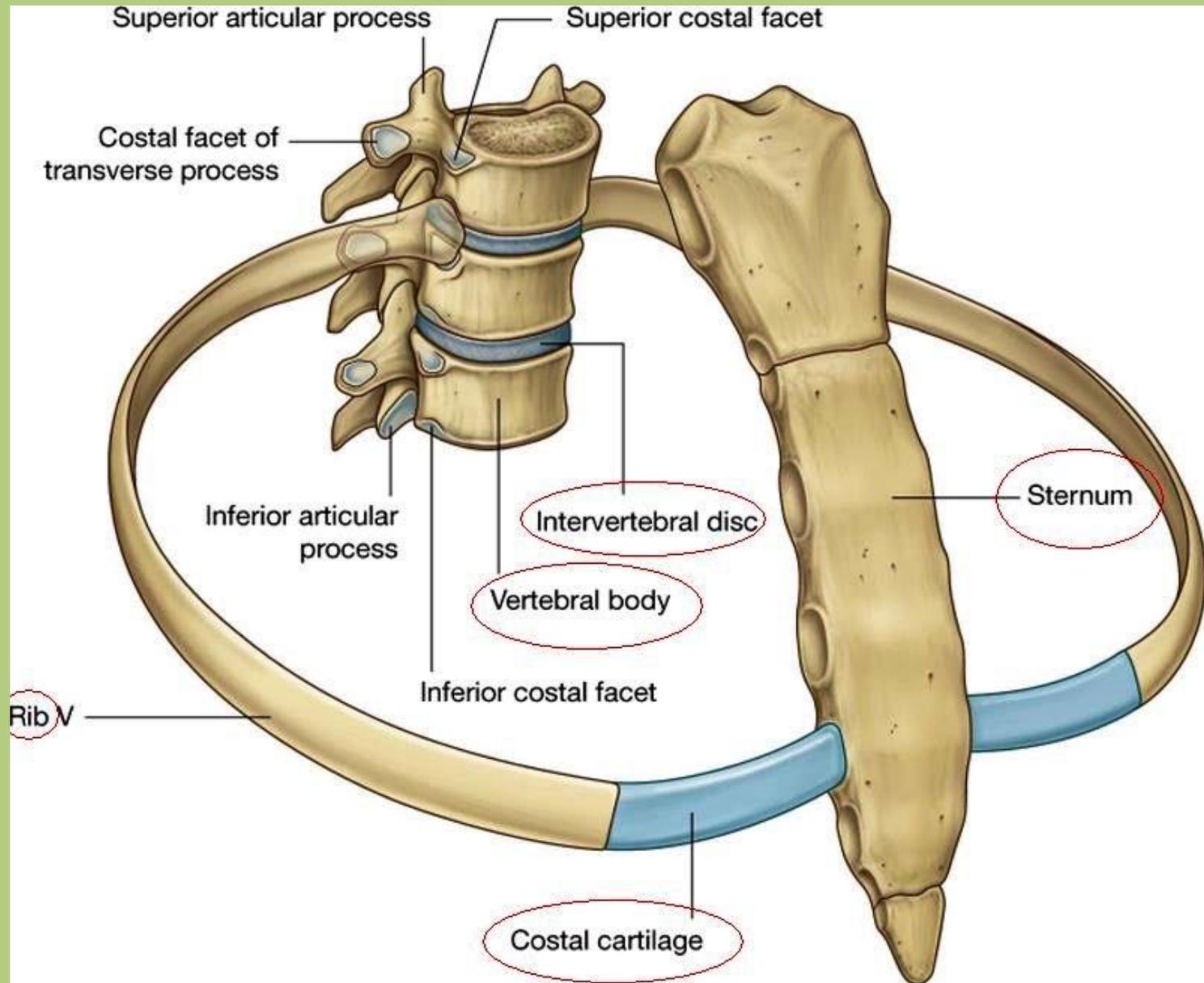




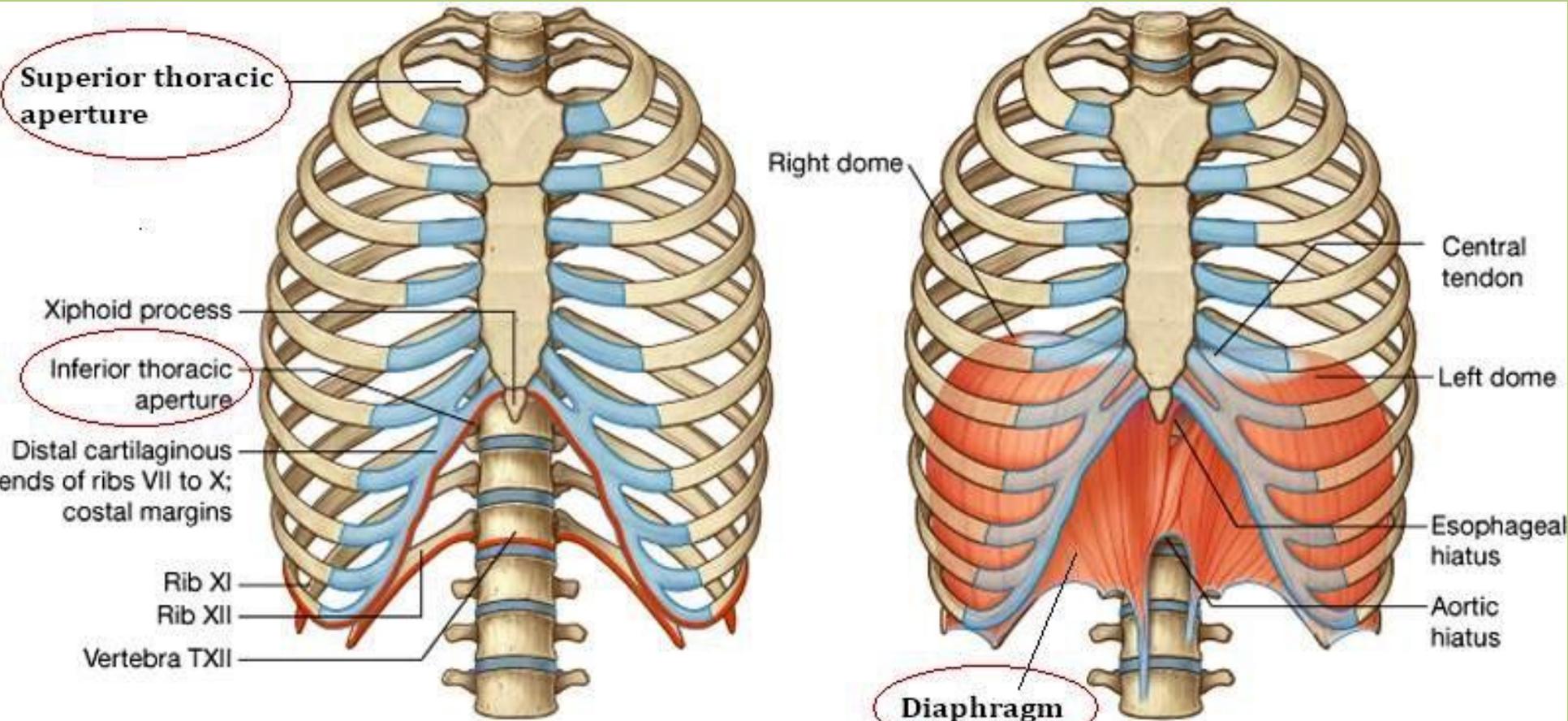
Chest cavity and respiratory muscles.  
Bones of the lower limb.

Sándor Katz M.D., Ph.D.

# Chest cavity - bony structures



# Chest cavity- bony structures



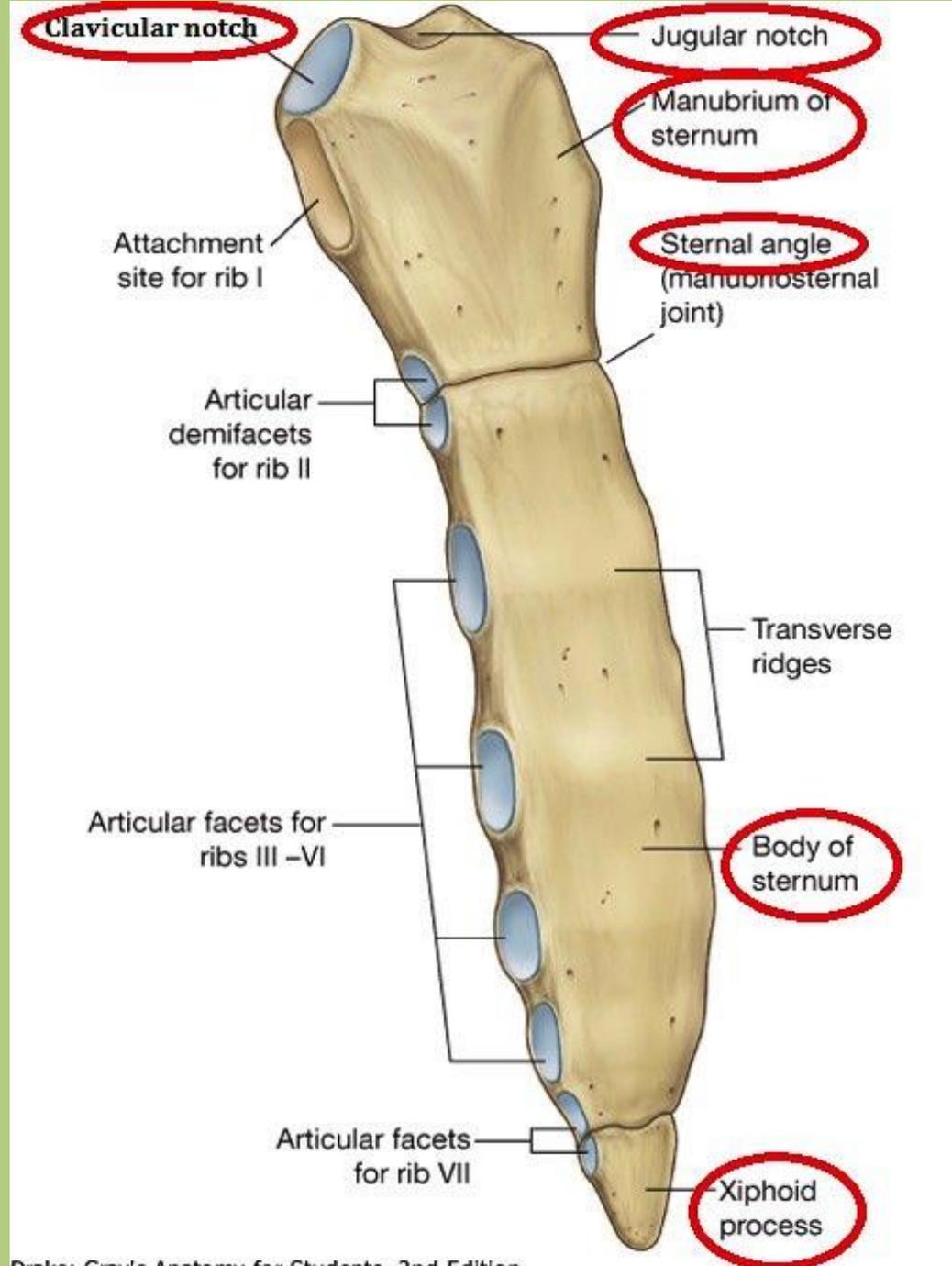
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# Sternum

manubrium

body

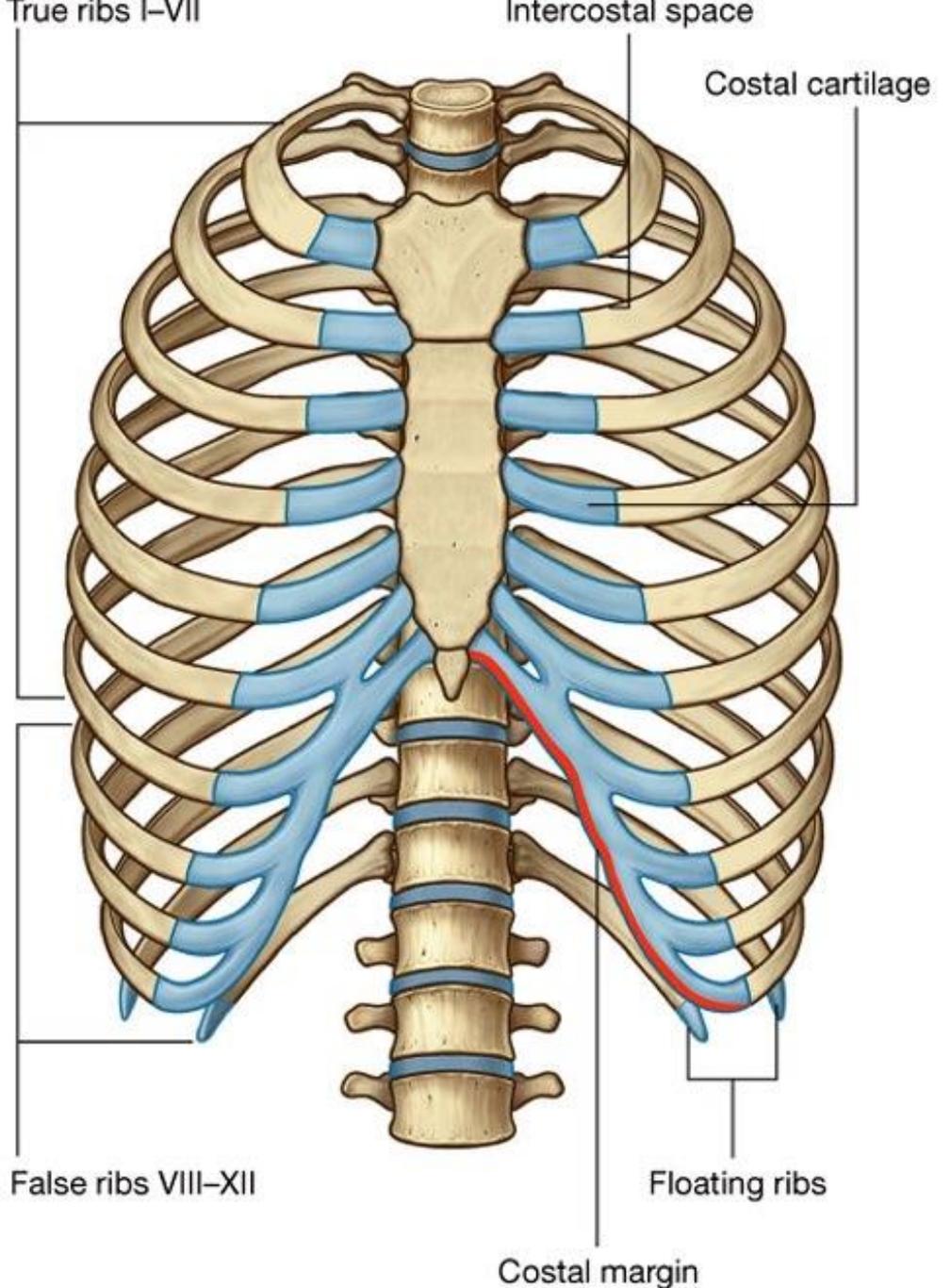
xiphoid process



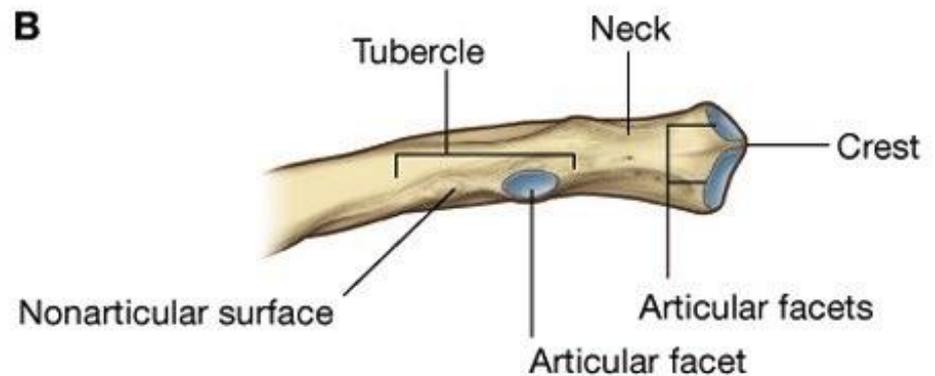
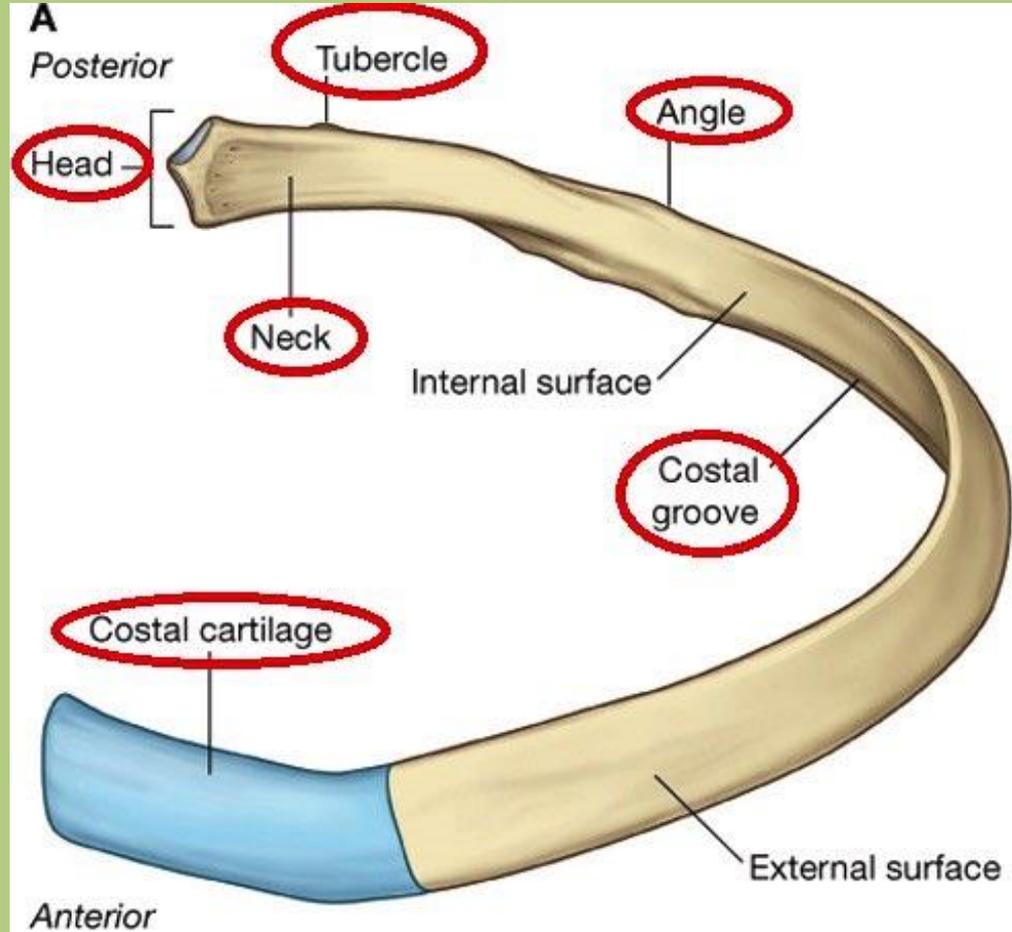
# Ribs

**True ribs:** first seven pairs connect to the sternum directly by costal cartilages.

**False ribs:** remaining five pairs connect to the sternum indirectly, forming costal arch.  
Last two pairs: *floating ribs*.



# General features of ribs

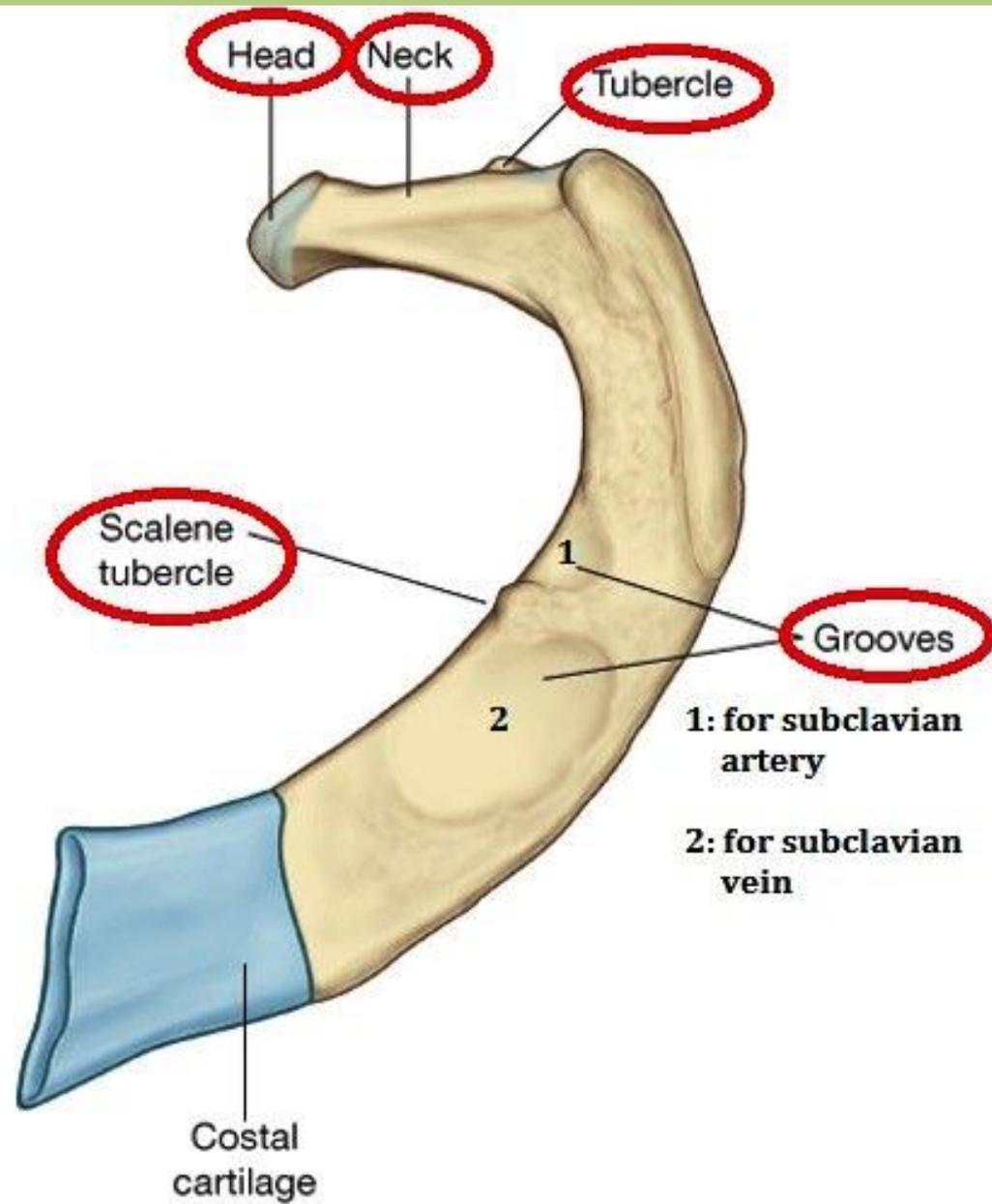


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# I. rib

Rib I



# Respiratory muscles

- **Intercostal muscles**
- **Diaphragm**
- **Accessory muscles**

# Intercostal muscles

## External intercostal muscles:

Arise from the lower border of the ribs and *insert on the upper border of the ribs below*.

## Function:

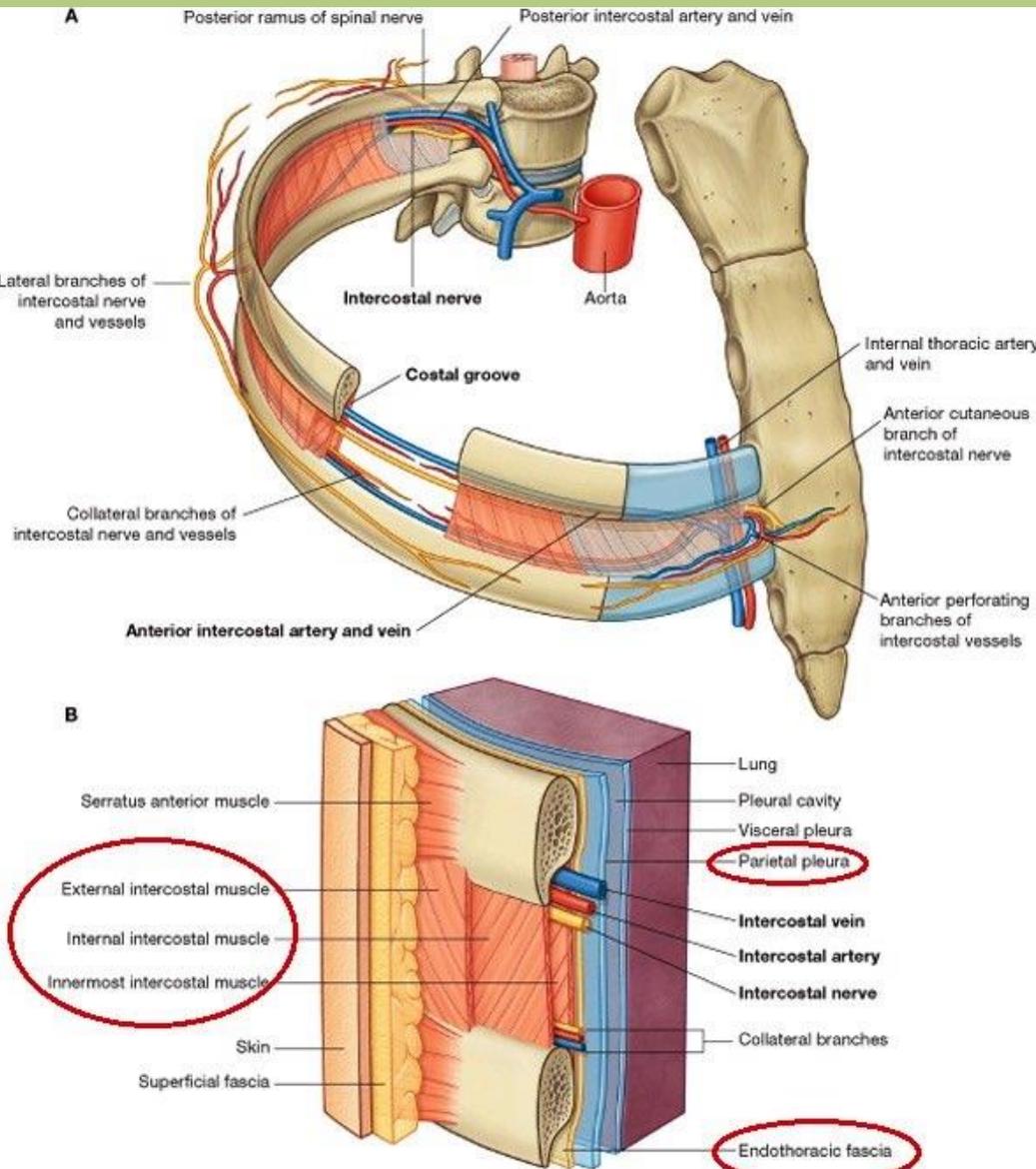
**Elevation of the ribs**, they reinforce the intercostal space during the deep inspiration.

## Internal intercostal muscles:

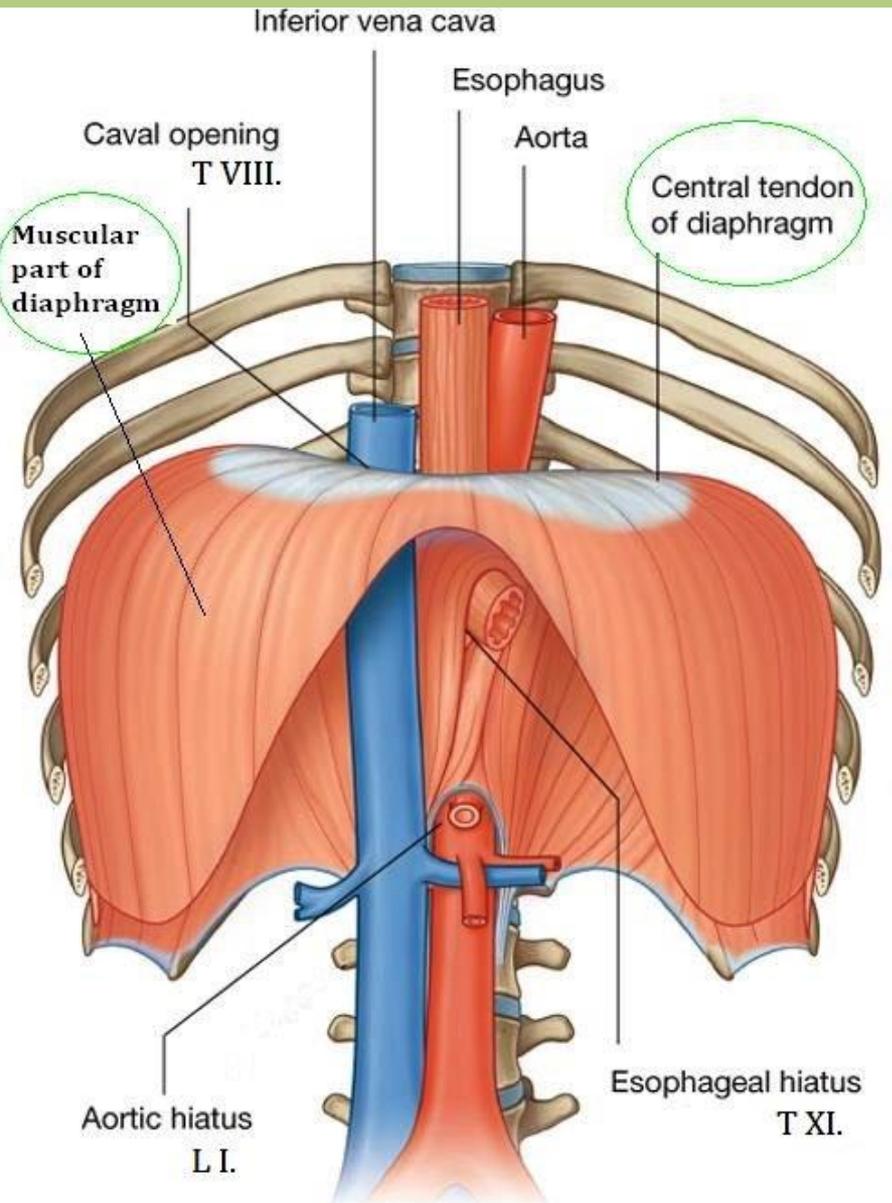
Arise from the ridge of the inner surface of ribs and *insert on the inferior border of the ribs above*.

## Function:

**Depression of the ribs**, they reinforce the intercostal space during the deep expiration.



# Diaphragm - (inspiration)



## CENTRAL TENDON

*Caval hiatus for the inferior vena cava - T8*

## MUSCULAR PART:

- **Sternal part**

*Superior epigastric vessels*

- **Costal part**

- **Lumbar part:**

Left and right crus, and both have medial and lateral parts.

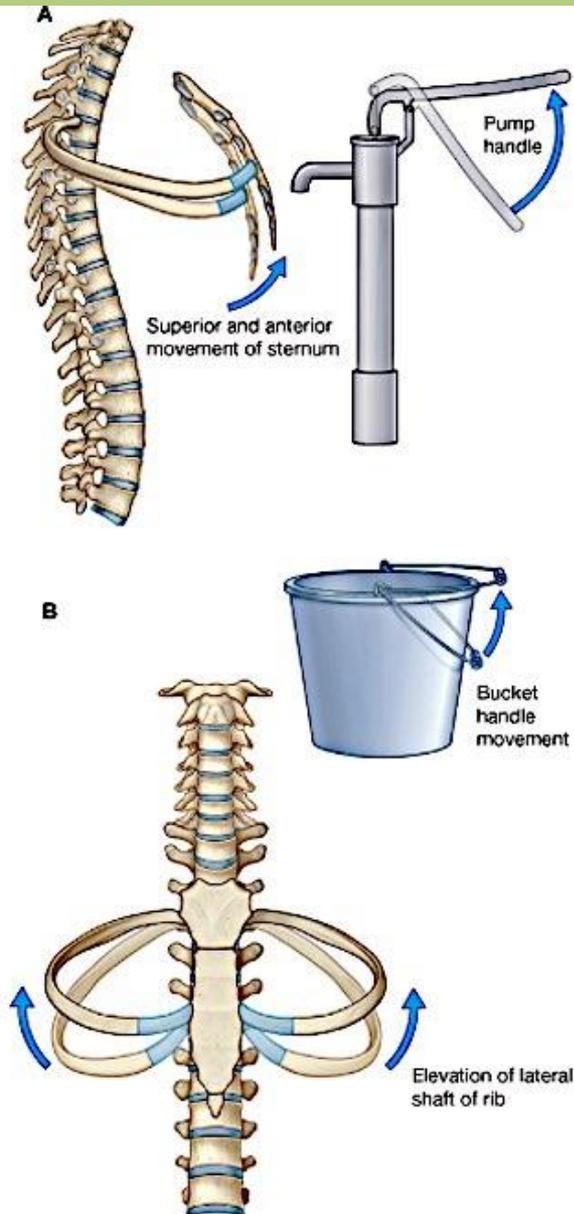
*Esophageal hiatus for the esophagus - T10-11*

*Aortic hiatus for the aorta and thoracic duct - T12-L1*

*No hiatus for the azygos, hemiazygos veins, sympathetic trunk and greater and lesser splanchnic nerves - L2*

**Innervation: phrenic nerves**

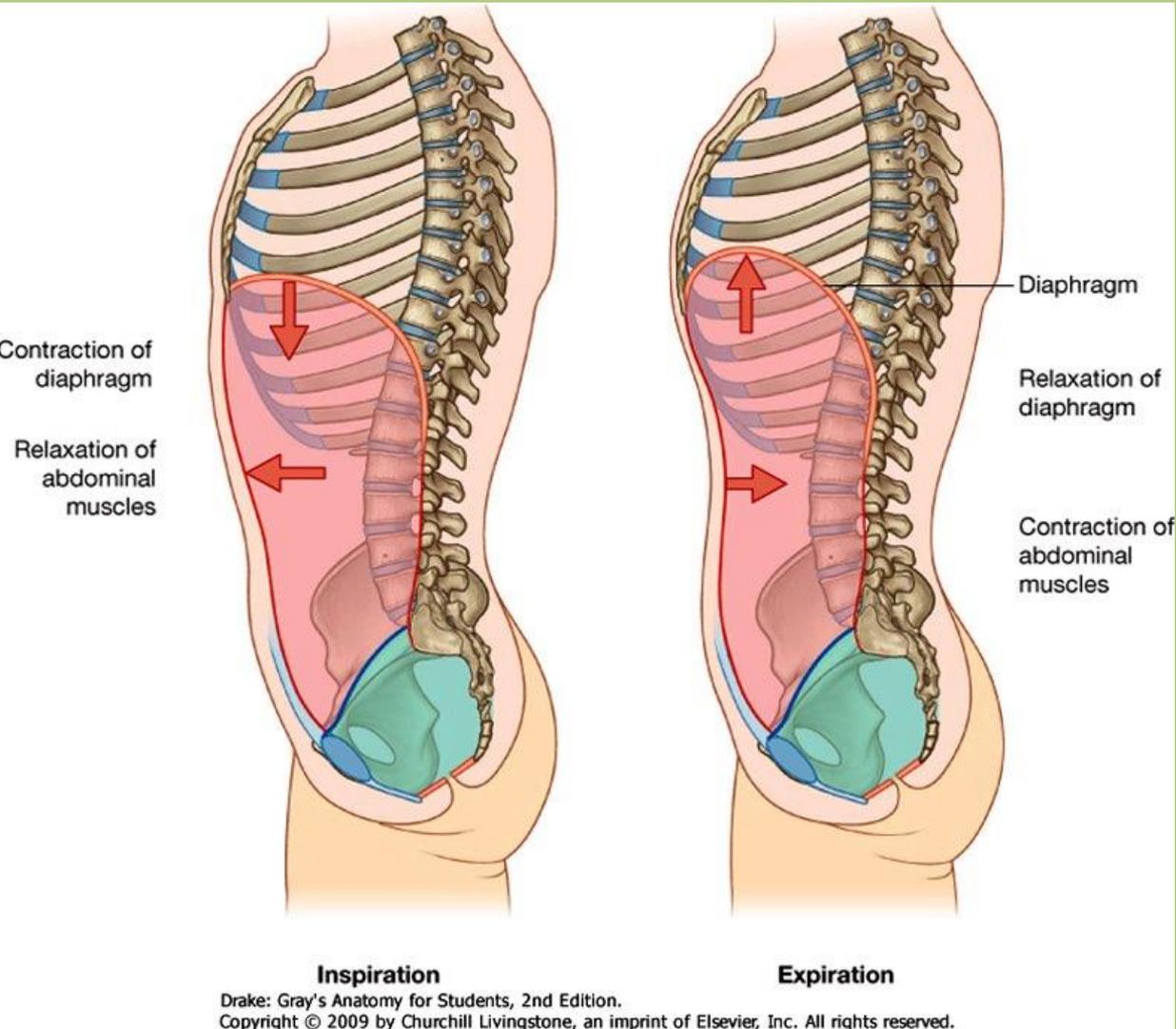
# Movements of the thoracic wall during breathing



A: ***Pump handle*** movement of ribs and sternum - ***superior and anterior movement***.

B: ***Bucket handle*** movement of ribs - ***elevation of ribs***.

# Accessory respiratory muscles

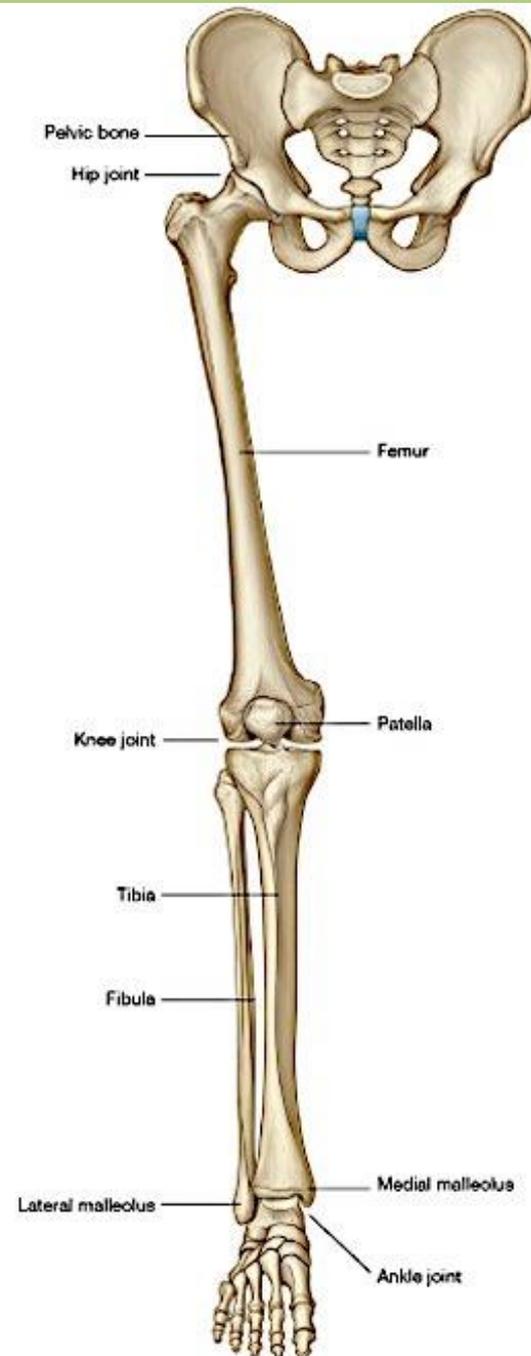


**Inspiration:** scalene muscles and sternocleidomastoid.

**Expiration:** abdominal muscles.

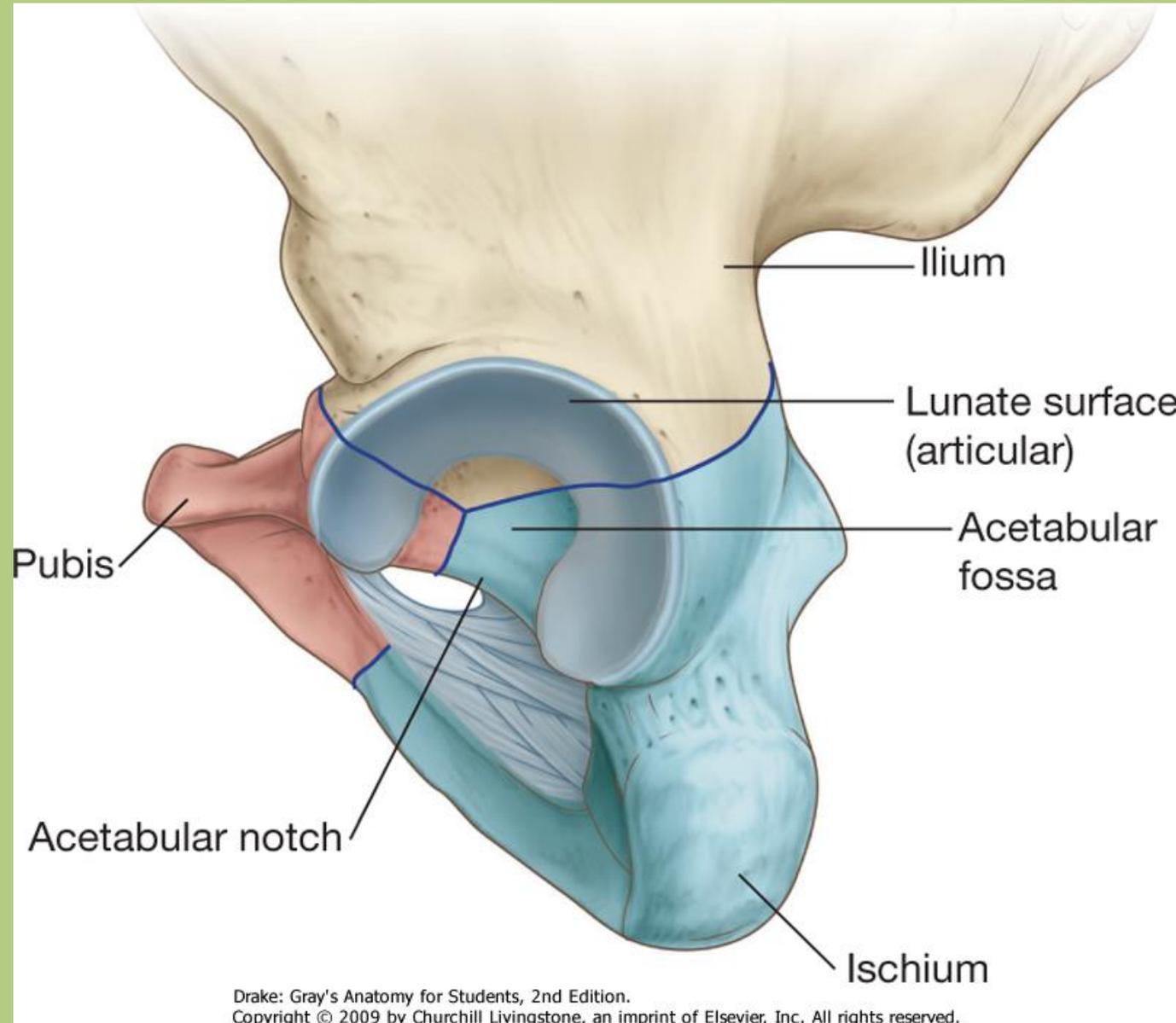
# Lower limb

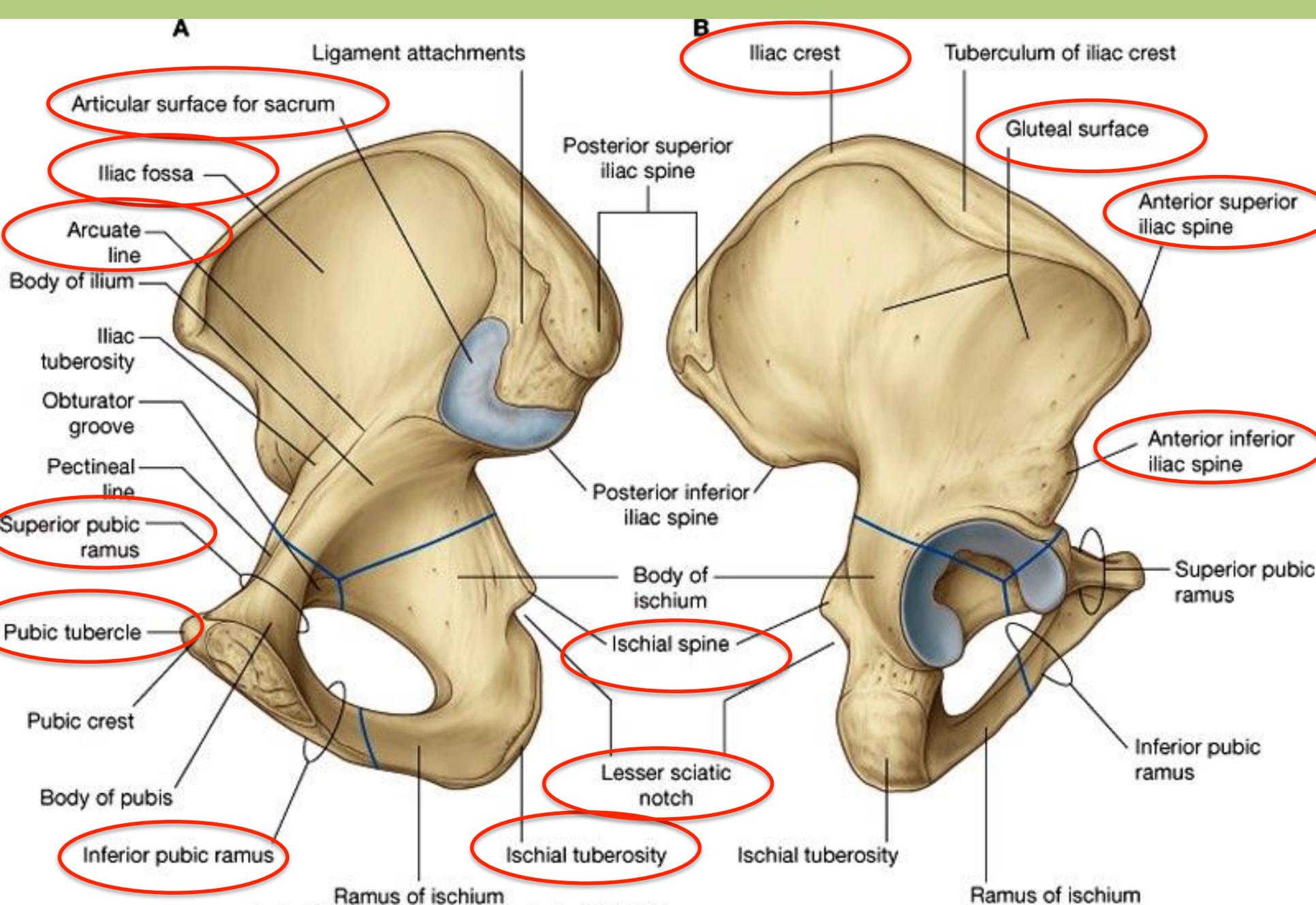
- **Pelvic girdle:** hip bones
- **Free lower extremity:** femur, patella, tibia, fibula, tarsal bones, metatarsals and phalanges



# Hip bone

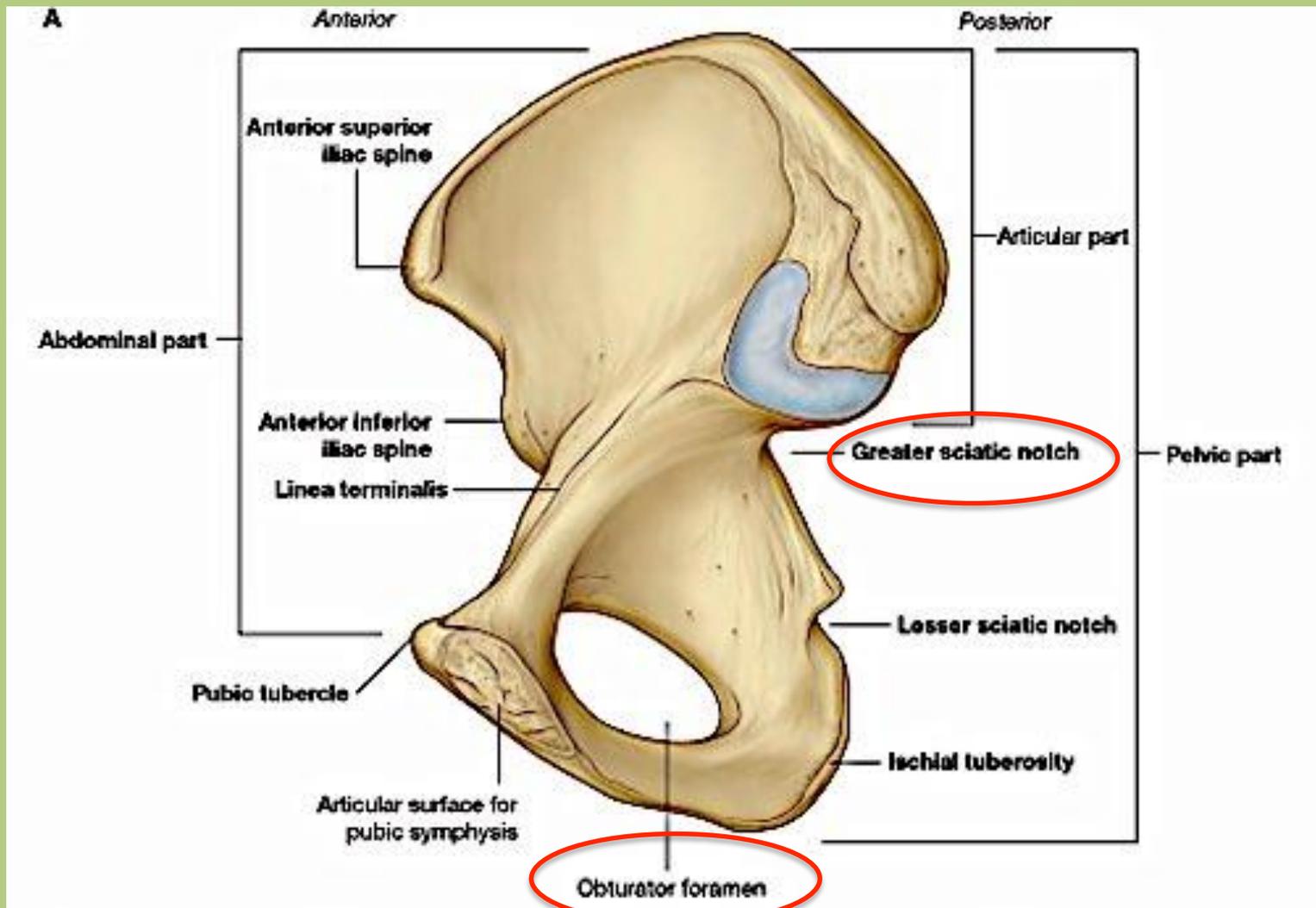
Definitive fusion of the Y-shaped growth plate occurs 16th - 18th year.





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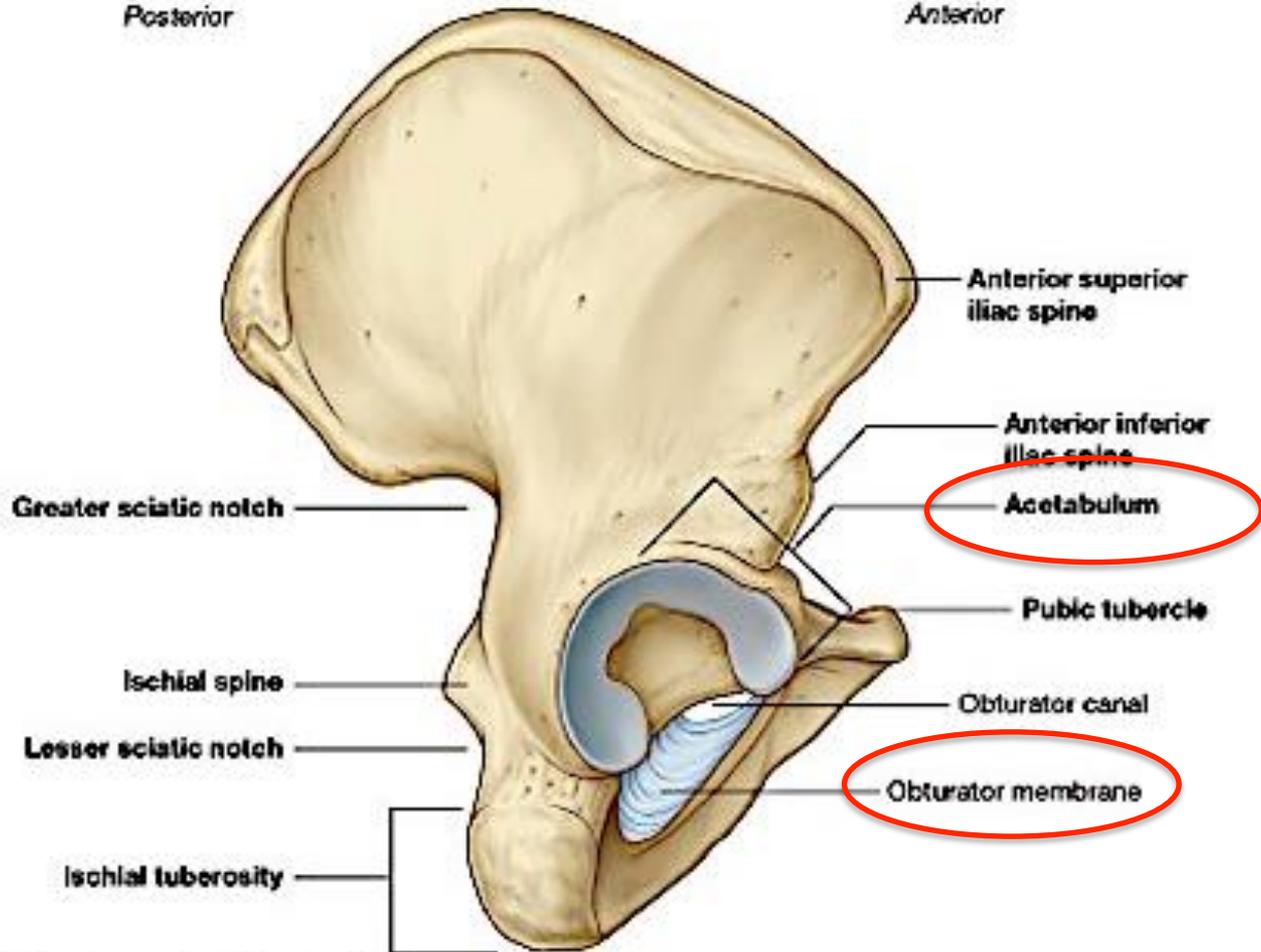
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**B**

Posterior

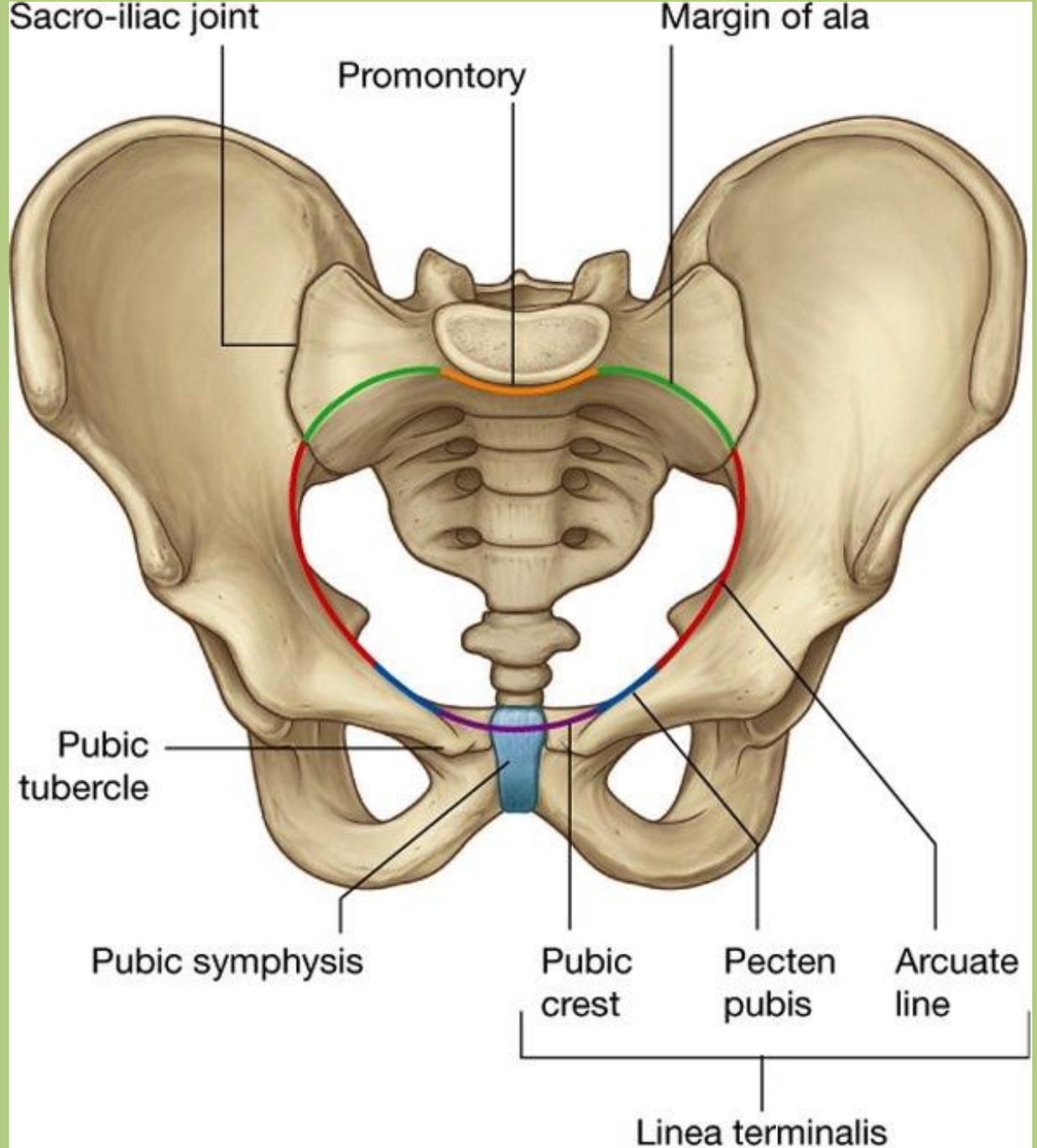
Anterior



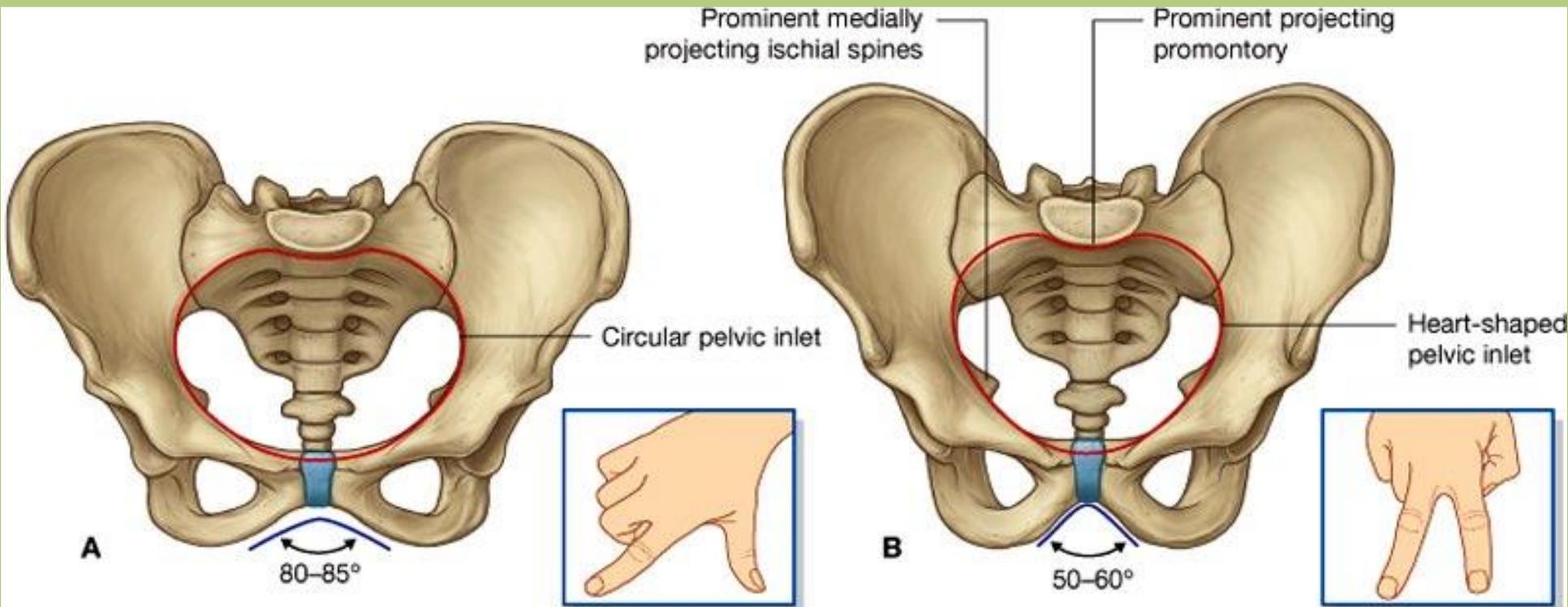
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# Pelvis



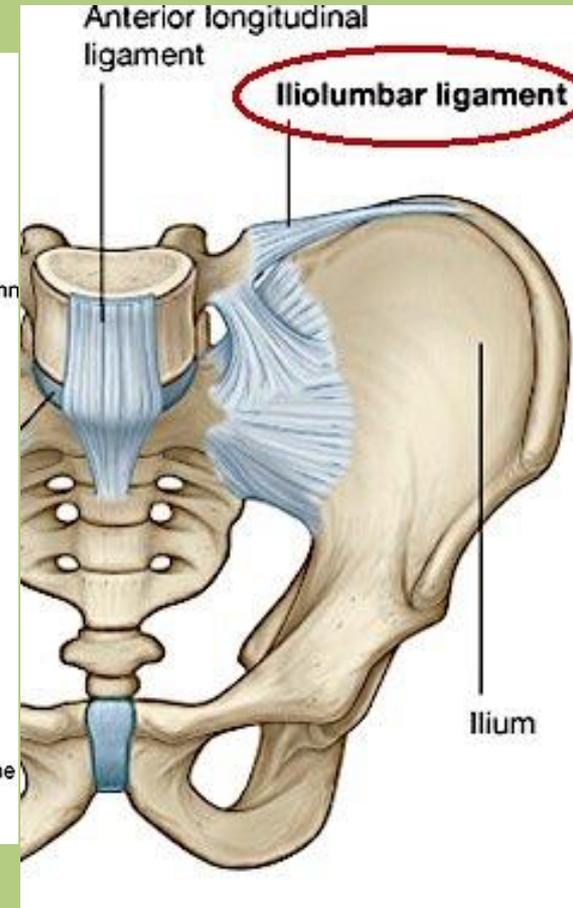
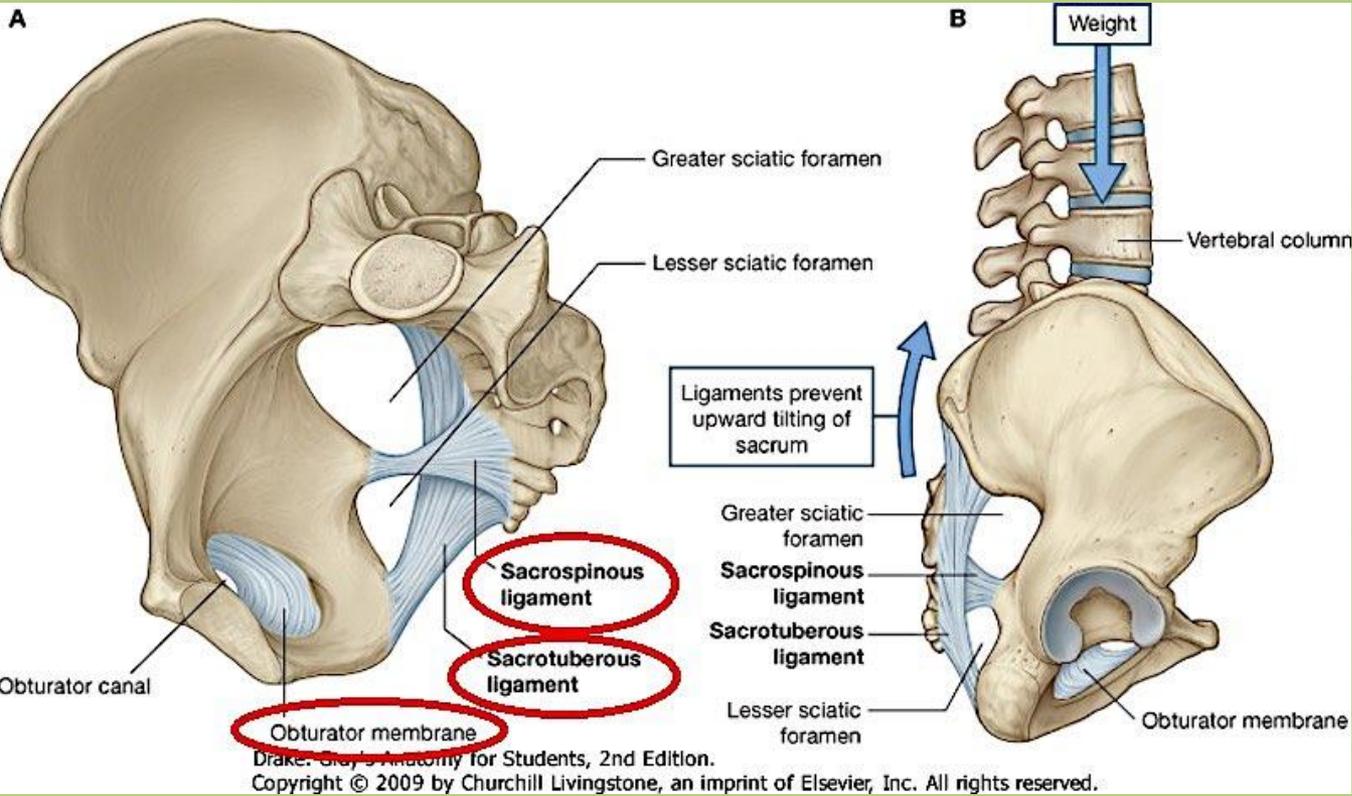
# Comparison of the female and male pelvises



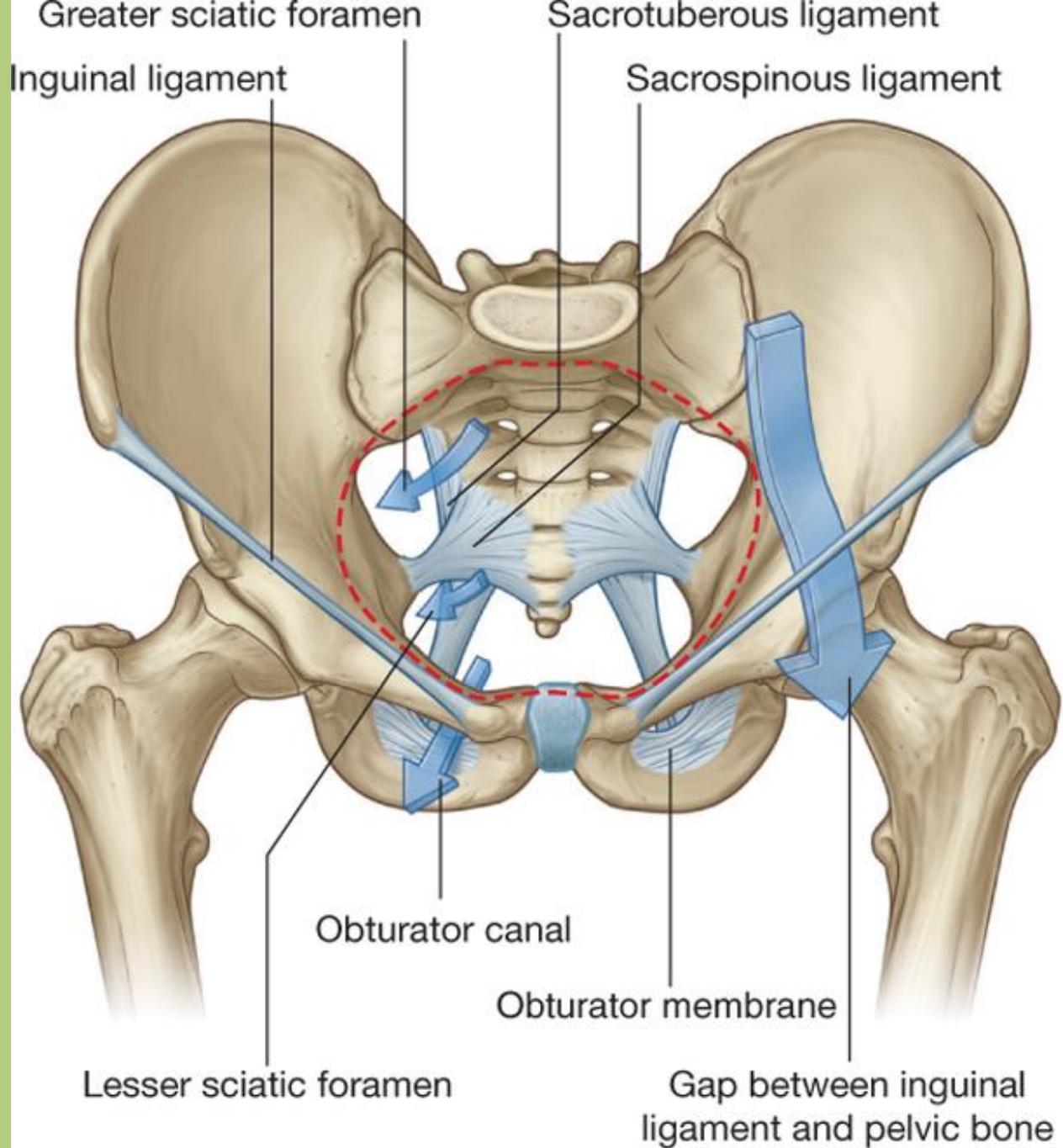
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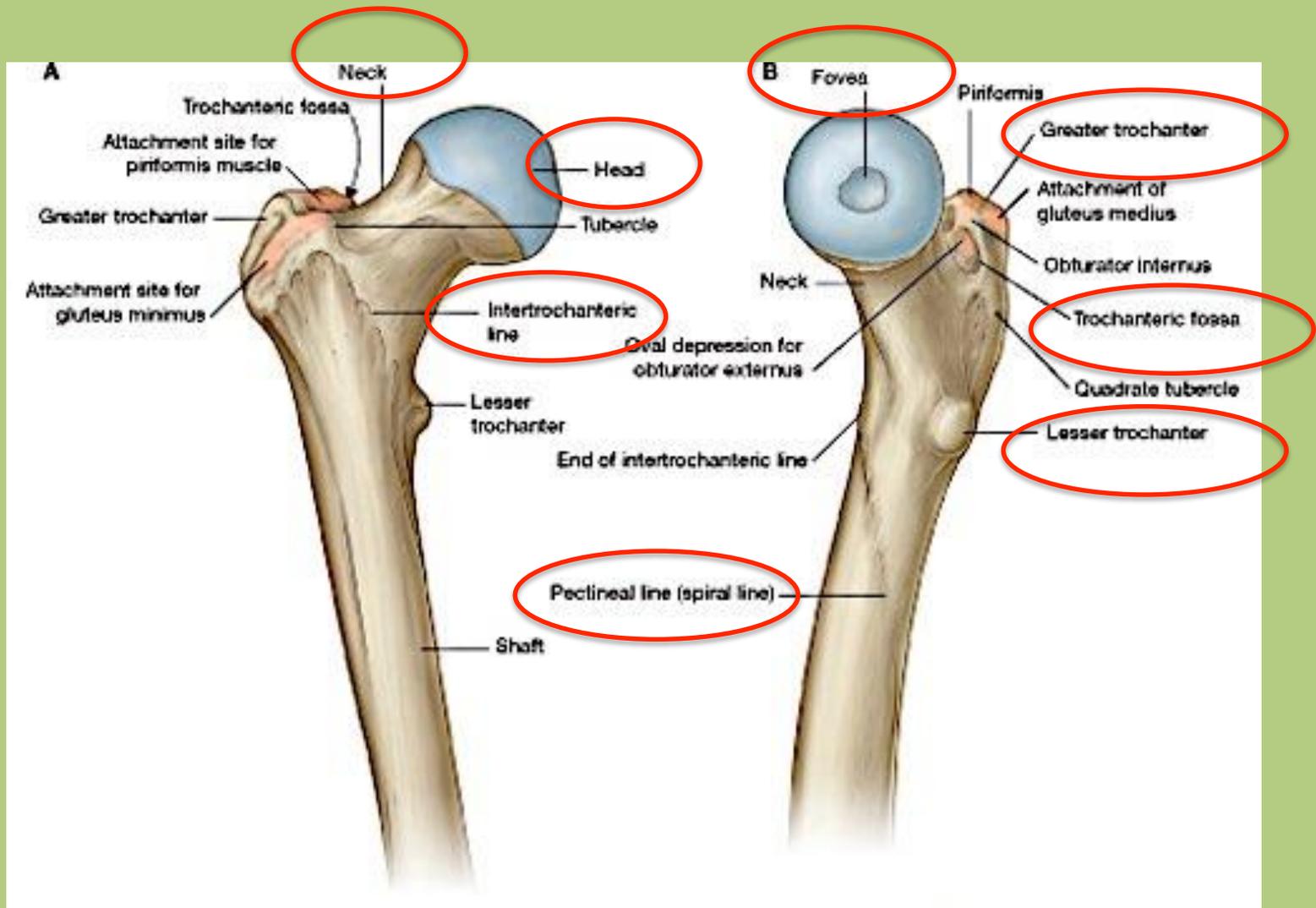
# Pelvic ligaments



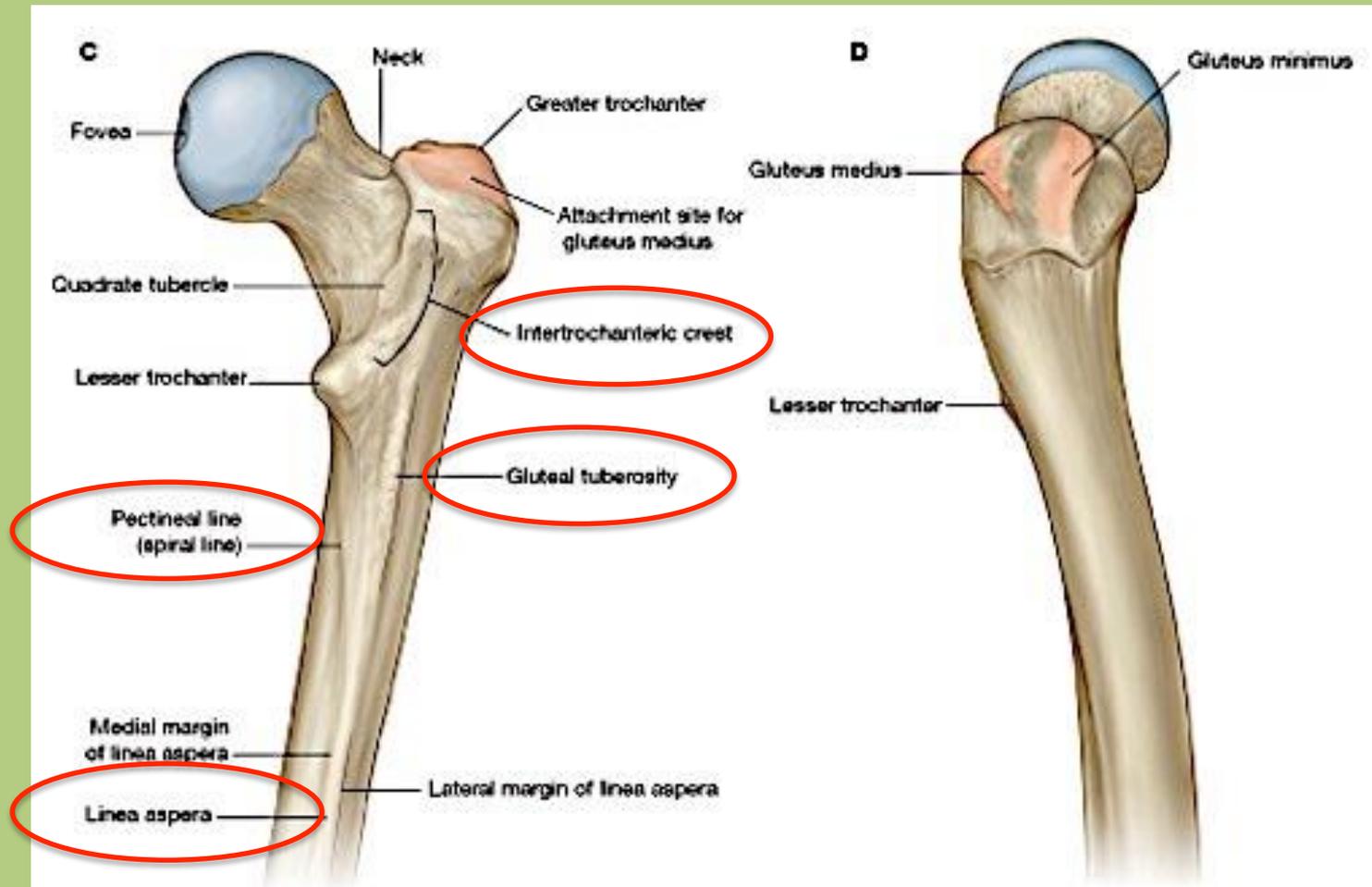
# Pelvis



# Femur



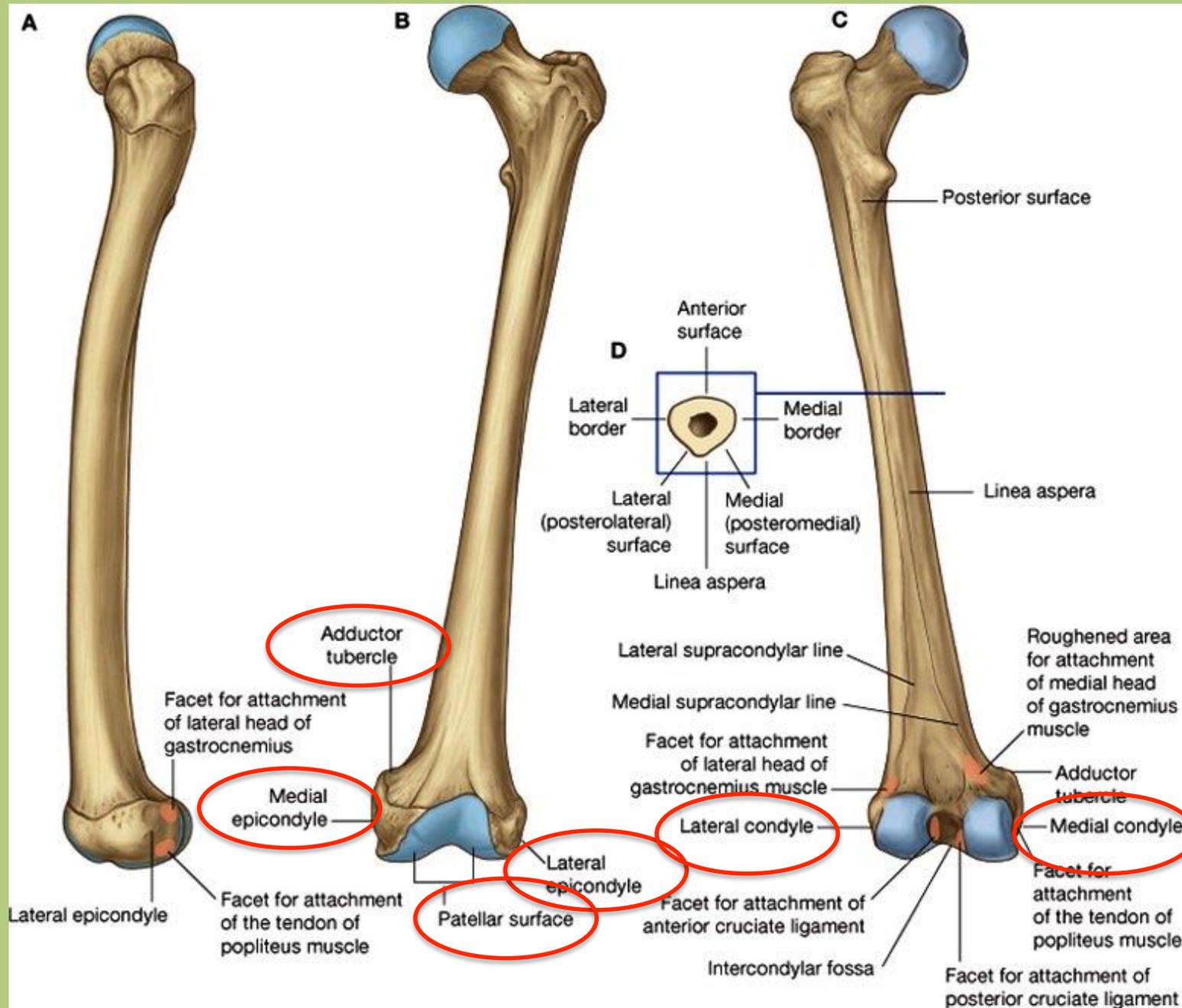
# Femur

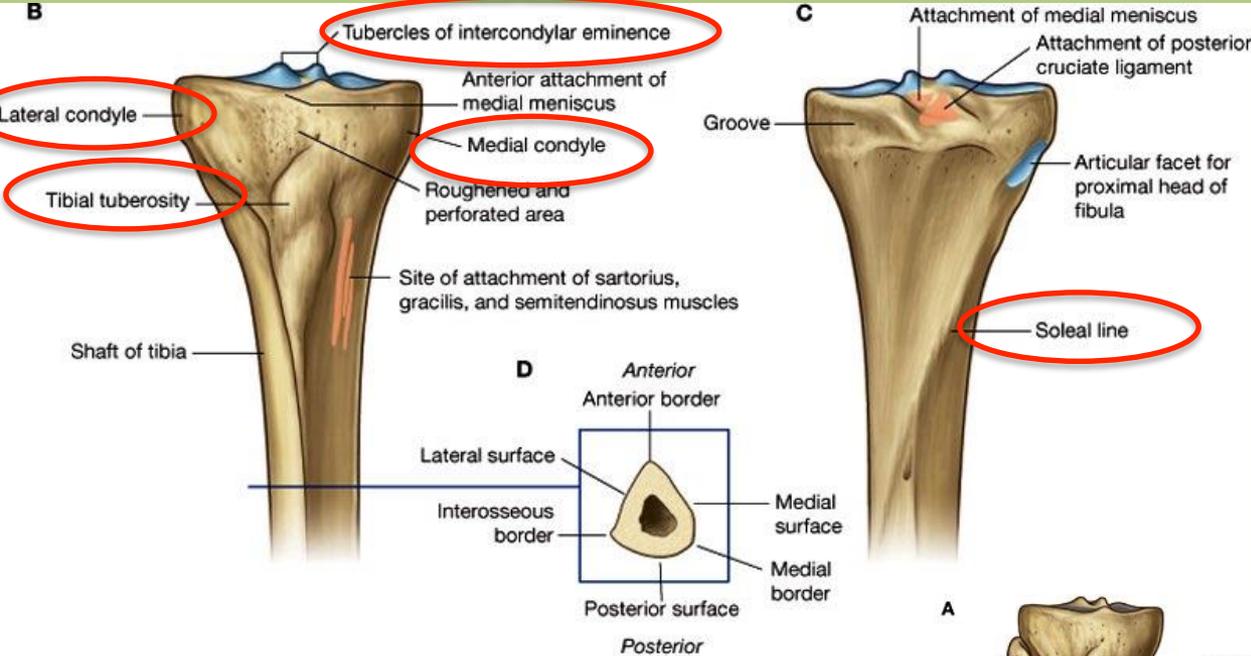


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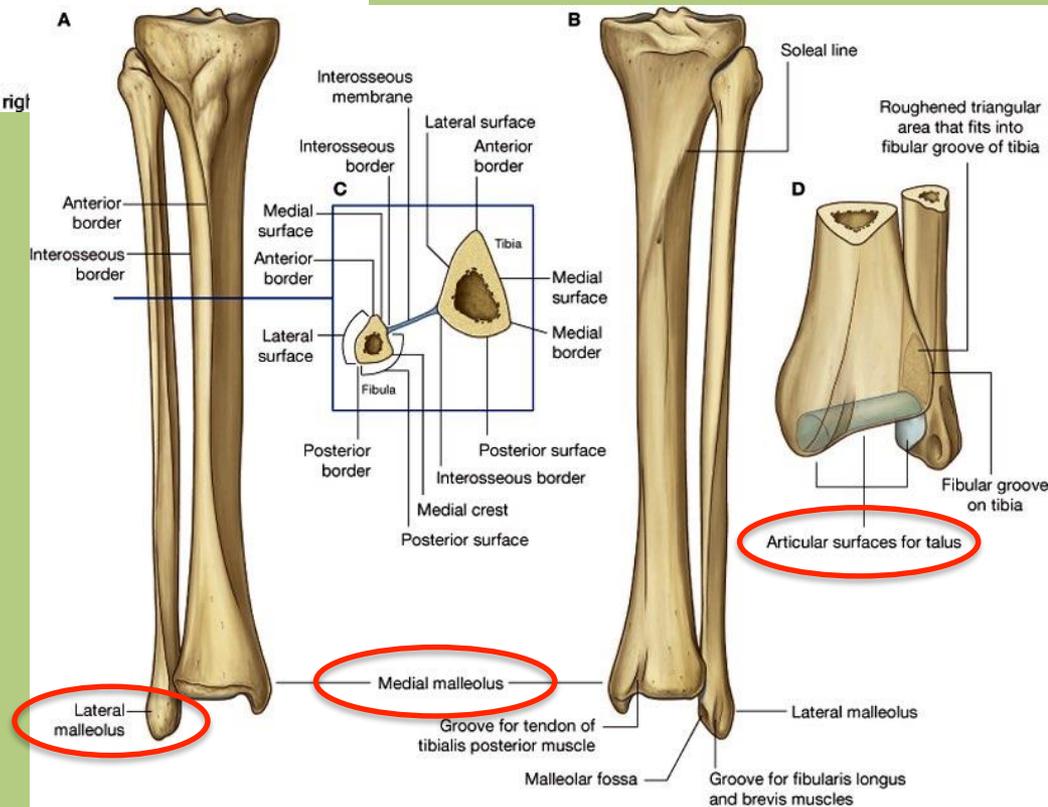
# Femur





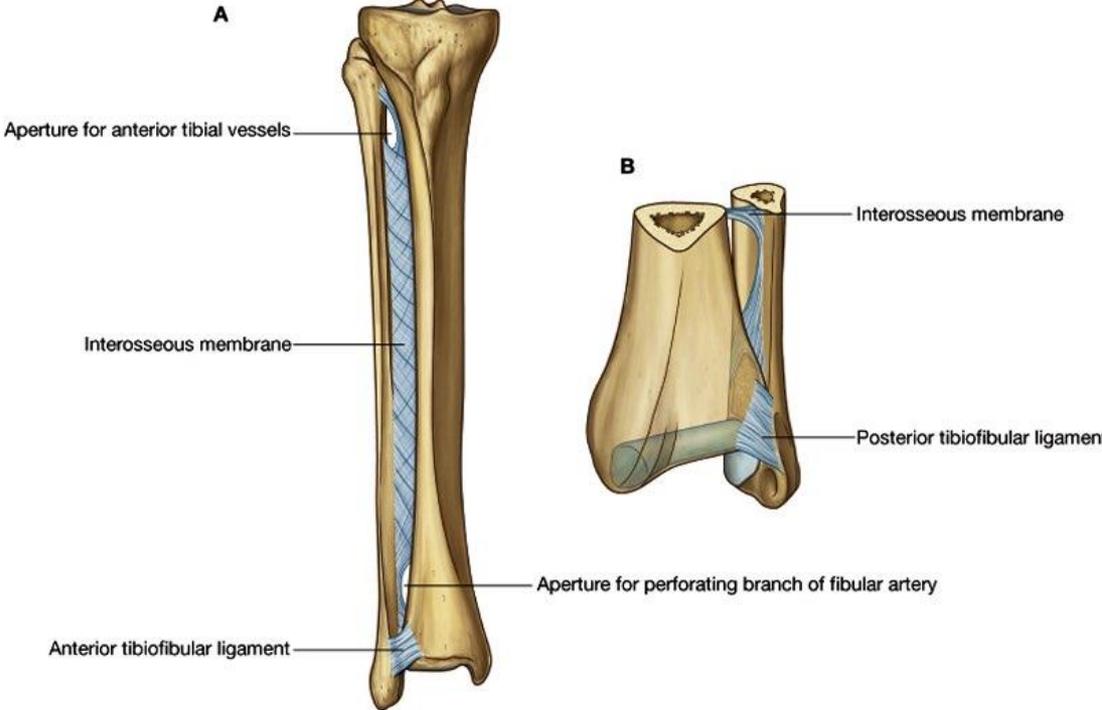
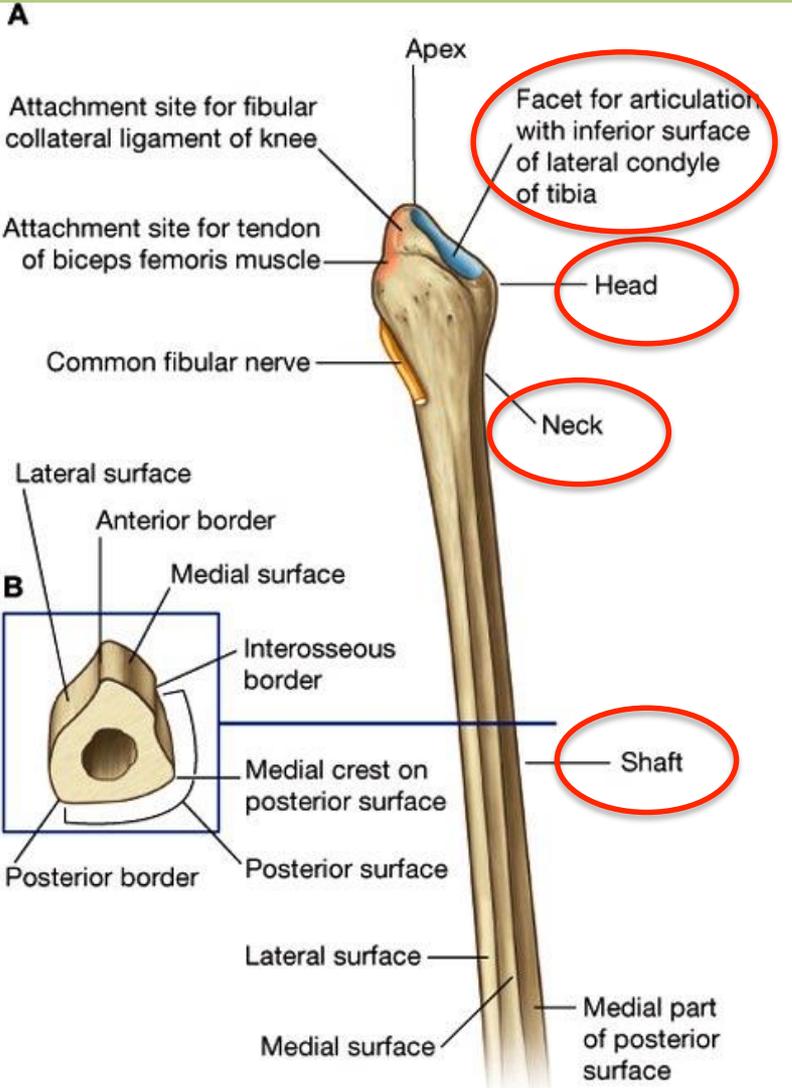
# Tibia

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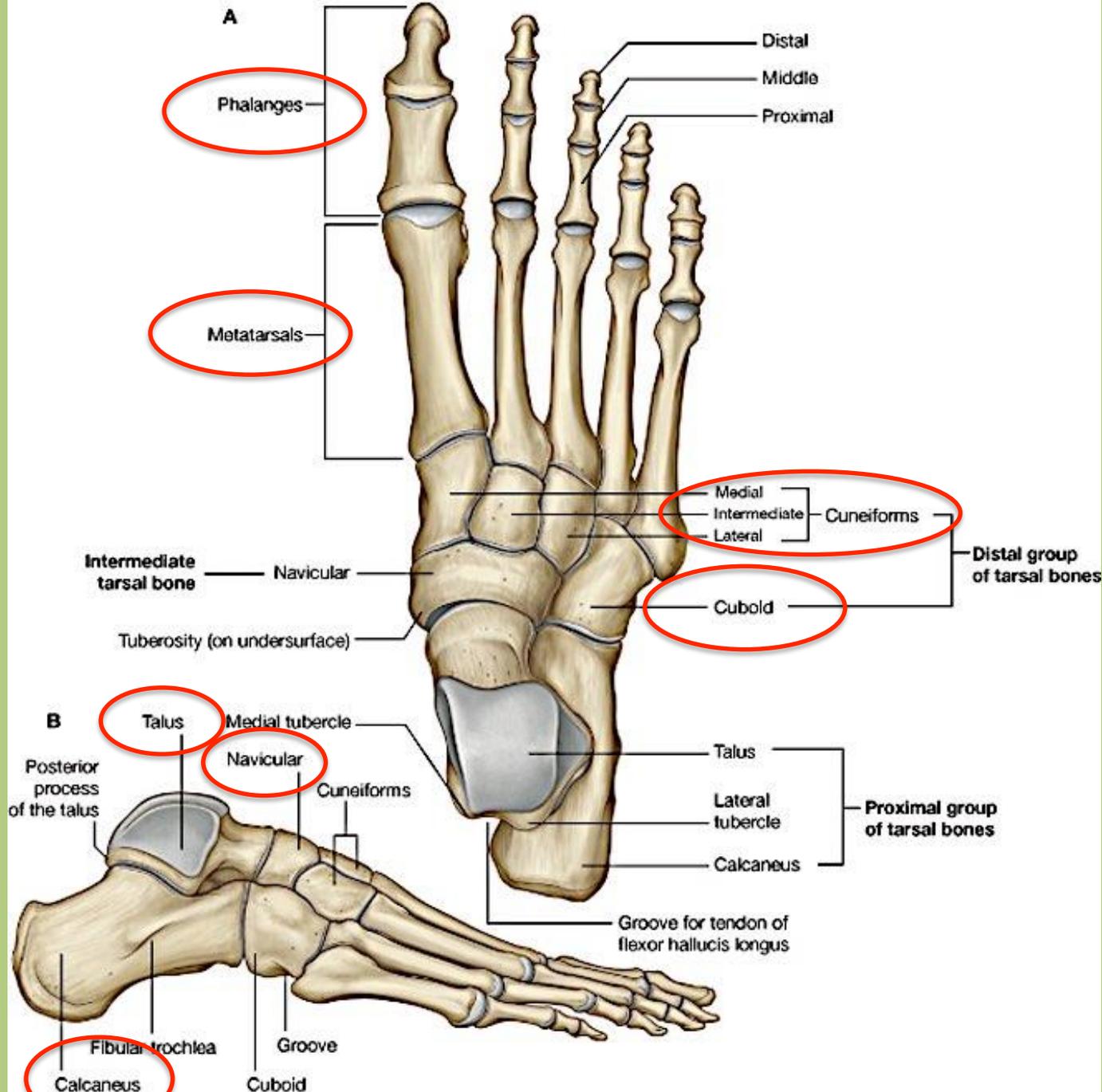
# Fibula



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# Bones of the foot:

tarsal bones  
metatarsals  
phalanges



Thank you for your attention.

Reference: Gray's Anatomy for Student  
Thieme Atlas of Anatomy