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# The Skeletal System 2: The Appendicular Skeleton

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# Skeleton of the Lower Limb

- Skeleton of the Lower Limb
- Two separate regions
- 1. A single *pelvic girdle* (2 bones)
- 2. The *free part* (30 bones)

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# Pelvic (Hip) Girdle

- Each coxal (hip) bone consists of three bones that fuse together: ilium, pubis, and ischium
- The two coxal bones are joined anteriorly by the pubic symphysis (fibrocartilage)
- Joined posteriorly by the sacrum forming the sacroiliac joints (Fig 8.9)

# Bony Pelvis Figure 8.9

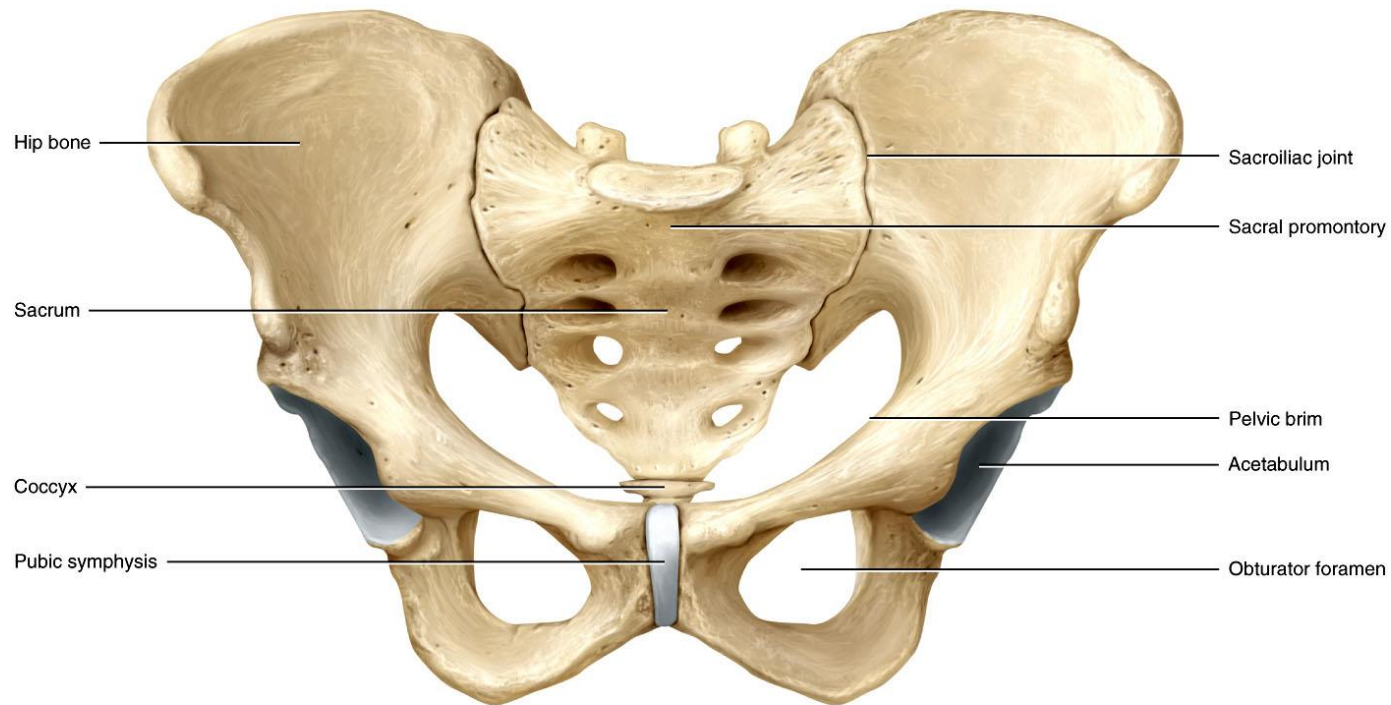
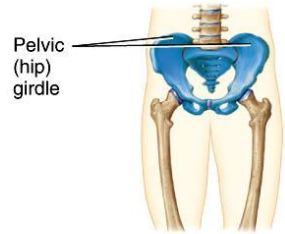


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# The Ilium

- Largest of the three hip bones
- Ilium is the superior part of the hip bone
- Consists of a superior *ala* and inferior *body* which forms the acetabulum (the socket for the head of the femur)
- Superior border - iliac crest
- *Hip pointer* - occurs at anterior superior iliac spine
- Greater sciatic notch - allows passage of sciatic nerve

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# Ischium and Pubis

- Ischium - inferior and posterior part of the hip bone
- Most prominent feature is the ischial tuberosity, it is the part that meets the chair when you are sitting
- Pubis - inferior and anterior part of the hip bone
- Superior and inferior rami and body

# Right Hip Bone Figure 8.10

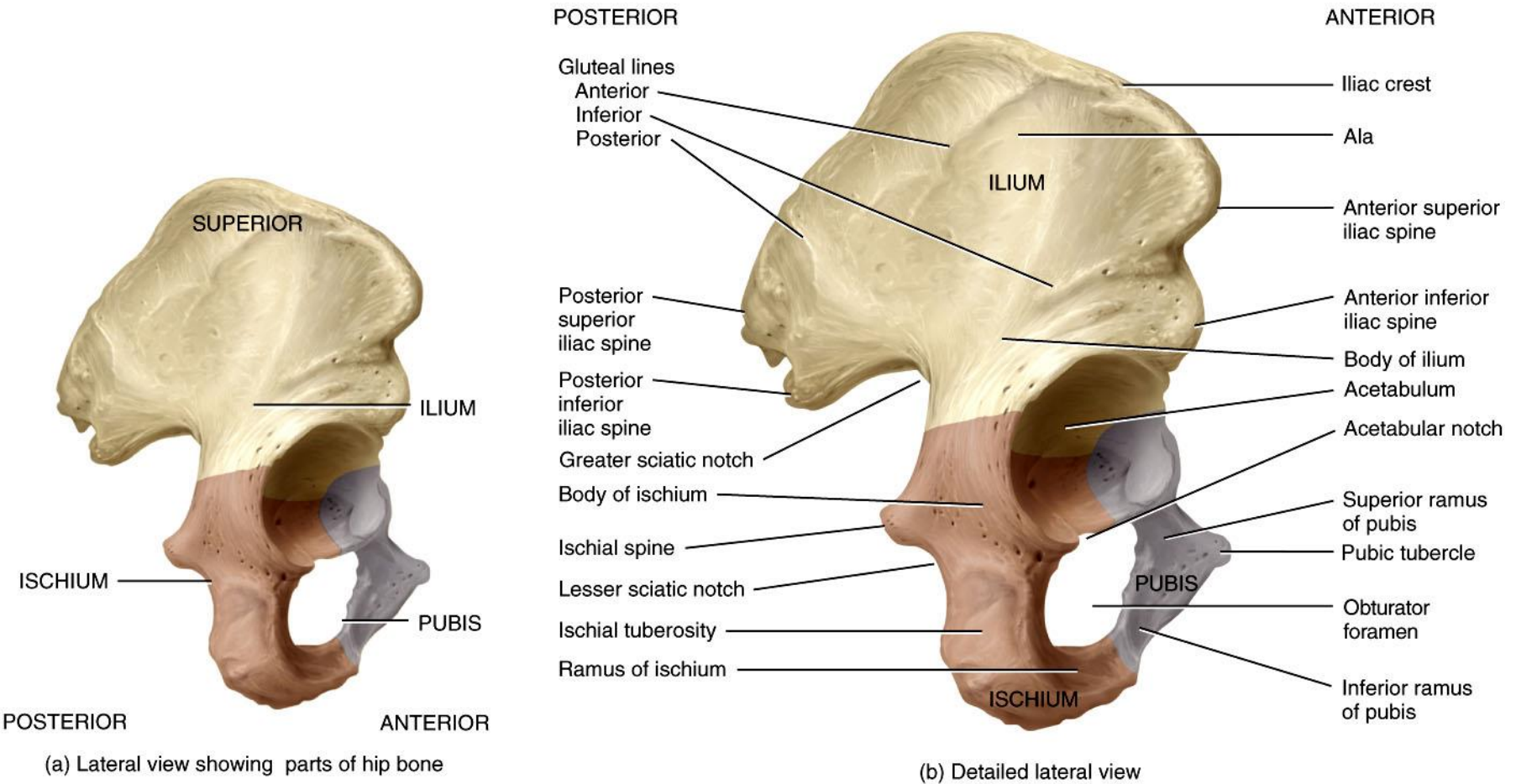


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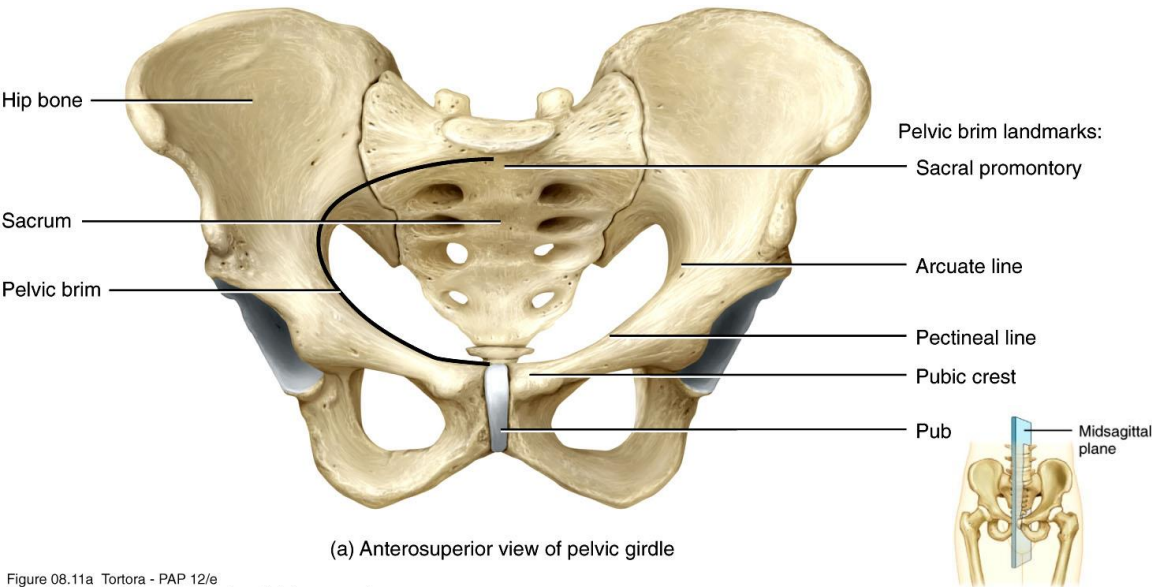
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# False and True Pelves

- **Pelvic brim** - a line from the sacral promontory to the upper part of the pubic symphysis
- **False pelvis** - lies above this line (Fig 8.9b)
- Contains no pelvic organs except urinary bladder (when full) and uterus during pregnancy
- **True pelvis** - the bony pelvis inferior to the pelvic brim, has an inlet, an outlet and a cavity
- Pelvic axis - path of baby during birth

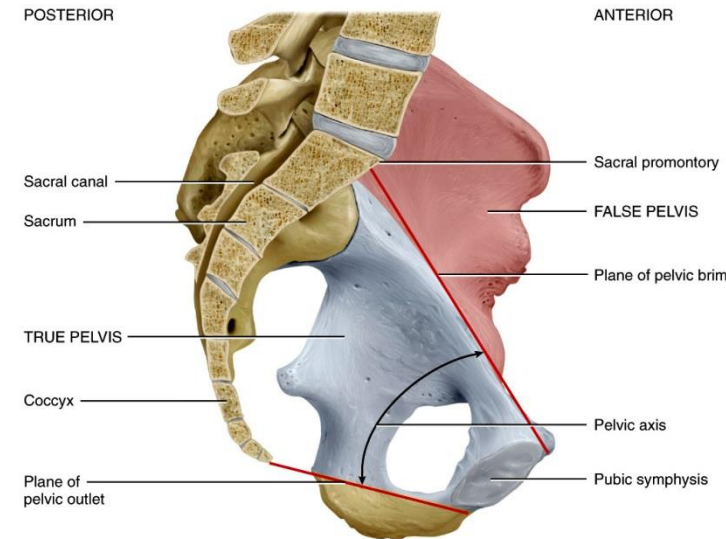


# True and False Pelves Figure 8.11



(a) Anterosuperior view of pelvic girdle

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(b) Midsagittal section indicating locations of true and false pelves

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# Comparing Male and Female Pelves

- Males - bones are larger and heavier
- Pelvic inlet is smaller and heart shaped
- Pubic arch is less than  $90^\circ$
- Female - wider and shallower
- Pubic arch is greater than  $90^\circ$
- More space in the true pelvis (Table 8.1)

# Comparing Male and Female Pelves

## Table 8.1

**TABLE 8.1**

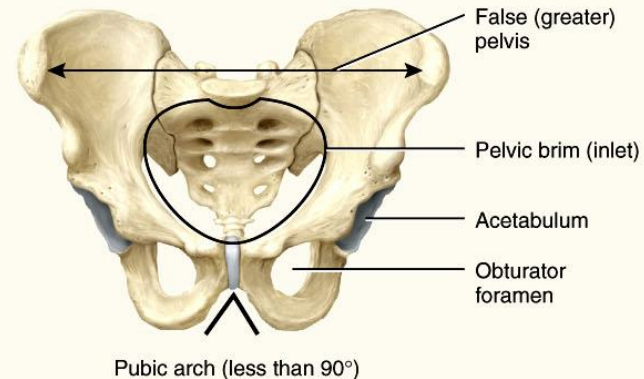
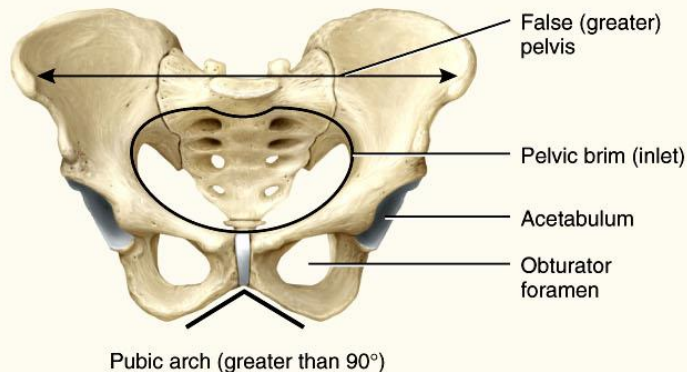
Comparison of Female and Male Pelves

POINT OF COMPARISON	FEMALE	MALE
<b>General structure</b>	Light and thin.	Heavy and thick.
<b>False (greater) pelvis</b>	Shallow.	Deep.
<b>Pelvic brim (inlet)</b>	Larger and more oval.	Smaller and heart-shaped.

**Pubic arch**

Greater than 90° angle.

Less than 90° angle.



Anterior views

TABLE 8.1 CONTINUES

# Comparing Male and Female Pelves

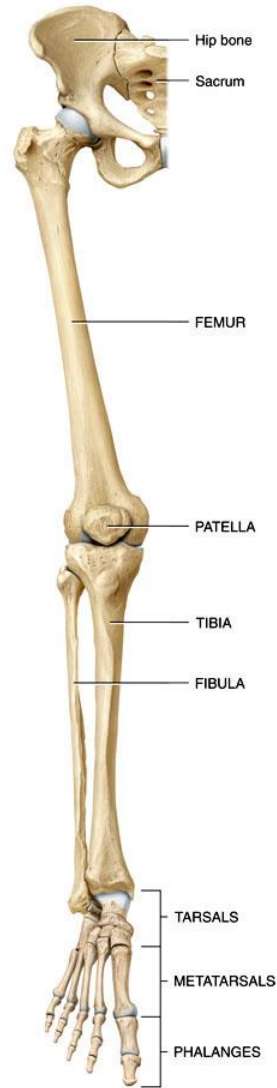
## Table 8.1

TABLE 8.1 CONTINUED

POINT OF COMPARISON	FEMALE	MALE
	<p>Right lateral views</p>	
<b>Pelvic outlet</b>	Wider.	Narrower.
<b>Ischial tuberosity</b>	Shorter, farther apart, and more medially projecting.	Longer, closer together, and more laterally projecting.
	<p>Inferior views</p>	

# Right Lower Limb

## Figure 8.12



Anterior view of lower limb

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# Skeleton of the Thigh - Femur and Patella

- Femur - longest, heaviest, and strongest bone in the body
- Proximally, the head articulates with the acetabulum of the hip bone forming the hip (coxal) joint
- Neck - distal to head, common site of fracture
- Distally, the medial and lateral condyles articulate with the condyles of the tibia forming the knee joint
- Also articulates with patella

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# Femur

- Greater and lesser trochanters are projections where large muscles attach
- Gluteal tuberosity and linea aspera - attachment sites for the large hip muscles
- Intercondylar fossa - depression between the condyles
- Medial and lateral epicondyles - muscle site attachments for the knee muscles

# Right Femur Figure 8.13

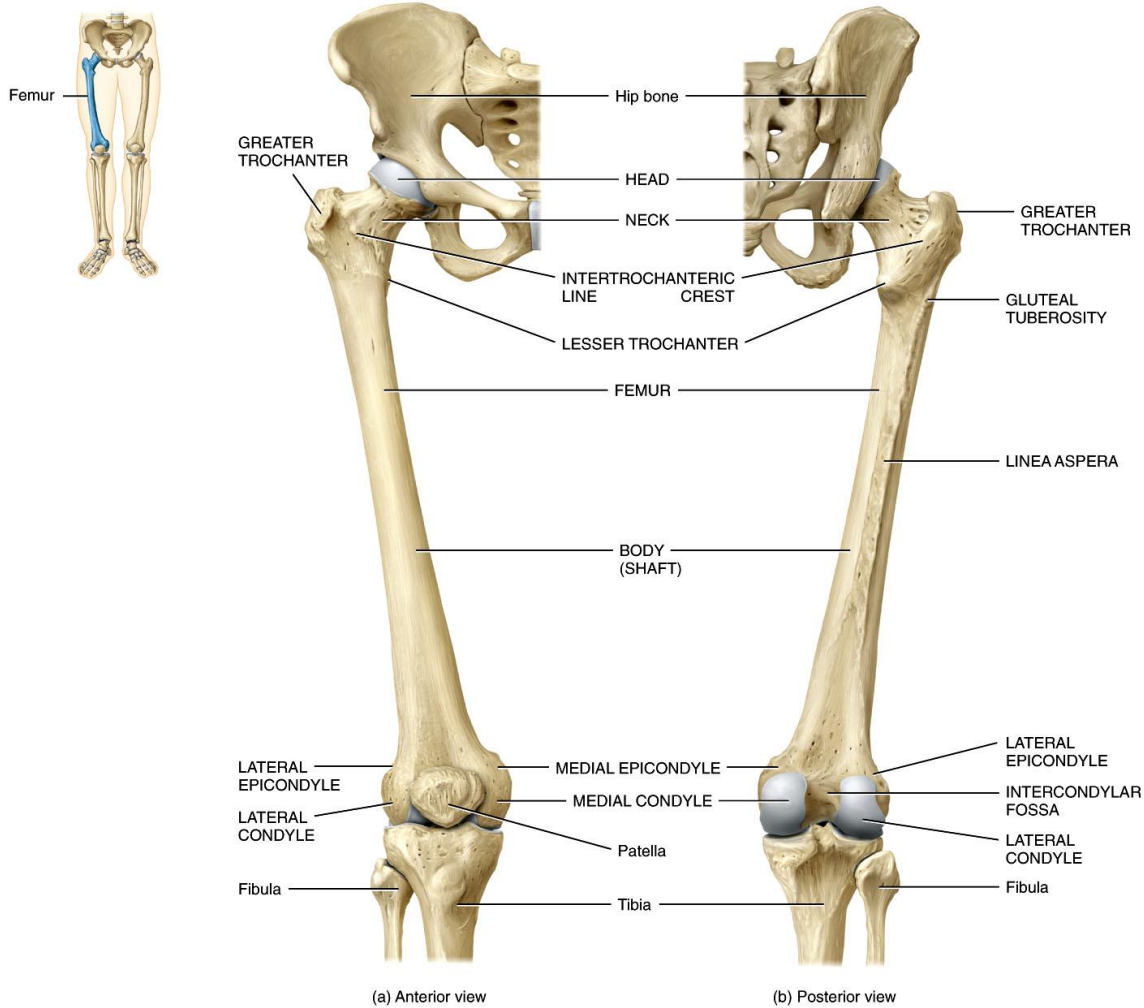


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# Patella

- Largest sesamoid bone in the body
- Forms the patellofemoral joint
- Superior surface is the base
- Inferior, narrower surface is the apex
- Thick articular cartilage lines the posterior surface
- Increases the leverage of the quadriceps femoris muscle
- Patellofemoral stress syndrome - “runner’s knee”

# Patella Figure 8.14

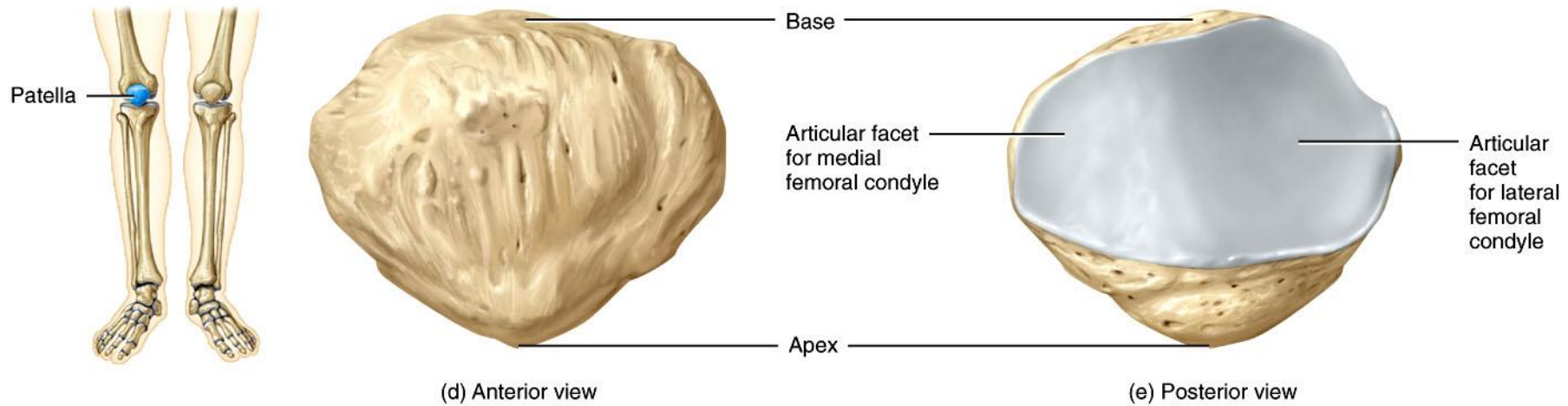


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# Tibia (shin bone)

- The larger, medial weight-bearing bone of the leg
- The lateral and medial condyles at the proximal end articulate with the femur
- It articulates distally with the talus and fibula
- Tibial tuberosity - attachment site for the patellar ligament
- Medial malleolus - medial surface of distal end (medial surface of ankle joint)

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# Fibula

- The smaller, laterally placed bone of the leg
- Non-weight bearing
- The head forms the proximal tibiofibular joint
- Lateral malleolus - distal end, articulates with the tibia and the talus at the ankle

# Tibia and Fibula Figure 8.15

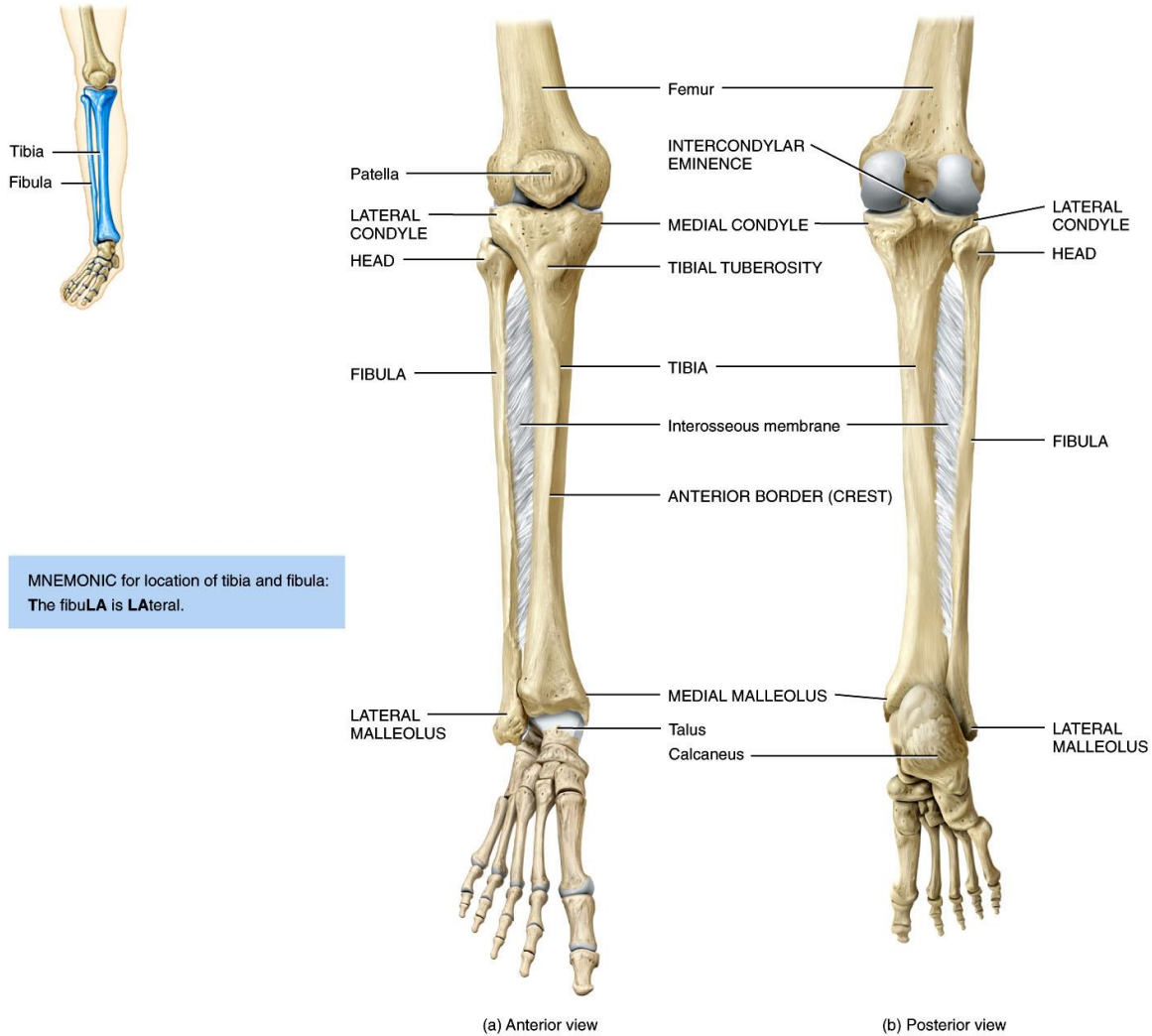
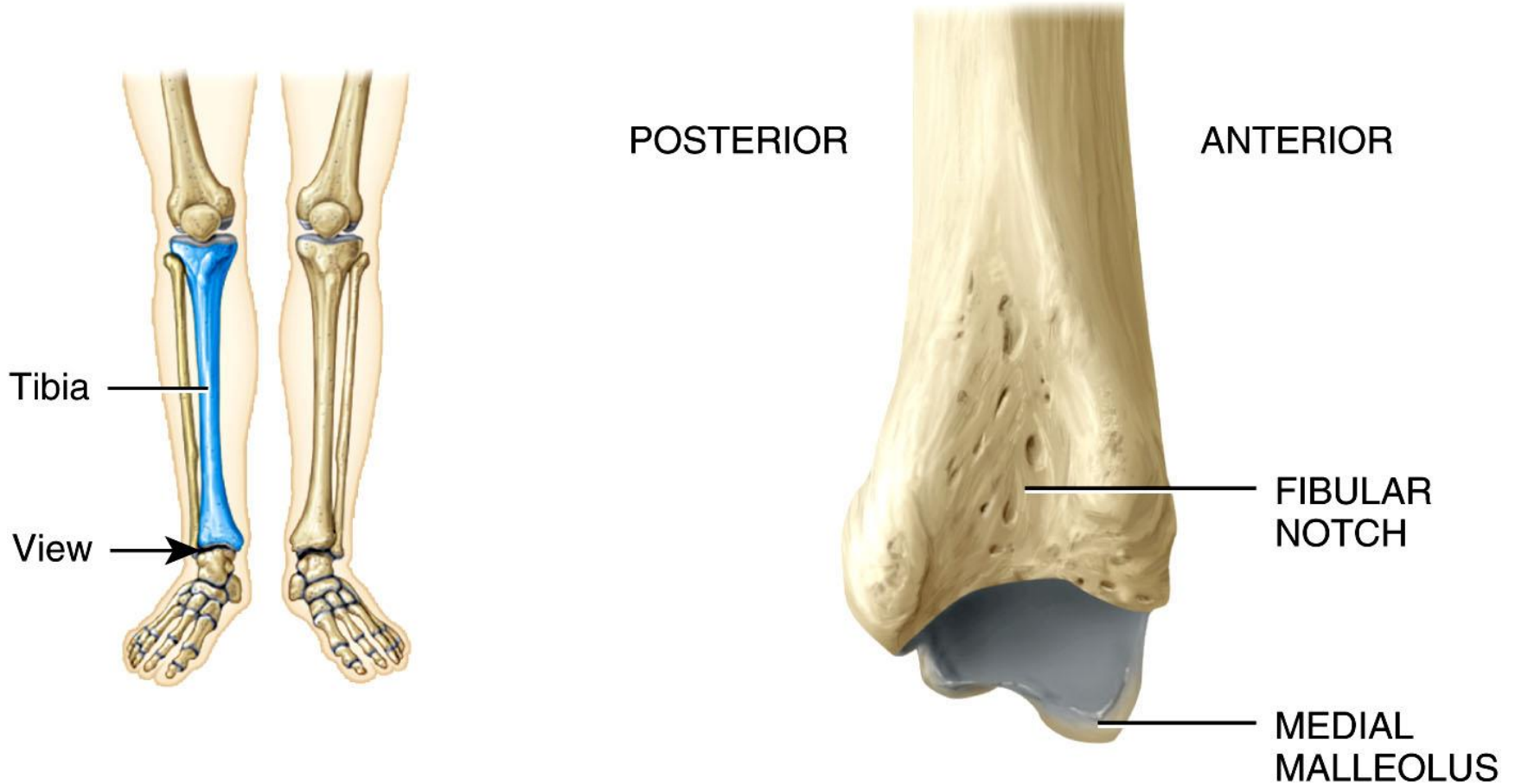


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# Tibia and Fibula Figure 8.15



(c) Lateral view of distal end of tibia

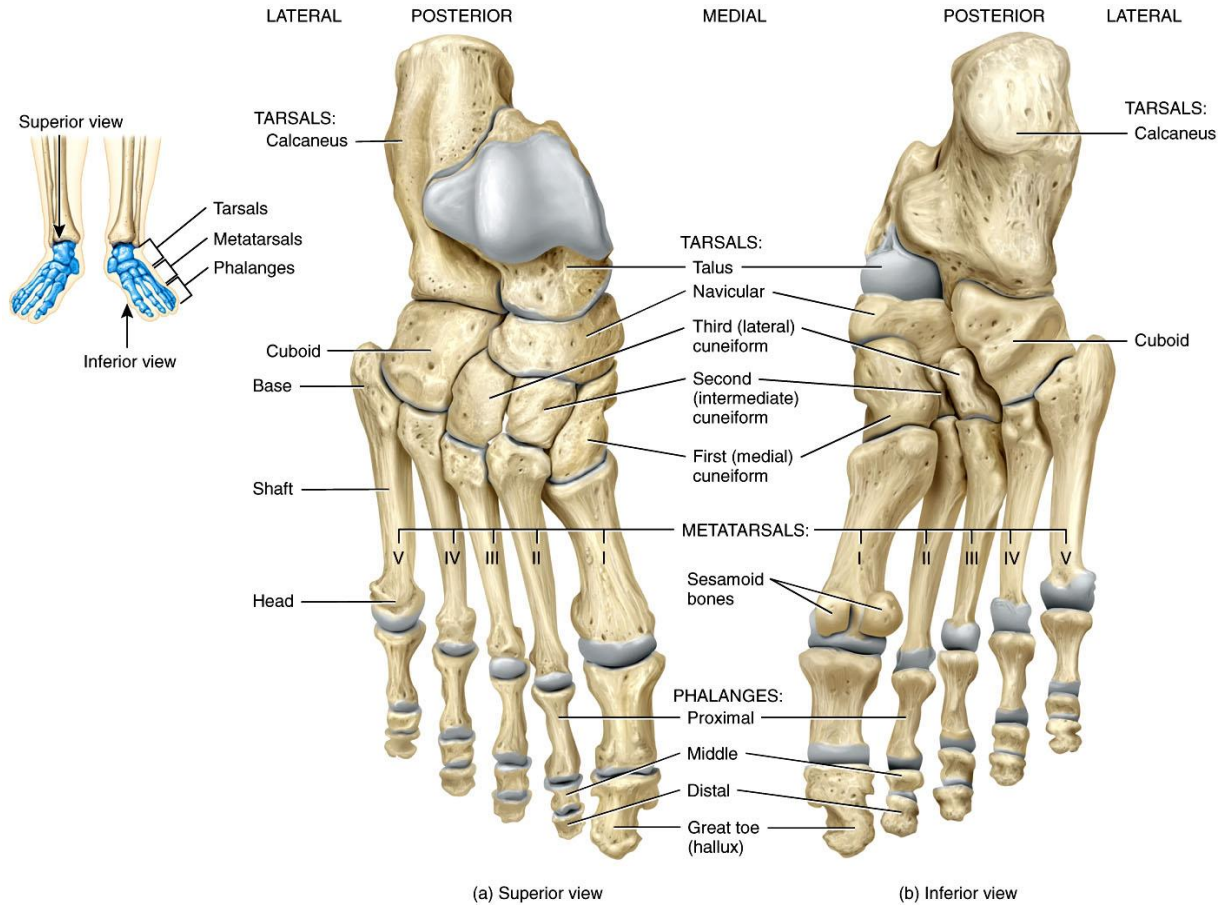
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# Skeleton of the Foot - Tarsals, Metatarsals, and Phalanges

- Seven tarsal bones - talus (articulates with tibia and fibula), calcaneus (the heel bone, the largest and strongest), navicular, cuboid and three cuneiforms
- Five metatarsals - (I-V) base, shaft, head
- 14 phalanges (big toe is the hallux)
- Tarsus = ankle

# Right Foot Figure 8.16



MNEMONIC for tarsal bones:

<b>T</b> all	<b>C</b> enters	<b>N</b> ever	<b>T</b> ake	<b>S</b> hots	<b>F</b> rom	<b>C</b> orners.
Talus	Calcaneus	Navicular	Third cuneiform	Second cuneiform	First cuneiform	Cuboid

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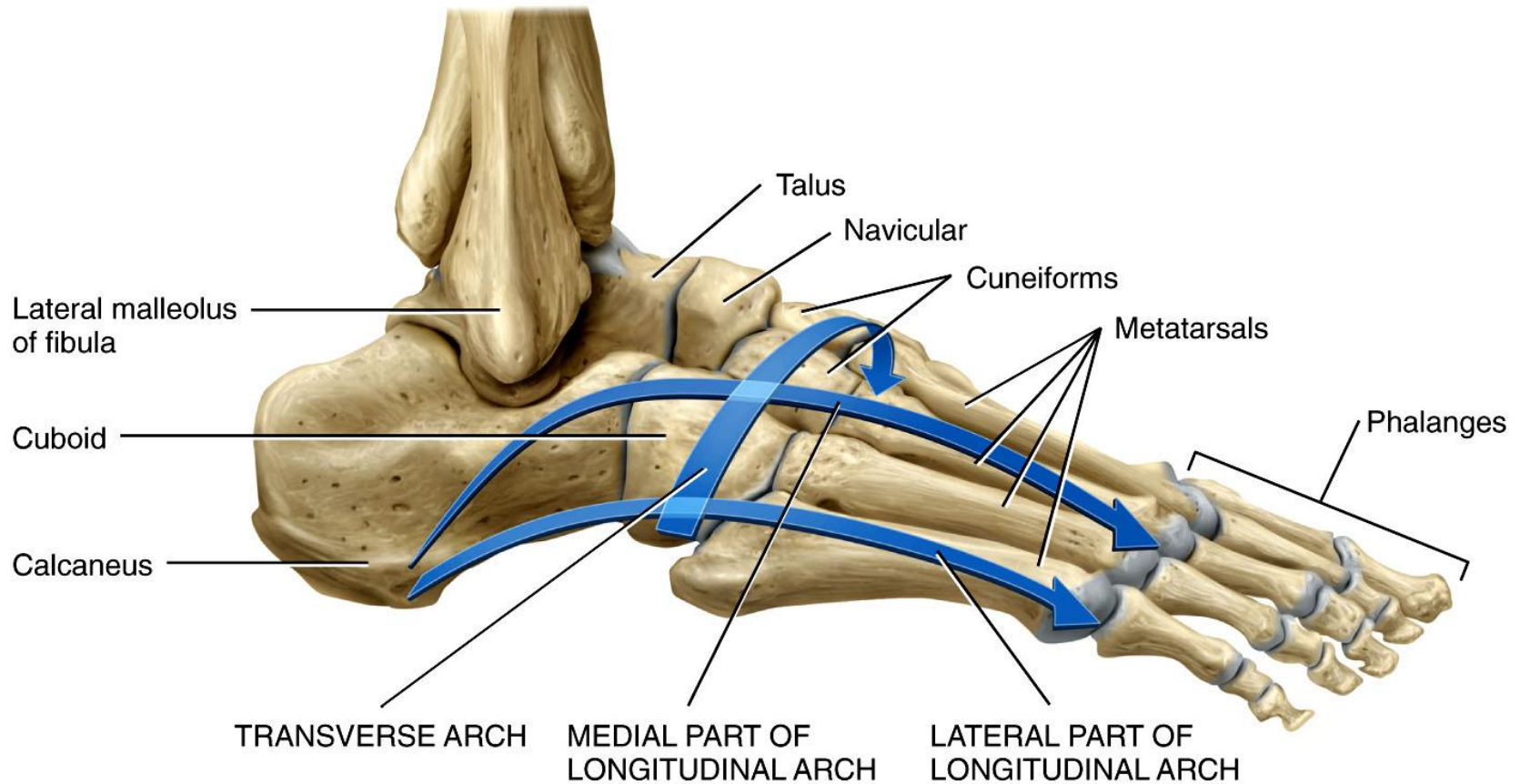


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# Arches of the Foot

- Two arches support the weight of the body
- Provide spring and leverage to the foot when walking
- The arches flex when body weight applied
- **Flatfoot - the arches decrease or “fall”**

# Arches of the foot - Figure 8.17



Lateral view of arches

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# Arches of the Foot

- longitudinal and transverse
- Two longitudinal arches: medial & lateral