

Biology 224

Human Anatomy and Physiology - II

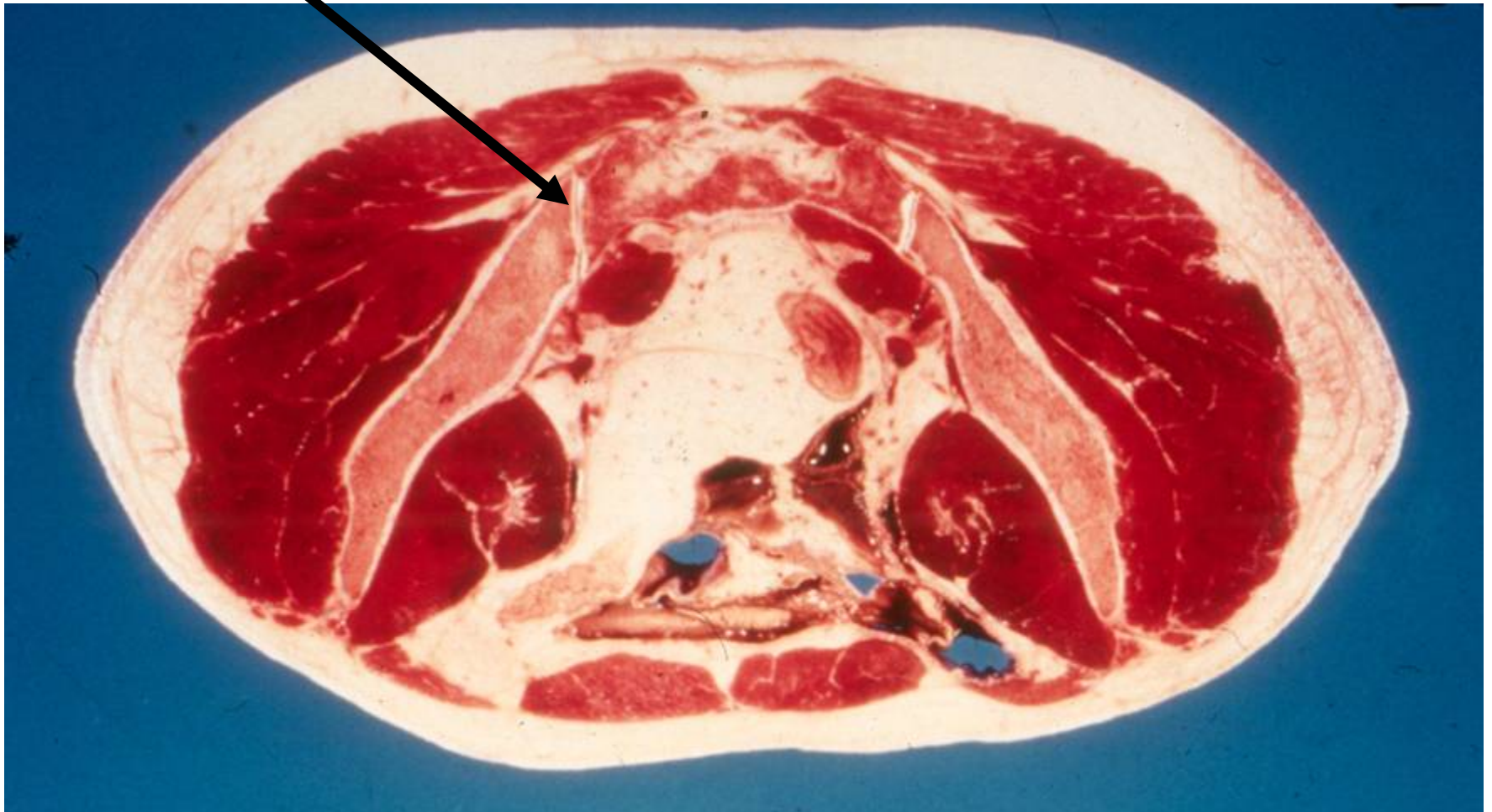
Week 6; Lecture 2; Wednesday

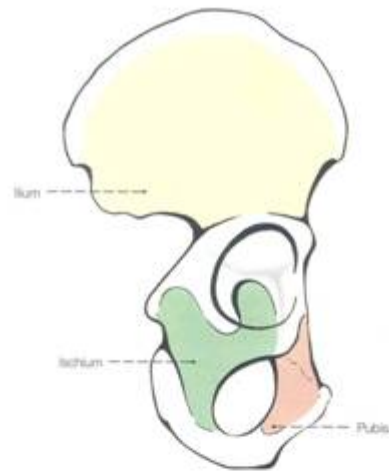
Dr. Stuart S. Sumida

Overview and Review of the Pelvis and Perineum

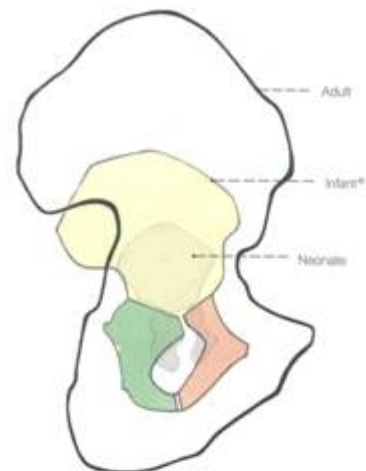
Three-Dimensional Context for Excretory and Reproductive Systems

Pelvic girdle is suturally attached to axial skeleton to facilitate transmission of locomotor energy generated by legs to rest of body.



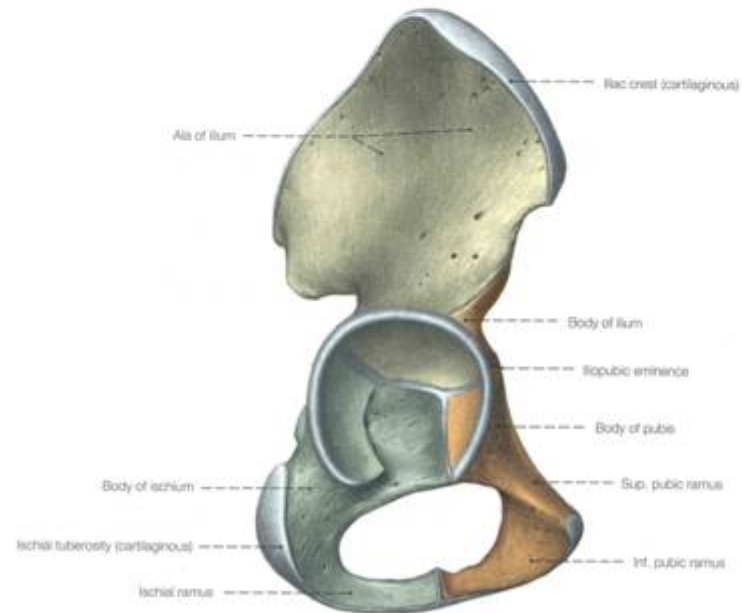


The right hip bone in a drawing showing the extent of its three osseous parts in a newborn, lateral aspect (110%).



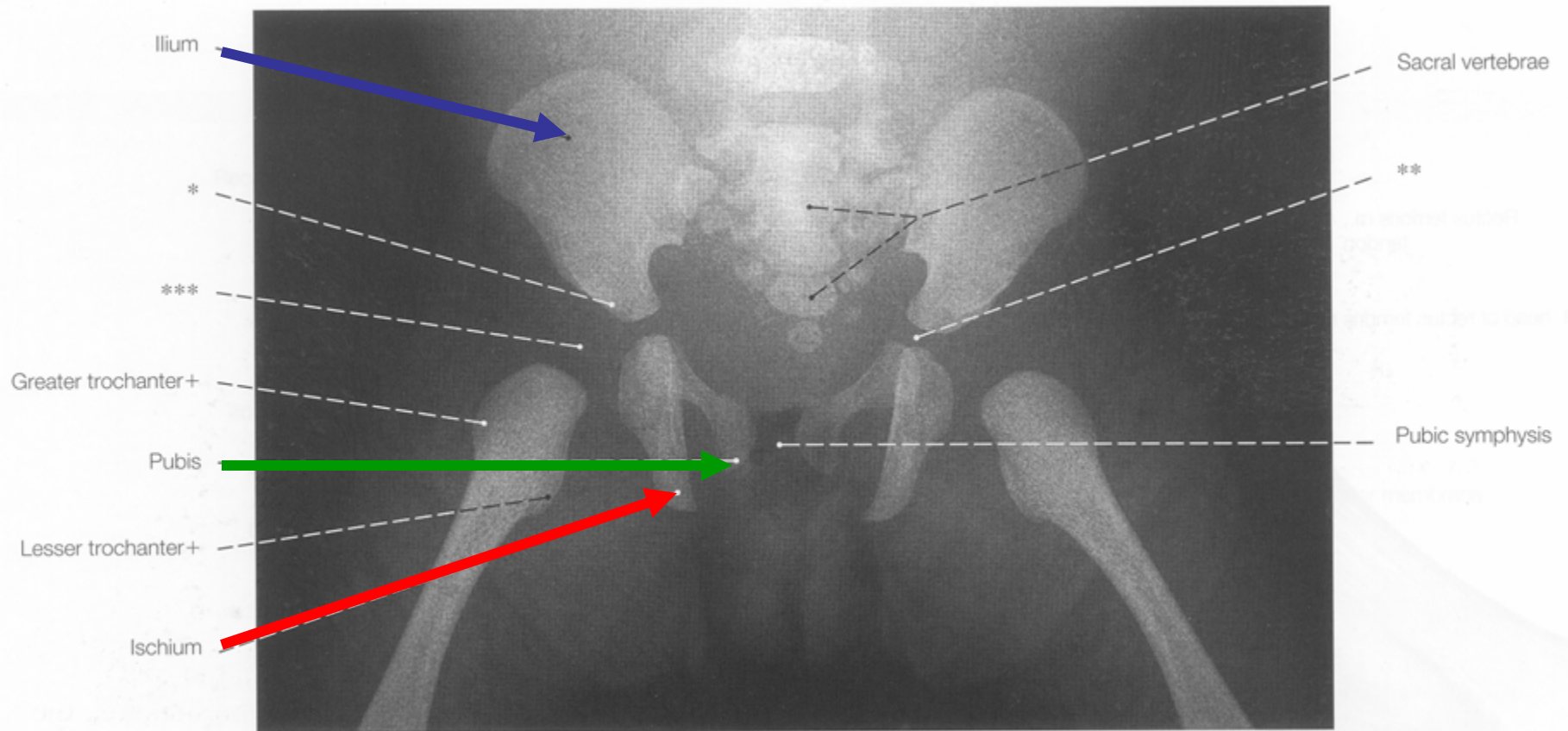
The right hip bone in a drawing showing the extent of its three osseous parts at different ages, lateral aspect.

* At about 6 years of age



The right hip bone, developmental state in a 6-year-old child, lateral aspect (90%).

The three parts of the hip bone are connected with each other in the region of the acetabulum in a Y-shaped cartilaginous junction, which undergoes synostosis at about 13-18 years of age.



Originally, right and left hip bones (= “inominant bones”) formed from three independent elements: **ilium**, **ischium**, and **pubis**.

Sacrum is originally five indenendant vertebrae.



Fig. 389: Lateral View of the Adult Right Hip Bone

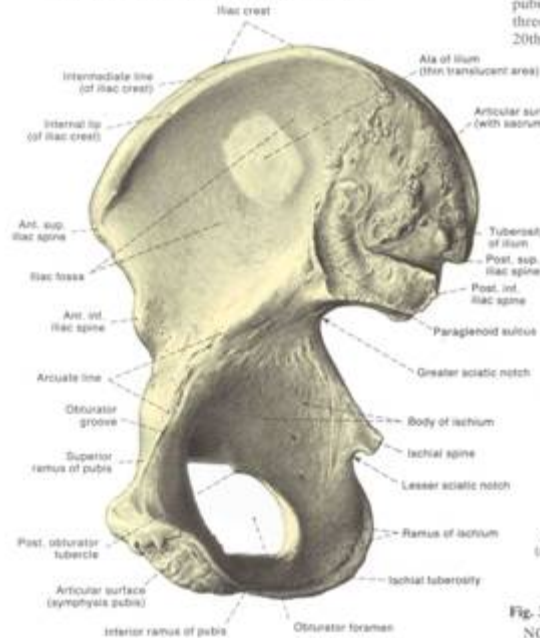


Fig. 390: Medial View of the Adult Right Hip Bone

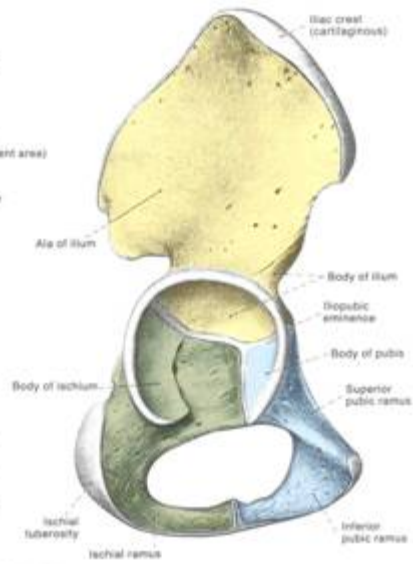


Fig. 391: Hip Bone of 5 Year Old Child: Lateral View

NOTE that the hip bone is formed by a fusion of the ilium (yellow), ischium (green) and pubis (blue). Although ossification of the inferior pubic ramus occurs during the 7th or 8th year, complete fusion of the three bones at the acetabulum occurs sometime between the 15th and 20th year.

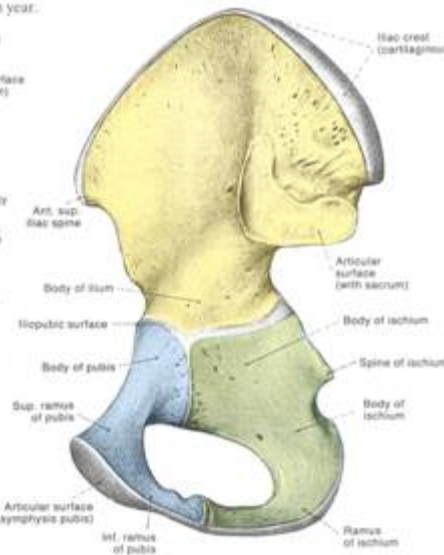
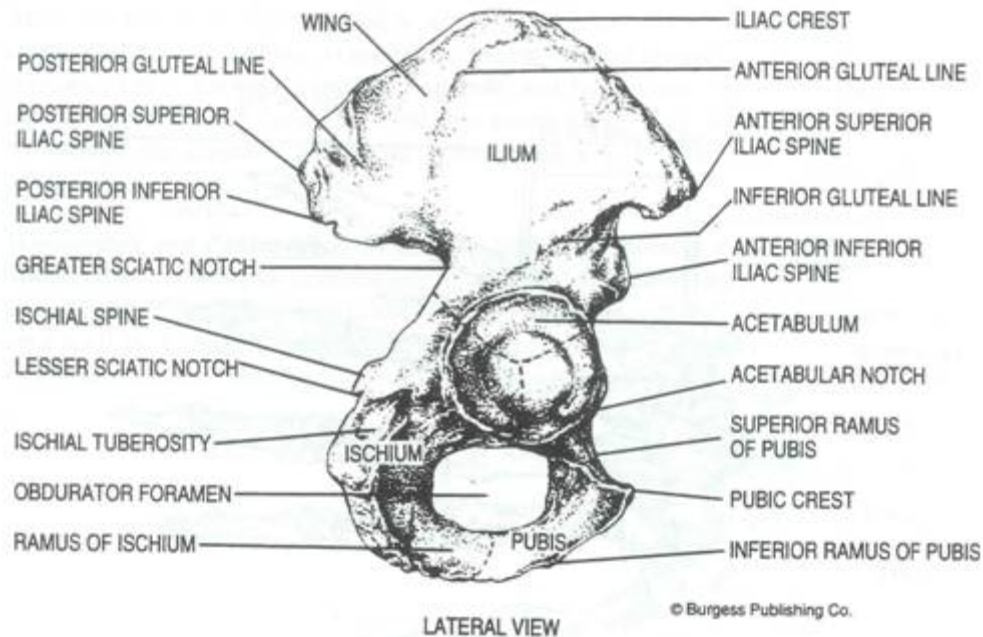


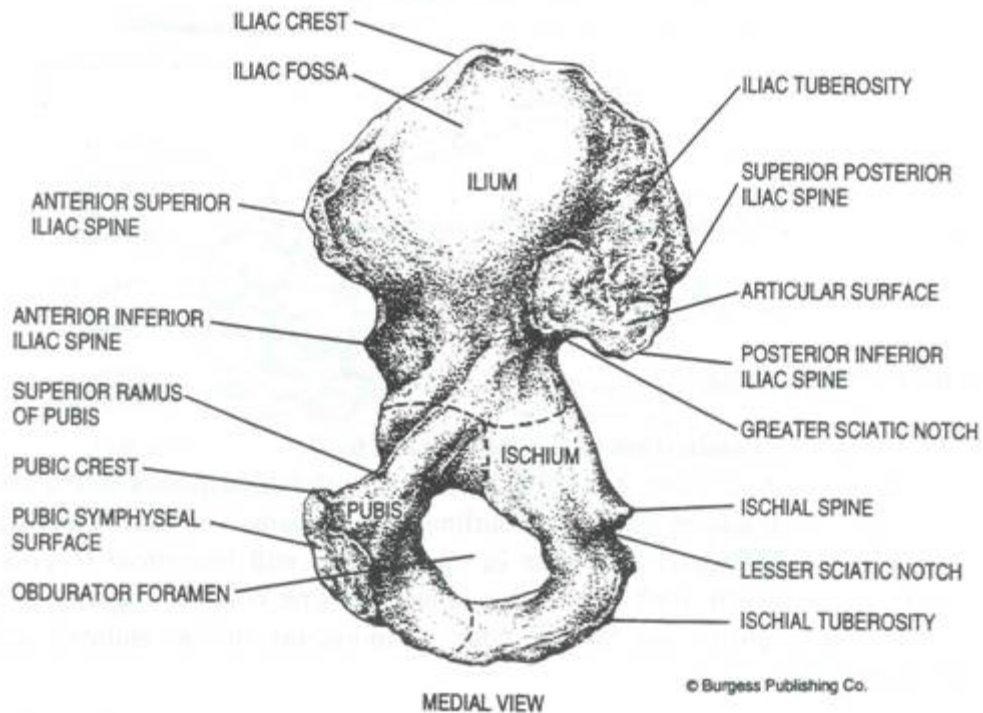
Fig. 392: Hip Bone of 5 Year Old Child: Medial View

NOTE the lines of fusion of the three bones above the obturator foramen and the fusion of the inferior pubic ramus and the ischial ramus below that foramen.

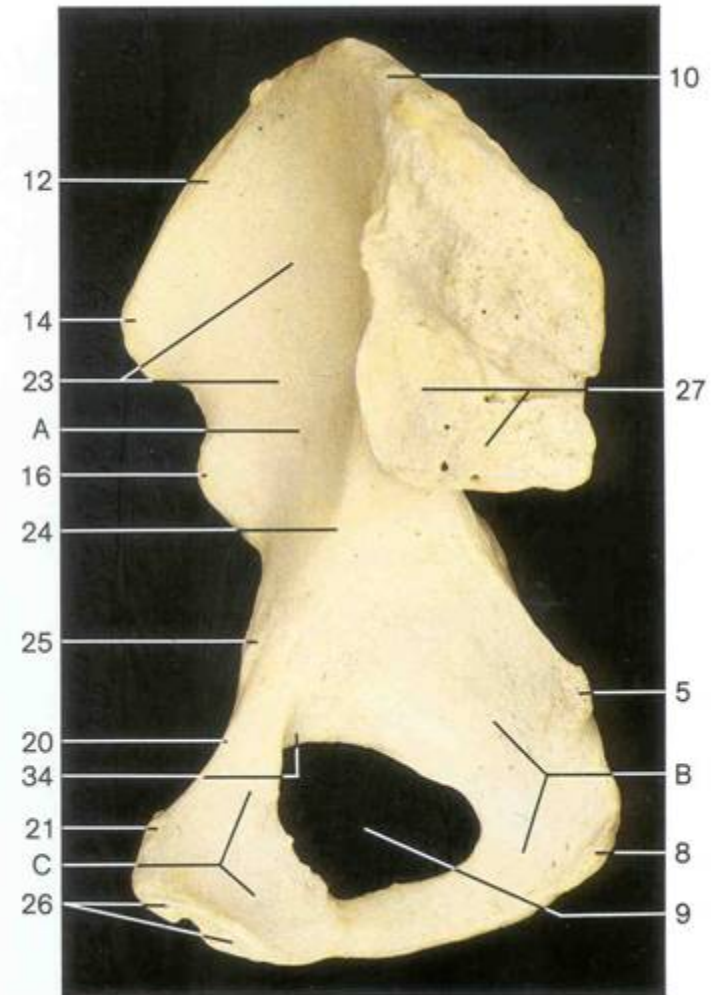
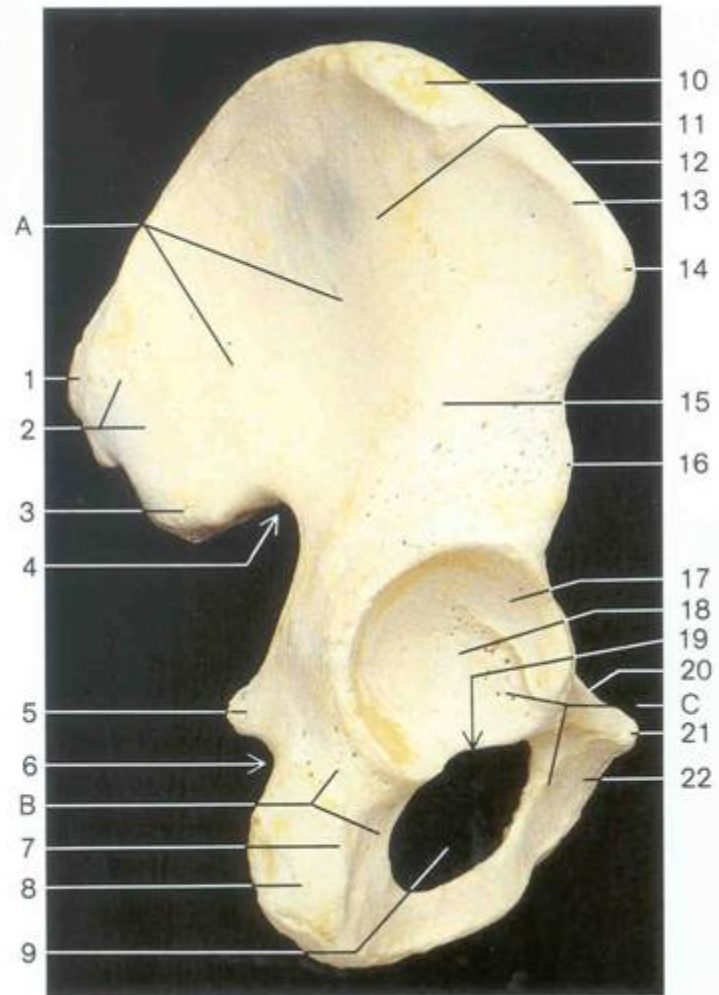


Major Landmarks You should remember:

1. Iliac crest
2. Anterior superior iliac spine
3. Anterior inferior iliac spine
4. Posterior superior iliac spine
5. Posterior inferior iliac spine
6. Greater sciatic notch
7. Spine of ischium
8. Lesser sciatic notch
9. Obturator foramen



Quiz yourself...



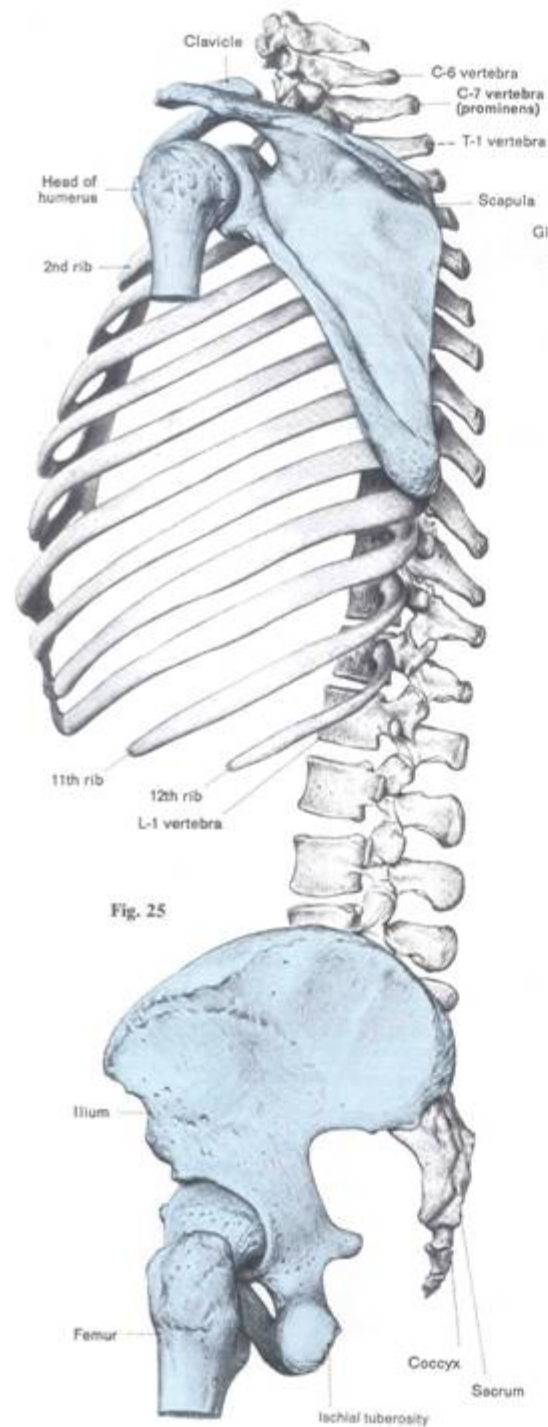


Fig. 25

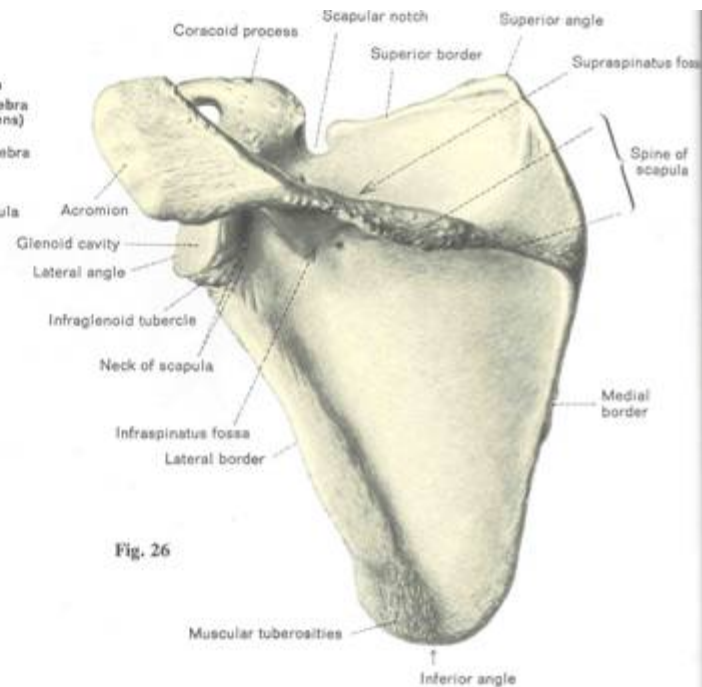


Fig. 26

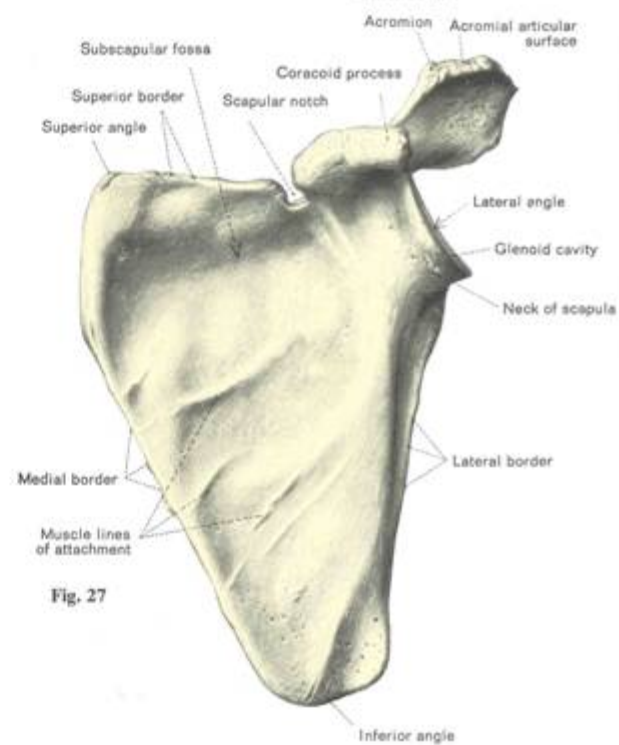
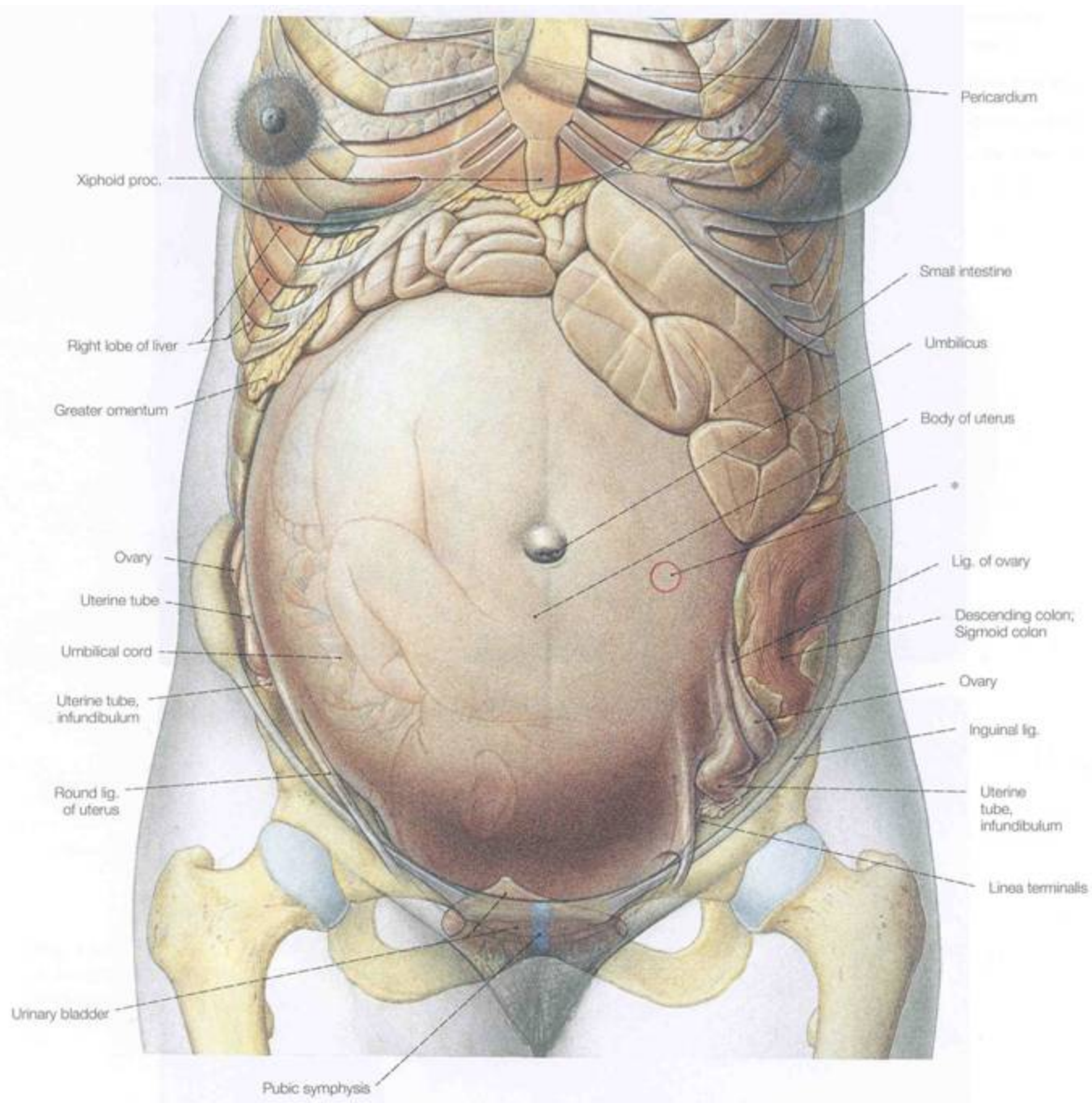
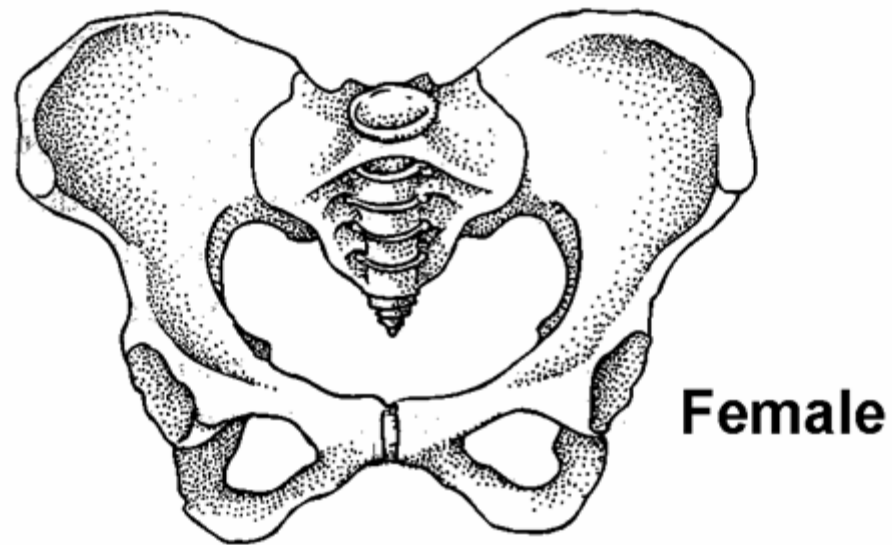
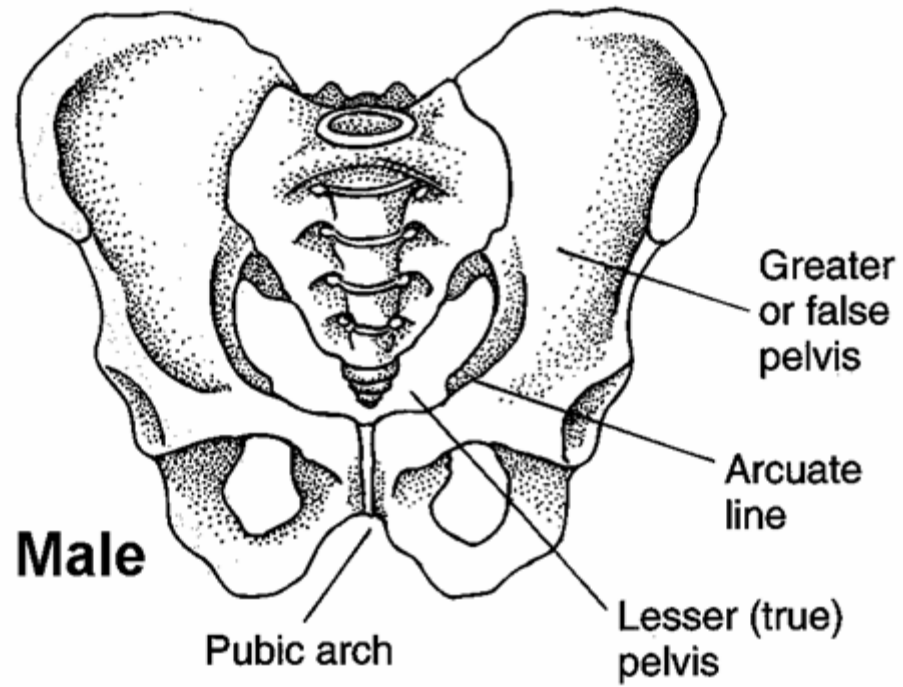
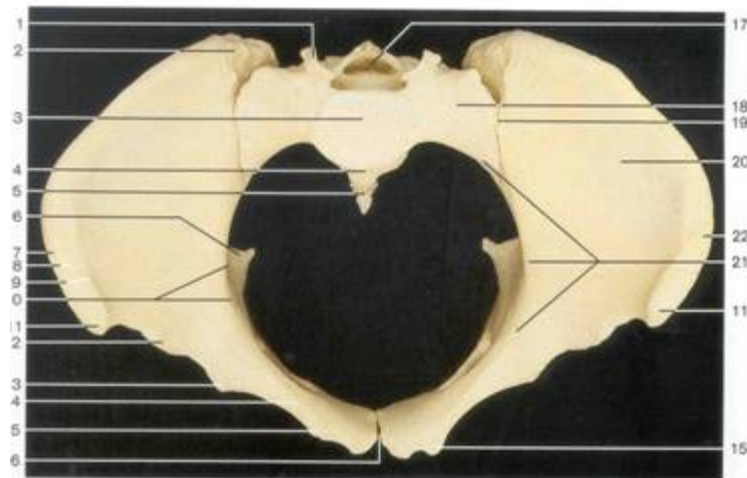


Fig. 27







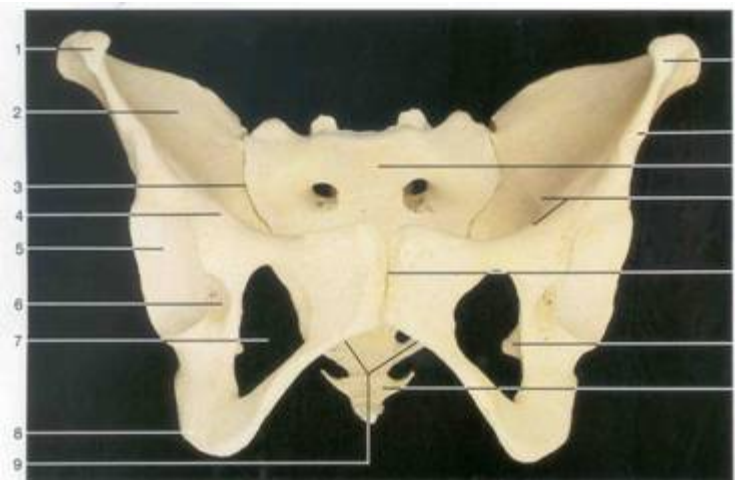
Female pelvis (superior aspect). Note the differences between the male and the female pelvis, predominantly in the form and dimensions of the sacrum, the superior and inferior apertures and the alae of the ilium.



Male pelvis (superior aspect). Compare with the female pelvis (depicted above).

- | | |
|--|----------------------------------|
| 1 Superior articular process of sacrum | 12 Anterior inferior iliac spine |
| 2 Posterior superior iliac spine | 13 Iliopubic eminence |
| 3 Base of sacrum | 14 Pecten pubis |
| 4 Sacral promontory | 15 Pubic tubercle |
| 5 Coccyx | 16 Pubic symphysis |
| 6 Ischial spine | 17 Sacral canal |
| 7 External lip | 18 Ala of sacrum |
| 8 Intermediate line | 19 Position of sacroiliac joint |
| 9 Internal lip | 20 Iliac fossa |
| 10 Arcuate line | 21 Linea terminalis |
| 11 Anterior superior iliac spine | 22 Iliac crest |

Female

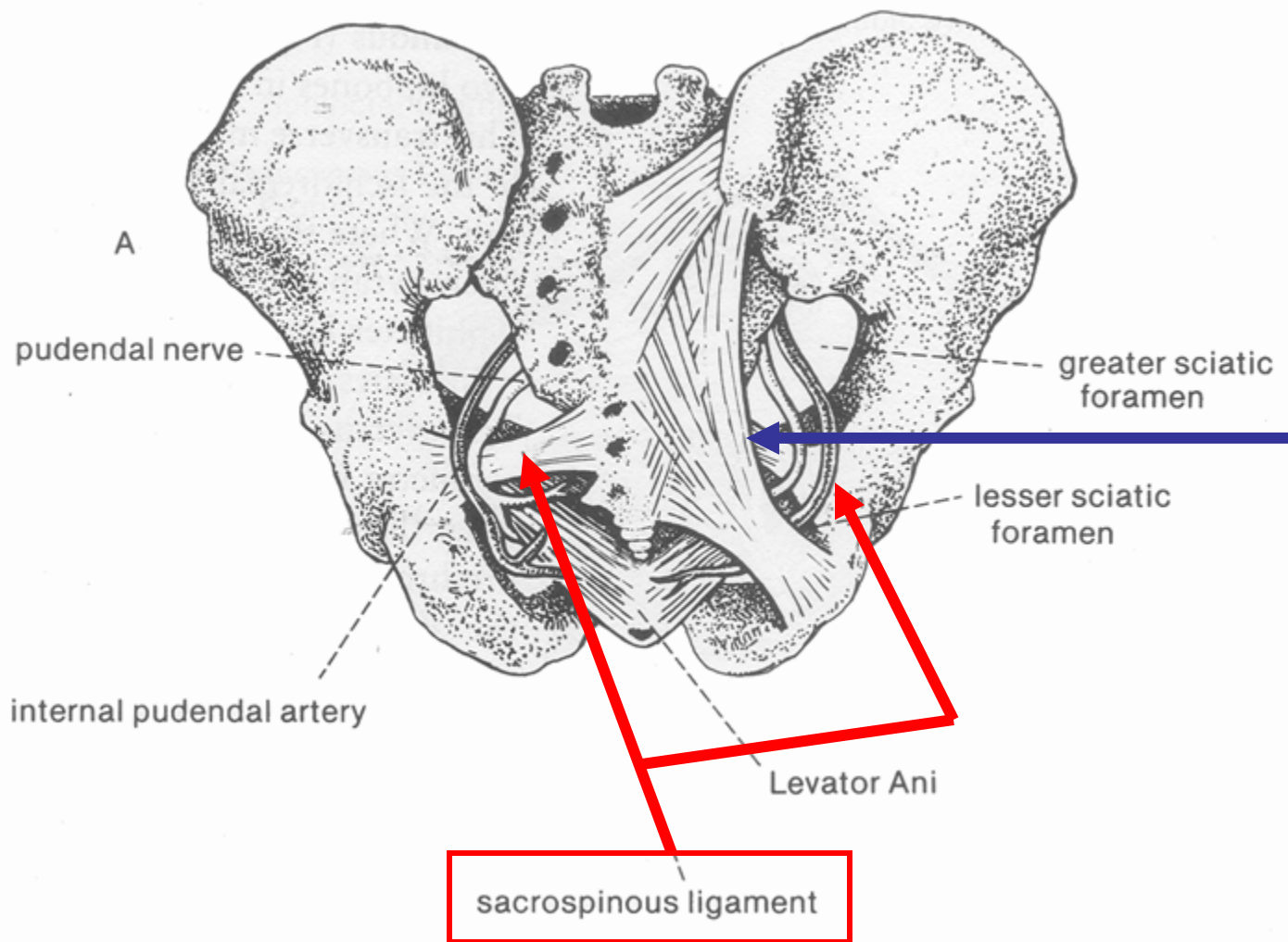


Female pelvis (anterior aspect). Note the differences between the form and dimensions of the male and the female pelvis. The female pubic arch is wider than the male. The obturator foramen in the female pelvis is triangular, while that in the male pelvis is ovoid.



Male pelvis (anterior aspect). Compare with foregoing figure.

- | | |
|----------------------------------|--|
| 1 Anterior superior iliac spine | 9 Pubic arch |
| 2 Iliac fossa | 10 Anterior inferior iliac spine |
| 3 Position of sacroiliac joint | 11 Sacrum |
| 4 Iliopubic eminence | 12 Linea terminalis (at margin of superior aperture) |
| 5 Laminate surface of acetabulum | 13 Pubic symphysis |
| 6 Acetabular notch | 14 Ischial spine |
| 7 Obturator foramen | 15 Coccyx |
| 8 Ischial tuberosity | |

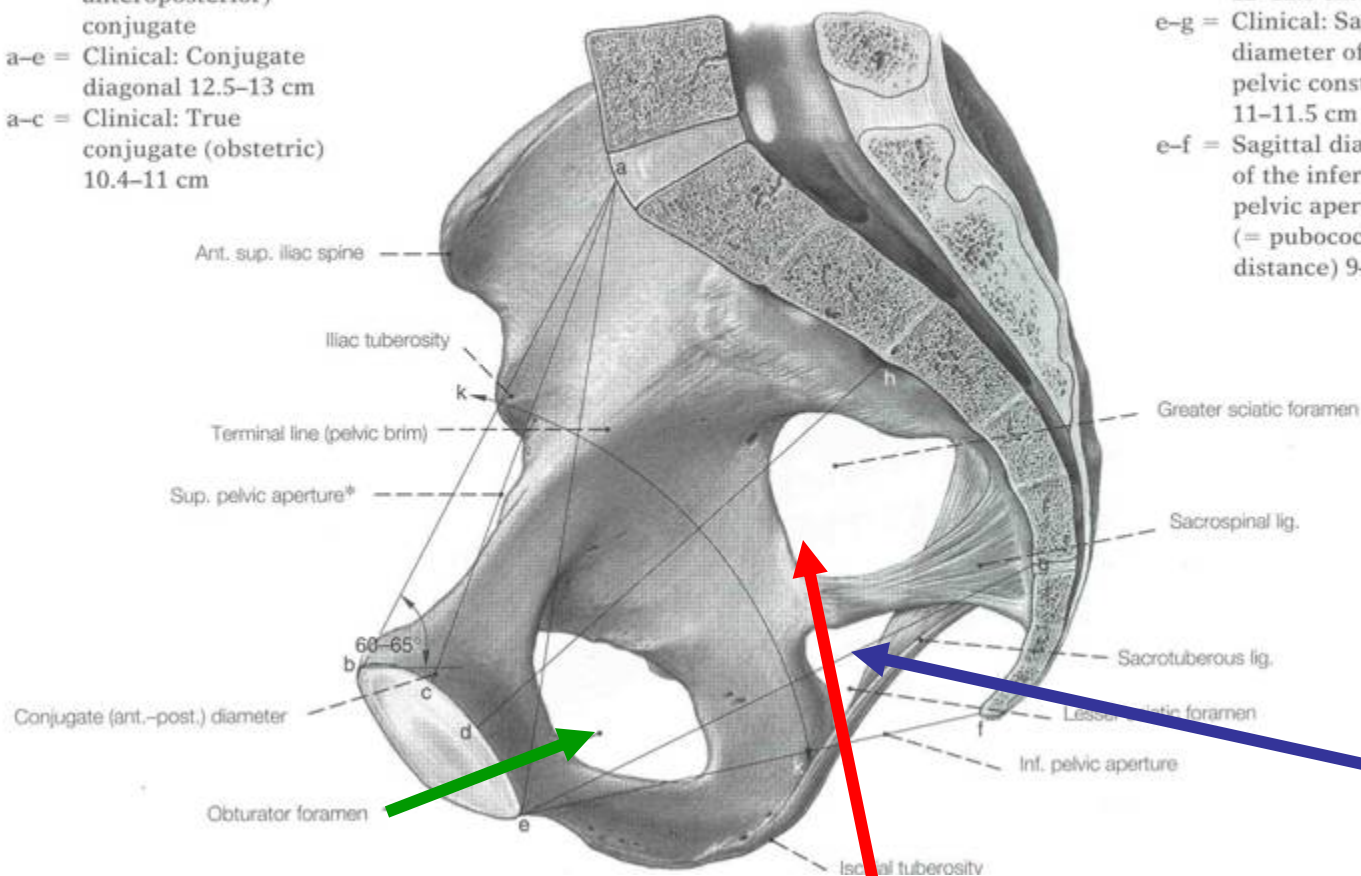


Ligament running from sacrum to ischial tuberosity is **SACROTUBEROUS LIGAMENT**. Its presence closes off lesser sciatic notch to become lesser sciatic foramen.

Ligament running from sacrum to ischial spine is **SACROSPINOUS LIGAMENT**. Its presence closes off greater sciatic notch to become greater sciatic foramen.

k-k = Pelvic axis
a-b = Clinical: Anatomical
(true, anteroposterior)
conjugate
a-e = Clinical: Conjugate
diagonal 12.5–13 cm
a-c = Clinical: True
conjugate (obstetric)
10.4–11 cm

h-d = Clinical: Sagittal
diameter of the
pelvic brim
12–12.5 cm
e-g = Clinical: Sagittal
diameter of the
pelvic constriction
11–11.5 cm
e-f = Sagittal diameter
of the inferior
pelvic aperture
(= pubococcygeal
distance) 9–10 cm

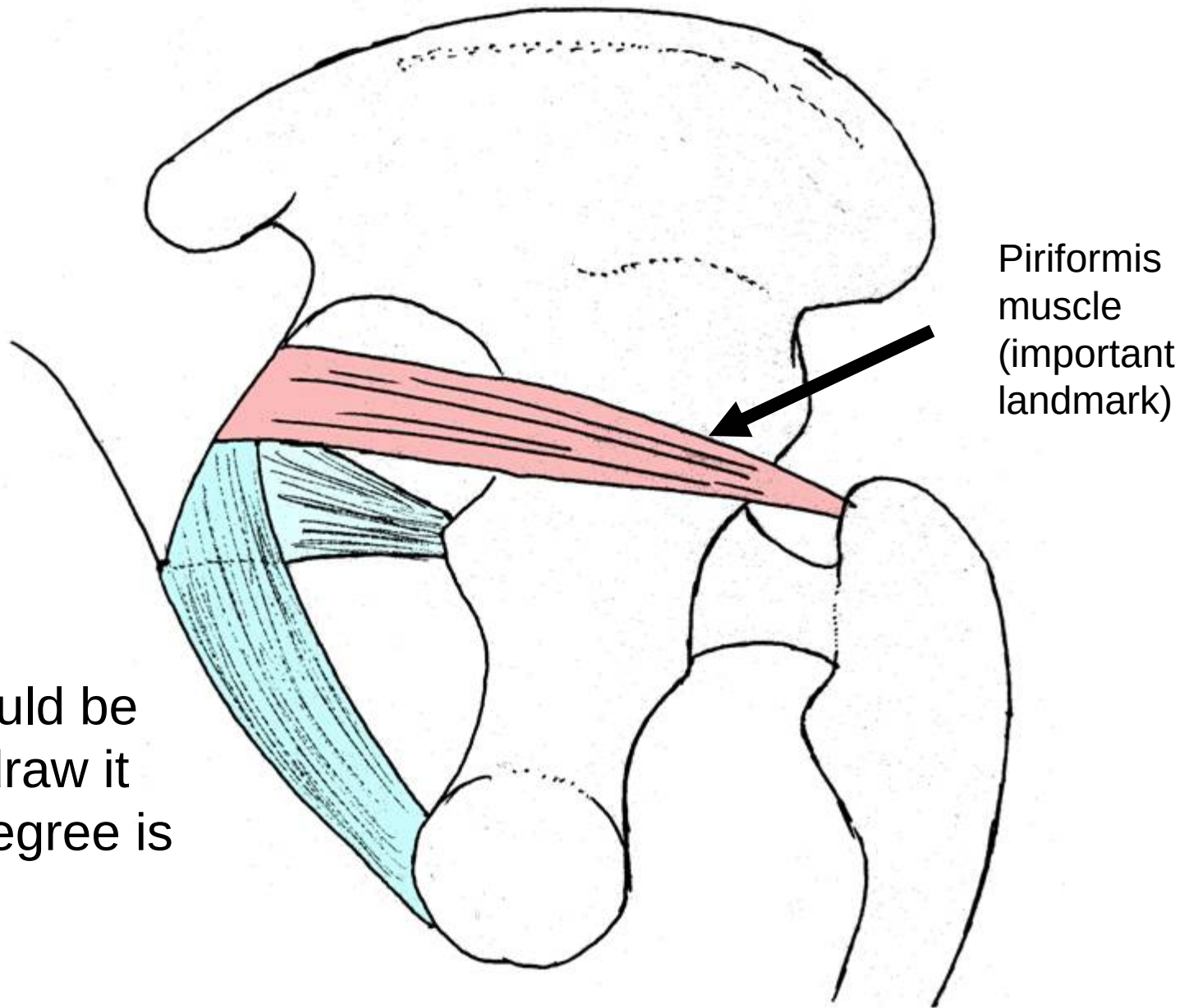


Ligament running from sacrum to ischial tuberosity is **SACROTUBEROUS LIGAMENT**. Its presence closes off lesser sciatic notch to become **lesser sciatic foramen**.

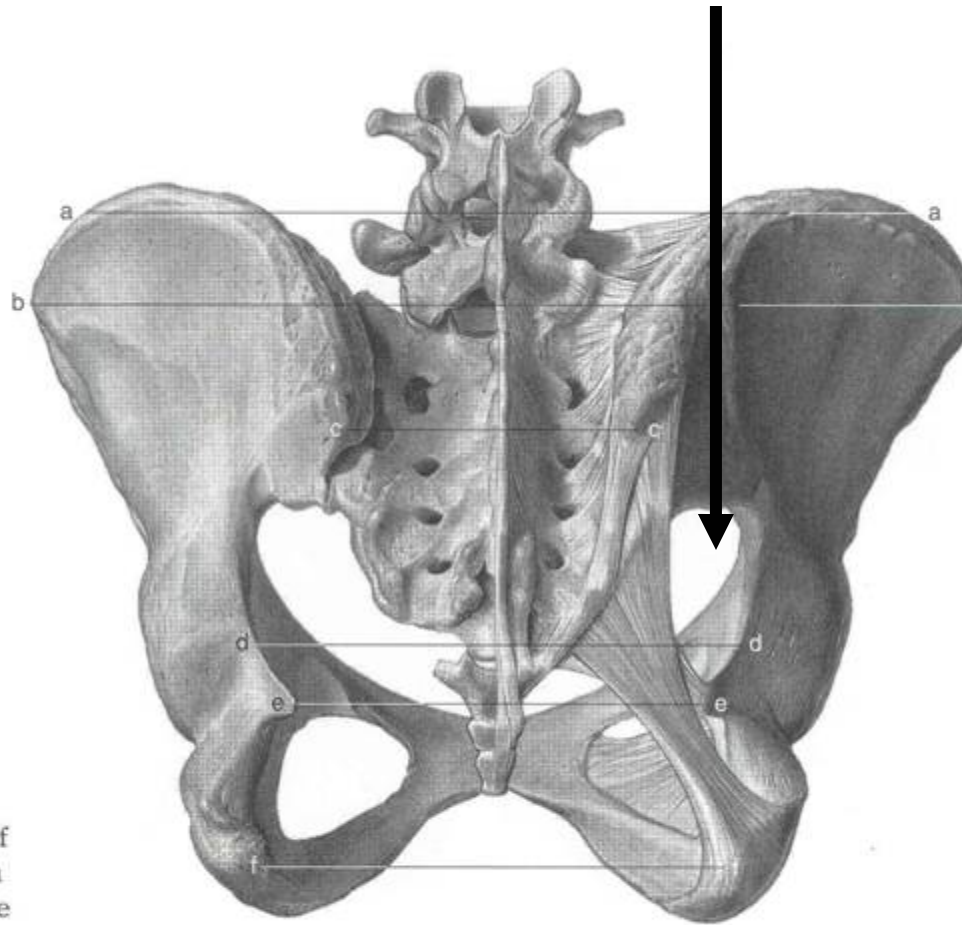
Most, but not all of **obturator foramen** is covered over by obturator membrane. Smaller foramen is left.

Ligament running from sacrum to ischial spine is **SACROSPINOUS LIGAMENT**. Its presence closes off greater sciatic notch to become **greater sciatic foramen**.

You should be able to draw it to this degree is detail.

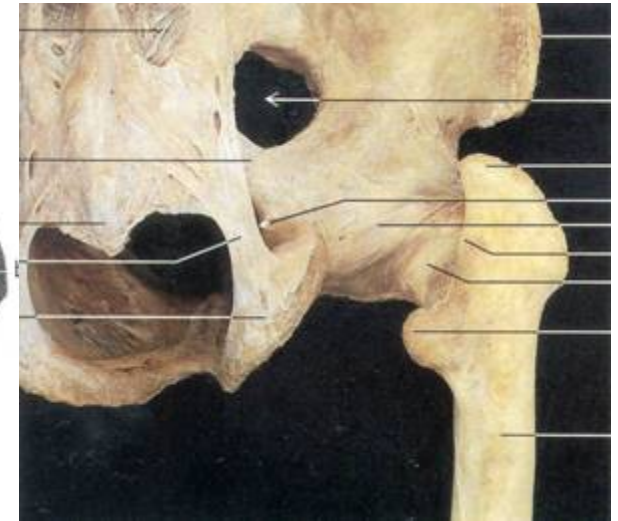


Along with some other important things, the SCIATIC NERVE exits the pelvis through the greater sciatic foramen.

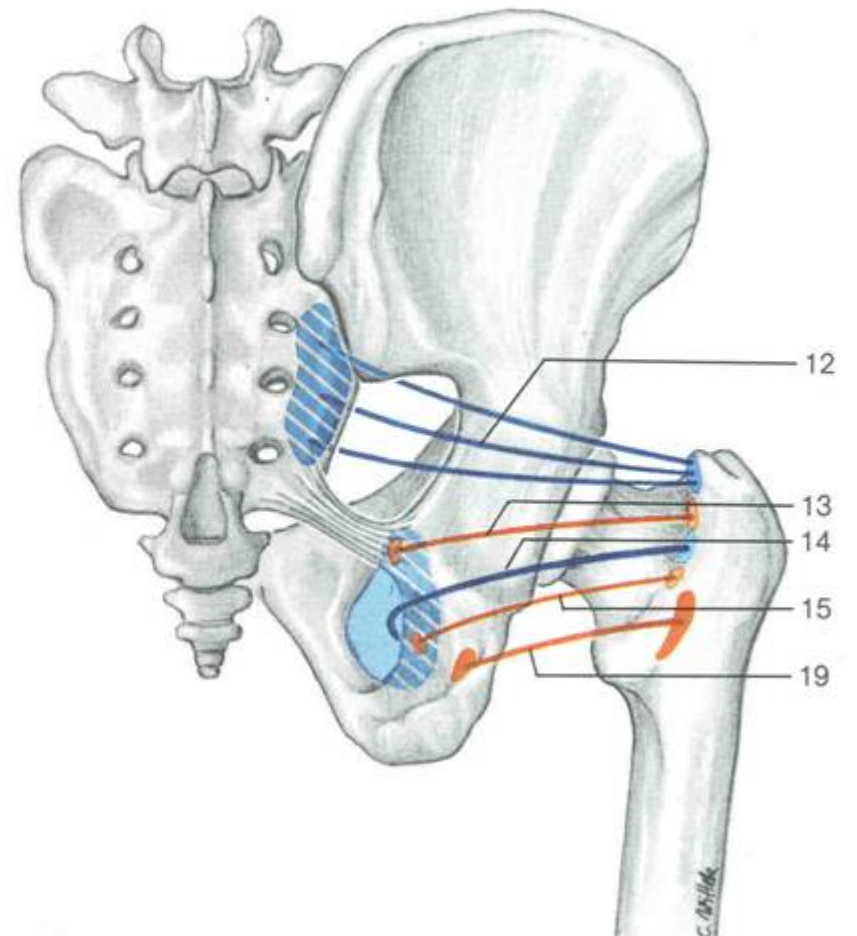
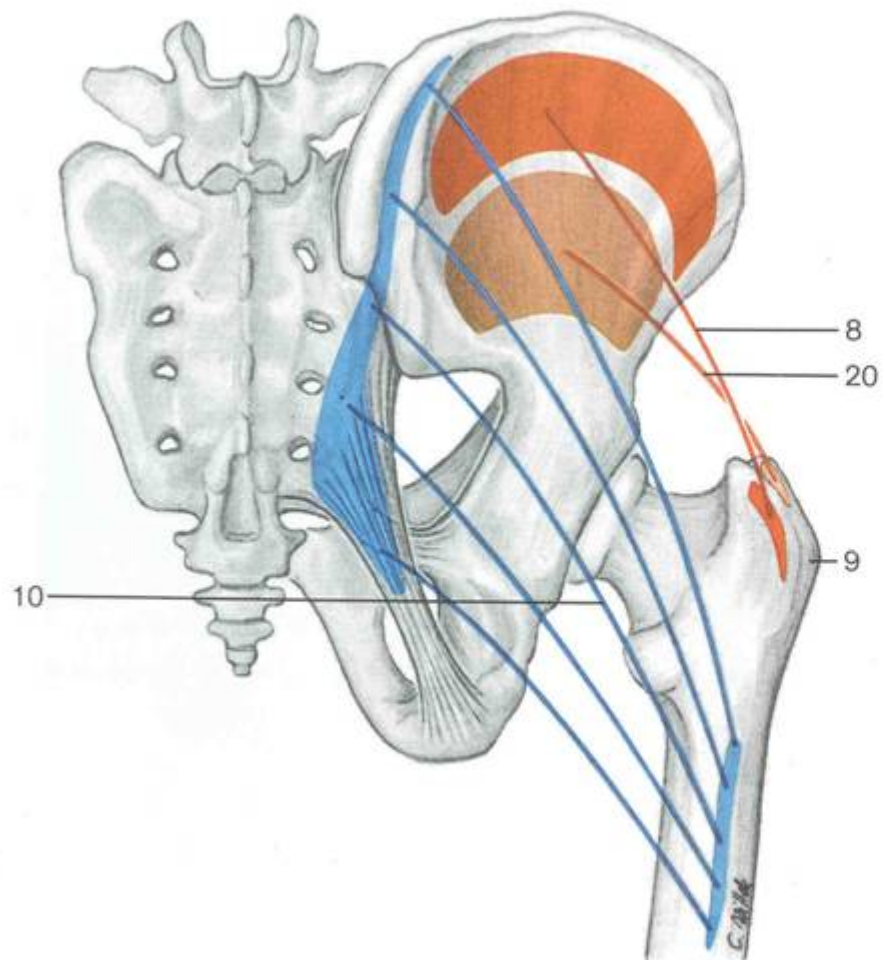


The pelvis, dimensions in the female, dorsal aspect

- a-a = Crestal distance
28-29 cm*
- b-b = Spinal distance
25-26 cm*
- c-c = Post. spinal
diameter (width of
the sacrum) 10 cm
- * In perspective, the
crestal distance
appears shorter
than the spinal
distance



- d-d = Transverse diameter
of the pelvic brim (= interacetabular line)
12-12.5 cm
- e-e = Transverse diameter
of the pelvic
constriction
(=interspinal line)
10.5 cm
- f-f = Transverse diameter
of the inferior pelvic
aperture (= tuberal
diameter) 11-12 cm

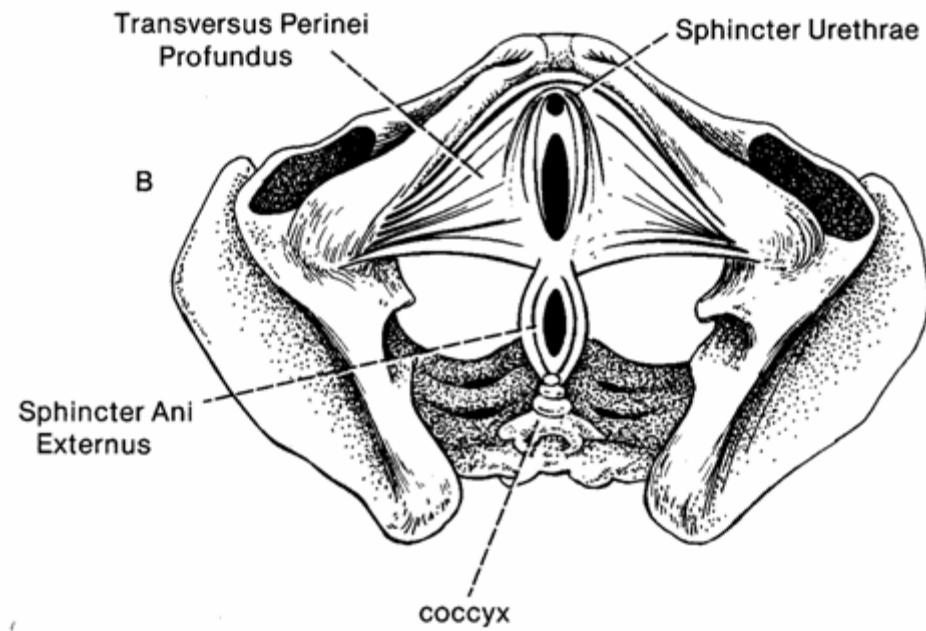
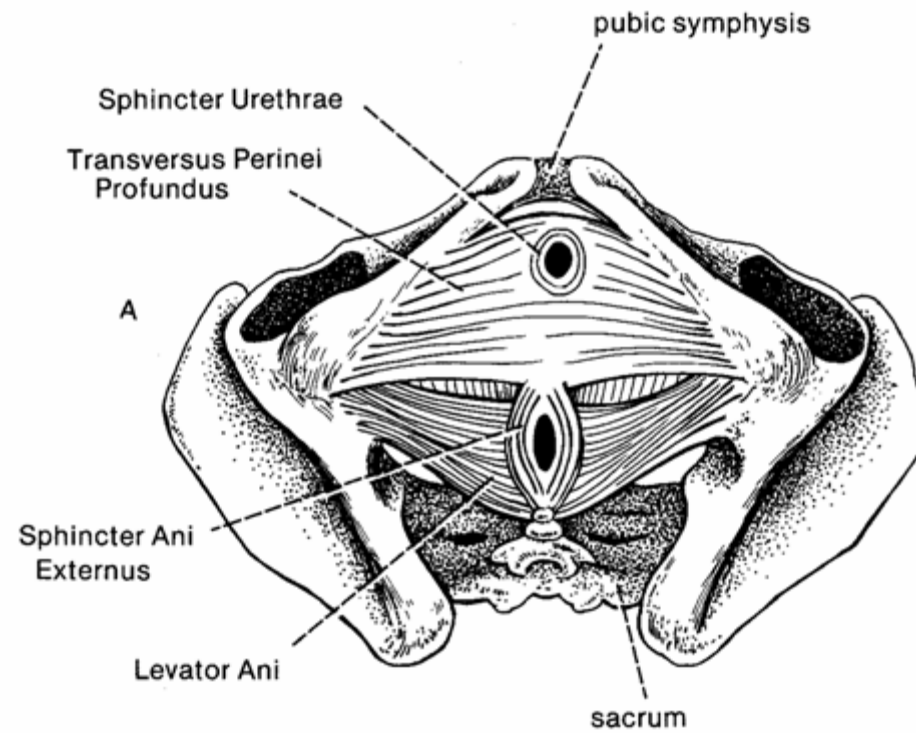


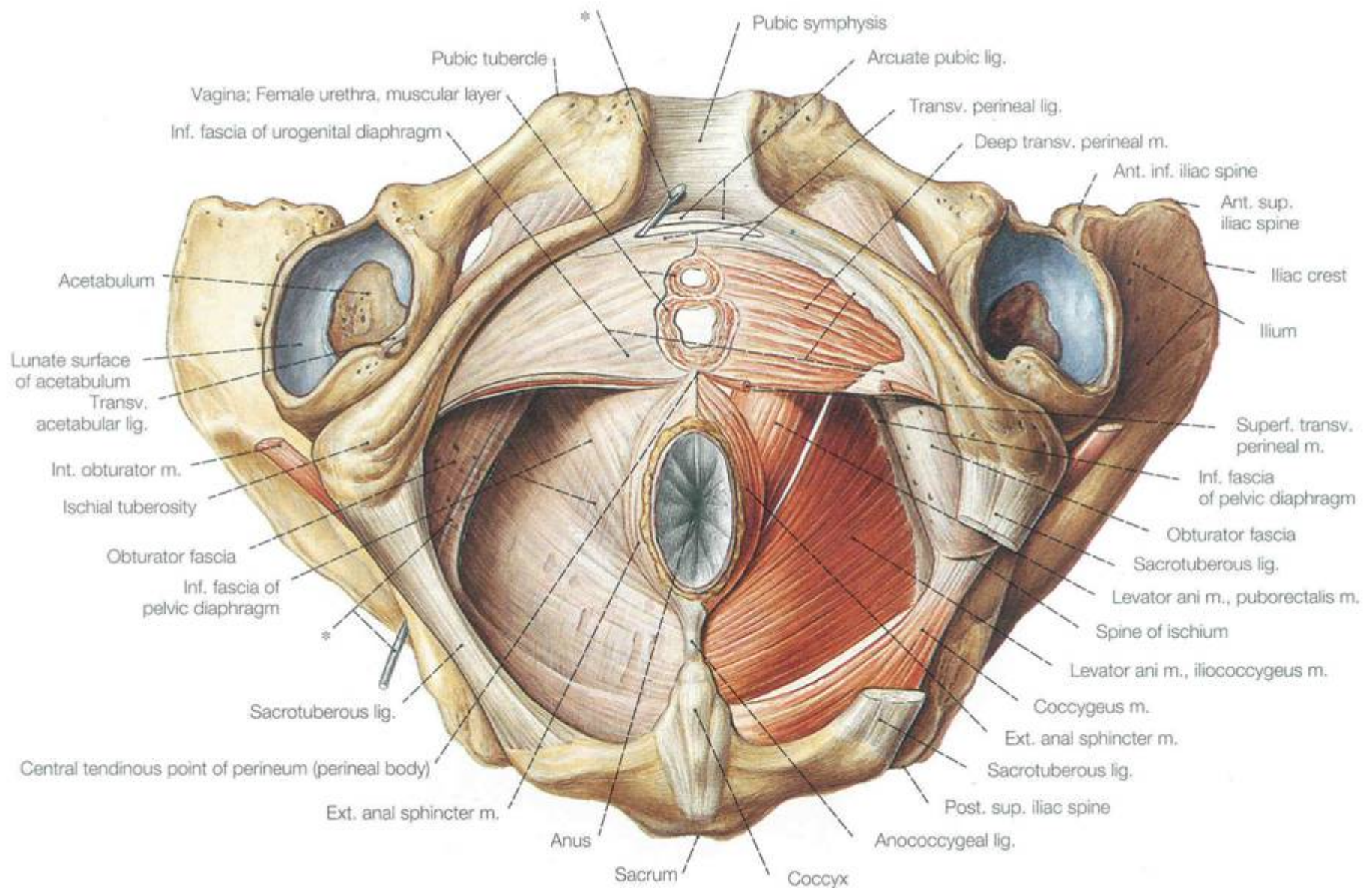
Review of Perineal Musculature.

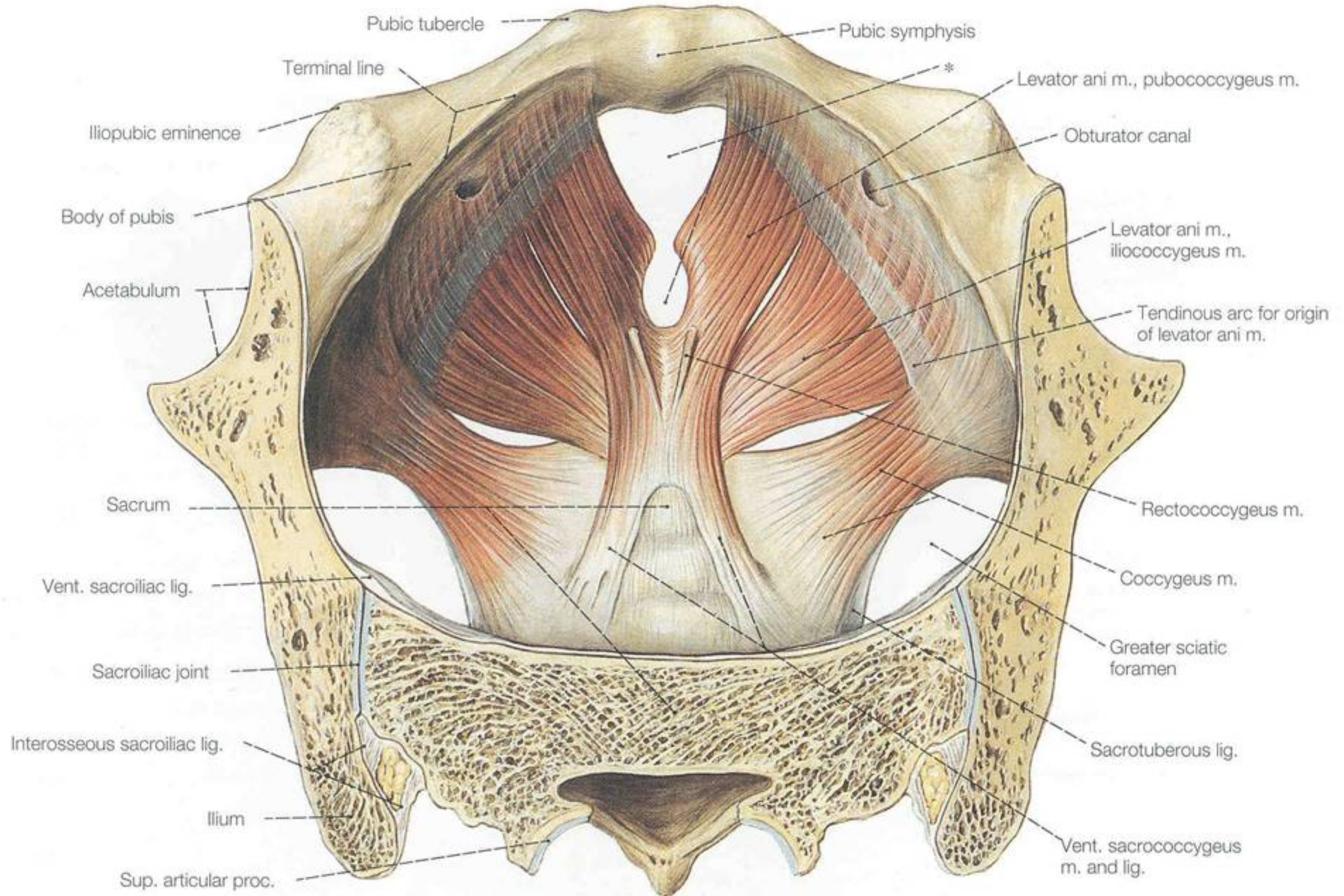
It is hypaxial musculature. Remember, always three layers:

1. External Layer: Urogenital diaphragm (external sphincters) and deep transverse perineal muscle
2. Middle Layer: Pelvic diaphragm
 - Levator ani
 - Coccygeus
 - Iliococcygeus (more superficial and posterior)
 - Pubococcygeus (more anterior)
3. Deep Layer: Transversalis fascia

Nerves run between middle and innermost layers.







MUSCULAR INNERVATION:

Superficial layer: Pudendal nerve (S2,3,4) to urogenital diaphragm.

Middle layer: Nerve to pelvic diaphragm (S4,5)

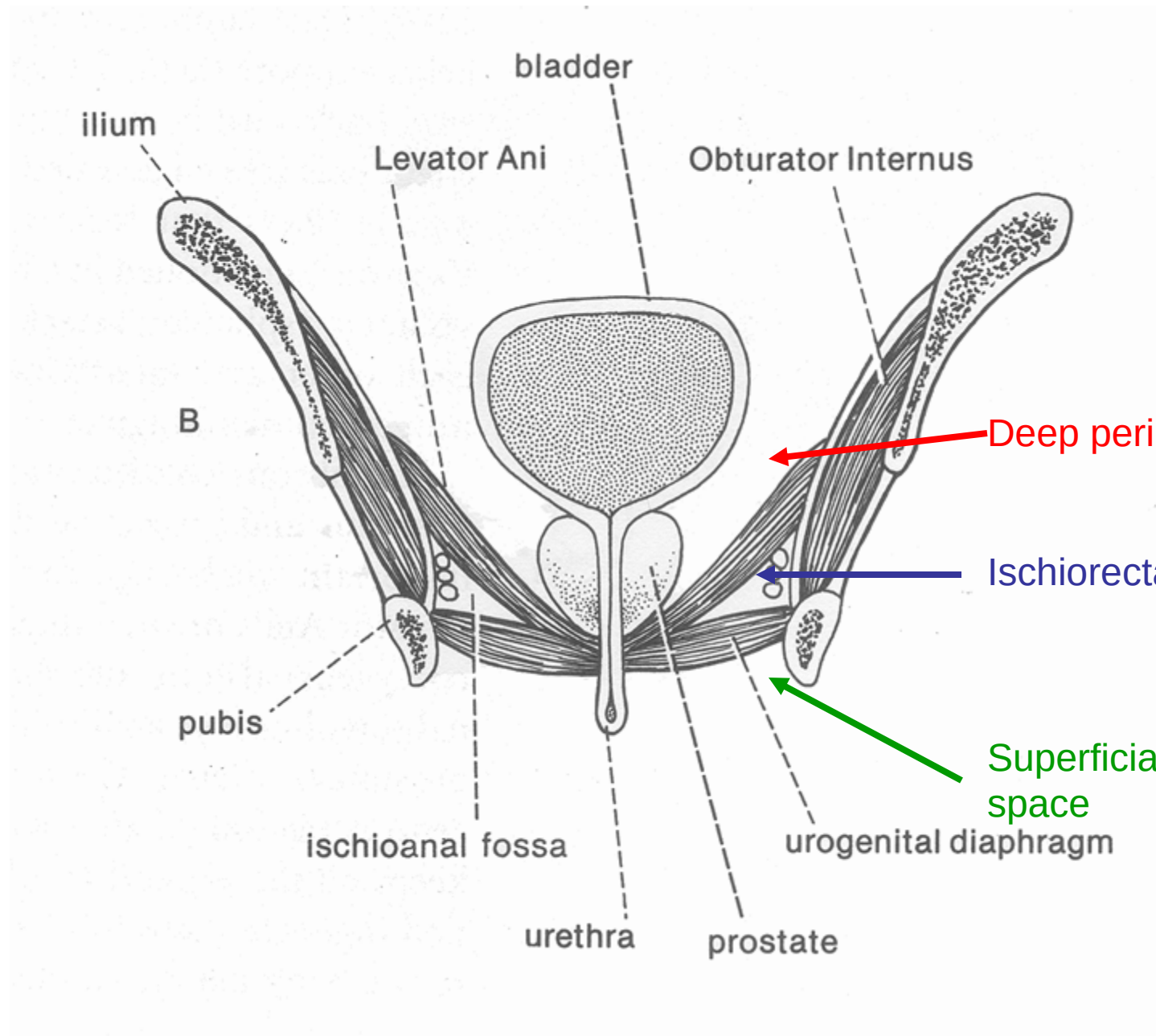
Deep layer: reduced to fascia, no innervation necessary.

Muscle layers define important spaces:

Deep perineal space lies internal to deepest layer (transversalis fascia).

Ischiorectal fossa lies between urogenital diaphragm and pelvic diaphragm.

Superficial perineal space is between urogenital diaphragm and superficial fascia plus skin.



ilium

bladder

Levator Ani

Obturator Internus

B

Deep perineal space

Ischioanal fossa

pubis

Superficial perineal space

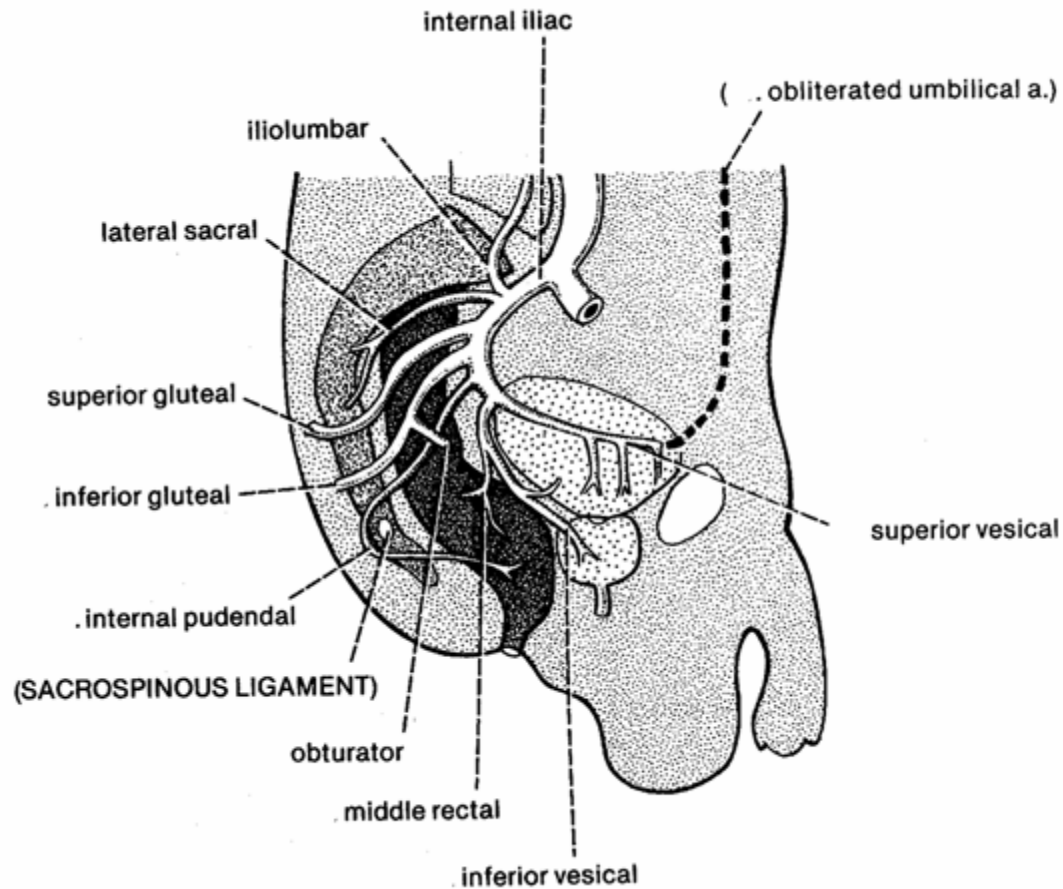
ischioanal fossa

urogenital diaphragm

urethra

prostate

Branches of the Internal Iliac Artery (In order)



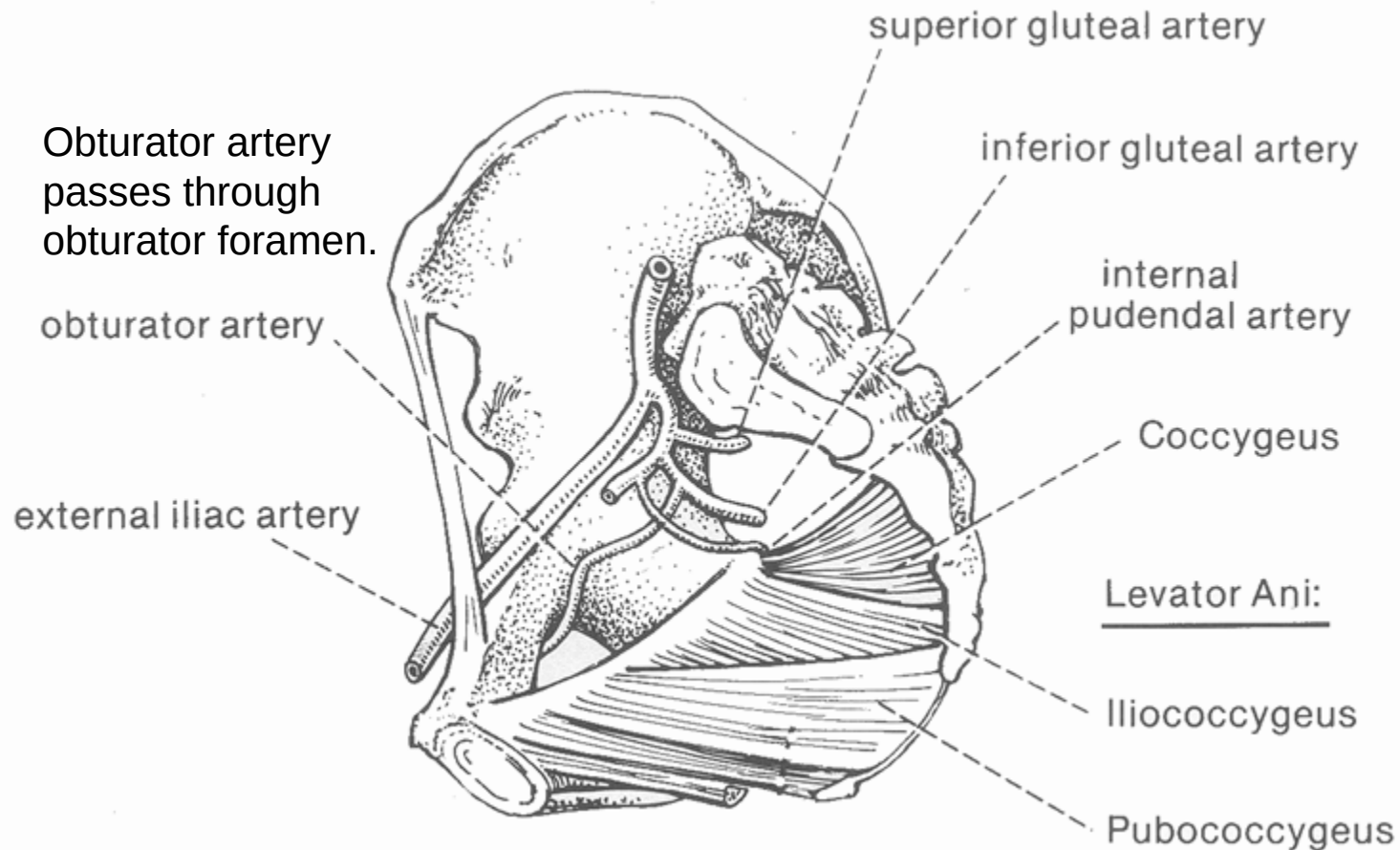
1. Iliolumbar
2. Lateral sacral
3. Superior gluteal
4. Inferior gluteal
5. Internal pudendal
6. Obturator
7. Middle rectal
8. Inferior vesicle
9. Superior vesicle
10. The old umbilical artery connects to end of internal iliac.

Detail on Branches of Internal Iliac:

Superior gluteal artery runs with superior gluteal nerve through greater sciatic foramen and over piriformis muscle.

Inferior gluteal artery goes through greater sciatic foramen, but runs with inferior gluteal nerve and runs below piriformis muscle.

(Internal) Pudendal artery travels with pudendal nerve



Remember, terminal end of the internal iliac artery was the fetal umbilical artery.

This means that you should be able to find it in continuity with the umbilicus via the MEDIAL UMBILICAL FOLD.