

BONES OF THE LOWER LIMB

- ★ The bones of lower limb consists of
 - **The pelvic girdle:**
 - Connects the lower limb to the trunk.
 - It is formed of 2 hip bones & sacrum .
 - **Bone of the thigh:** The femur .
 - **Bones of the leg:** The tibia and the fibula .
 - **Bones of the foot:** The tarsus, the metatarsus and the phalanges .

I. Hip bone: formed of 3 bones:

1. Iliac bone : It is the upper part of hip bone .

- It has **3 borders** :
 - a. Upper border** called iliac crest which has 3 lips (inner , middle and outer which has tubercle of iliac crest) .
 - b. Anterior border** which presents the anterior superior iliac spine (A.S.I.S) & anterior inferior iliac spine .
 - c. Posterior border** which presents the posterior superior iliac spine & posterior inferior iliac spine .
- It has **2 surfaces** :
 - a. Outer or gluteal** surface which has 3 gluteal lines (Posterior , middle & inferior) .
 - b. Inner or pelvic** surface which show iliac fossa , iliac tuberosity & auricular surface (articulate with sacrum) .

2. Ischeal bone: The lower posterior part of hip bone & consists of :

a. Body : which has **3 surfaces** (femoral , pelvic & posterior) and **2 borders** (anterior form part of obturator foramen & posterior form lower part of greater sciatic notch)

b. Ischeal tuberosity which is divided by a transverse ridge into an upper quadrangular part (formed of lower medial & upper lateral part) and a lower triangular part .

c. Ischeal spine which separates the greater sciatic notch from the lesser sciatic notches .

d. Ischeal ramus which joins the inferior pubic ramus to form ischeopubic (conjoint) ramus which form with that of the opposite side the pubic arch .

3. Pubic bone: The lower anterior part of hip bone & consists of :

a. Body : has 3 surfaces: anterior, posterior and medial.

* It articulates with the medial surface of the opposite bone to form the symphysis pubis.

* Its upper border is called **pubic crest** (1.5 cm long) which ends laterally in a projection called **pubic tubercle**.

b. superior pubic ramus which has 3 surfaces :

- pectineal surface & pectineal line .
- A smooth posterior *pelvic surface*.
- An inferior *obturator surface* which shows a groove for the passage of the obturator nerve and vessels.

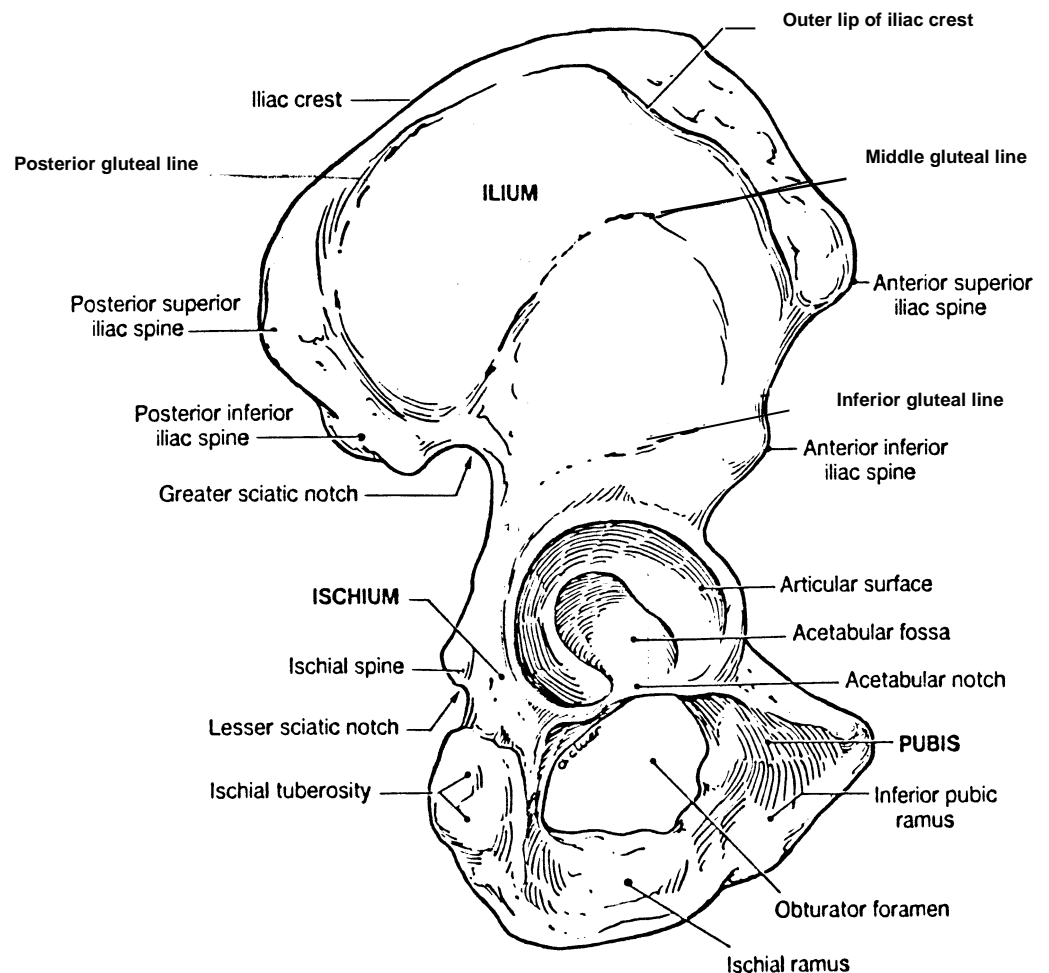
c. Inferior pubic ramus :

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- Joins the ischial ramus .
- It has 2 surfaces : (outer and inner pelvic surface)
- It has 2 borders : Upper border form part of obturator foramen and lower border form the pubic arch .

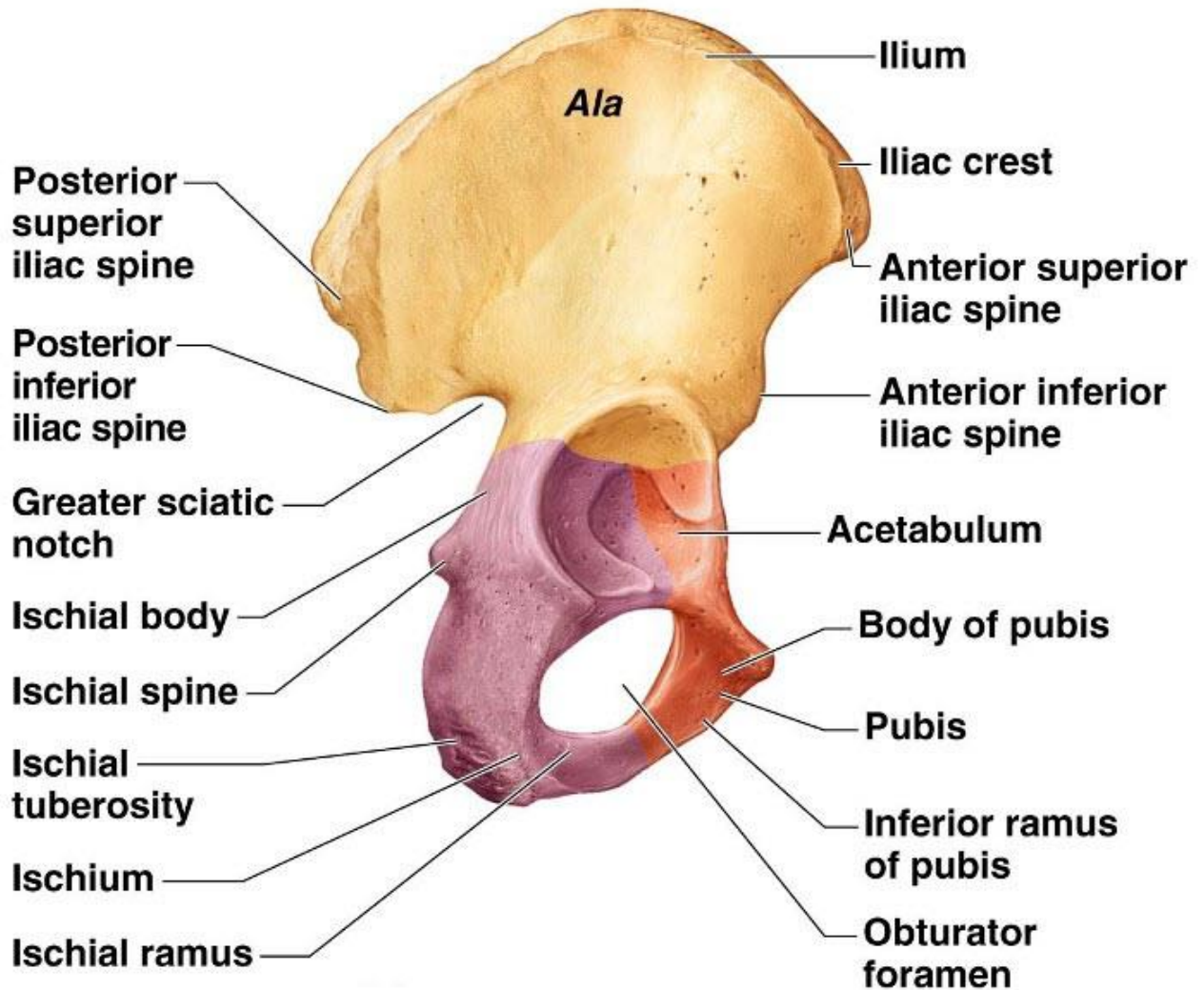
★ Articulation of hip bone :

- 1- Anterior with other hip bone forming *symphysis pubis* .
- 2- Posterior with sacrum forming *sacroiliac joint* .
- 3- Lateral with femur forming *hip joints* .



**Outer (gluteal)
surface of right hip bone.**

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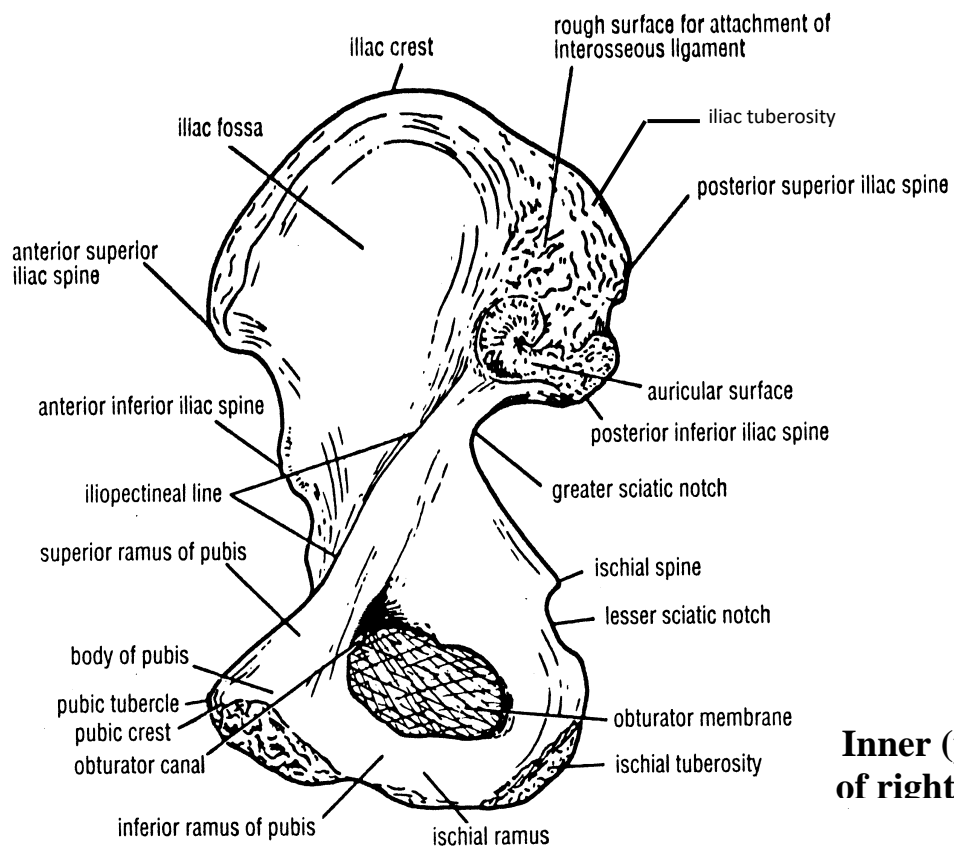
The acetabulum

- It is a hollow depression on the lateral surface of the hip bone .
- Its floor shows:
 - ⇒ Central rough non-articular called *acetabular fossa* .
 - ⇒ Horse-shoe smooth articular area called *lunate surface* (articulates with the head of femur forming the hip joint).
- Its margin is deficient inferiorly to form the *acetabular notch* which is completed by the *transverse acetabular ligament* to form an *acetabular foramen*.
- A fibrocartilaginous lip called *labrum acetabulare* is attached to the margin of the acetabulum to increase its depth.

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The obturator foramen

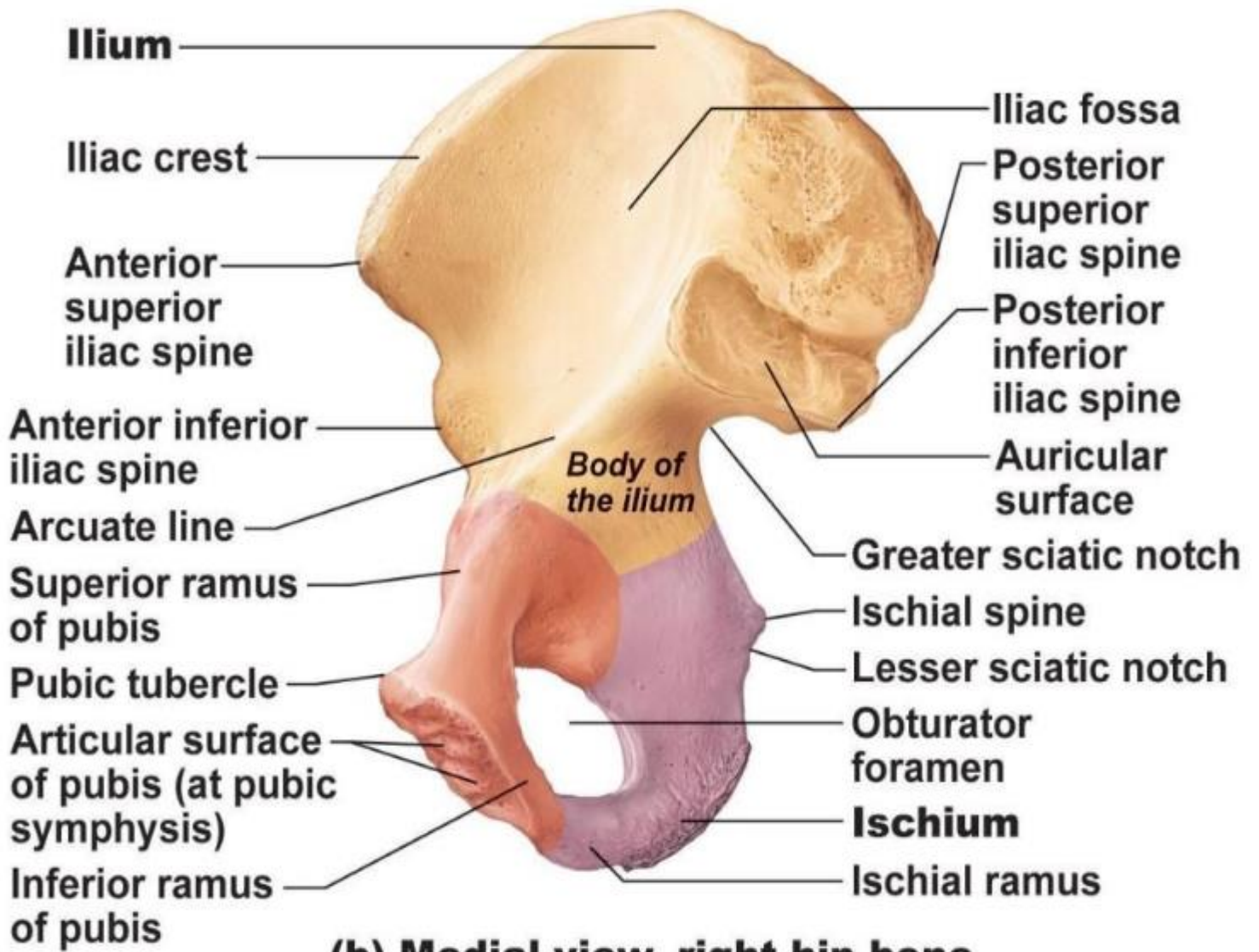
- A large opening found below and in front of the acetabulum. It is filled with *obturator membrane* except superiorly .
- An *obturator groove* forms with the superior border of this membrane an *obturator canal* for the passage of obturator vessels and nerve.



**Inner (pelvic) surface
of right hip bone.**

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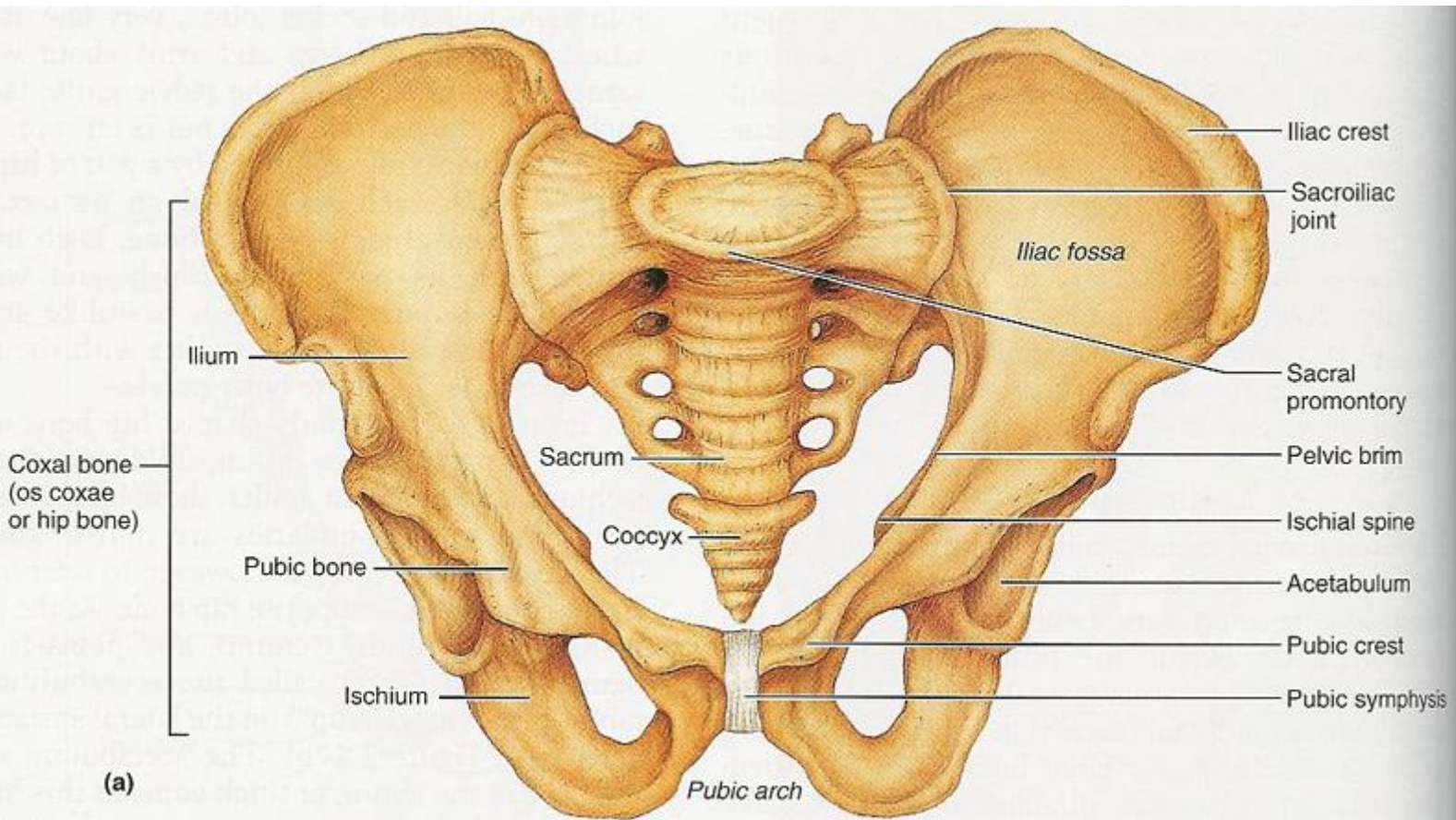
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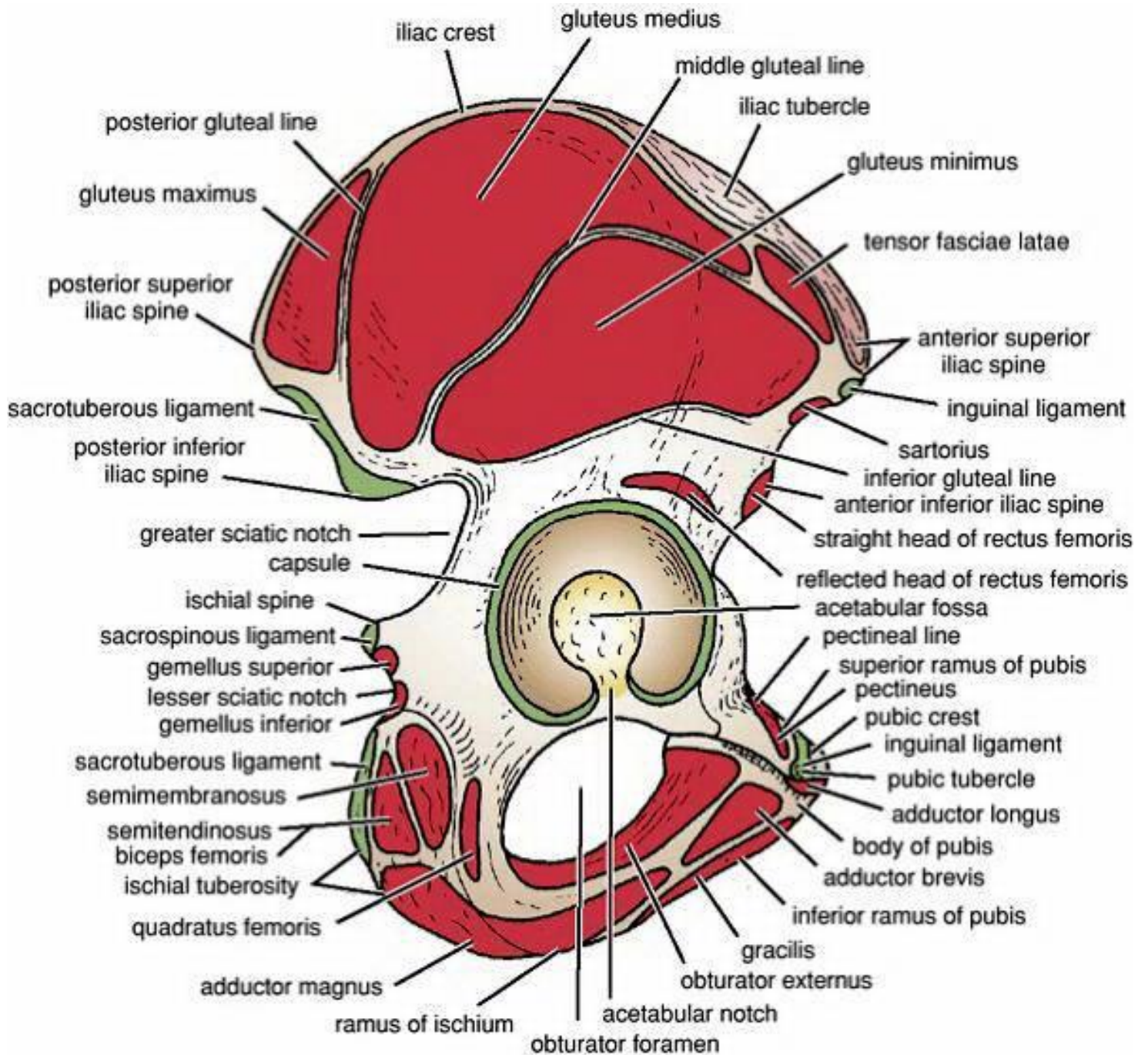
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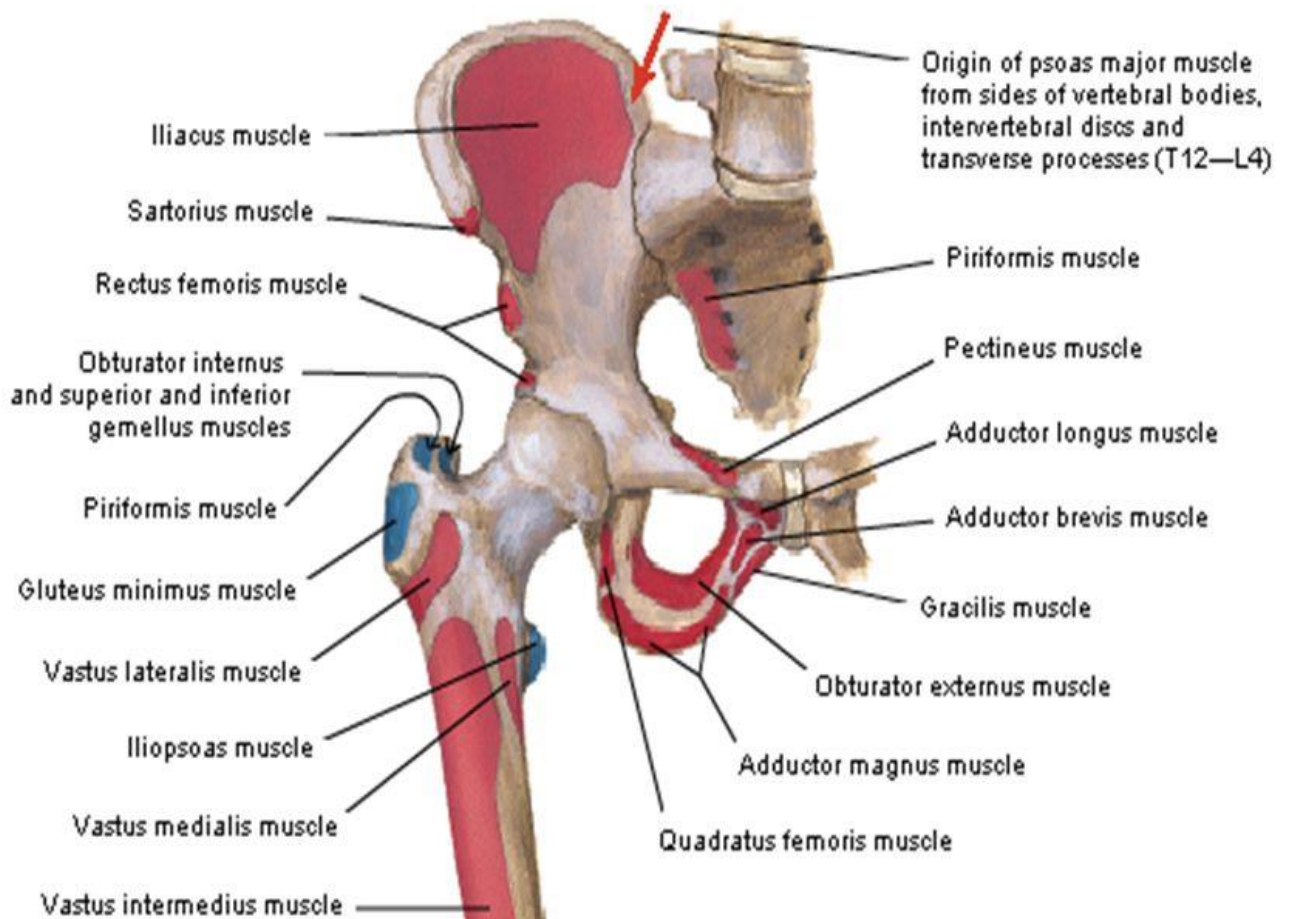
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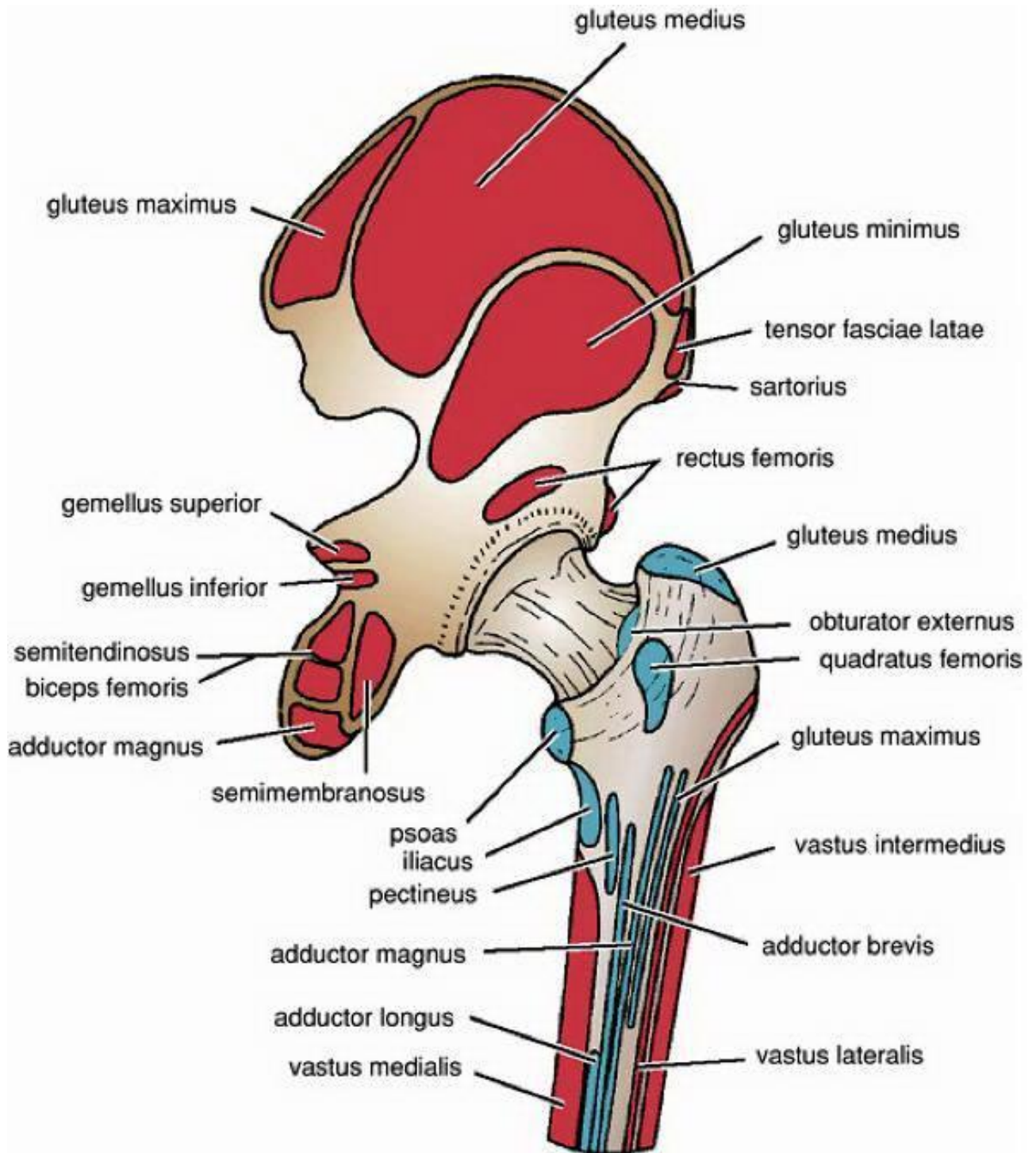
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HIP & THIGH MUSCLES ATTACHMENT (ANTERIOR VIEW)



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II.Femur: It is the longest & strongest bone in the body. It has :

1. **Upper end:** consists of

- **Head** (show fovea) & **neck** .
- **Greater trochanter** (Its medial surface shows **trochanteric fossa**) & **lesser trochanter** with the **intertrochanteric line** (anterior) & **intertrochanteric crest** (posterior) in between.
- **Intertrochanteric line** makes a spiral turn medially, to form the **spiral line**
- The neck shaft angle is 125 degree .

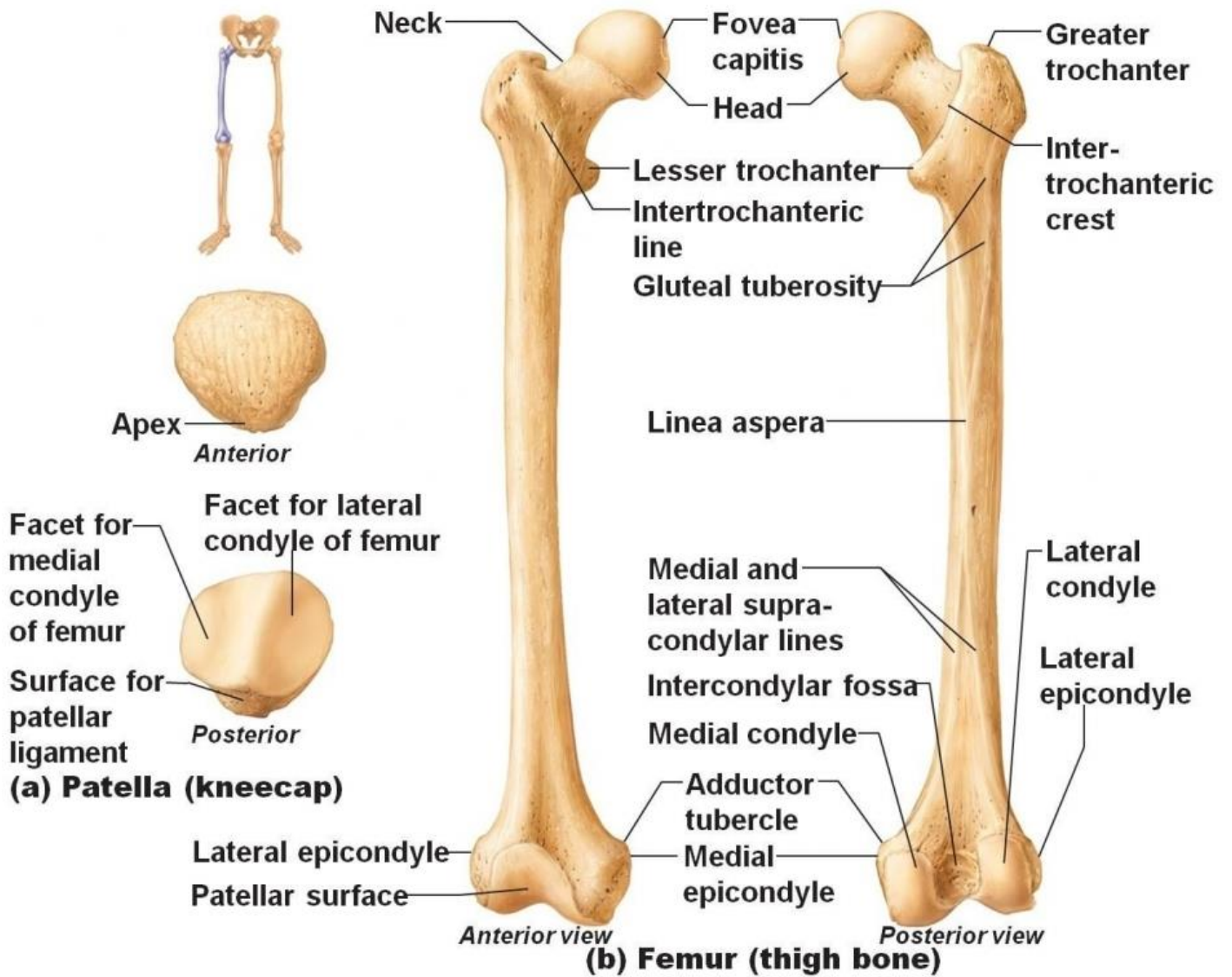
2. **Shaft:** It presents

- * **Anterior surface** convex smooth anteriorly .
- * **Posterior surface** show **gluteal tuberosity** (lateral) , **pectineal line** , **spiral line** (medial) , **linea aspera** (has a medial & lateral lips) , medial & lateral **supracondylar ridges** & **popliteal surface** of femur.

3. **Lower end:** It has

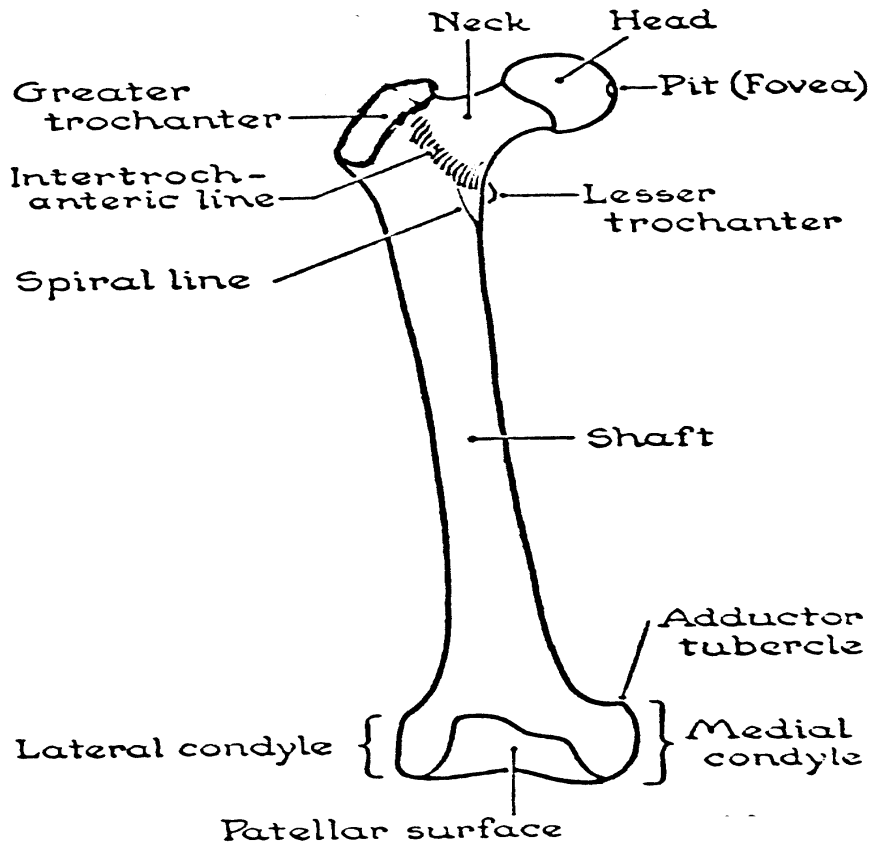
- * **2 condyles** : medial & lateral (more prominent , more on line with the shaft & show popliteal groove) which are fused anteriorly to form a **patellar surface** and separated posteriorly to form an **intercondylar fossa**.
- * **2 epicondyles** (lateral & medial) which are the most prominent part on the lateral & medial aspects of the 2 condyles .
- * **Adductor tubercle** is prominence present at the lower end of the medial supracondylar line.

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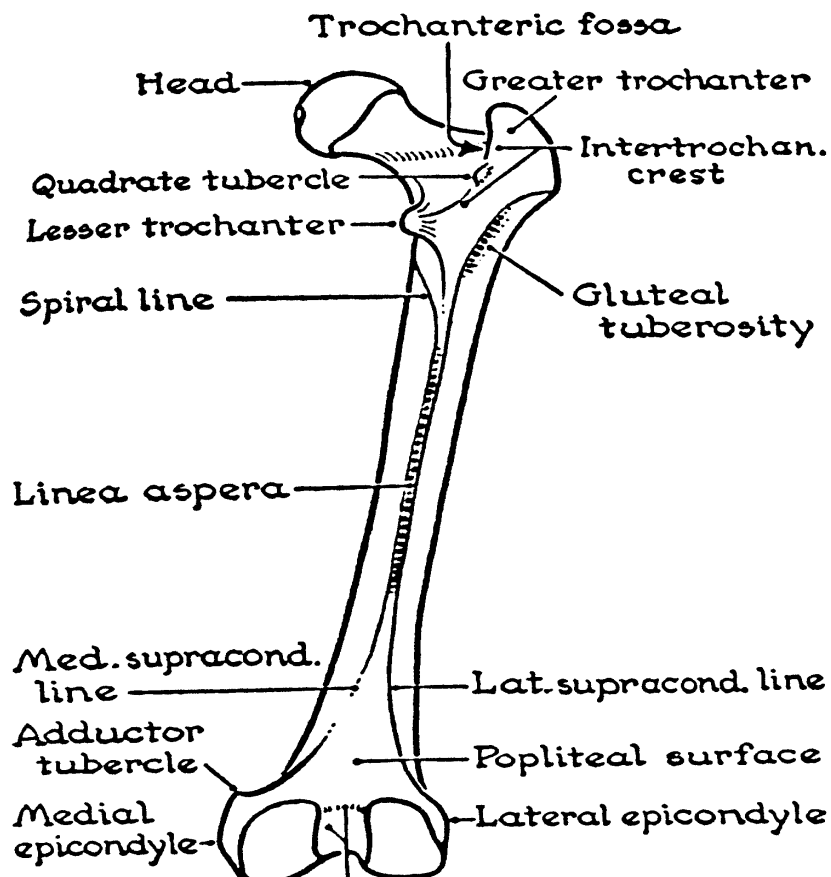


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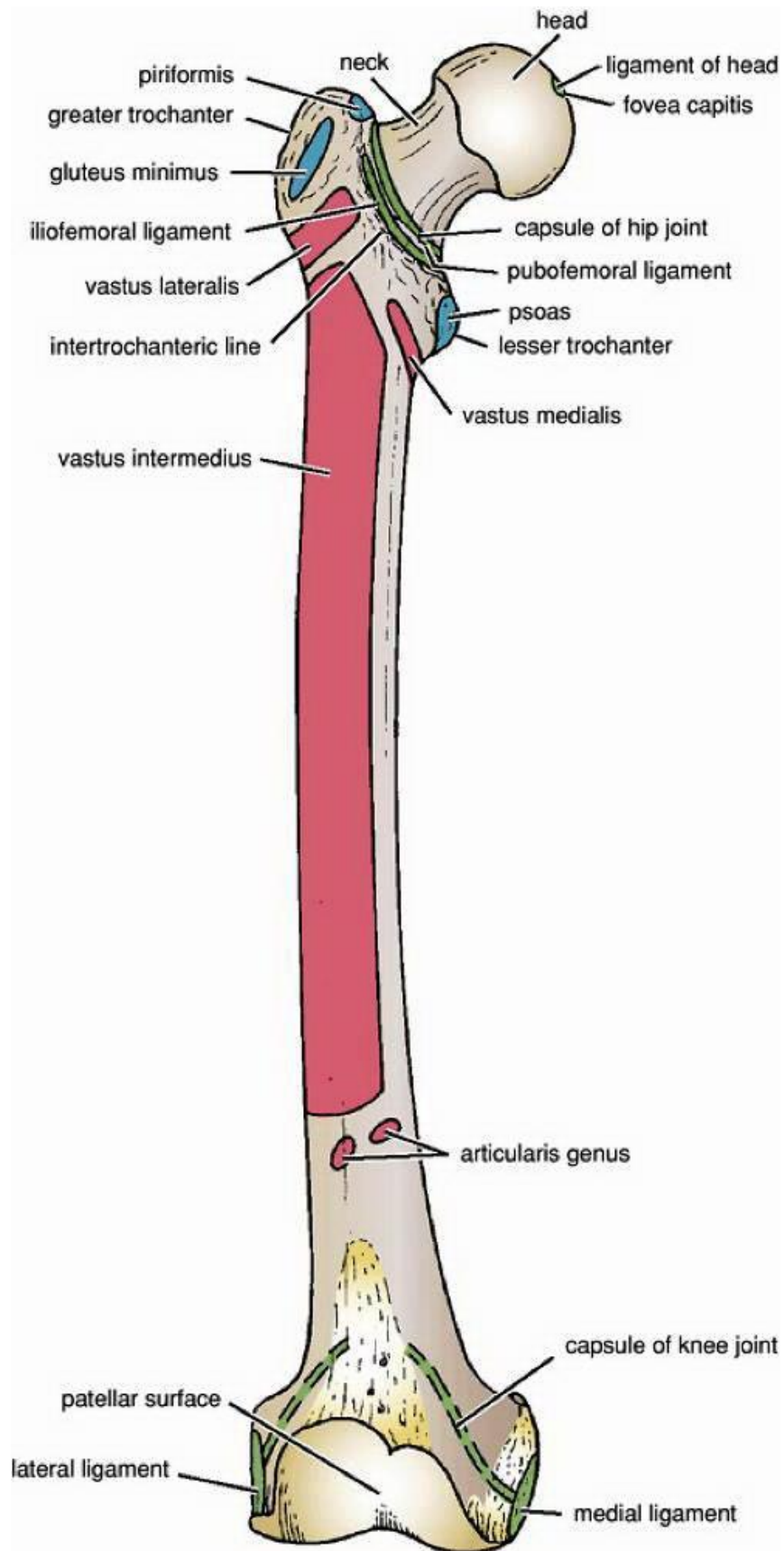
The femur (anterior view)



The femur (posterior view).

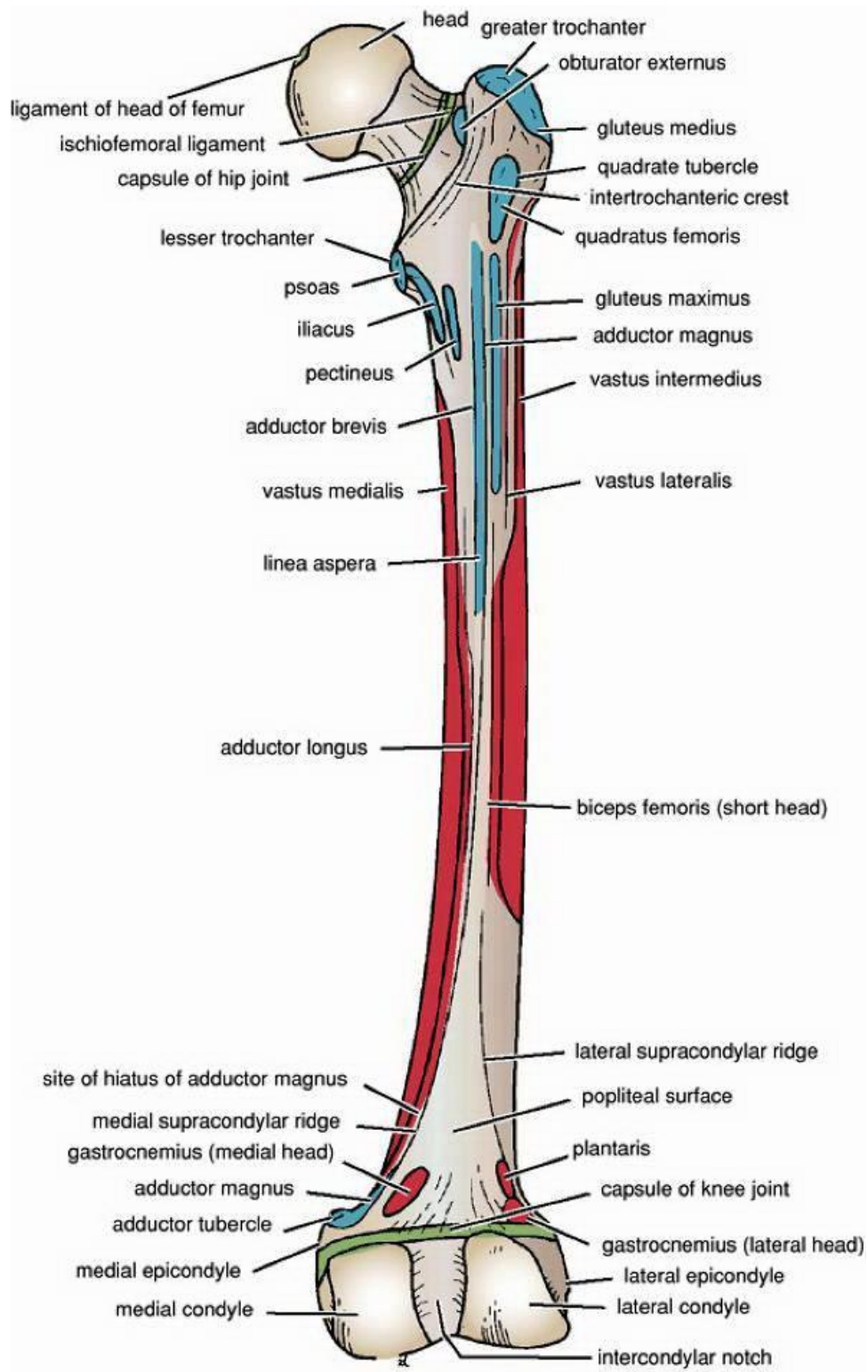
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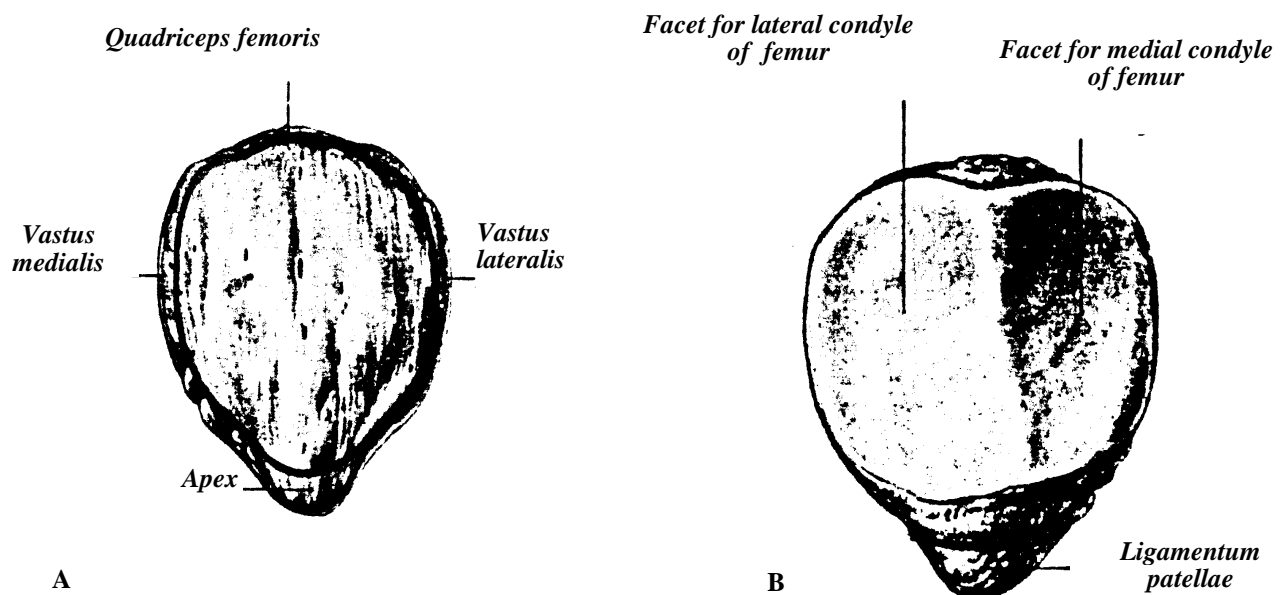
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Patella

- * The **largest sesamoid** bone in the body. (sesamoid bone is a bone that develops inside a tendon of a muscle to protect it from friction).
- * The patella develops **inside the tendon of quadriceps** femoris muscle, **in front of lower end of femur**.
- * The patella is triangular in shape and has : 3 borders and 2 surfaces:
 - **3 borders** : A base (or upper border), a medial and a lateral border. They give **attachment to** the **3** vasti and the rectus femoris muscles.
 - **An apex** : gives attachment to the patellar ligament.
 - **An anterior surface** : rough and subcutaneous.
 - **A posterior surface**: its upper part is smooth and articular divided by a **vertical ridge** into a **large lateral facet** (articulates with the lateral femoral condyle) and a **smaller medial** one (articulates with the medial femoral condyle).

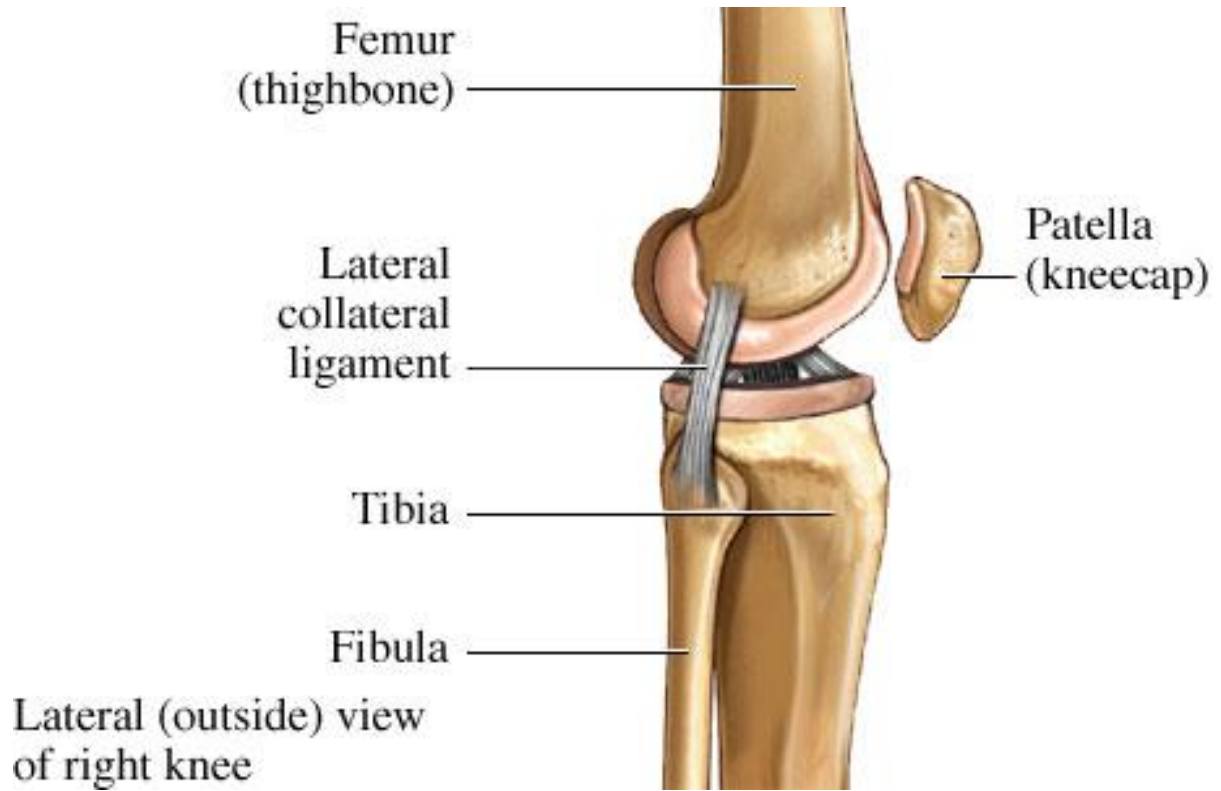
N.B.: *The patella has no particular function as the knee joint returns completely normal after surgical removal of a broken patella.*



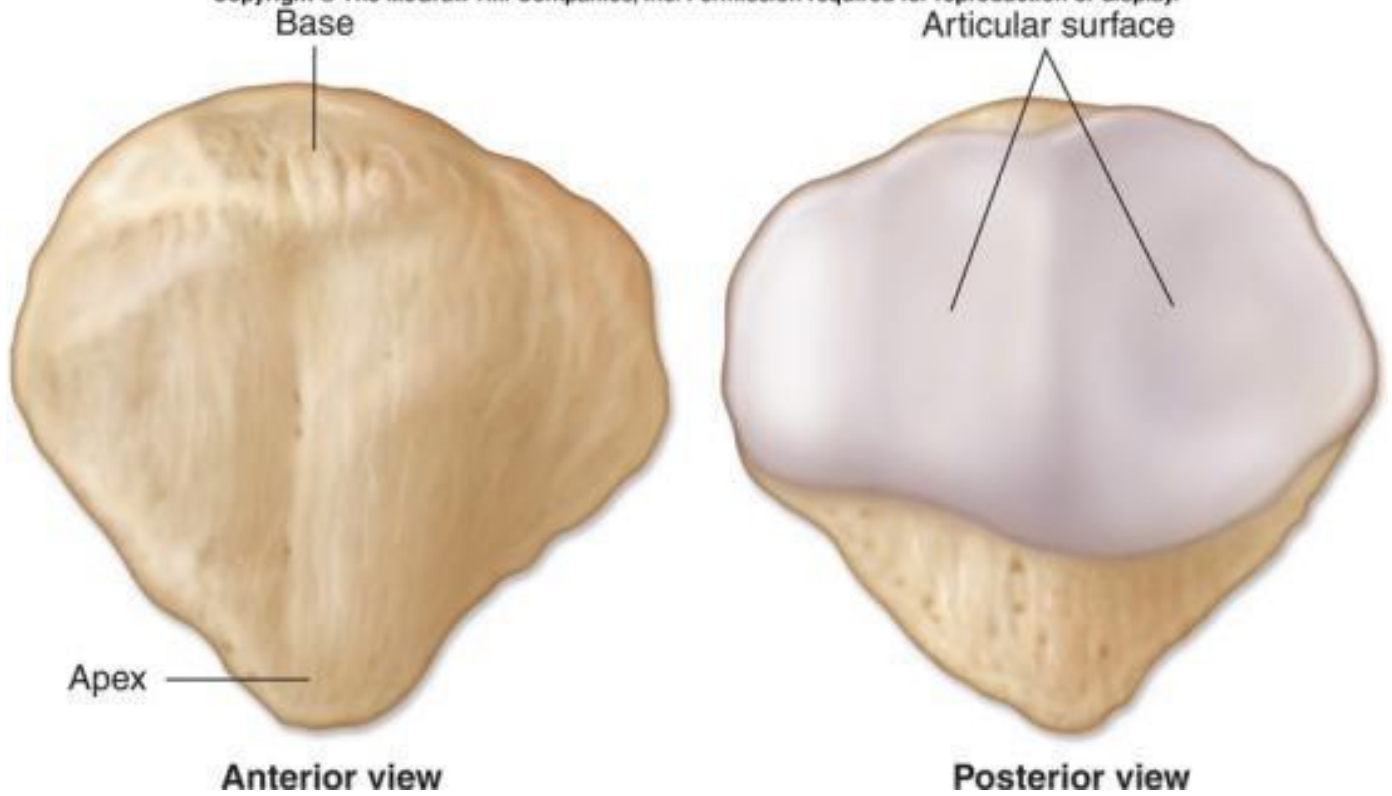
Left patella (A) anterior aspect (B) posterior aspect

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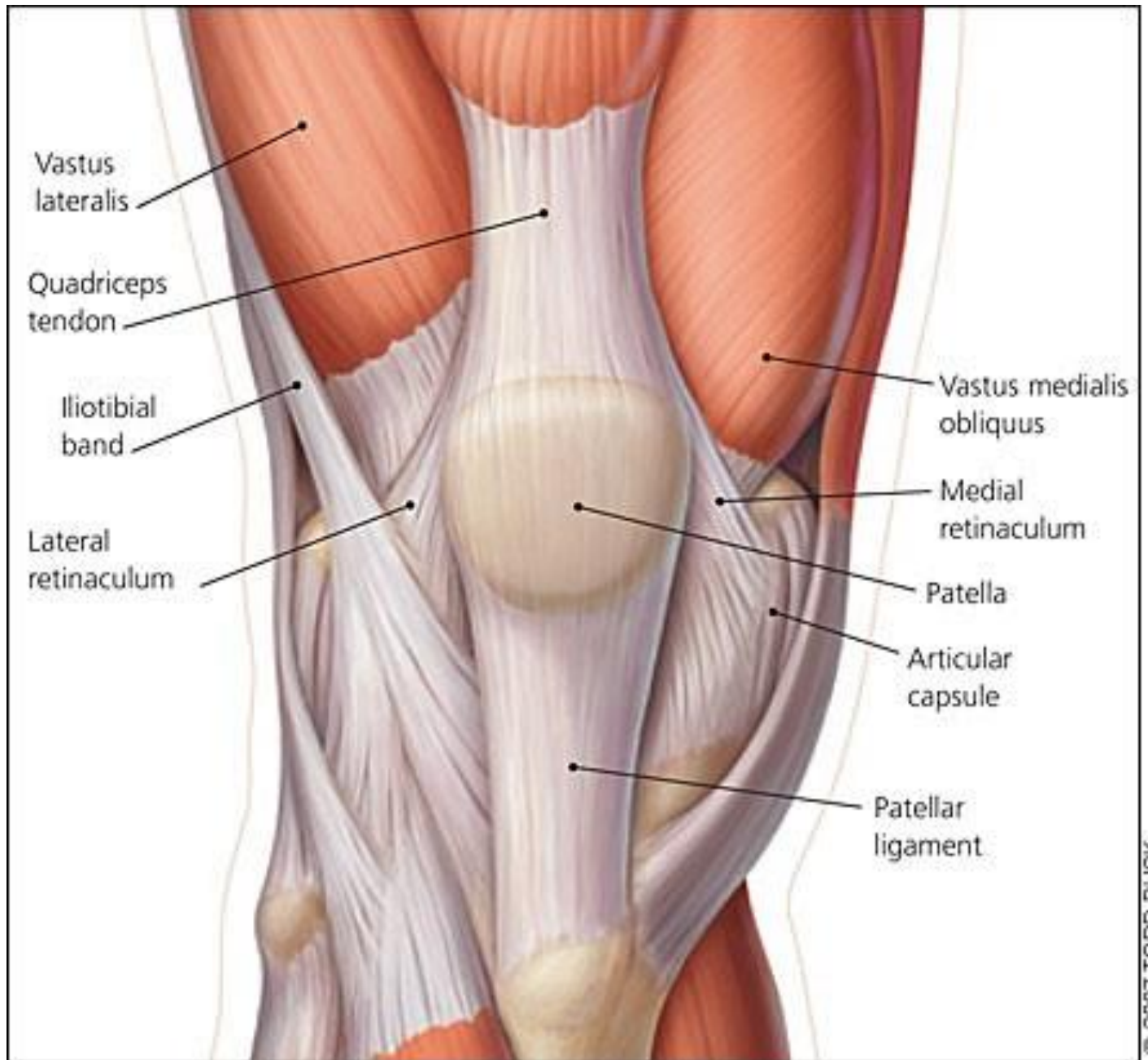


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III. Tibia: It is the *medial* of the 2 bones of the leg and the only one concerned with *body weight transmission* (from femur to foot). It has:

1. Upper end: consists of 2 condyles & tuberosity .

***2 condyles :**

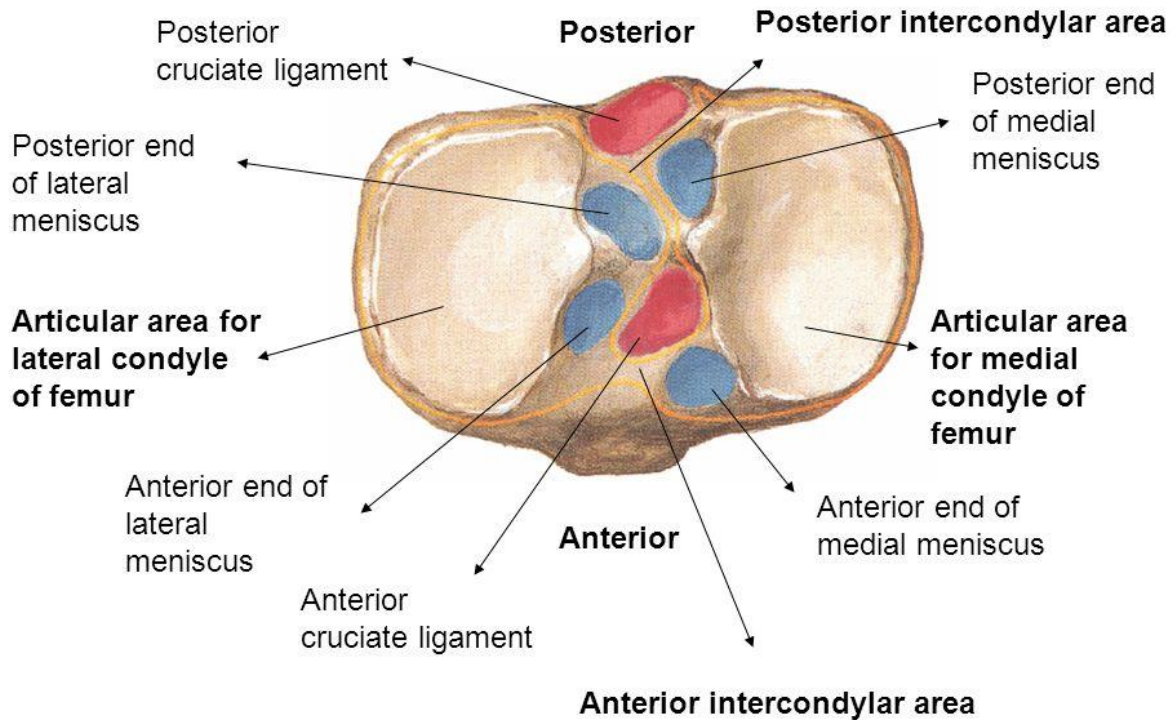
- **Medial** : **larger** than the lateral one and its upper articular surface is **oval** .
- **Lateral** : has upper articular surface is **circular**. Its **postero-lateral** aspect has an articular facet to articulate with the **head of the fibula** forming the **superior tibiofibular** joint.
- **The intercondylar area:**
 - A **rough non-articular** area present **between** the **2** articular surfaces of the **2** condyles.
 - It is **divided** into anterior and posterior areas by the **intercondylar eminence** [has **medial and lateral tubercles**].
- * **Tibial tuberosity** : lies anteriorly.

2. Shaft :It Presents

- * **3 surfaces** : medial , lateral & posterior (which has a soleal line)
- * **3 borders** :anterior (shin of tibia) , medial & lateral (interosseous border) .
- * The anterior border & medial surface are S.C. → Compound fracture is common.

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Tibia upper end – superior surface



3. Lower end: It has

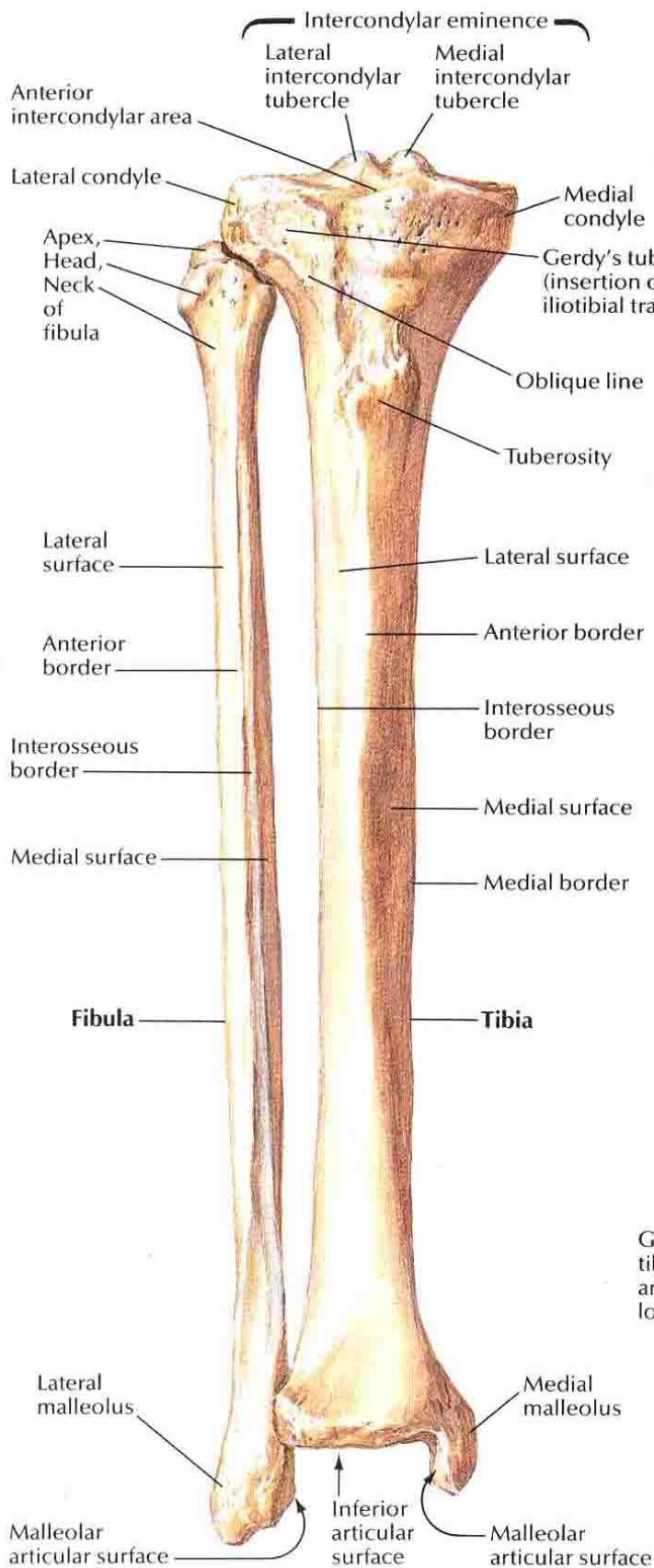
- * **5 surfaces** : **anterior** , **posterior** , **lateral** (has a *fibular notch* to articulate with the lower end of fibula to form the inferior tibiofibular joint) , **medial** (which projects downwards as the medial malleolus) & **inferior** articular surface (its posterior border projecting & called 3rd or posterior malleolus).

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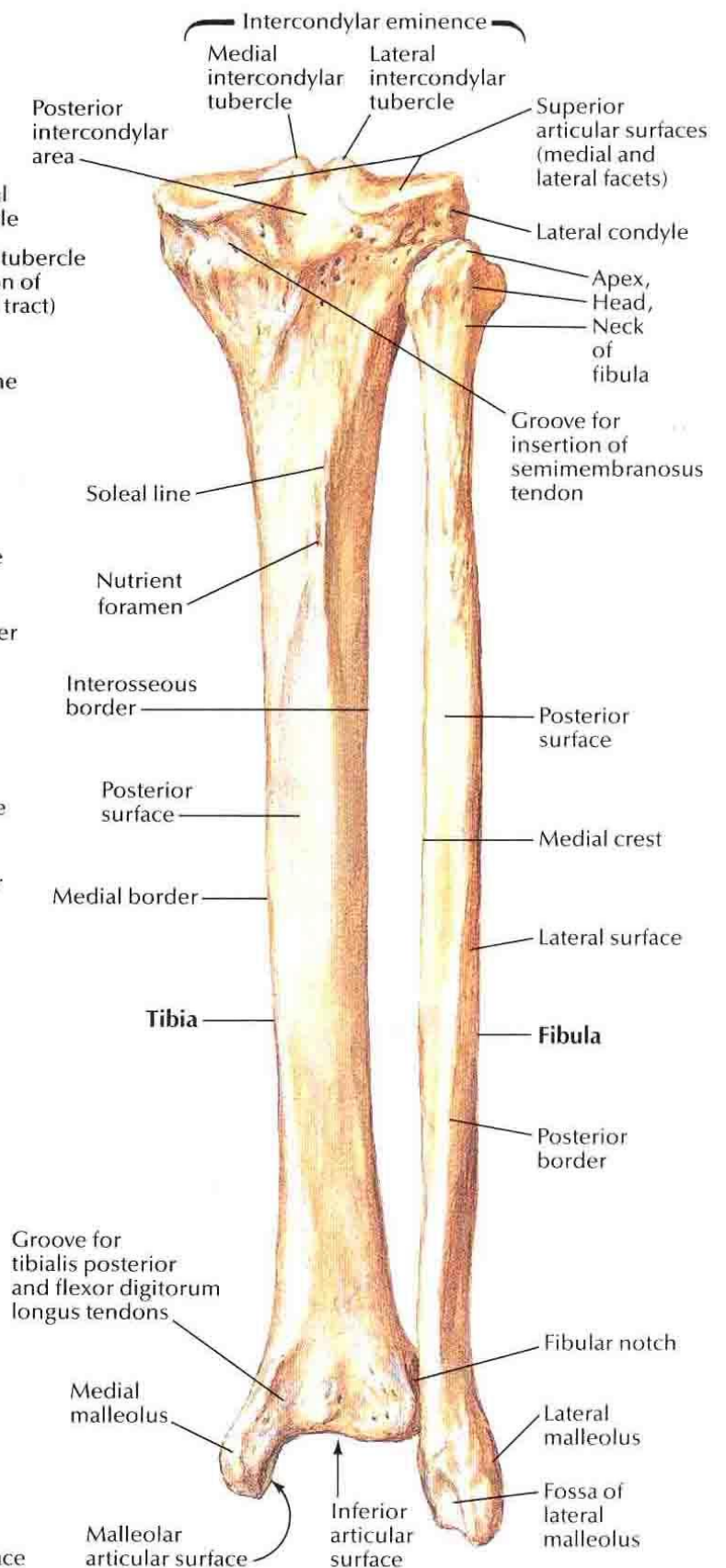
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Bones of right leg

Anterior view

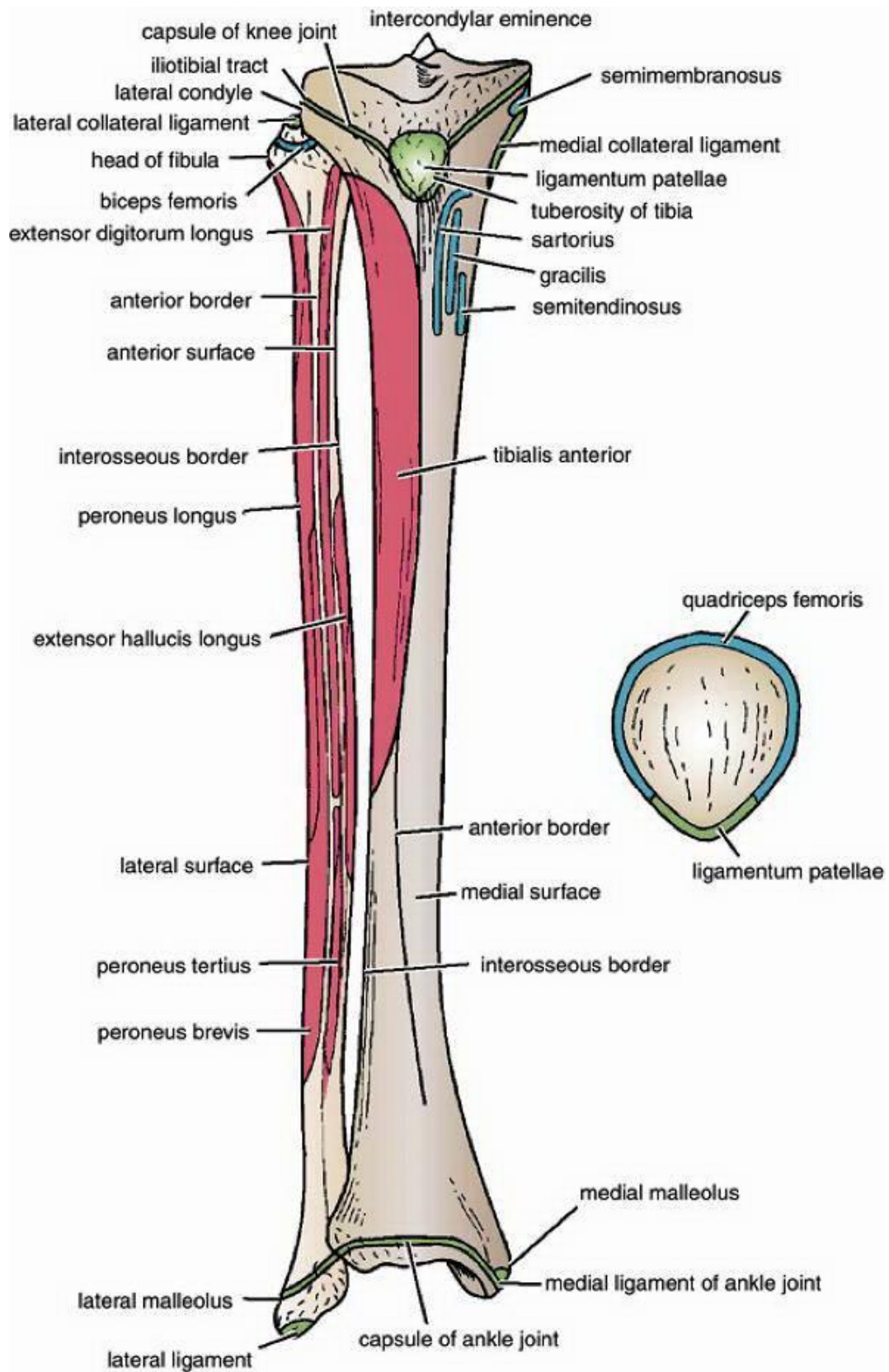


Posterior view



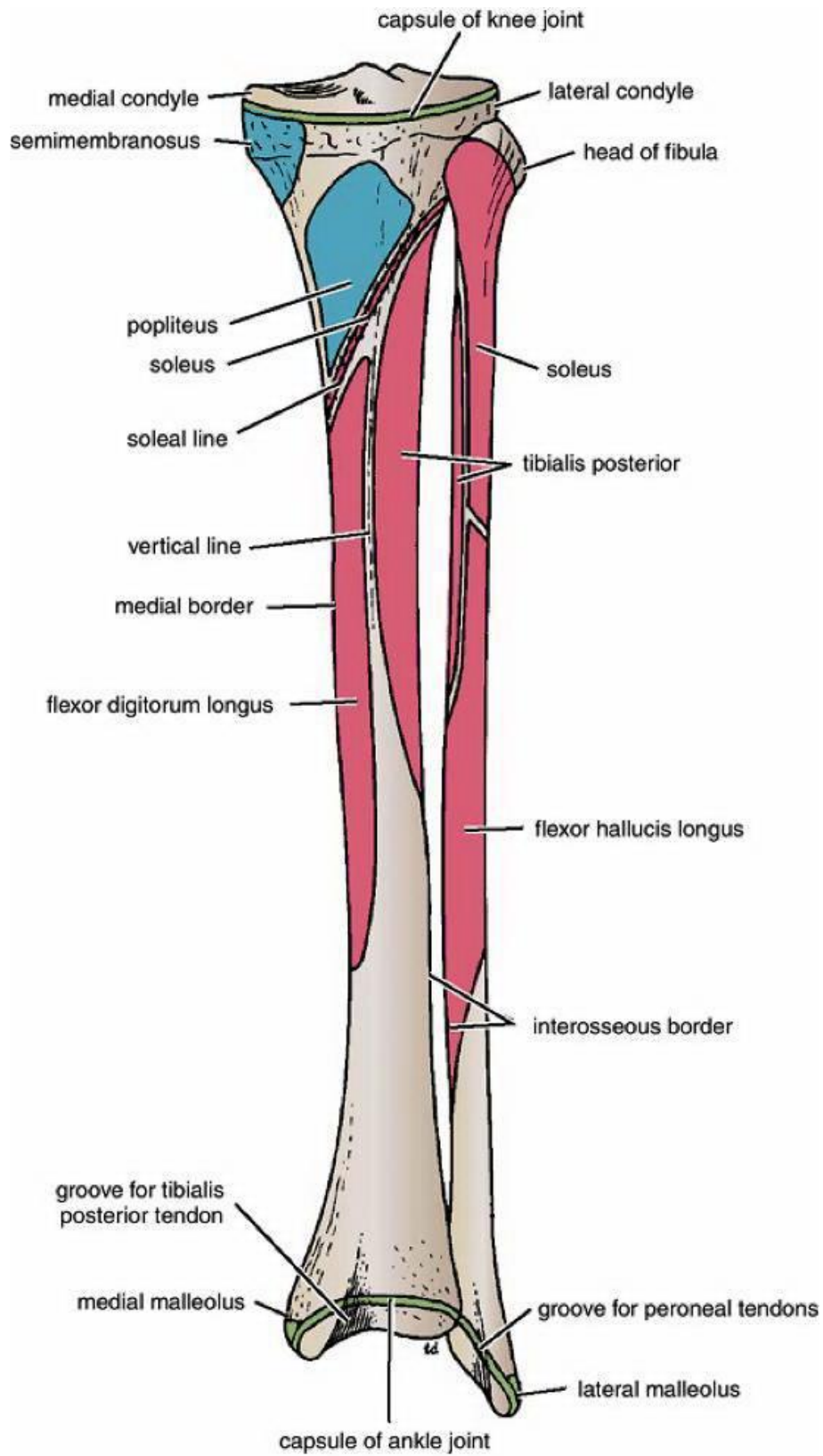
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IV-Fibula:

* The *lateral* of the two bones of the leg which does *not share* in body weight transmission . It has :

* **Upper end** : It presents a

1-Head : It has

-A *circular facet* on its medial surface (articulate with the lateral condyle of tibia to form the *superior tibiofibular* joint.

- A *styloid process* projecting upwards .

2- Neck : *related* to common fibular nerve and it is the *commonest* site of *fracture* fibula .

* **Shaft**: It has 3 borders (anterior , posterior , medial or interosseous border) & 3 surfaces (anterior , posterior & lateral)

***Lower end** :

- It is called the *lateral malleolus* .

- It has **2 surfaces** , a *lateral* subcutaneous surface and a *medial* surface showing smooth area for articulation with talus and *malleolar fossa* on the posterior part of its medial surface .

★ **Functions of Fibula** :

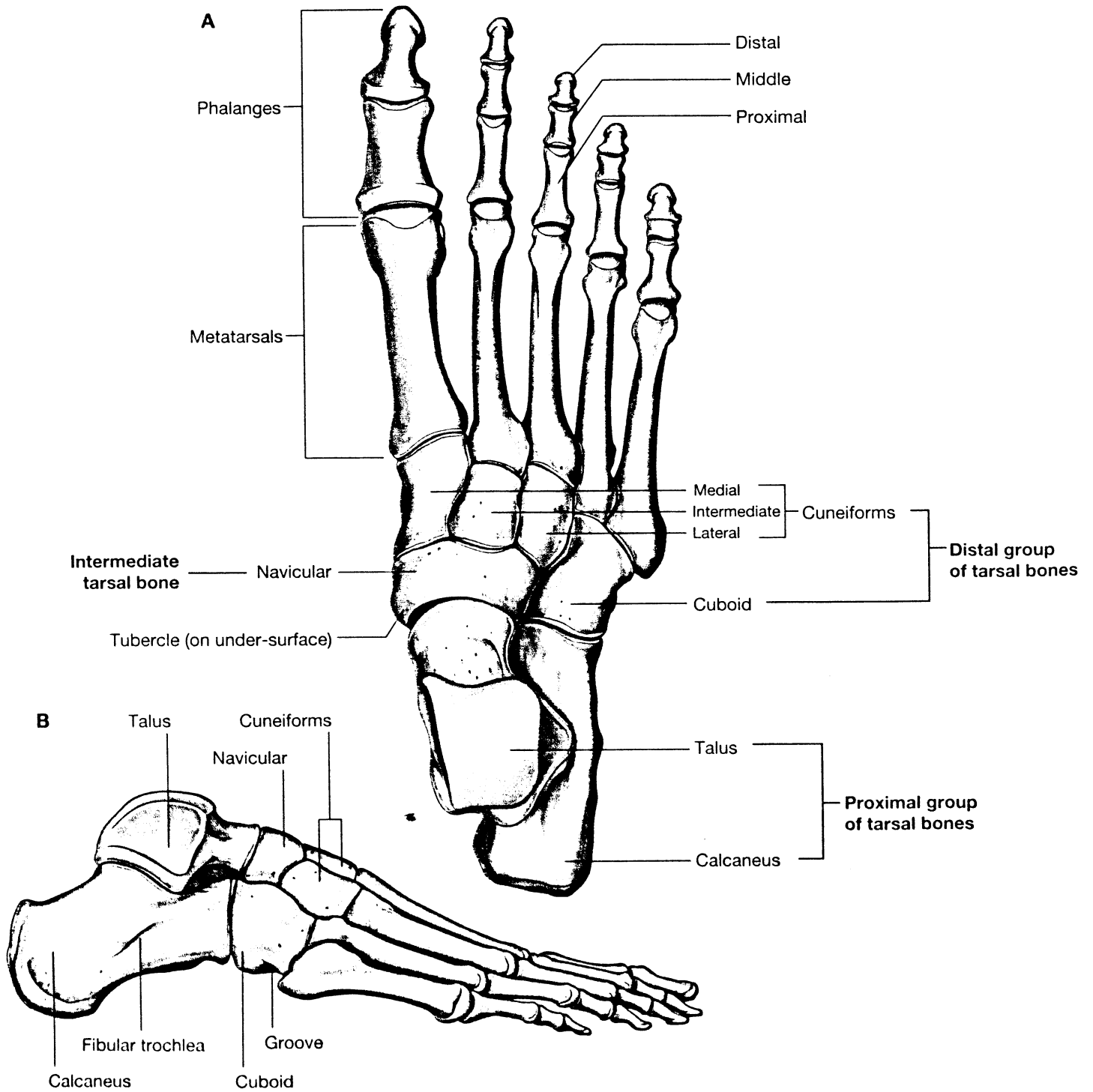
1-Gives *muscular attachments*.

2-Enters in the *formation of 3 joints*: ankle, STF and ITF. It does not share in the formation of the knee joint.

3-Used commonly as a *bone graft* in plastic bone surgery.

4-It *does not transmit body weight* because it does not articulate with the femur in the knee joint.

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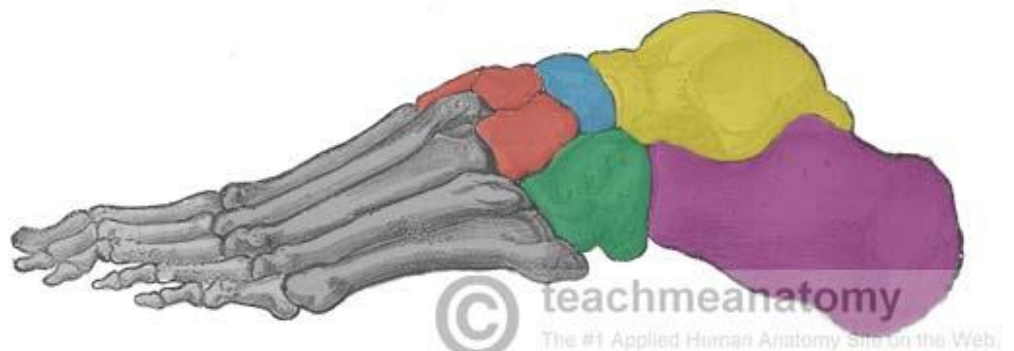
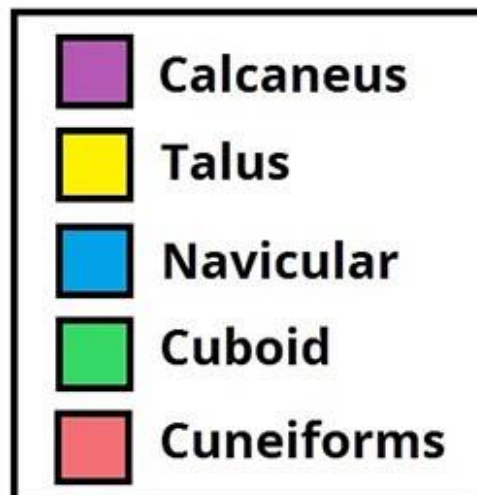
Bones of the right foot.
(A) Dorsal view (B) Lateral view

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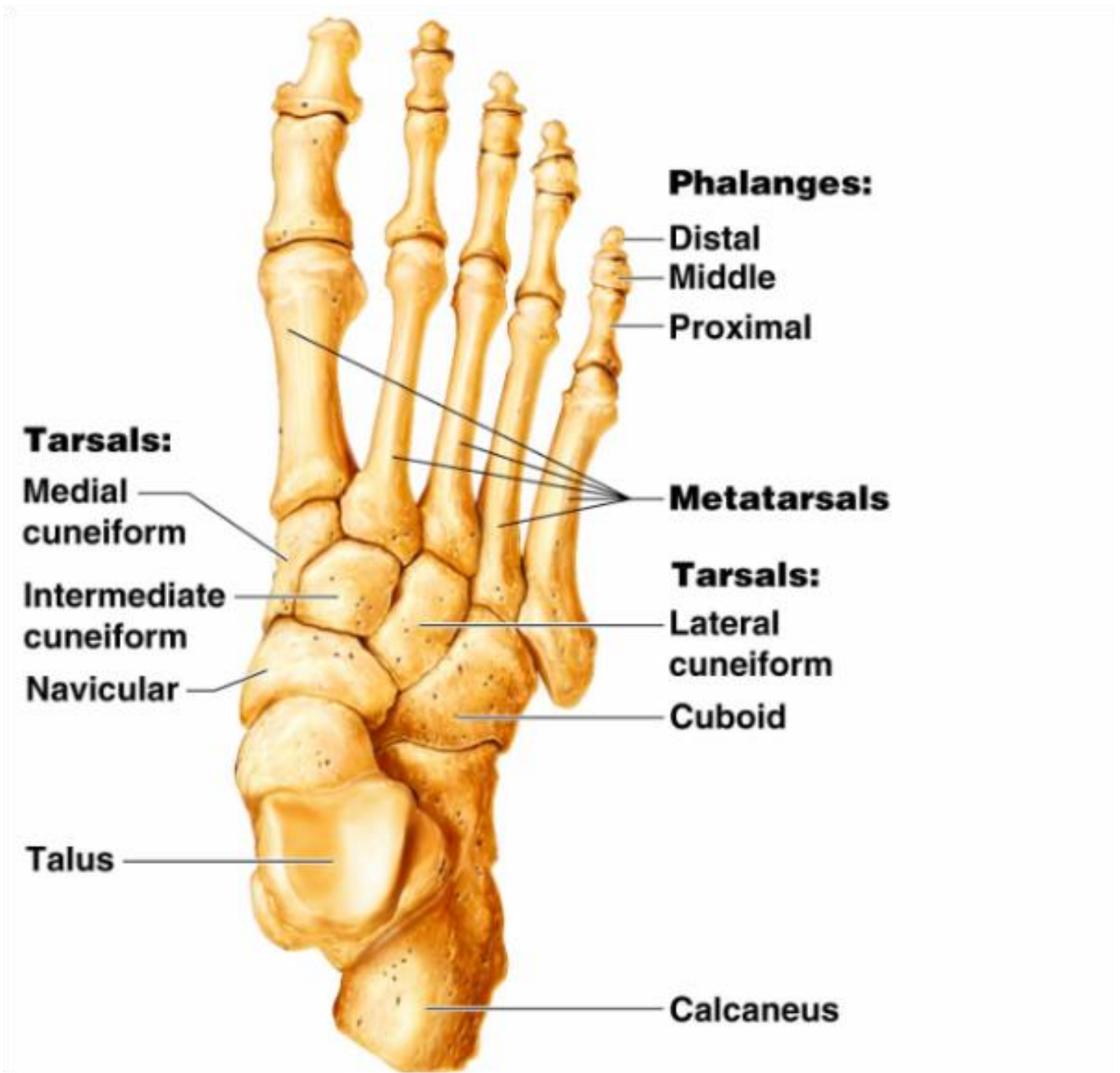
V- **Bones of foot:** Include:

1. **Tarsal bones** : Calcaneous, talus , navicular, cuboid & 3 cuneiform bones.
2. **5 Metatarsal bones:** The 5th metatarsal bone has a tuberosity.
3. **Phalanges:** Each toe has 3 phalanges except big one (has 2 phalanges).



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