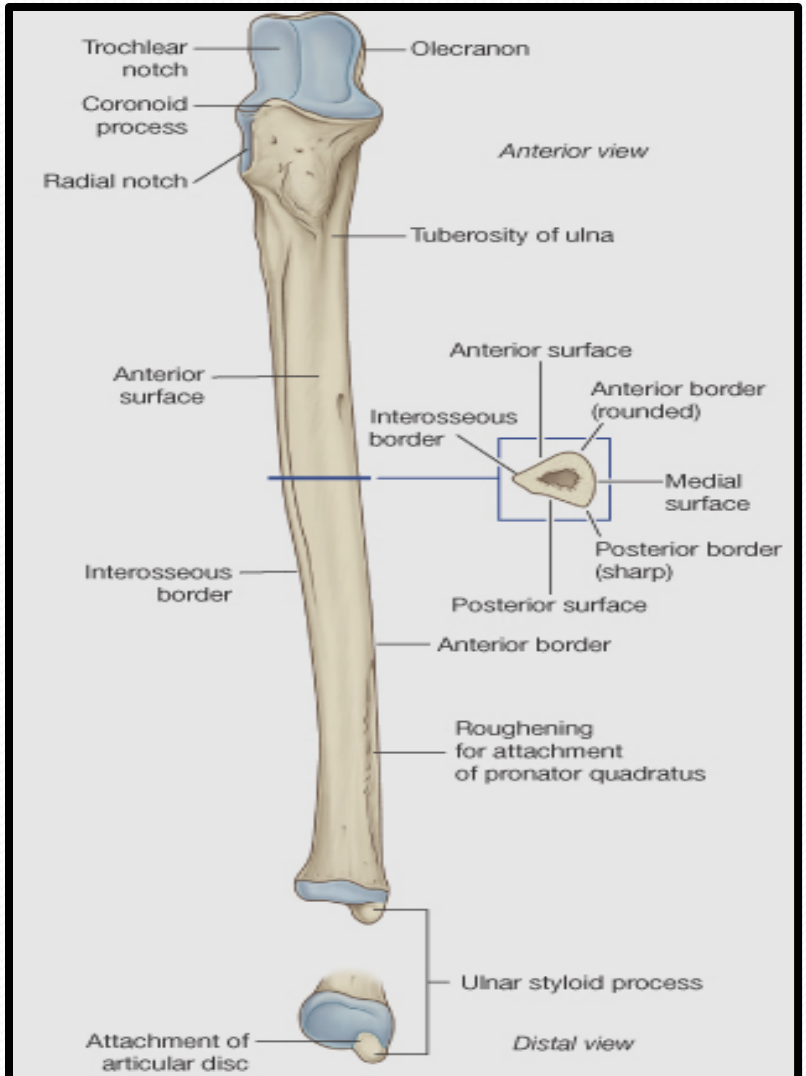
1. **Deltoid tuberosity:**
2. **Spiral (Radial) groove:**

Distal End: Medial (can be felt) and Lateral Epicondyles.



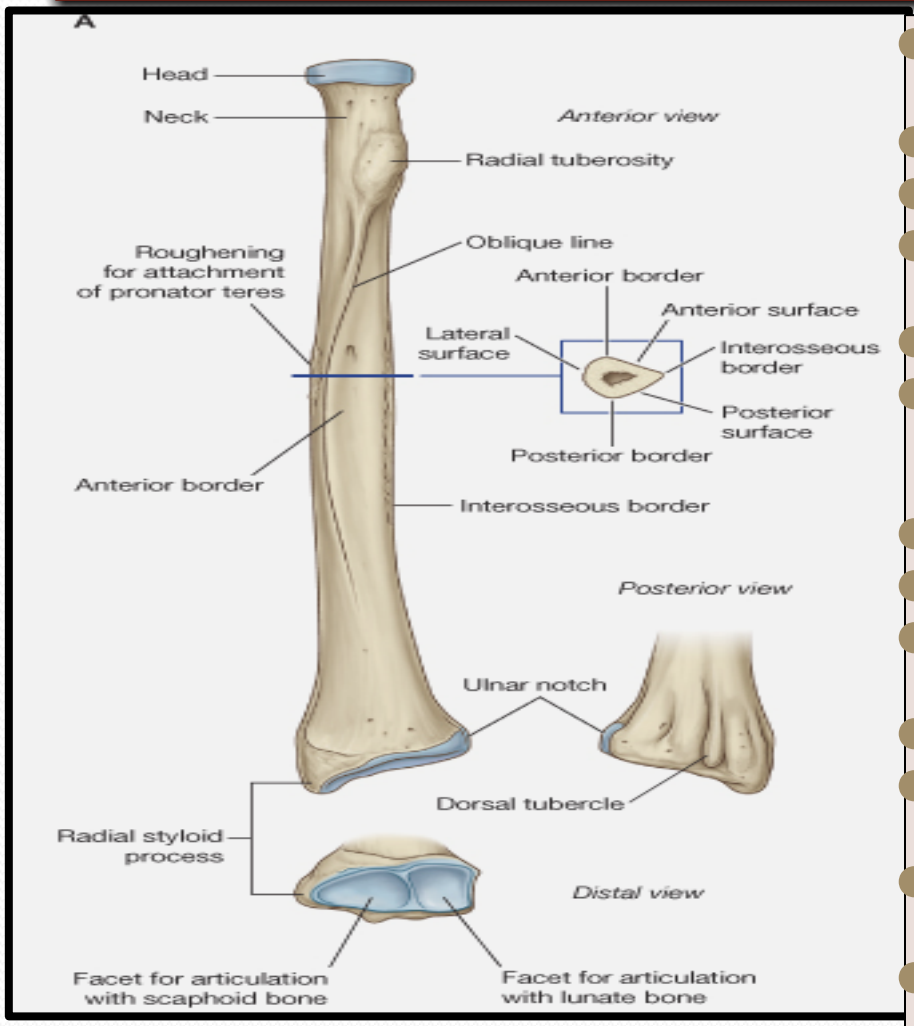
- **Structures at Distal end:**
- **Anteriorly:**
- **Trochlea: (medial) for articulation with the ulna**
- **Capitulum: (lateral) for articulation with the radius.**
- **Coronoid fossa: above the trochlea.**
- **Radial fossa: above the capitulum.**
- **Posteriorly:**
- **Olecranon fossa: above the trochlea.**

Ulna



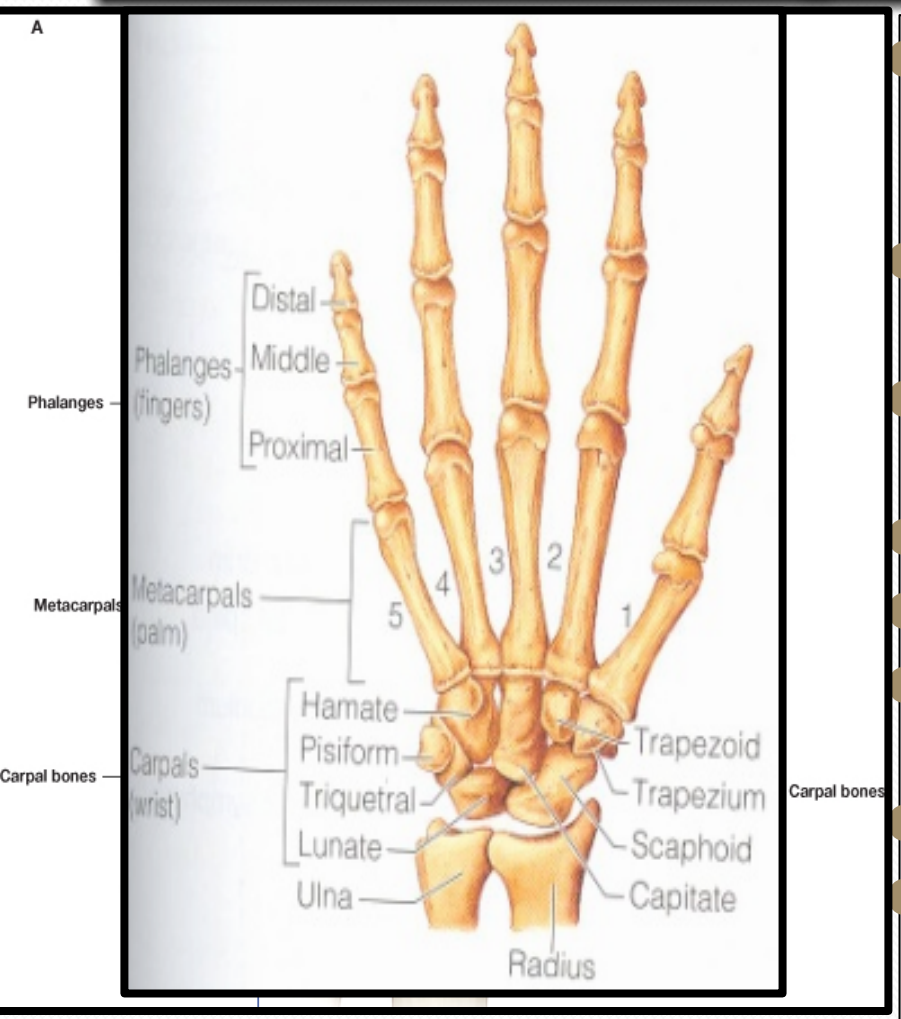
- It is the stabilizing bone of the forearm.
- It is the medial & longer of the two bones of the forearm.
- **Proximal End**
- **1. Olecranon Process :**
- **2. Coronoid Process :**
- **3.Tuberosity of Ulna:**
- **4.Trochlear Notch:**
- **5.Radial Notch :**
- **Shaft :**
- Thick & cylindrical superiorly but diminishes in diameter inferiorly
- It has Three Surfaces (Anterior, Medial & Posterior).
- Sharp Lateral Interosseous border.
- **Distal End:** Small rounded
- **1. Head:** lies distally at the wrist.

Radius



- It is the shorter and lateral of the two forearm bones.
- **Proximal End:**
- **1. Head:** small & circular
- Its upper surface is concave for articulation with the Capitulum.
- **2. Neck.**
- 3. Radial (Biciptal) Tuberosity : medially directed and separates the proximal end from the body.
- **Shaft:**
- Has a lateral convexity.
- It gradually enlarges as it passes distally.
- **Distal (Lower) End:** It is rectangular
- **1. Ulnar Notch :** a medial concavity to accommodate the head of the ulna.
- **2.Radial Styloid process:** extends from the lateral aspect.
- **3.Dorsal tubercle:** projects dorsally.

Carpal Bones



- Composed of Eight short bones
- Proximal row (from lateral to medial):
- Scaphoid, Lunate, Triquetral & Pisiform bones.
- Distal row (from lateral to medial):
- Trapezium, Trapezoid,
- Capitate & Hamate.
- Five Metacarpal bones, each has a Base, Shaft, and a Head.
- Each digit has Three Phalanges
- Except the Thumb which has only Two

The Bones of LL are:

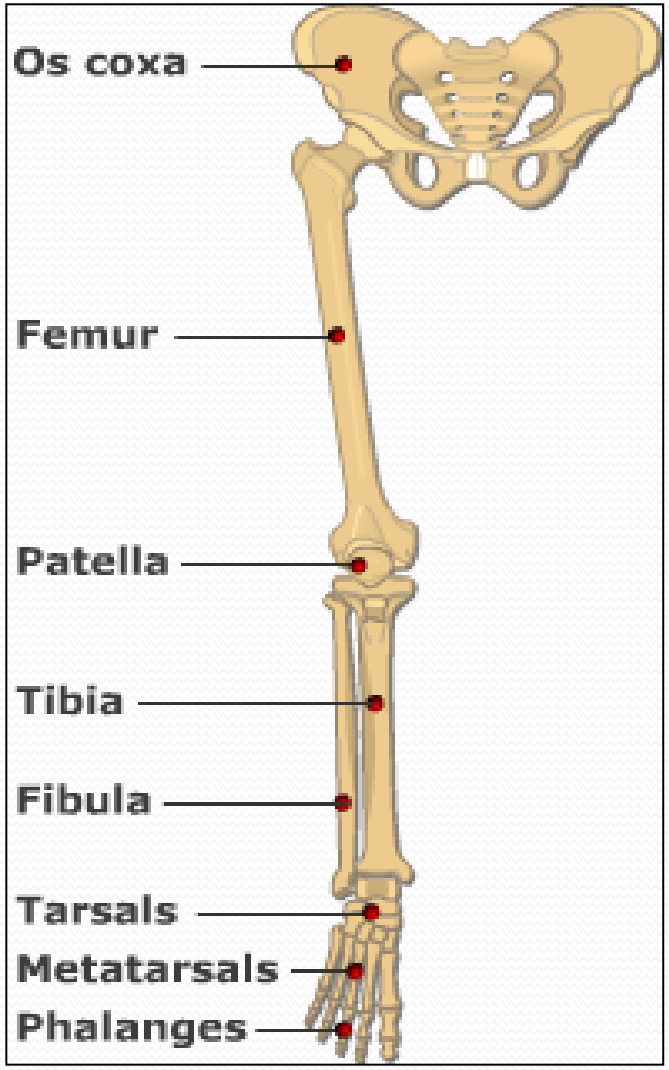
Pelvic Girdle: Hip bone &Sacrum

Thigh: Femur& Patella.

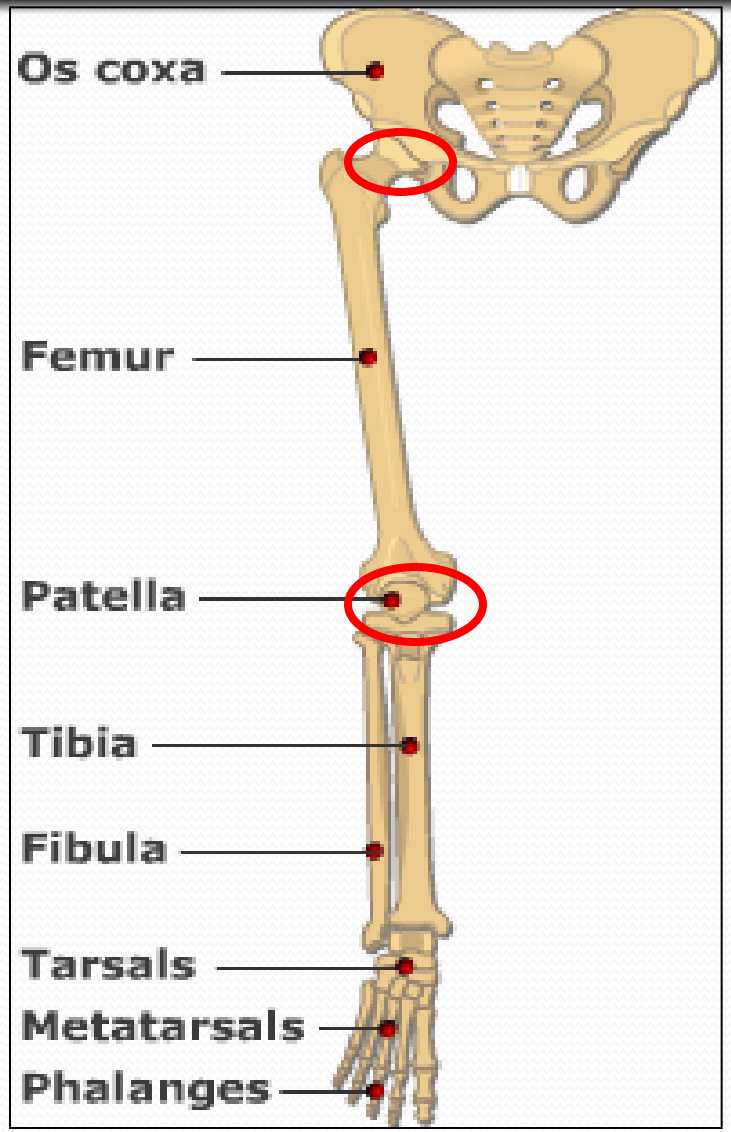
Leg: Tibia & Radius.

Ankle: Tarsal bones

Foot : Metatarsal & Phalanges.



BONES OF THIGH (Femur and Patella)



Femur:

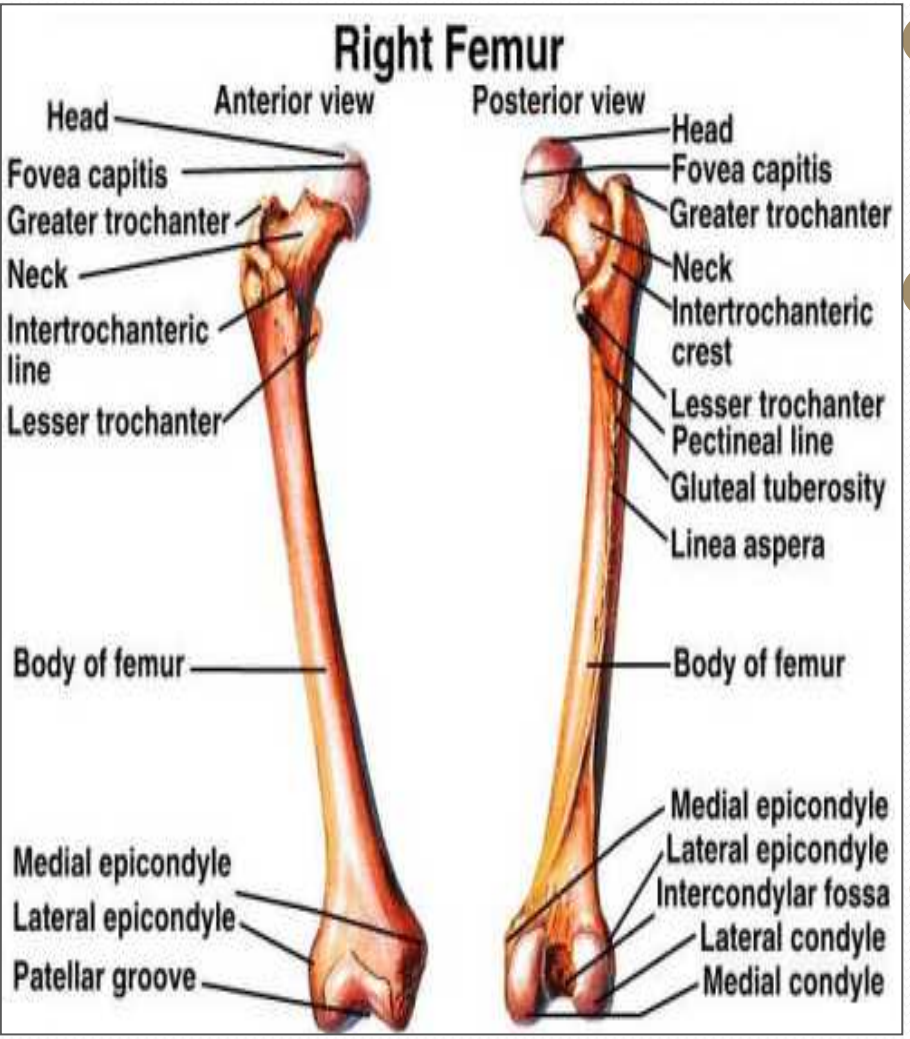
- Articulates above with acetabulum of hip bone to form the hip joint.
- Articulates below with tibia and patella to form the knee joint.

- **Femur :**

  Consists of :

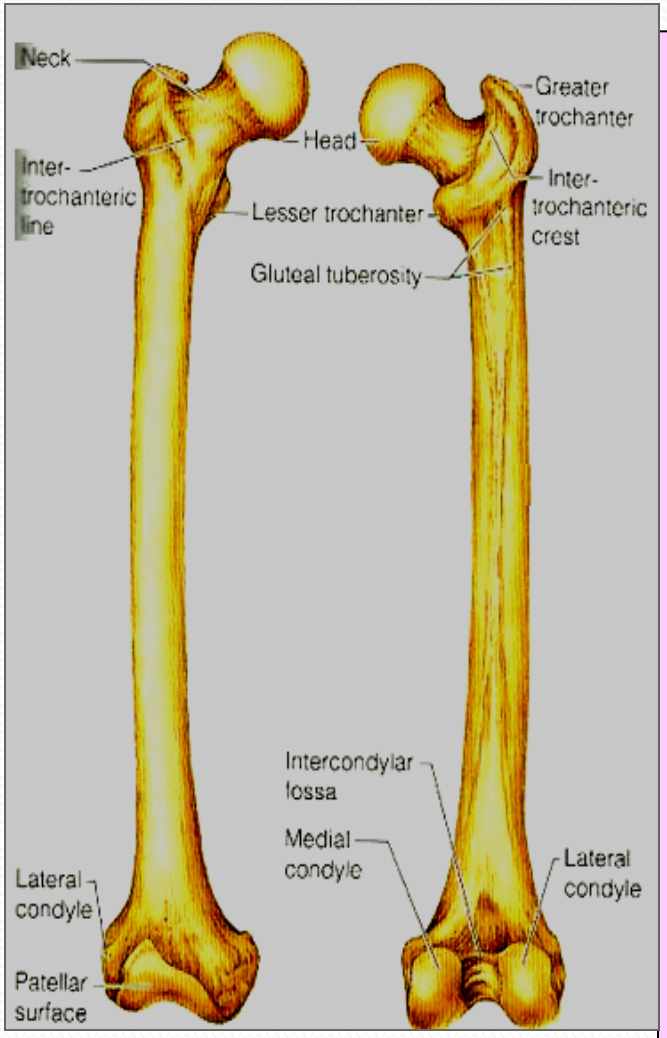
  - **Upper end**
  - **Shaft**
  - **Lower end**

UPPER END OF FEMUR



- **Head :**
- **It articulates** with acetabulum of hip bone to form hip joint.
- **Neck :**
- It connects head to the shaft. **Greater & lesser trochanters :**
- **Anteriorly,** connecting the 2 trochanters, the **inter-trochanteric line, where the iliofemoral ligament is attached.**
- **Posteriorly,** the **inter-trochanteric crest,** on which is **the quadrate tubercle (Qudratus femoris muscle).**

SHAFT OF FEMUR



Anterior view

Posterior view

It has 3 surfaces

Anterior

Medial

Lateral

It has 3 borders

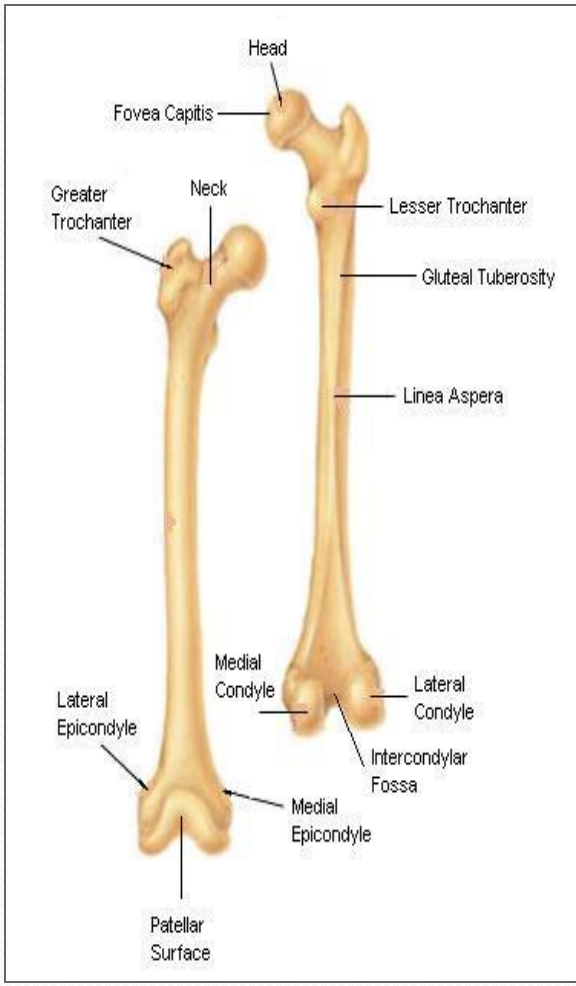
Two rounded

medial and **lateral**

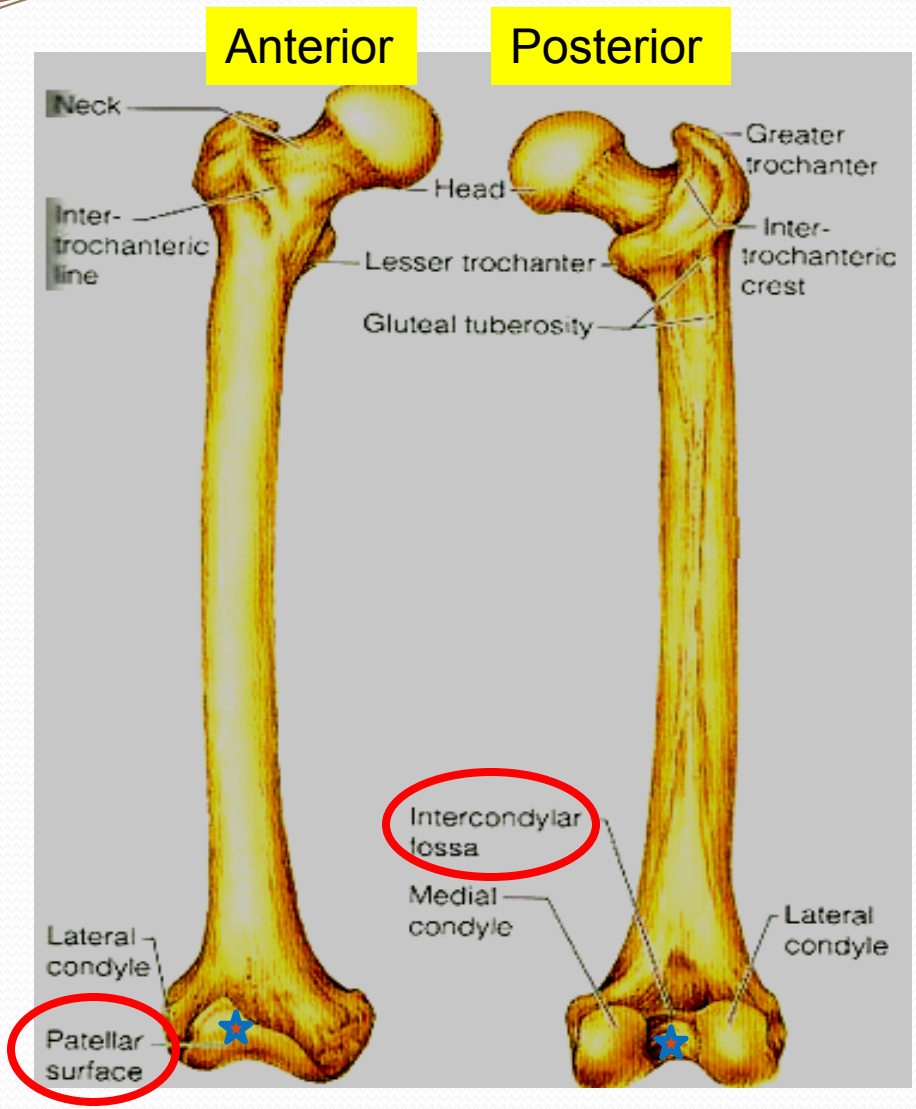
One thick

posterior border or ridge called

linea aspera

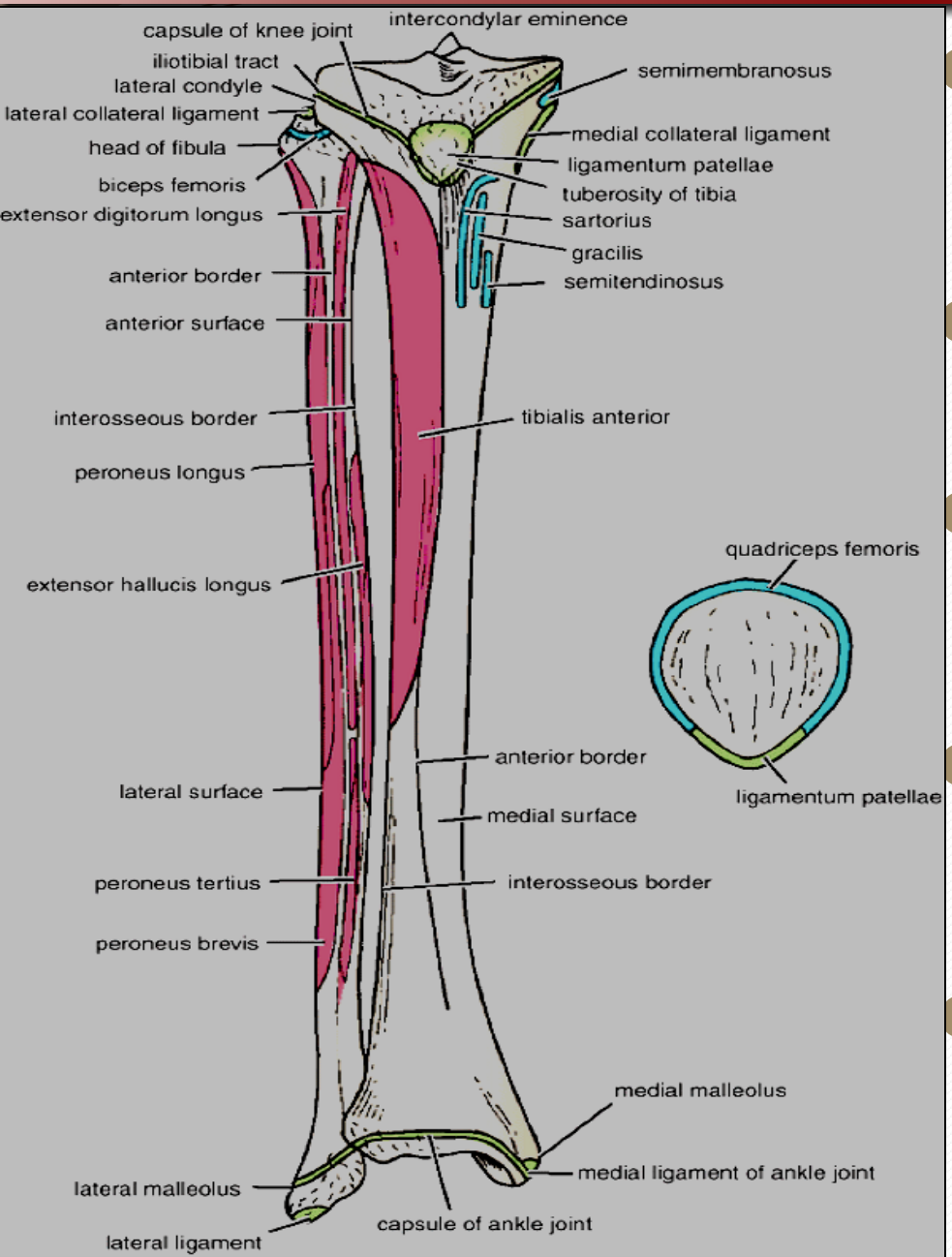


LOWER END OF FEMUR



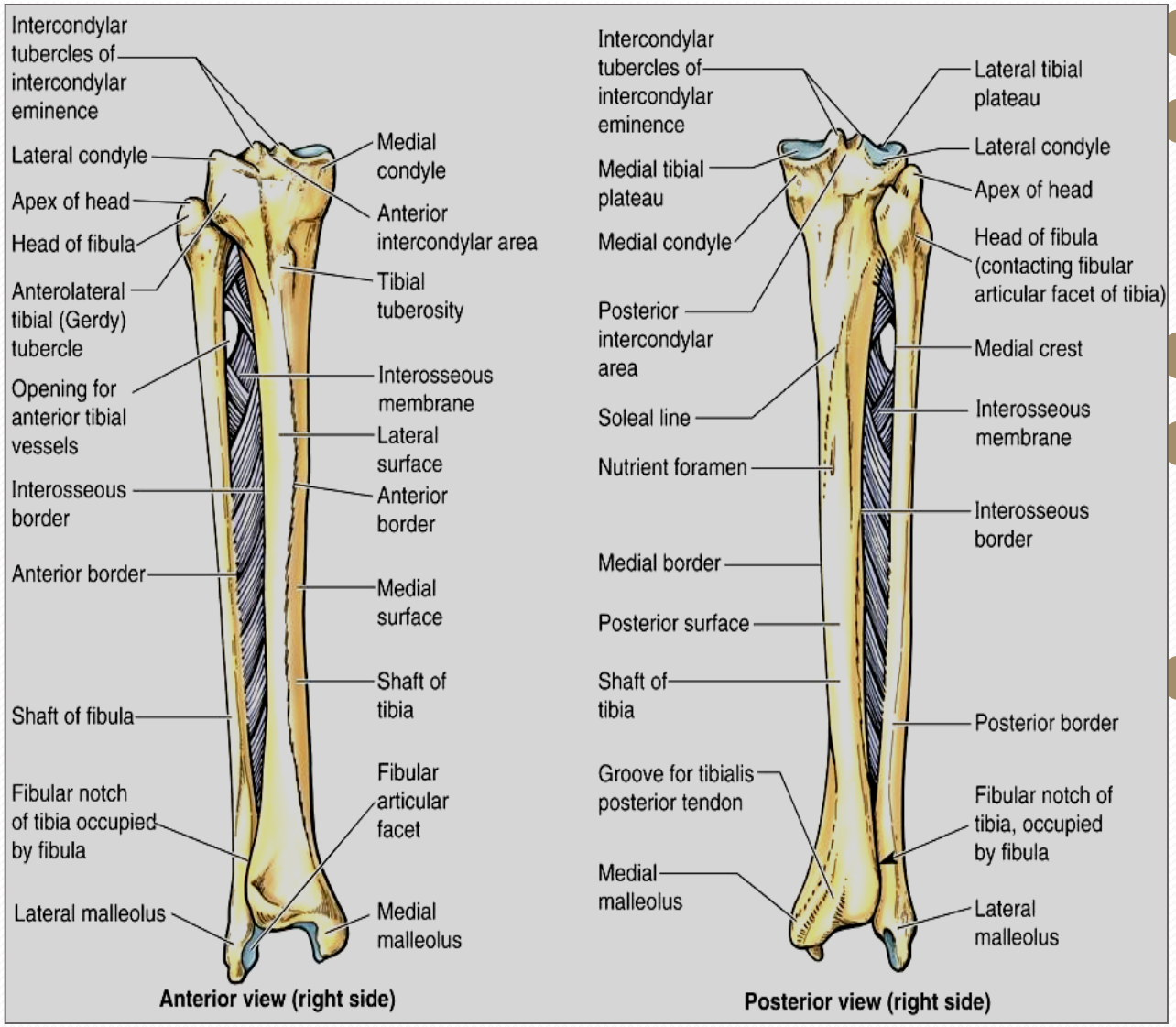
- Has lateral and medial condyles, separated anteriorly by articular patellar surface, and posteriorly by intercondylar notch or fossa.
- The 2 condyles take part in the knee joint.
- Above the condyles are the medial & lateral epicondyles.

PATELLA



- **It is a largest sesamoid bone** (lying inside the Quadriceps tendon in front of knee joint).
- **Its anterior surface** is rough and **subcutaneous.**
- **Its posterior surface** articulates with the condyles of the femur to form **knee joint.**
- **Its apex** lies inferiorly and is connected to tuberosity of tibia by ligamentum patellae.
- **Its upper, lateral, and medial margins** give attachment to Quadriceps femoris muscles.

BONES OF LEG (TIBIA AND FIBULA)



Tibia :

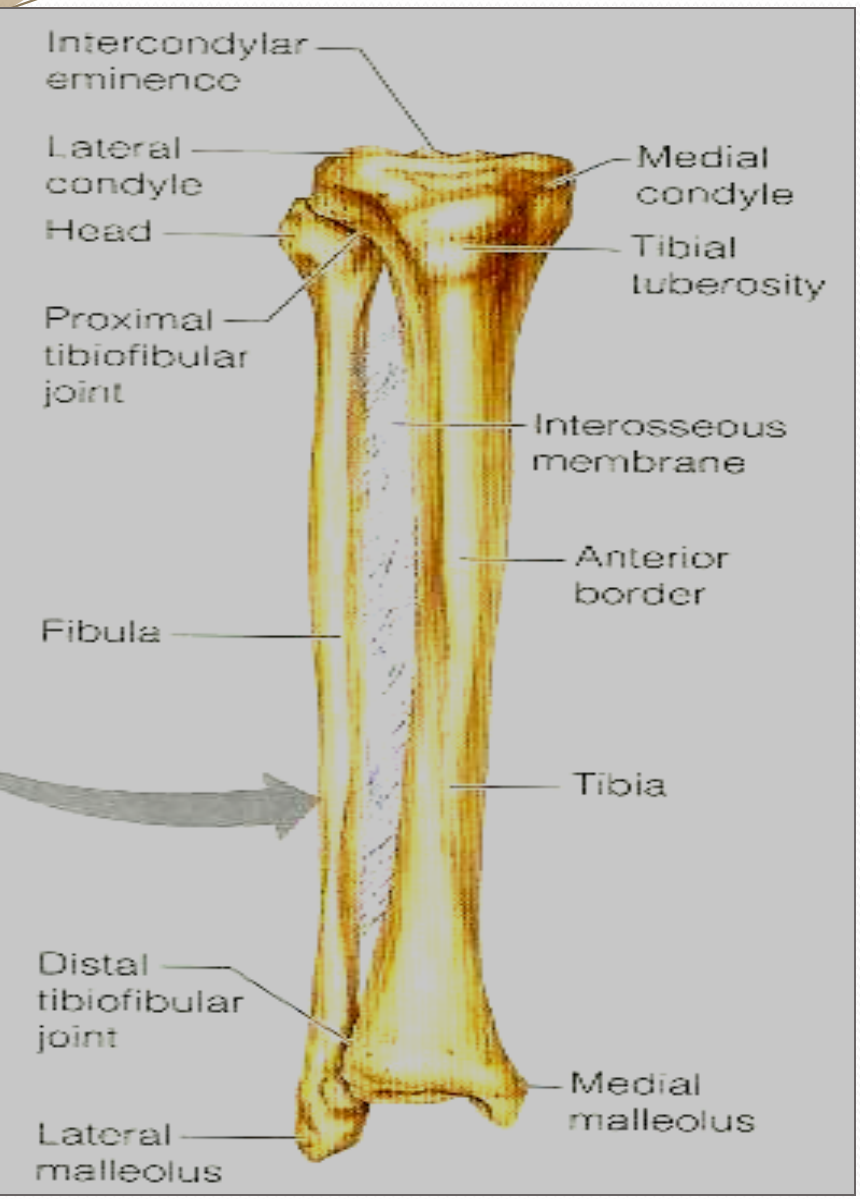
It is the medial bone of leg.

Fibula :

It is the lateral bone of leg.

Each of them has upper end, shaft, and lower end.

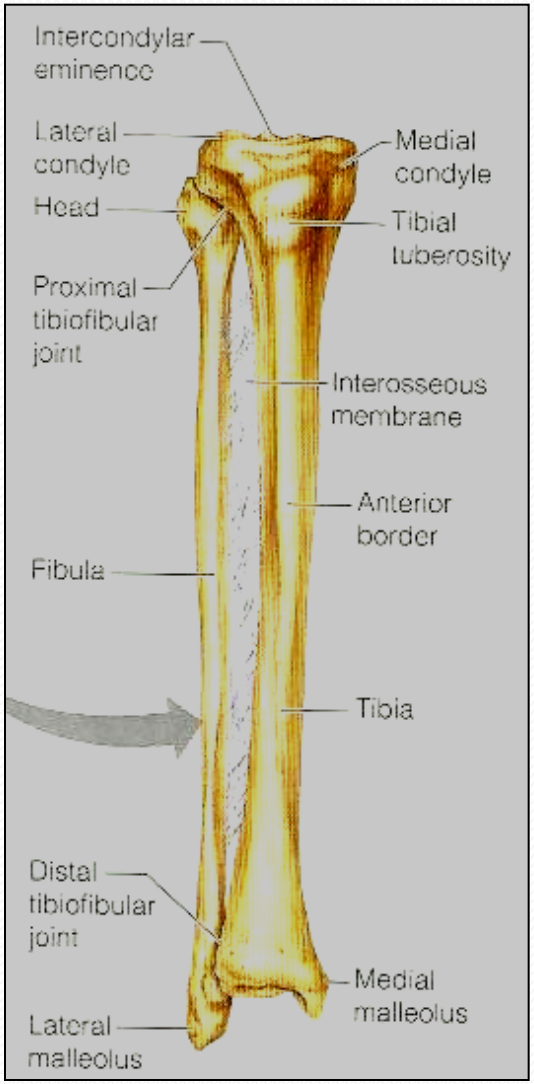
TIBIA

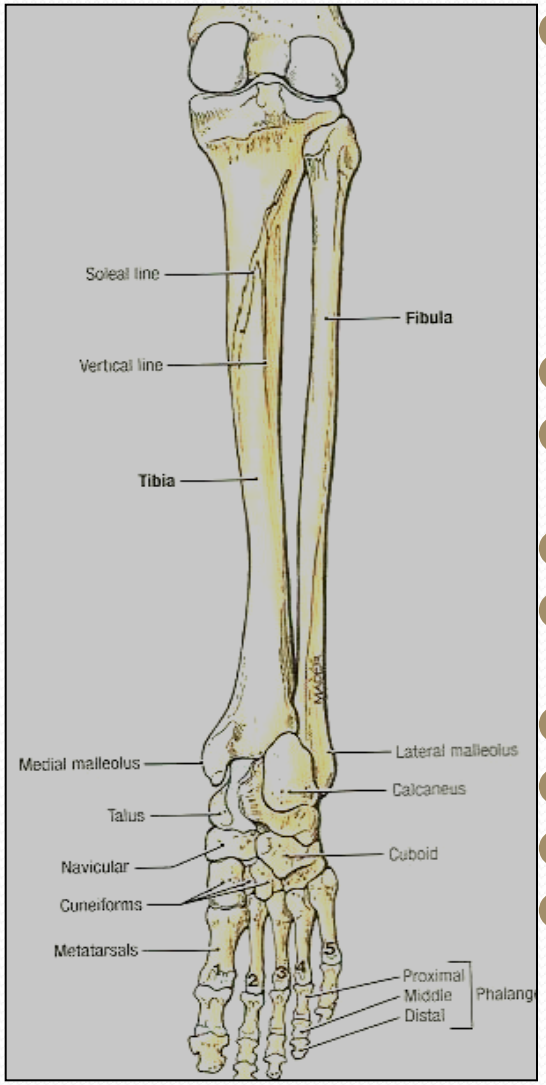


Upper end has:

- **2 tibial condyles:**
- **Medial condyle :** is larger and articulate with medial condyle of femur. It has a **groove** on its posterior surface for **semimembranosus muscles.**
- **Lateral condyle :** is smaller and articulates with lateral condyle of femur.
  It has **facet** on its lateral side for articulation with head of fibula to form **proximal tibio-fibular joint.**
- **Intercondylar area :** is rough and has

TIBIA

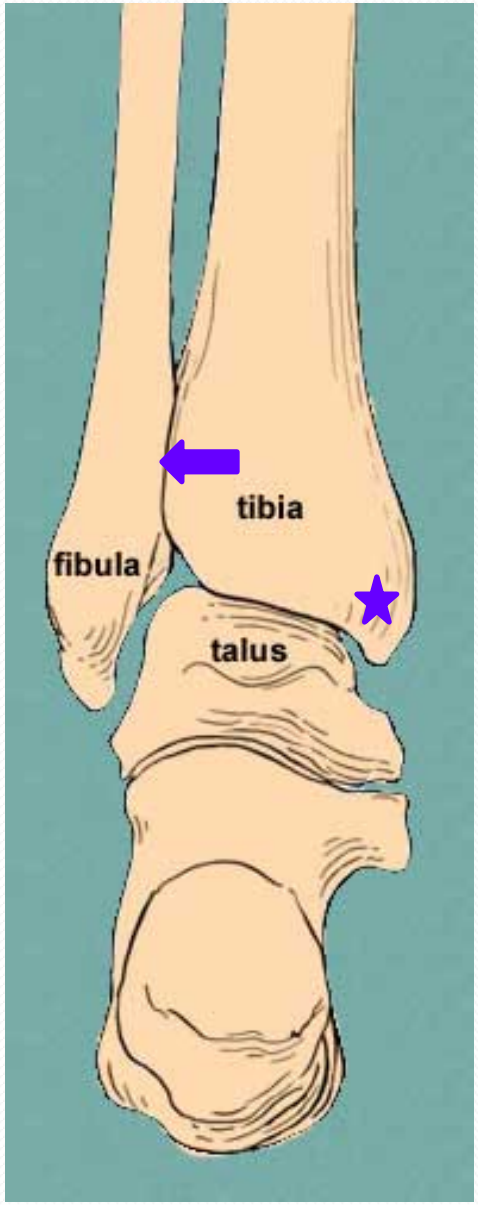




Shaft has:

- **Tibial tuberosity :**
  Its upper smooth part gives attachment to ligamentum patellae.
  Its lower rough part is **subcutaneous**.
- **3 borders :**
- **Anterior boder :** sharp and **subcutaneous.**
- **Medial border.**
- **Lateral border** interosseous border.
- **3 surfaces :**
- **Medial : subcutaneous.**
- **Lateral**
- **Posterior** has oblique line, **soleal line** for attachment of soleus muscle

TIBIA



Lowe end:

- Articulates with talus for formation of ankle joint.
- Medial malleolus: ★
  - Its medial surface is subcutaneous.
  - Its lateral surface articulate with talus.
- Fibular notch: lies on its lateral surface of lower end to form distal tibiofibular joint.

FIBULA

Fibula

Upper end:

- fibular head
- neck of fibula

Shaft:

- interosseous border

Lower end:

- lateral malleolus

- It is the selender lateral bone of the leg.
- It takes no part in articulation of knee joint.

Its upper end has:

Head : articulates with lateral condyle of tibia.

Styloid process.

Neck.

Shaft has:

4 borders : its medial ‘interosseous border gives attachment to interosseous membrane.

4 surfaces.

Lower end forms:

Lateral malleolus: is subcutaneous, Its medial surface is smooth for articulation with talus to form ankle joint.

BONES OF FOOT

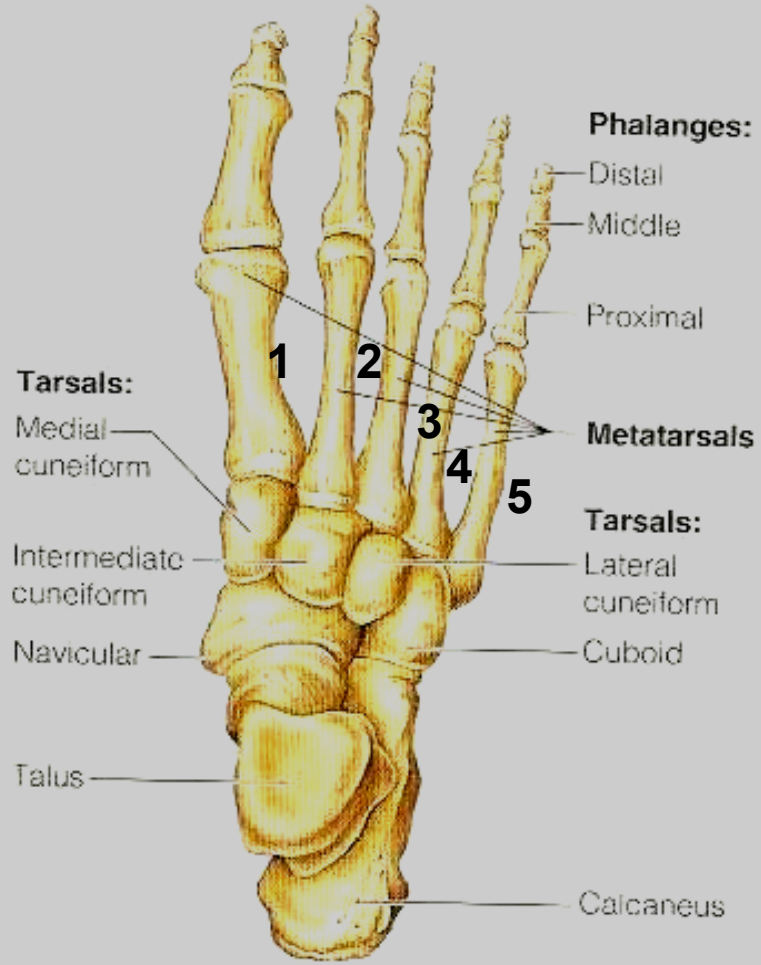


FIGURE 5.25 Bones of the right foot, superior view.

7 Tarsal bones:

1. Calcaneum.
2. Talus .
3. Navicular.
4. Cuboid.
5. 3 cuneiform bones.

Only Talus articulates with tibia & fibula at ankle joint.

Calcaneum: the largest bone of foot, forming the heel.

5 Metatarsal bones:

- They are numbered from medial (big toe) to lateral.
- 1st metatarsal bone is large and lies medially.
- Each metatarsal bone has a base (proximal). a shaft and a head (distal).

14 phalanges:

- 2 phalanges for big toe (proximal & distal)
- 3 phalanges for each of the lateral 4 toes (proximal, middle & distal)

THANK YOU