



***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), thigh (femur & patella)
- Bones of the forearm (radius & ulna), leg (tibia & Fibula).
- Bones of the hand (carpal, metacarpal, phalanges),foot (tarsals, metatarsals and phalanges)

Recognize the side and position of each bone

The Bones of UL are:

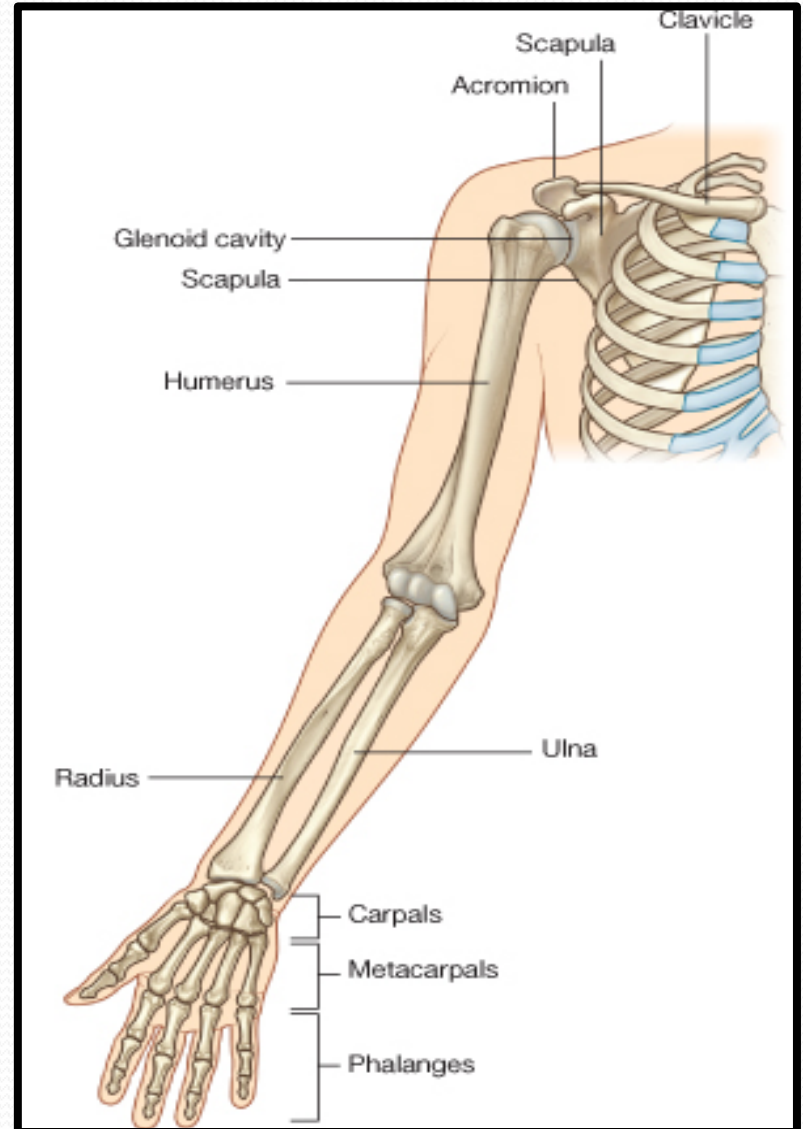
Pectoral Girdle.

Arm : Humerus.

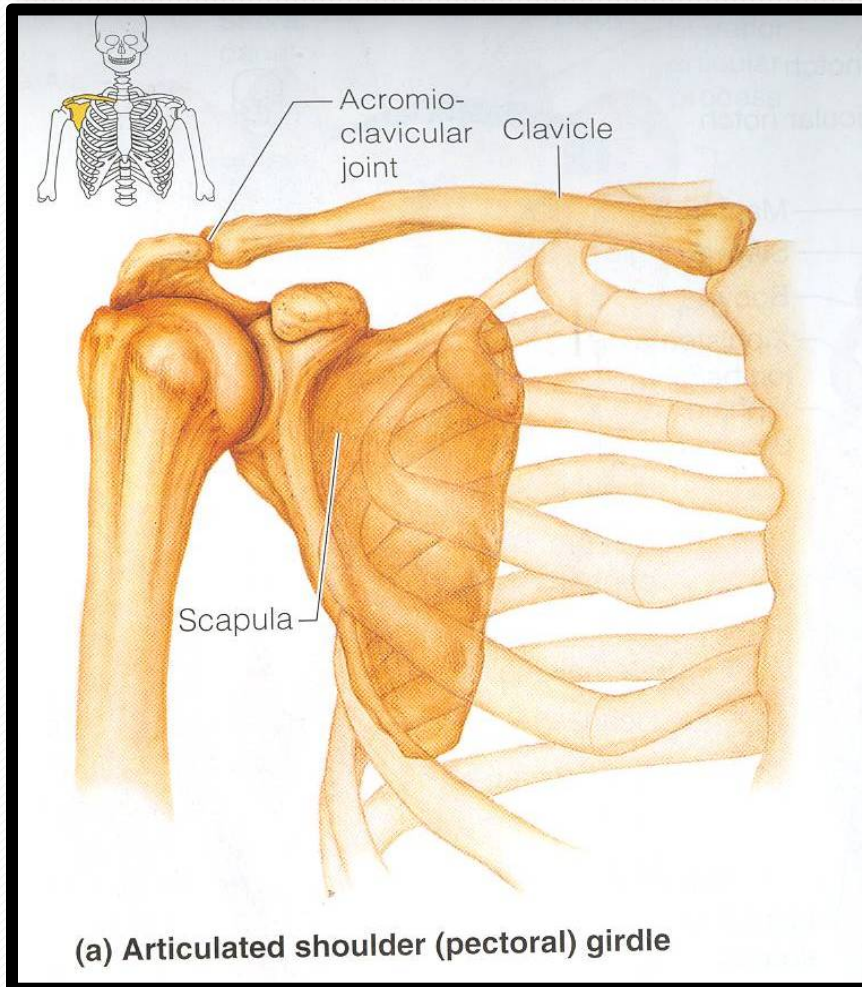
Forearm : Radius & Ulna.

Wrist : Carpals

**Hand: Metacarpals &
Phalanges**

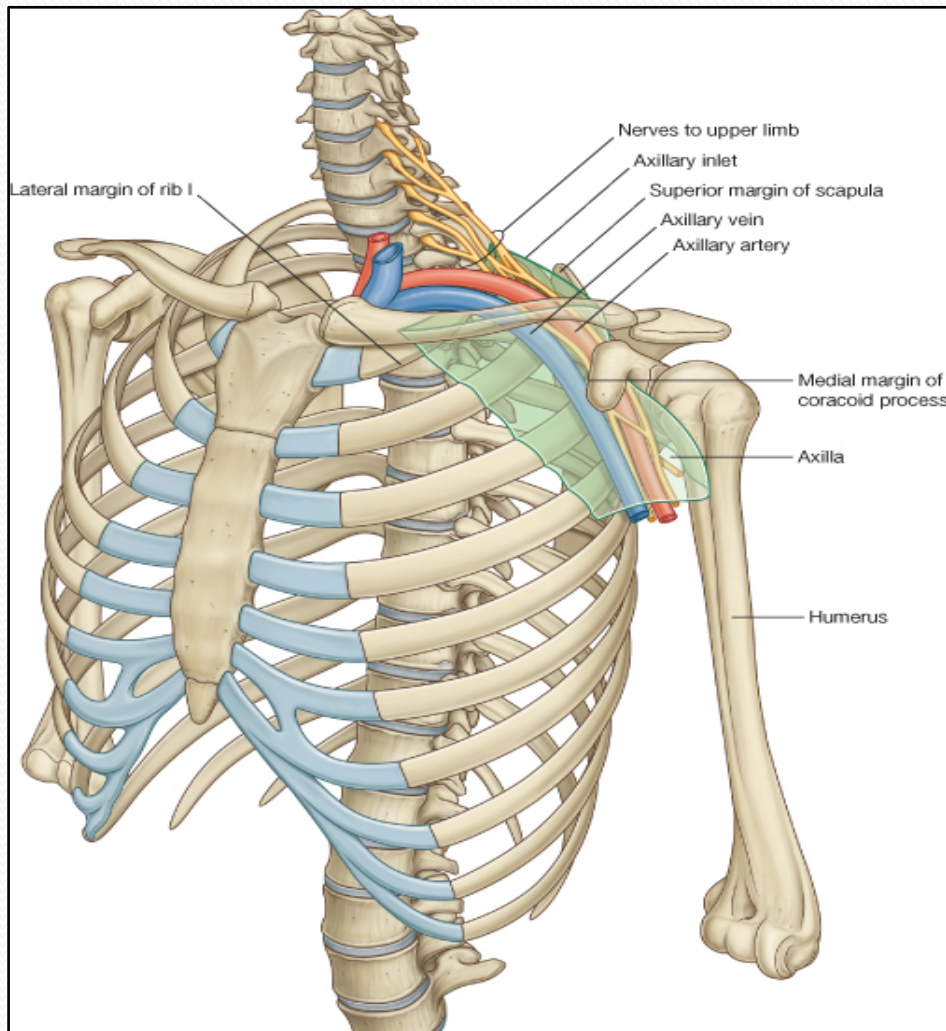


Pectoral Girdle



- **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):

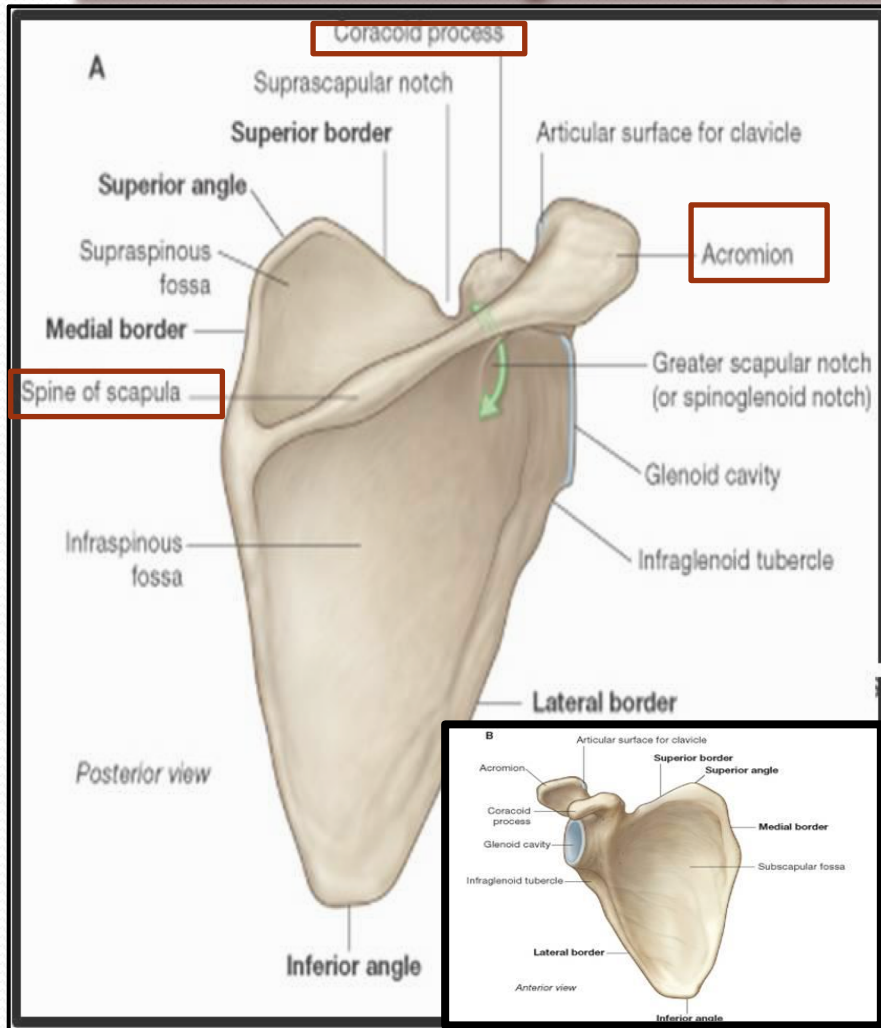
Its medial 2/3 is convex forward.

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 1st rib.

Scapula (Shoulder Blade)



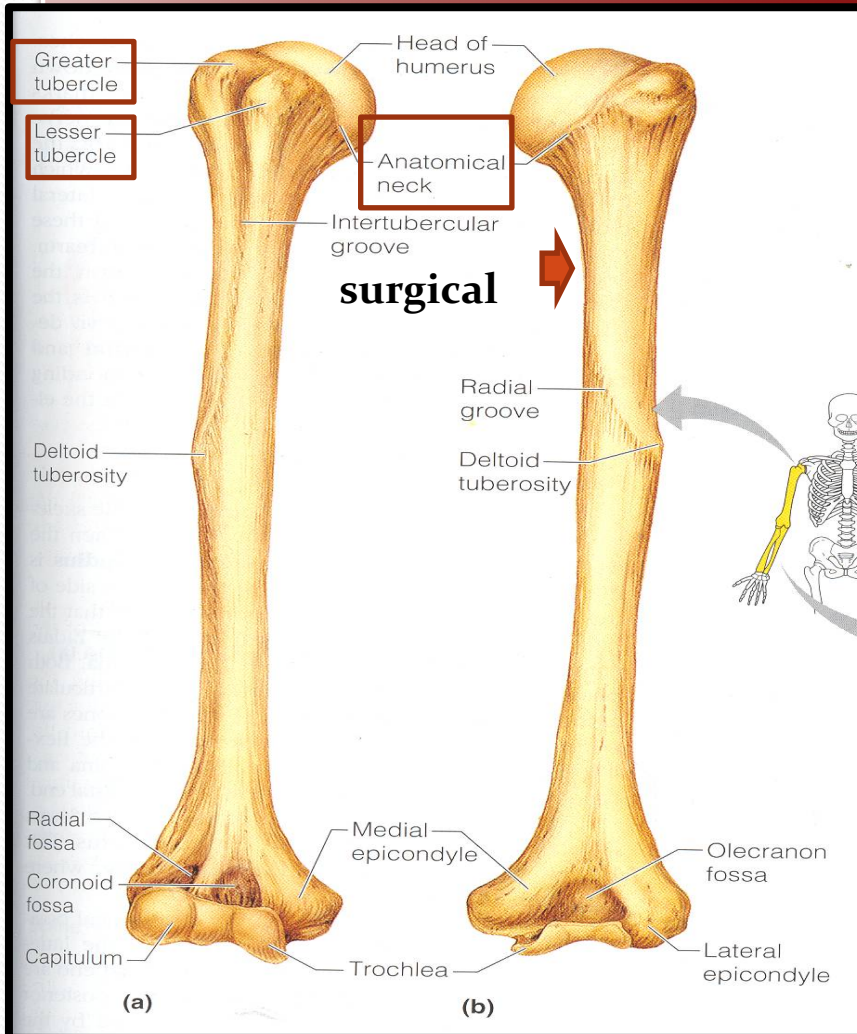
- It is a triangular **Flat** bone.
- Extends between the **2nd 7th ribs.**
- It has :
- **Three Processes:**
- **(1)Spine, (2) Acromion, (3) Coracoid**
- **Three Borders:** Superior, Medial (Vertebral) & Lateral (Axillary)
- **Three Angles:** Superior, Lateral (forms the Glenoid cavity), Inferior.

Two Surfaces:

Convex Posterior, Smaller Suprascapular Fossa (above the spine) and the larger Infraspinous Fossa (below the spine).

- **Concave Anterior (Costal)**

Humerus



Typical Long bone.

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

Intertubercular Groove.

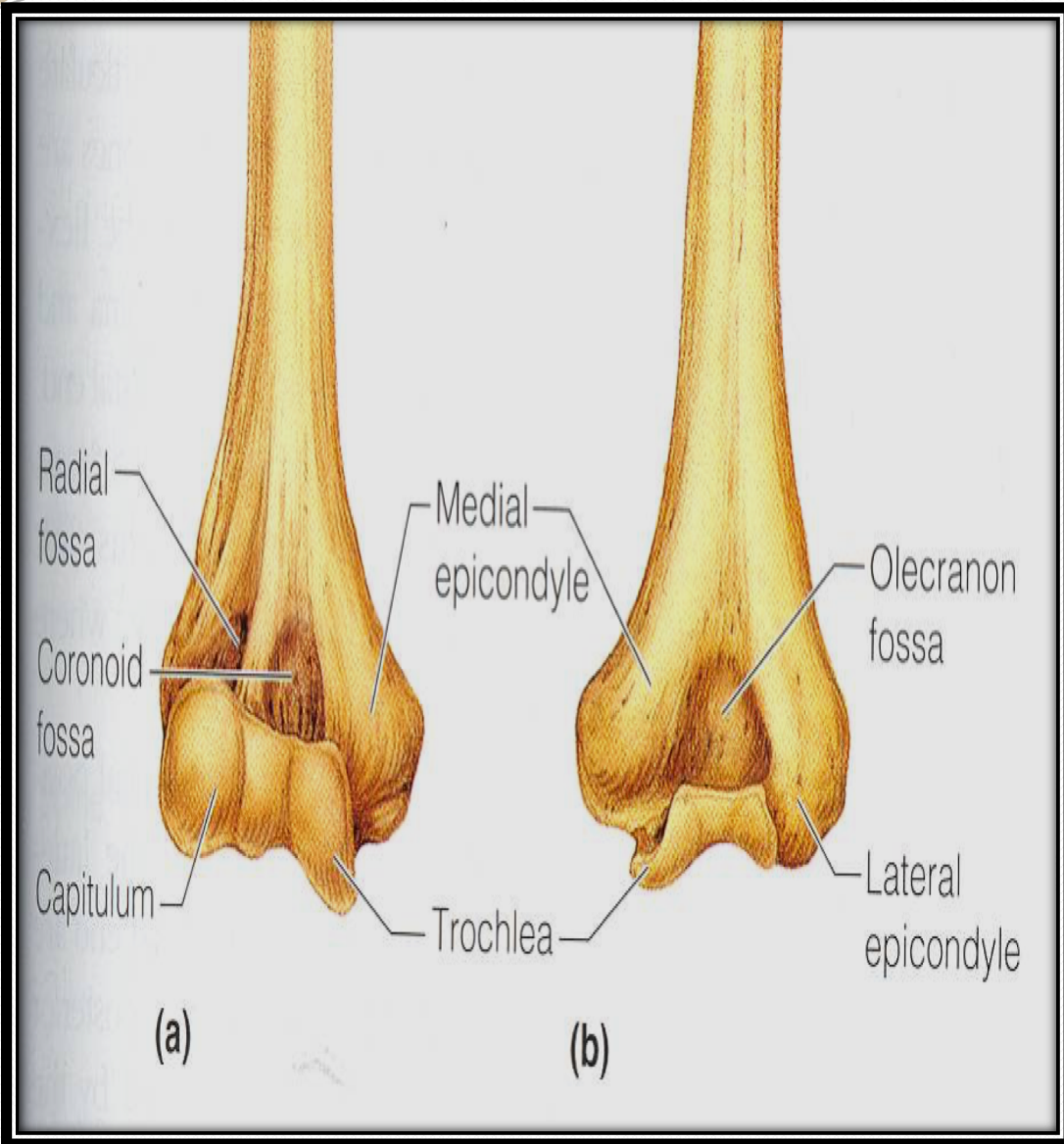
Anatomical neck: formed by a groove separating the head from the tubercles. **Surgical Neck:** a narrow part distal to the tubercles.

Shaft (Body): Has two prominent features:

1. **Deltoid tuberosity:**

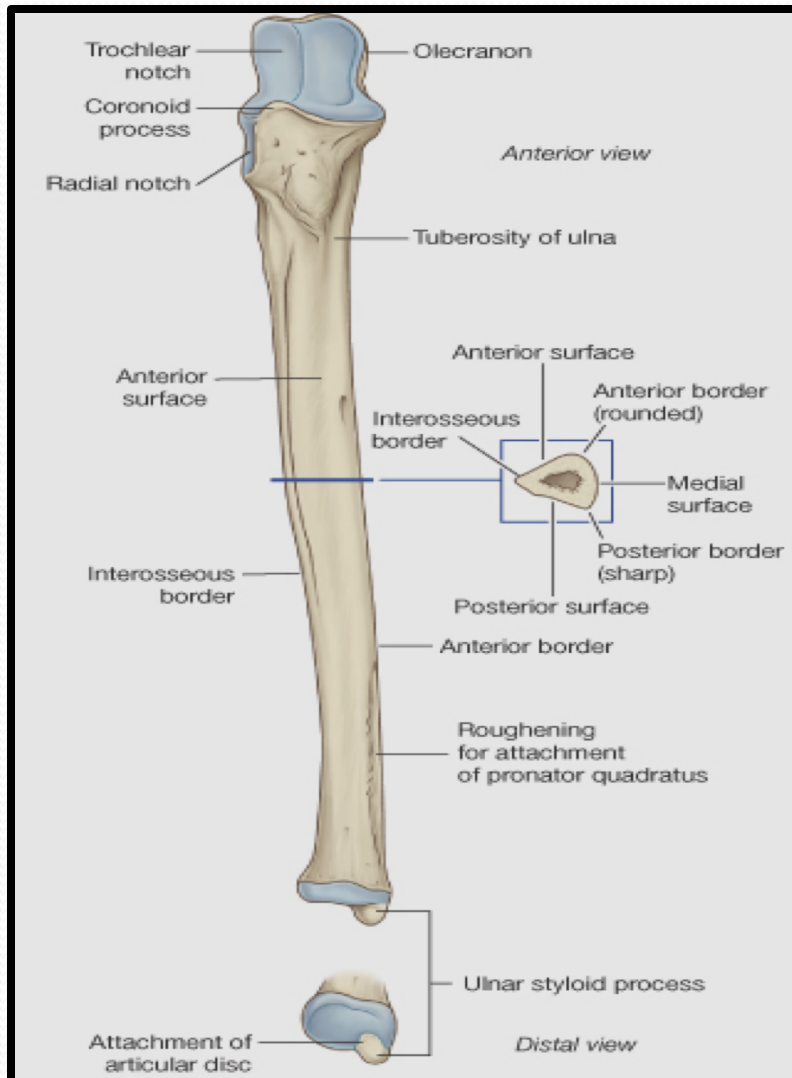
2. **Spiral (Radial) groove:**

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



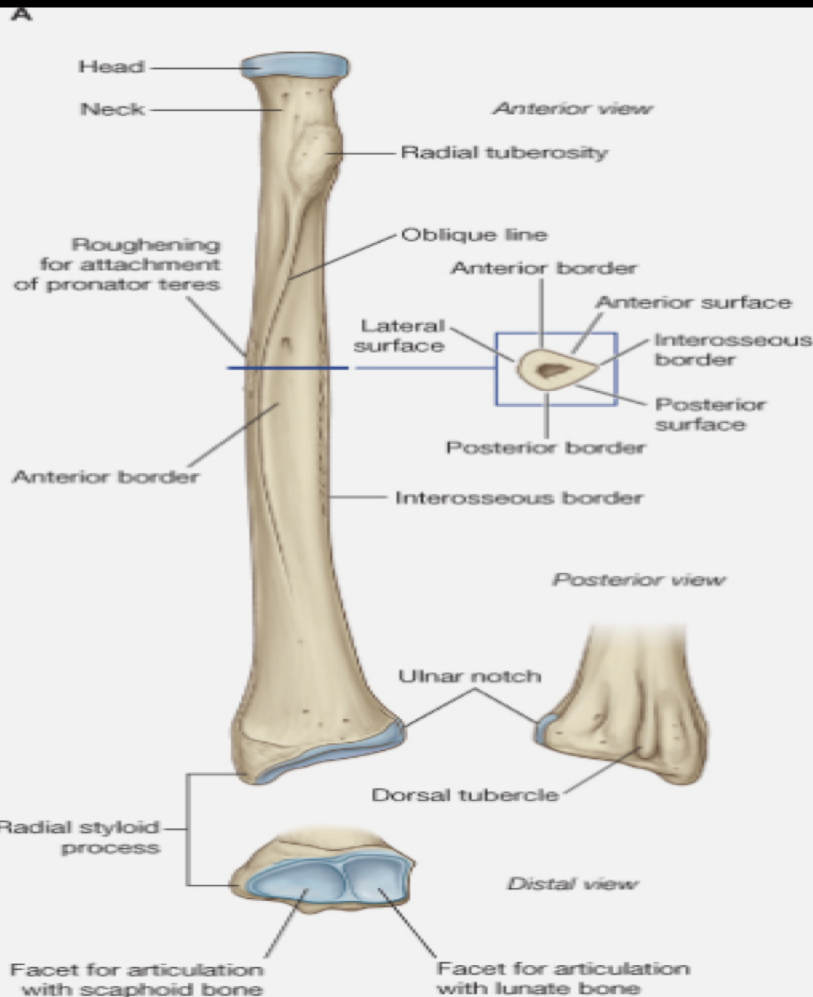
- **Structures at Distal end:**
- **Anteriorly:**
- **Trochlea: (medial)** for articulation with the ulna
- **Capitulum: (lateral)** for articulation with the radius.
- **Coronoid fossa:** above the trochlea.
- **Radial fossa:** above the capitulum.
- **Posteriorly:**
- **Olecranon fossa:** above the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

Ulna



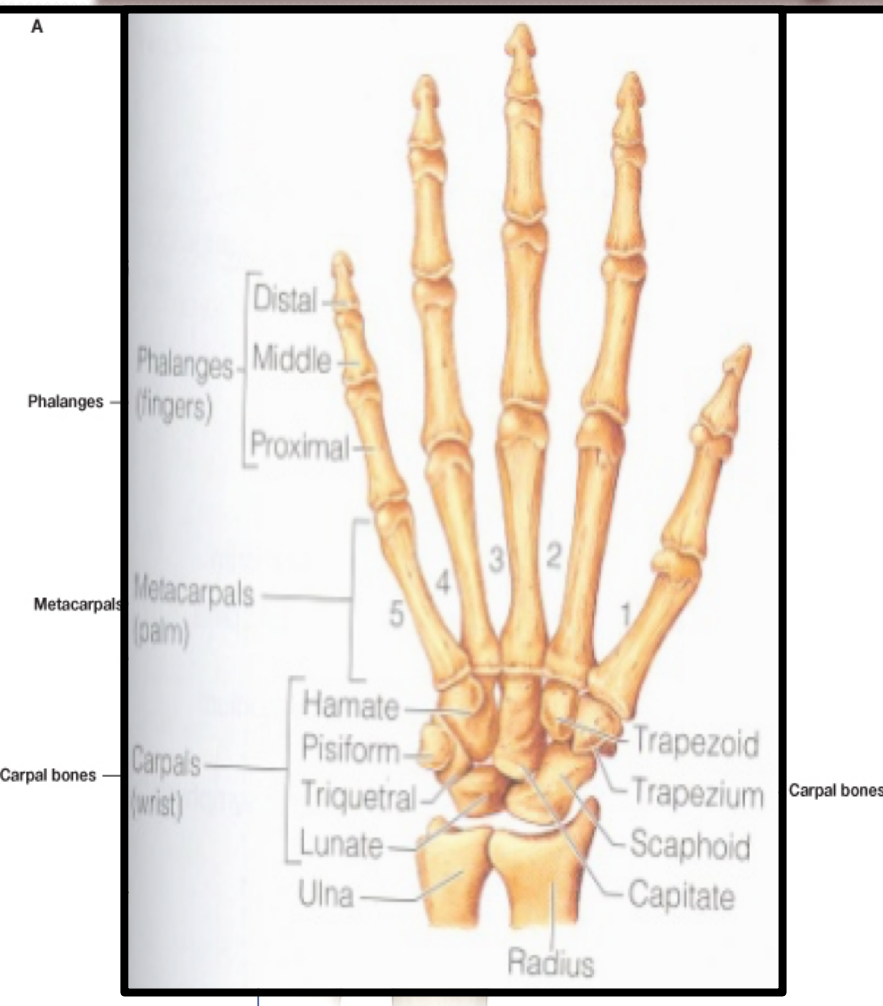
- It is the stabilizing bone of the forearm.
- It is the medial & longer of the two bones of the forearm.
- **Proximal End**
- **1. Olecranon Process :**
- **2. Coronoid Process :**
- **3. Tuberosity of Ulna:**
- **4. Trochlear Notch:**
- **5. Radial Notch :**
- **Shaft :**
- **Thick & cylindrical superiorly 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. .**
- **2. Styloid process: Medial.**

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 (Bicipital) 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, Triquetrum & 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:

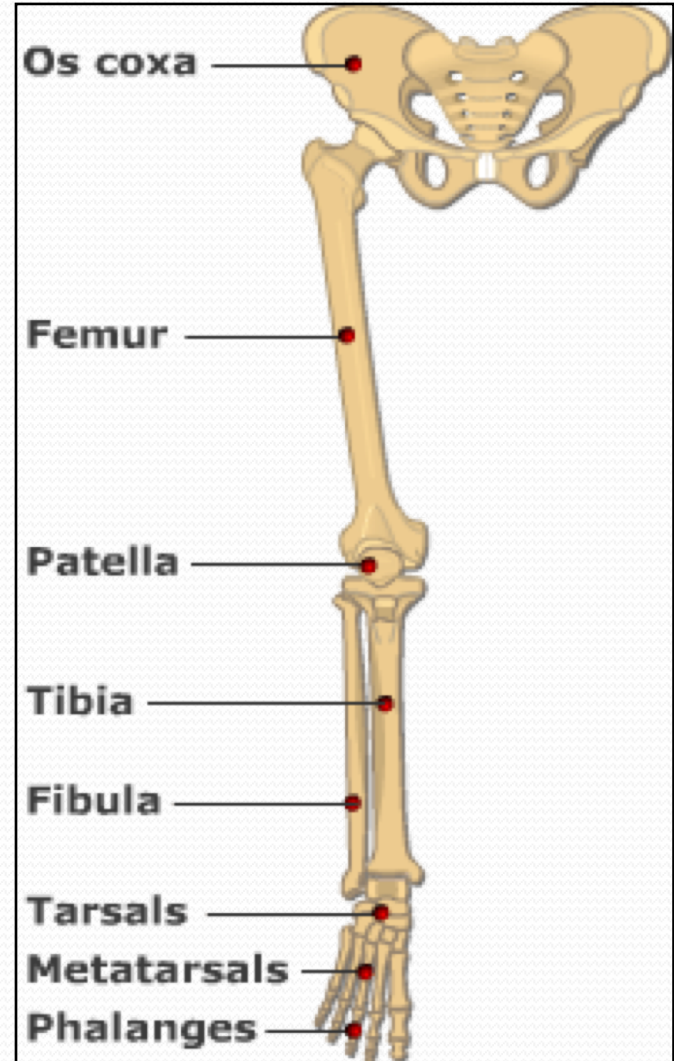
Pelvic Girdle: Hip bone
& Sacrum

Thigh: Femur & Patella.

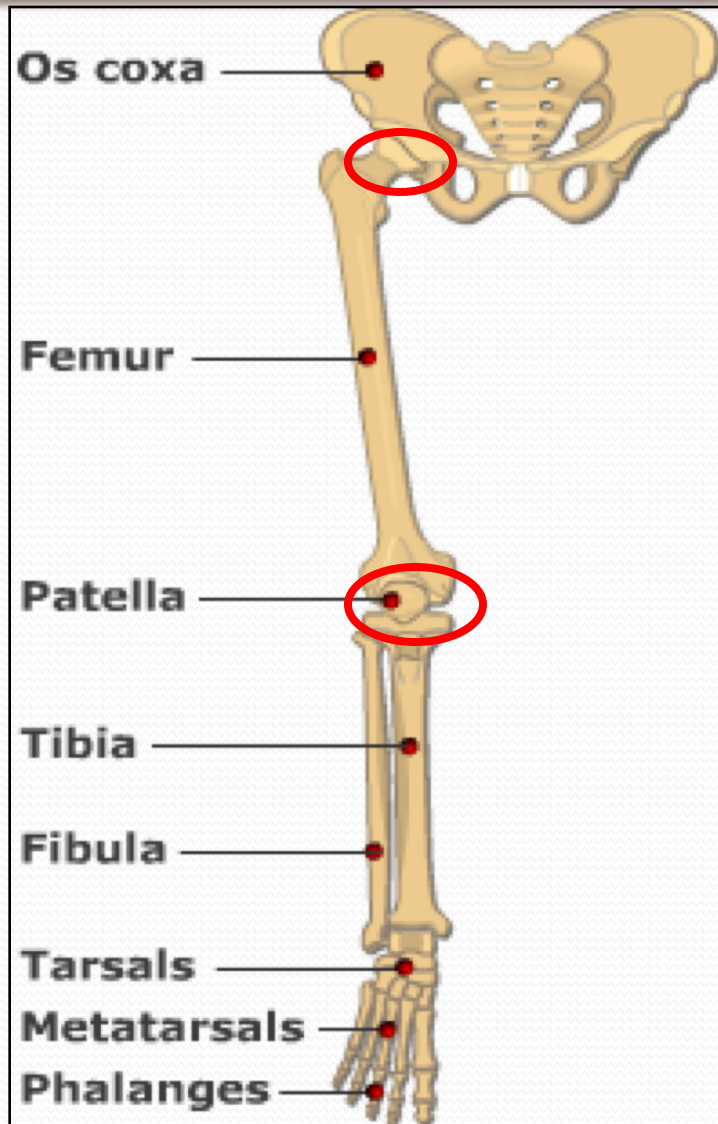
Leg: Tibia & Radius.

Ankle: Tarsal bones

Foot : Metatarsal &
Phalanges.



BONES OF THIGH (Femur and Patella)



Femur:

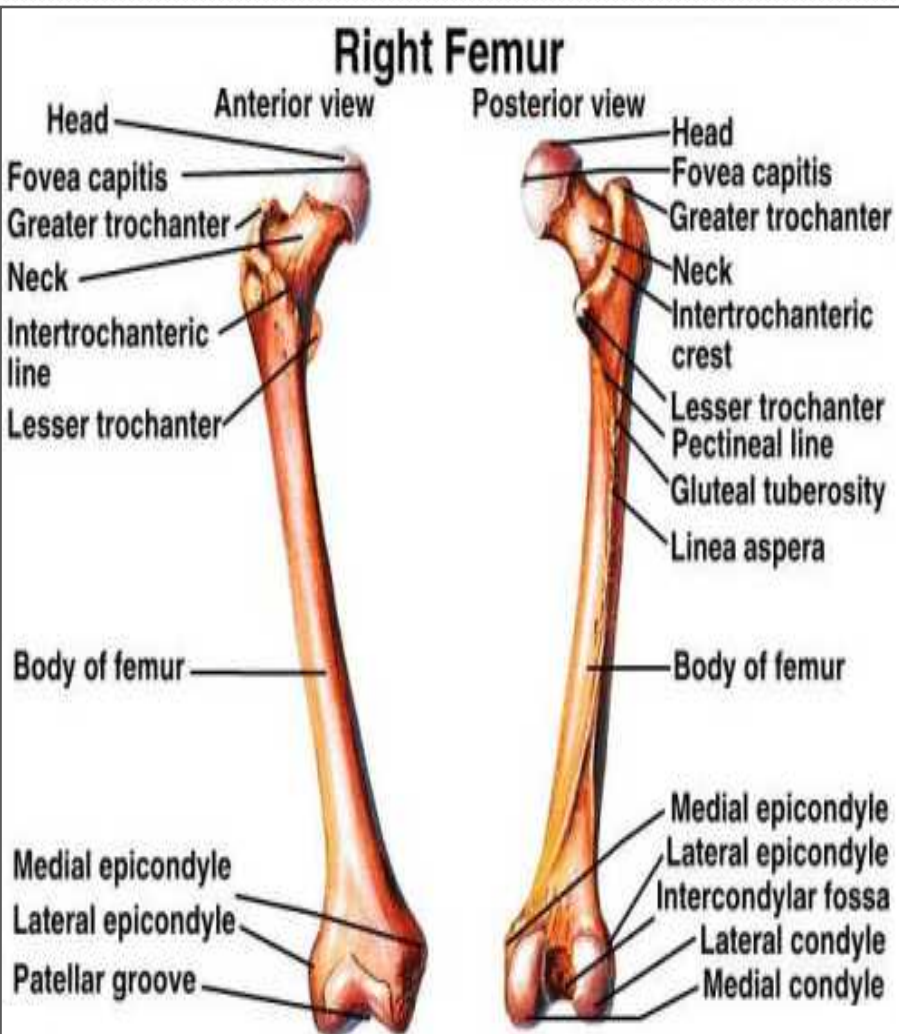
- Articulates above with acetabulum of hip bone to form the **hip joint**.
- Articulates below with tibia and patella to form the **knee joint**.

● Femur :

Consists of :

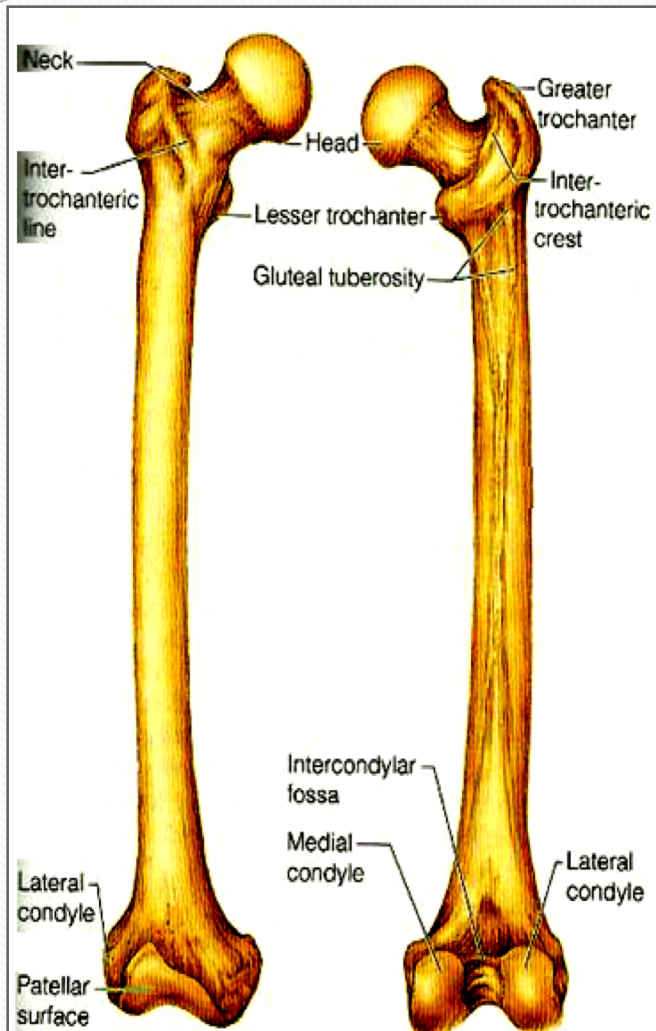
- Upper end
- Shaft
- Lower end

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** (Quadratus femoris muscle).

SHAFT OF FEMUR



Anterior view

Posterior view

It has 3 surfaces

Anterior

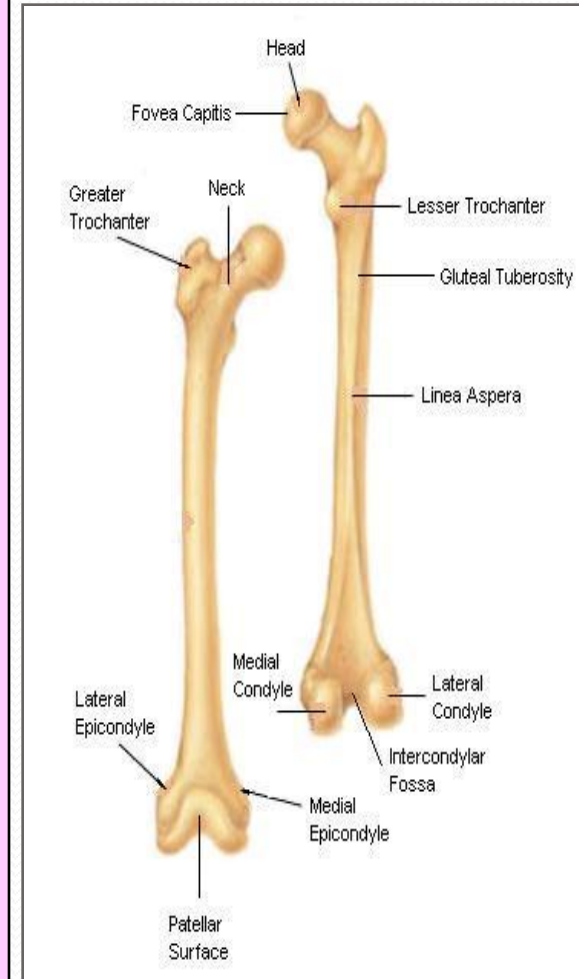
Medial

Lateral

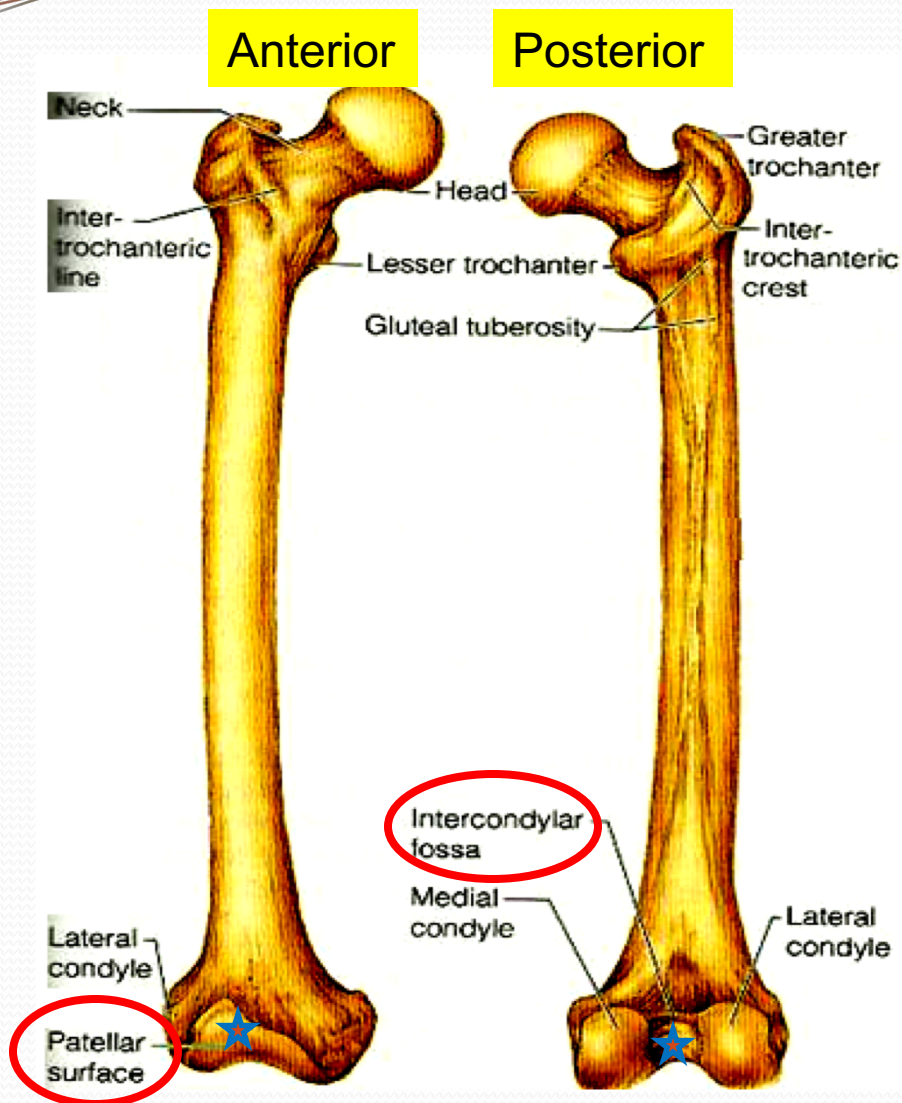
It has 3 borders

Two rounded medial and lateral

One thick posterior border or ridge called linea aspera

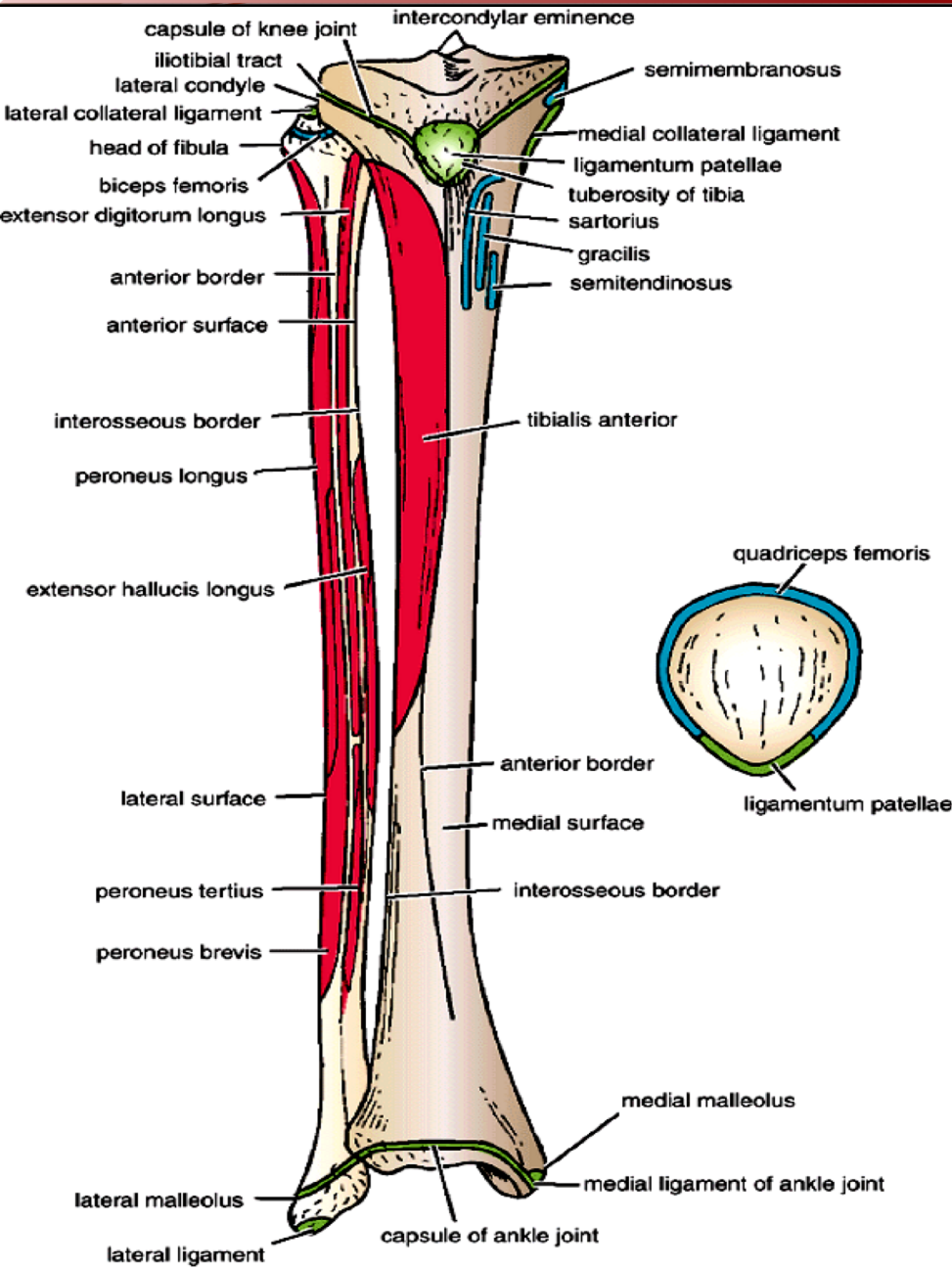


LOWER END OF FEMUR



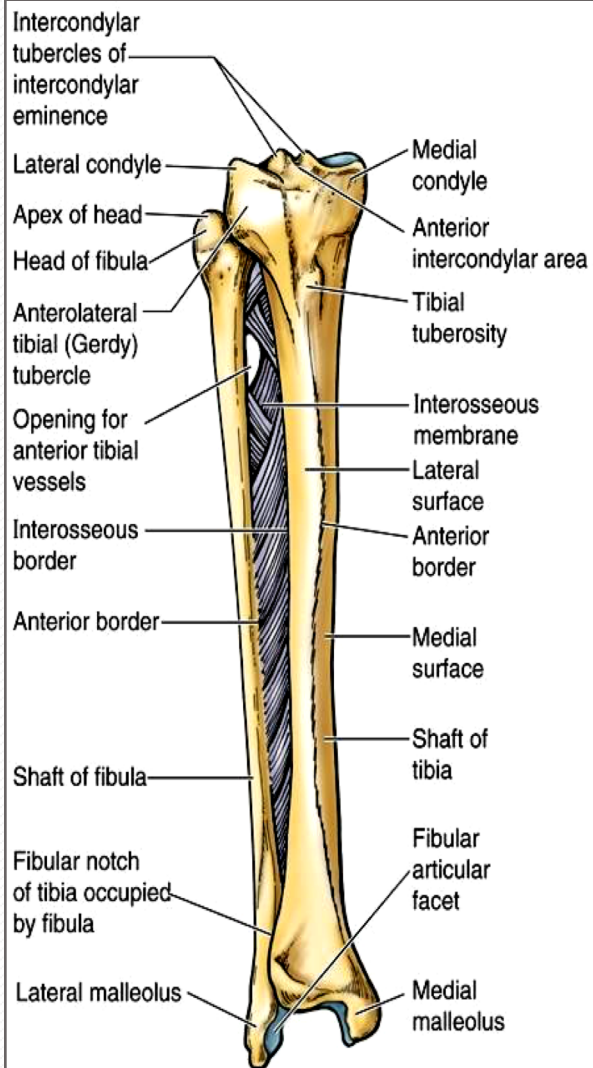
- Has **lateral and medial condyles**, separated **anteriorly** by articular patellar surface, and **posteriorly** by intercondylar notch or fossa.
- **The 2 condyles** take part in the knee joint.
- Above the condyles are the medial & lateral epicondyles.

PATELLA

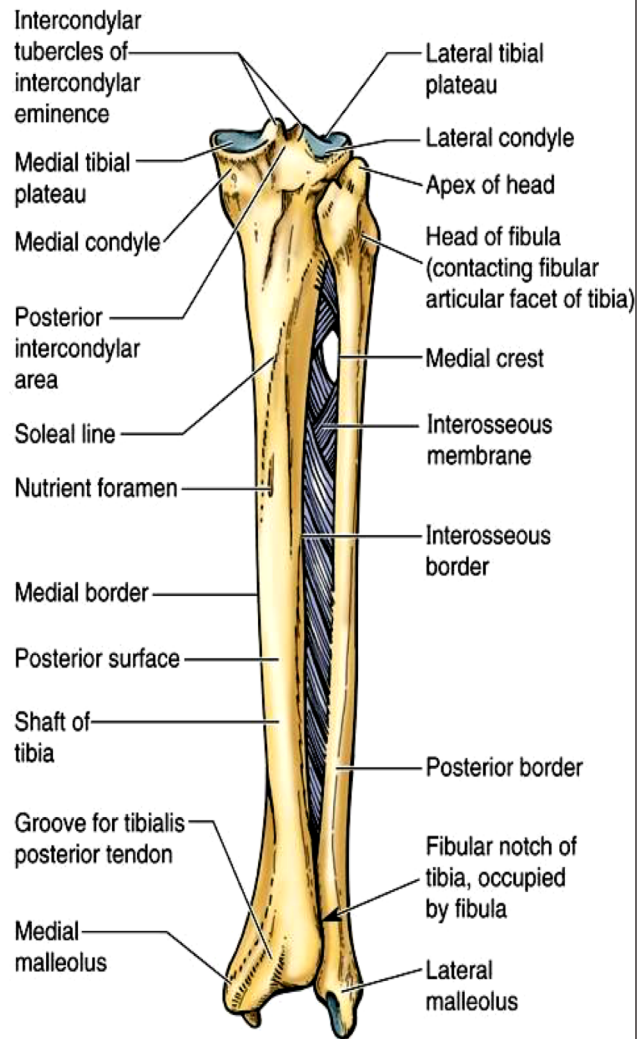


- It is a largest sesamoid bone (lying inside the Quadriceps tendon in front of knee joint).
- Its anterior surface is rough and **subcutaneous**.
- Its posterior surface articulates with the condyles of the femur to form **knee joint**.
- Its apex lies inferiorly and is connected to tuberosity of tibia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

BONES OF LEG (TIBIA AND FIBULA)



Anterior view (right side)



Posterior view (right side)

Tibia :

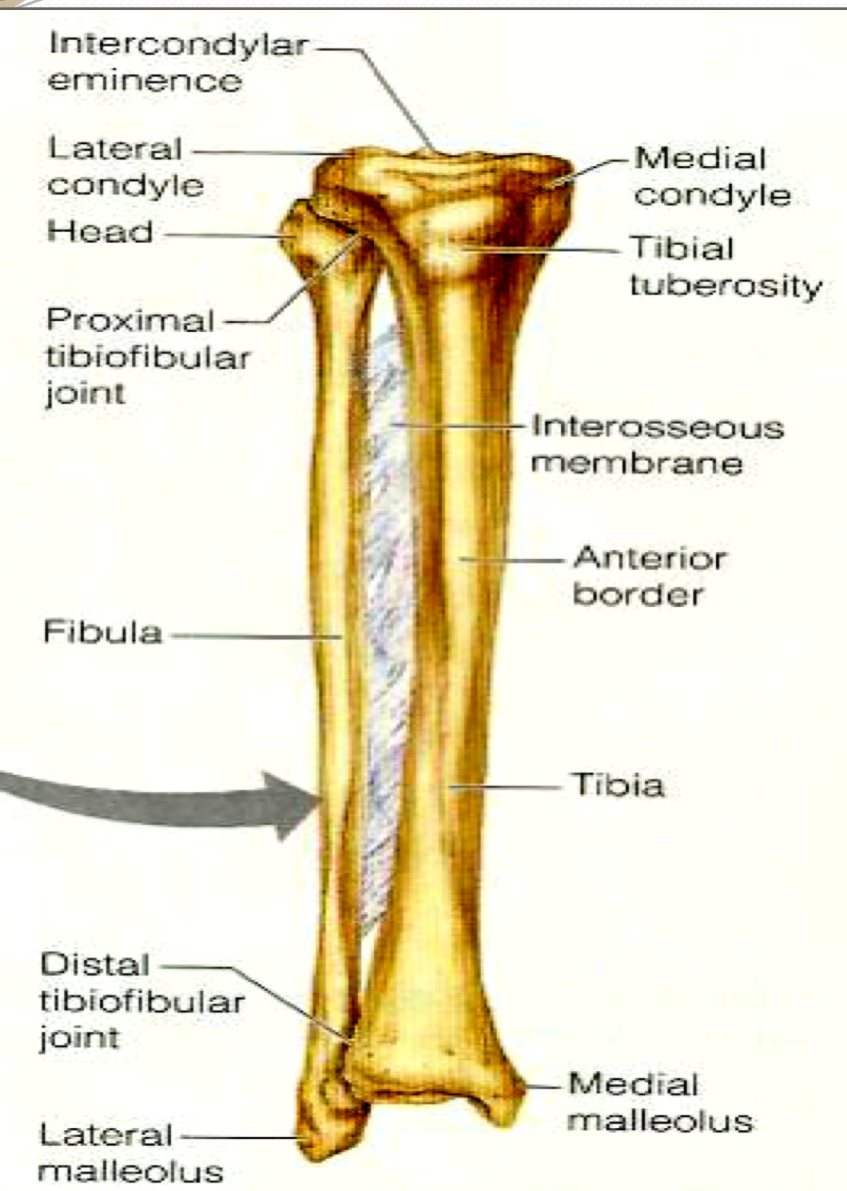
It is the medial bone of leg.

Fibula :

It is the lateral bone of leg.

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

TIBIA



Upper end has:

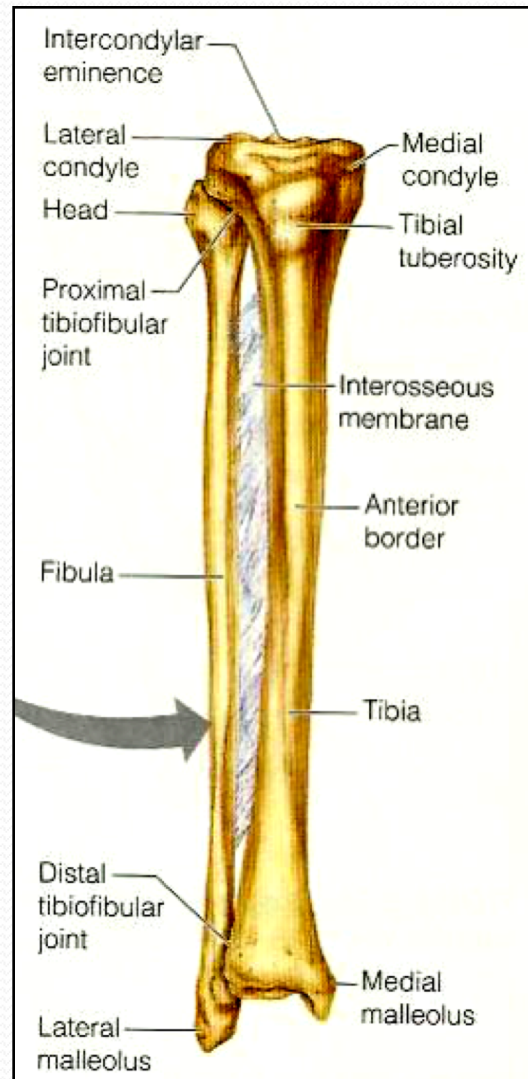
2 tibial condyles:

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 a **facet** on its lateral side for articulation with head of fibula to form **proximal tibio-fibular joint**.

Intercondylar area : is rough and has intercondylar eminence.

TIBIA



Shaft has:

Tibial tuberosity :

Its upper smooth part gives attachment to ligamentum patellae.

Its lower rough part is **subcutaneous**.

3 borders :

Anterior border : sharp and **subcutaneous**.

Medial border.

Lateral border interosseous border.

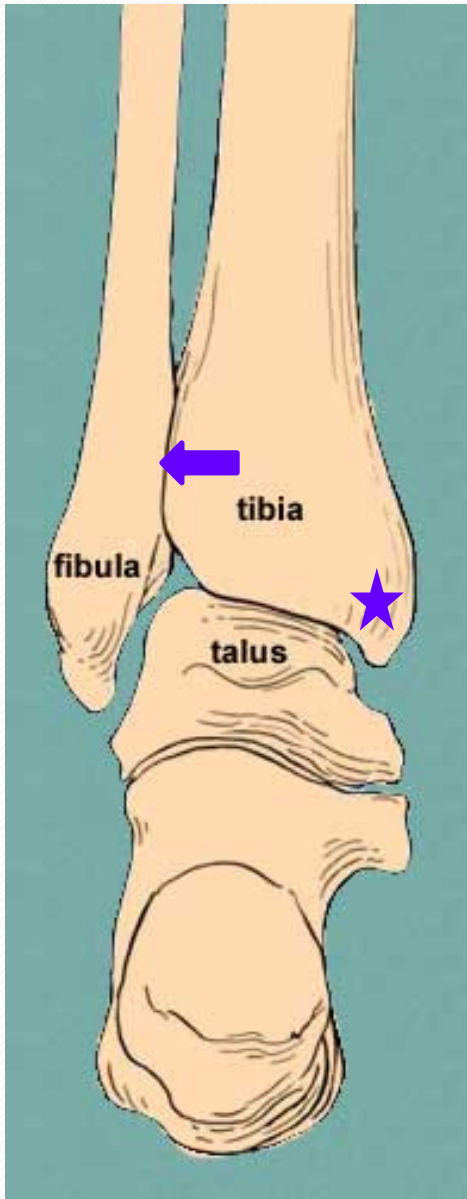
3 surfaces :

Medial : **subcutaneous**.

Lateral

Posterior has oblique line, soleal line for attachment of soleus muscle

TIBIA



Low end:

- Articulates with talus for formation of ankle joint.
- **Medial malleolus:** ★
 - Its medial surface is subcutaneous.
 - Its lateral surface articulates 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 slender 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

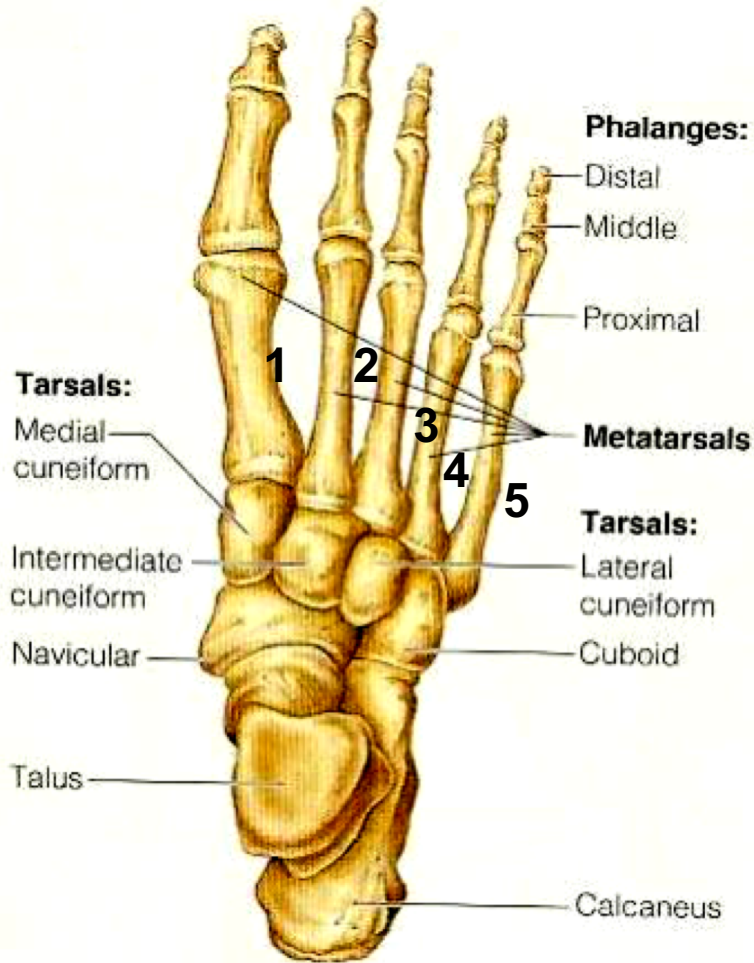


FIGURE 5.25 Bones of the right foot, superior view.

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