

Pelvis + Perineum

*BY:- Zufan Tessema
(MSc.)*

Outlines

Pelvis

- Function of pelvis
- Pelvic girdle
- Joints of pelvis
- The pelvic wall
- Pelvic cavity
- Pelvic Viscera
 - Male pelvic viscera
 - Female pelvic organs

Perineum

Pelvis

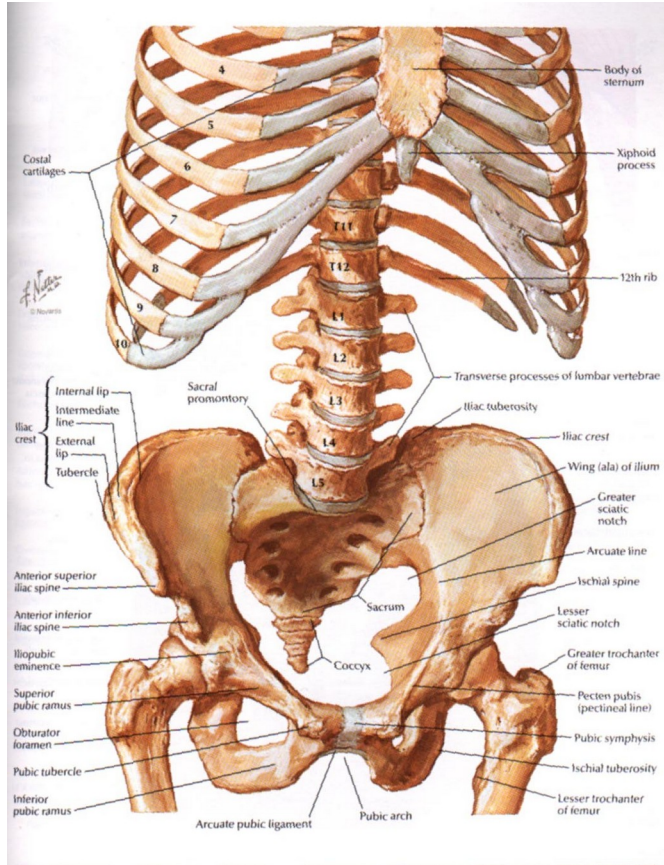
- Is the part of the body between the trunk and the lower limbs.
- The pelvis cavity is the inferior most part of the abdominopelvis cavity
- Anatomically it is bounded by the pelvis girdle
- Enclosed by bony, ligamentous and muscular wall
- Contains the urinary bladder, ureters, pelvic genital organs, rectum, blood vessels, lymphatics and nerves

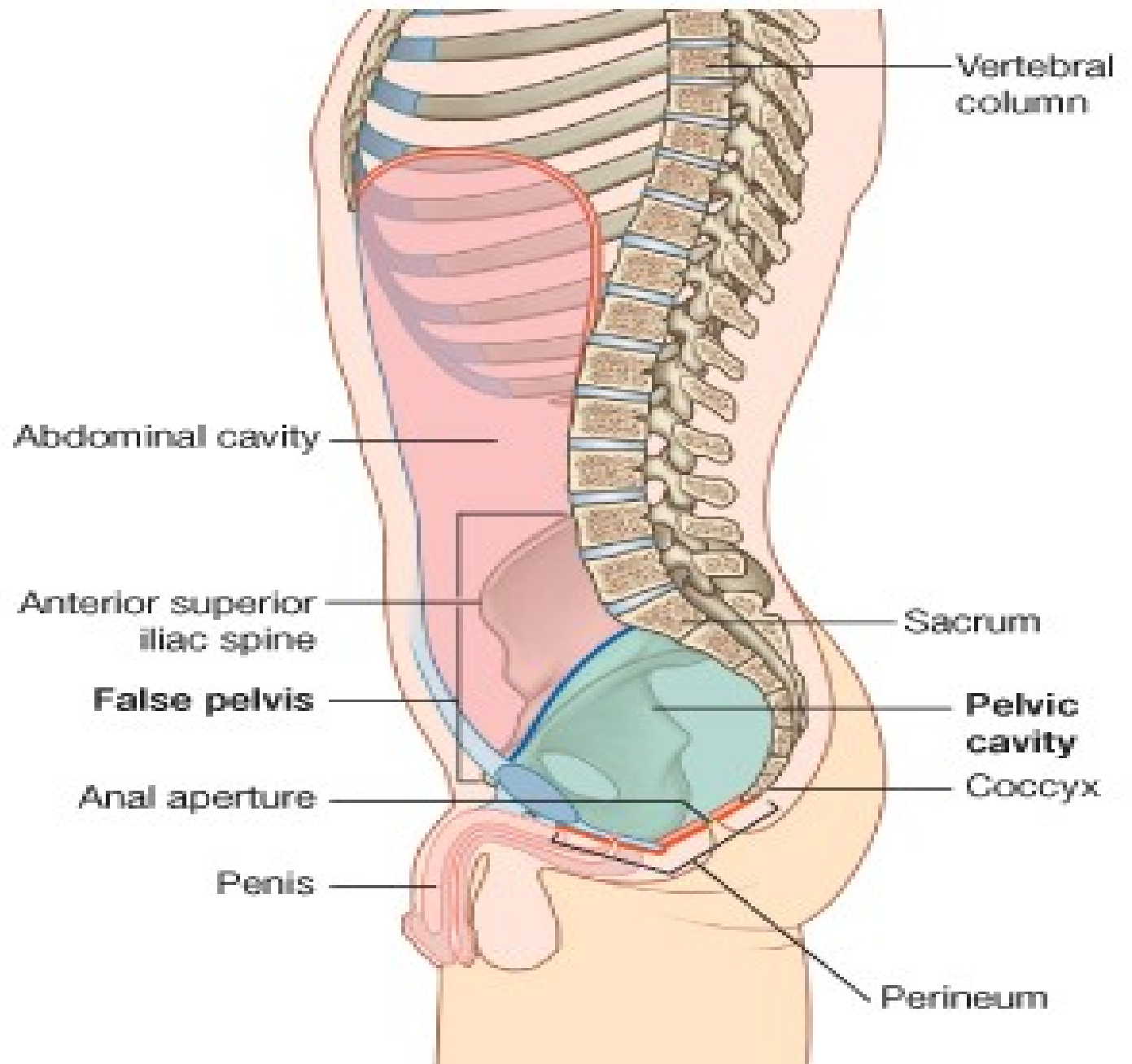
Pelvis girdle

- A basin shaped ring of bones that connects the vertebral column to the two femur.
- Functions are to :
- Protect the pelvis viscera
- Provide support for abdomino pelvis viscera
- Attachment for muscles of locomotion and posture

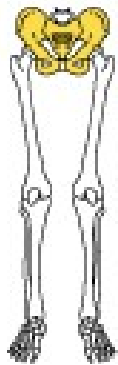
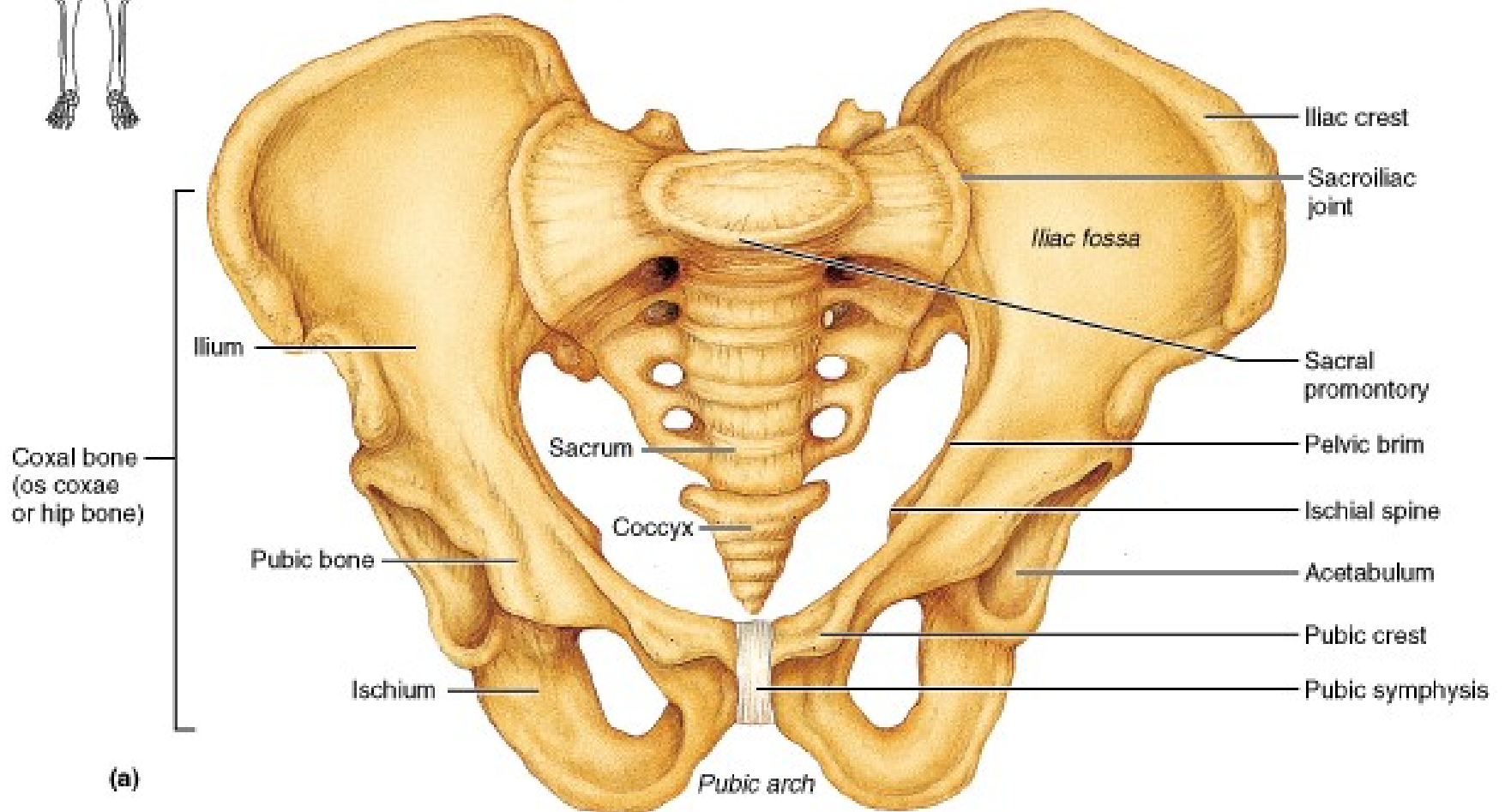
Bony Pelvis

- 2 Pelvic = Coxal = Innominate bones fused together
- Each Pelvic bone
 - Ilium
 - Ischium
 - Pubis
 - 3 parts join to form **acetabulum**
- Sacrum and Coccyx help create pelvis and form pelvic cavity
- Function
 - attaches lower limb to axial skeleton
 - supports viscera
 - transmits weight of upper body





PELVIC BONE



Ilium

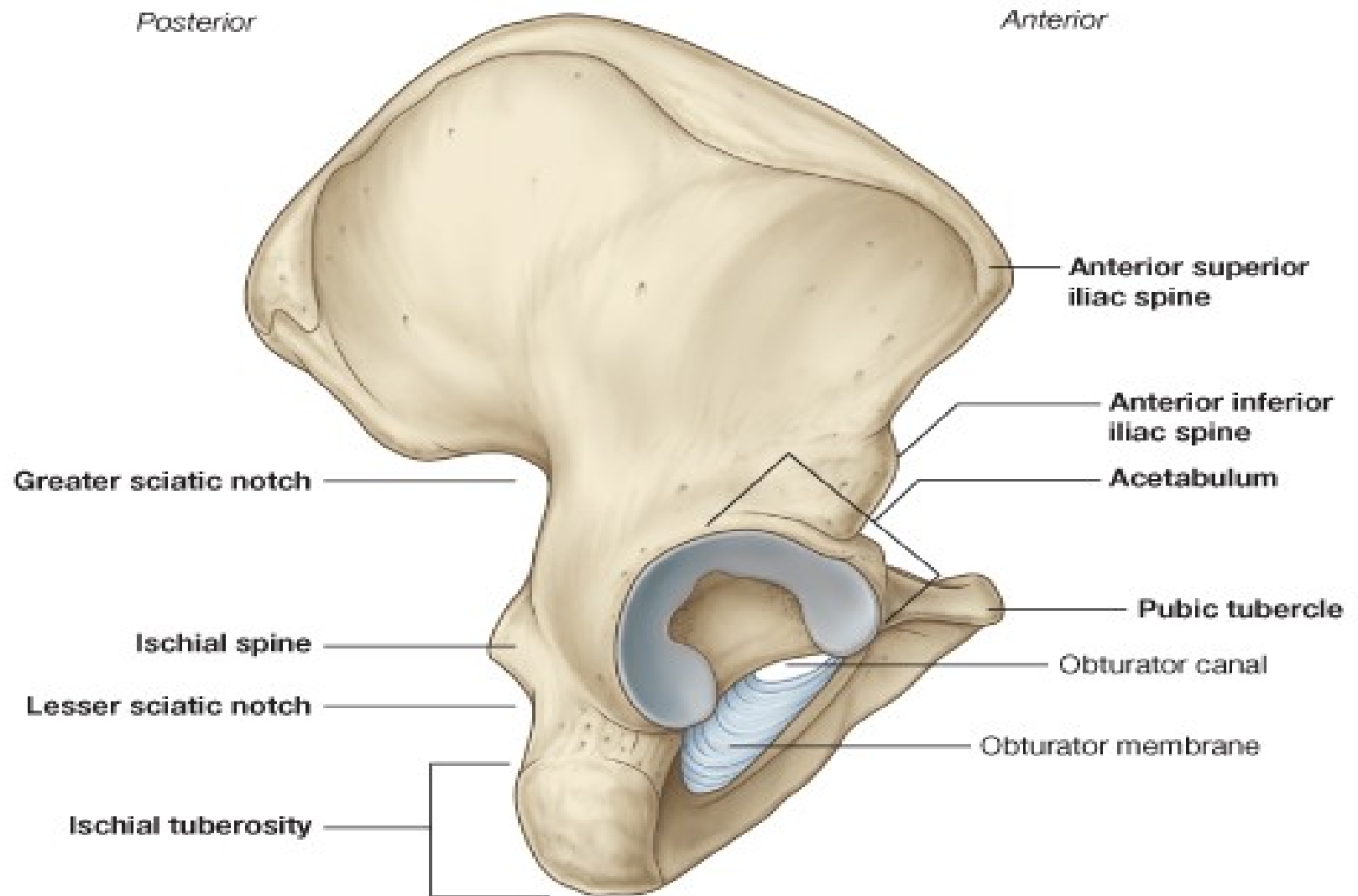
- The **ala, or wing** represents the spread of the fun
- **Body** is the handle of the fun
- The *ilium is the largest of the 3 “hip ones”, and is composed of a superior ala + inferior border, which helps form the acetabulum.*
- The superior border of the ilium = iliac crest, which ends anteriorly in a blunt ASIS.
- Below the ASIS is the anterior inferior iliac spine
- Posteriorly the iliac crest ends in the PSIS, with the posterior inferior iliac spine inferior to this

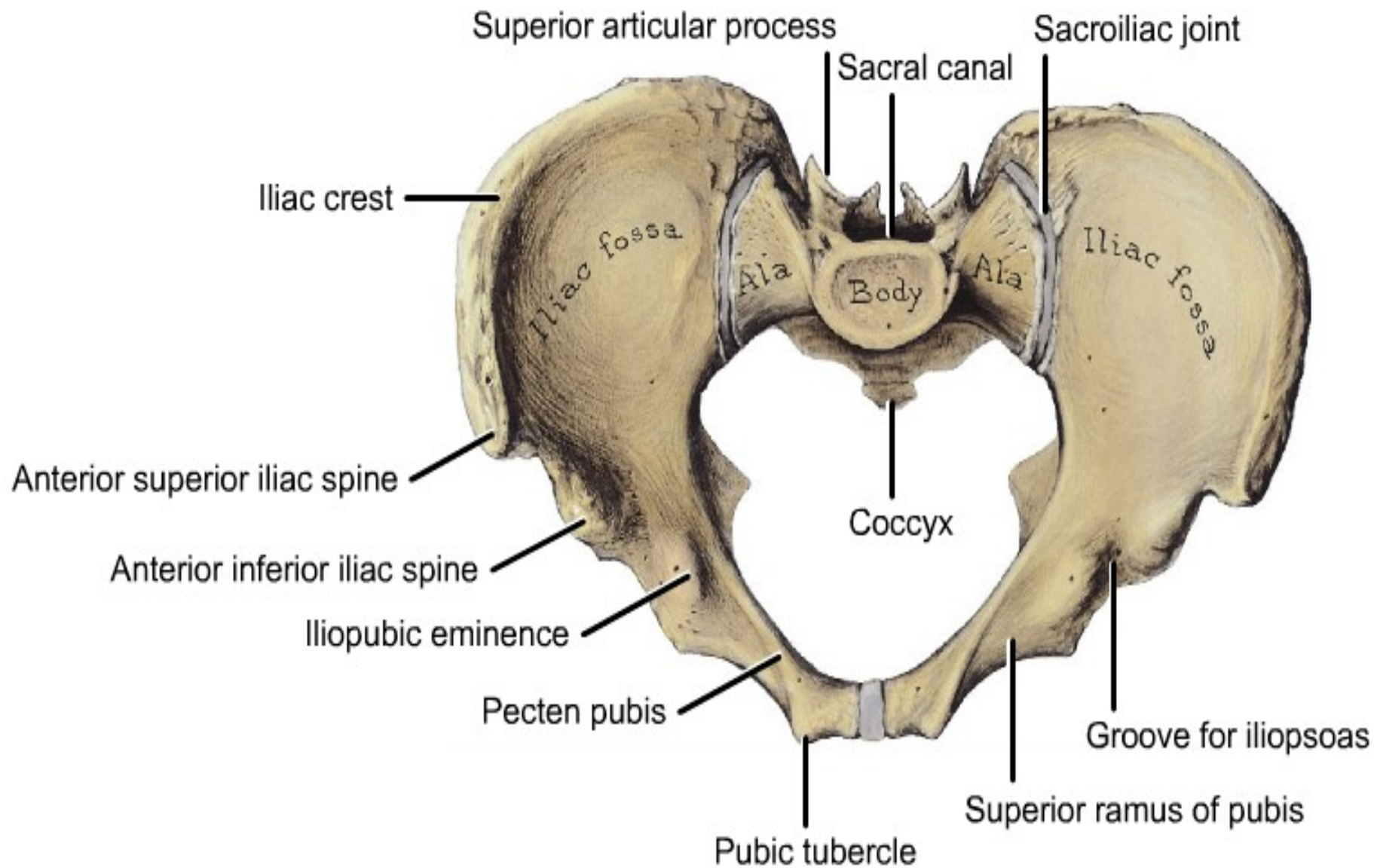
Ilium ...

- The iliac spines serve as points of attachment for the tendons of the muscles of the trunk, hip + thighs
- The medial surface of the ilium contains the **iliac fossa**, which the tendon of the iliacus muscle attaches
- Posterior to this fossa are the **iliac tuberosity**, a point of attachment for the sacroiliac ligament + the auricular surface, which articulates with the sacrum to form the sacroiliac joint

Ischium

- inferior/posterior portion of the os coxae
 - a. **ischial tuberosity** (the sits bone), the large postroinferior protuberance
 - b. **obturator foramen**
 - c. **lesser sciatic notch**, The concavity between the ischial spine and the ischial tuberosity
- The greater concavity is the **greater sciatic notch**
 - d. **ischial ramus** - extends from tuberosity to fuse with the pubis
 - f. **ischial spine** - divides the two sciatic notches





Pubis

- Forms anterior part of the acetabulum and anteromedial part of hip bone

Body

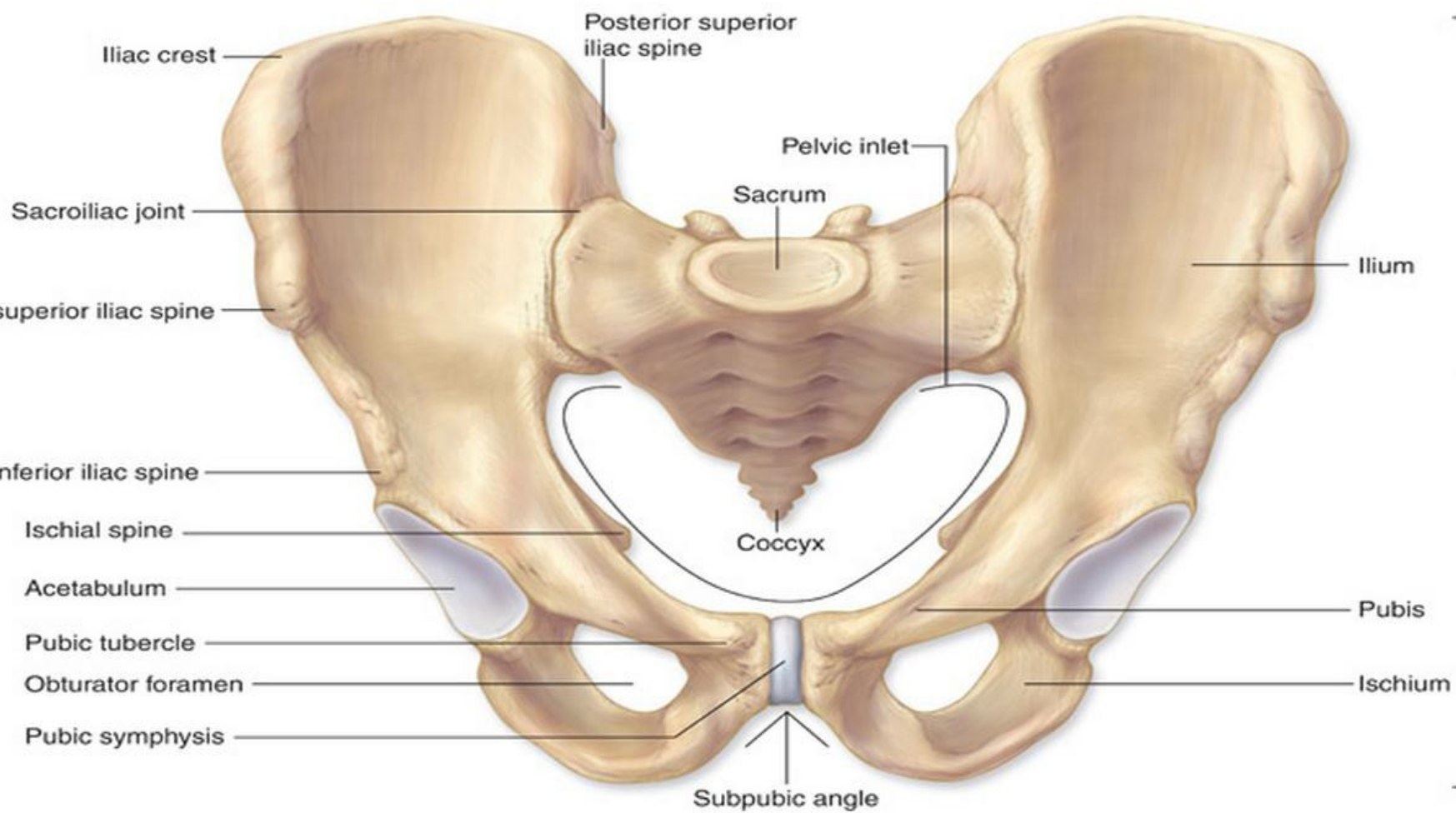
- has a symphyseal surface for articulation with the contralateral pubis

Rami

- two (inf. & sup.) which supports its body

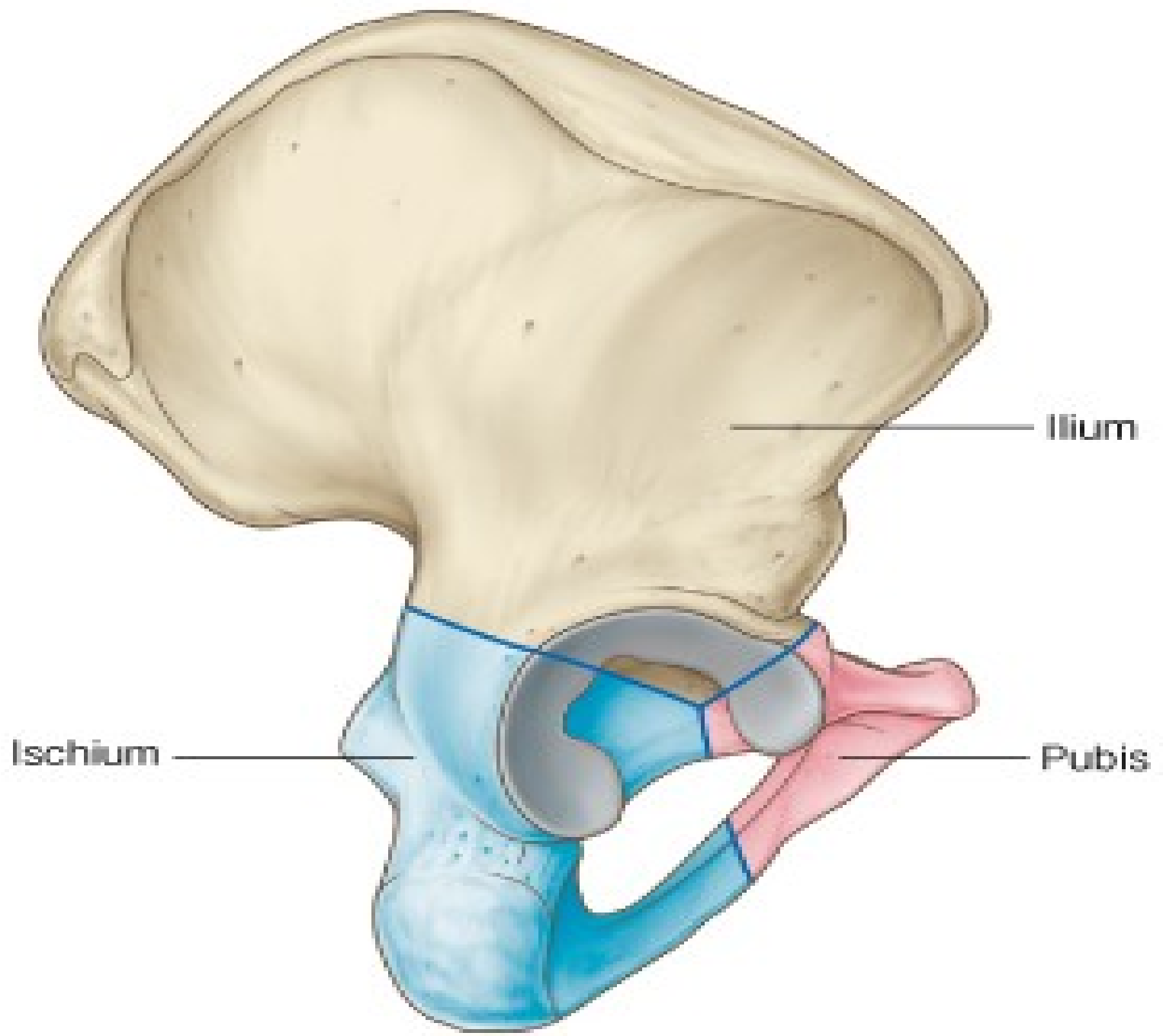
Landmarks

- pubic crest (medial) - ends at pubic tubercle (lateral)
- superior ramus - has a ridge called pecten pubis or pectineal line
- The pubic symphysis is a joint between the two pubes of the hip bones, and consists of a disc of fibrocartilage



Sacrum

- Triangular shaped, formed by five fused vertebrae
- Forms the posterior wall of the pelvis
- Articulates with L5 and iliac bone
- Transfers the weight of the body to the lower extremities



**Body of
first
sacral
vertebra**

**Transverse lines
(site of vertebral
fusion)**

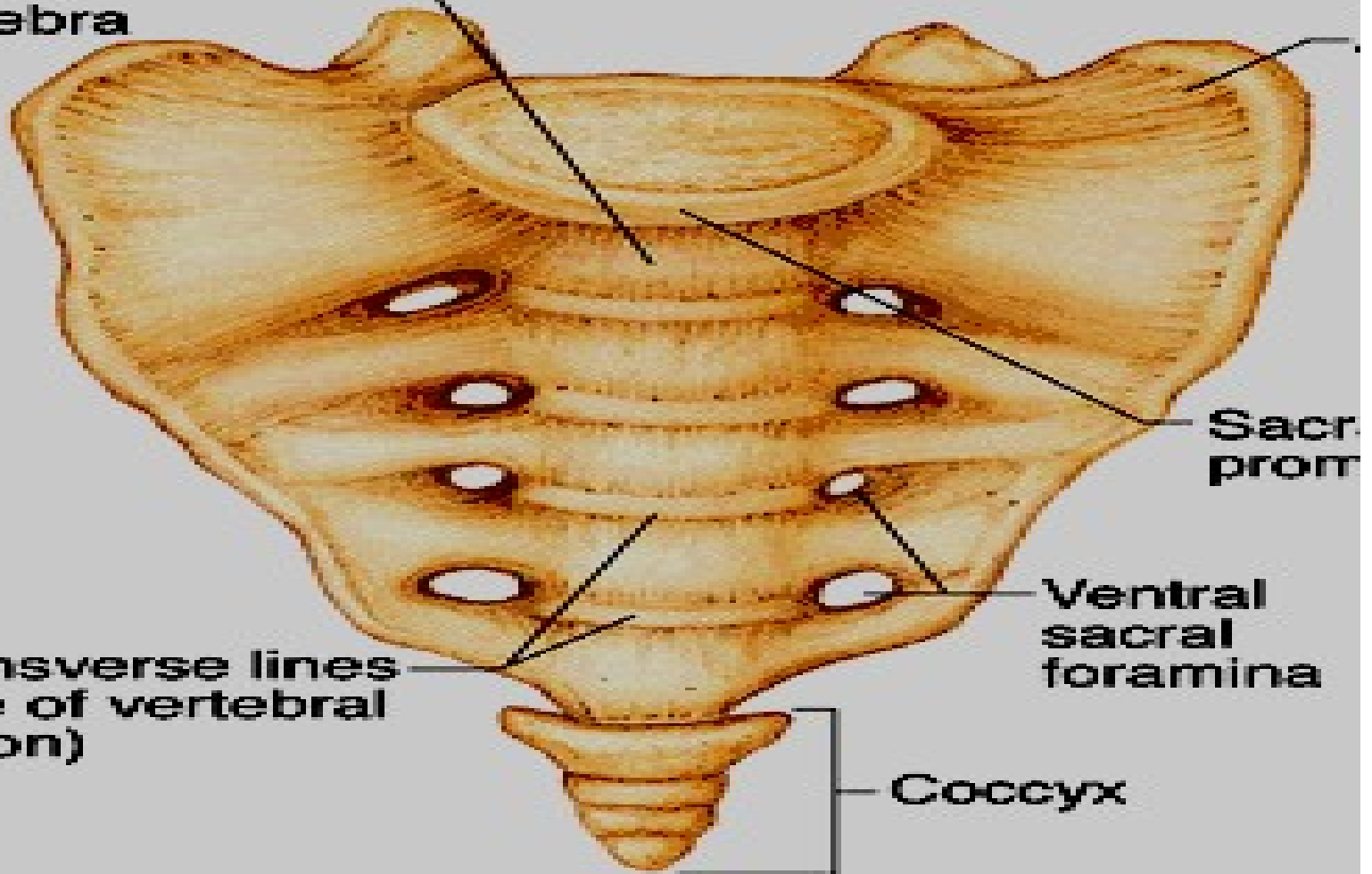
**Sacr.
prom**

**Ventral
sacral
foramina**

Coccyx

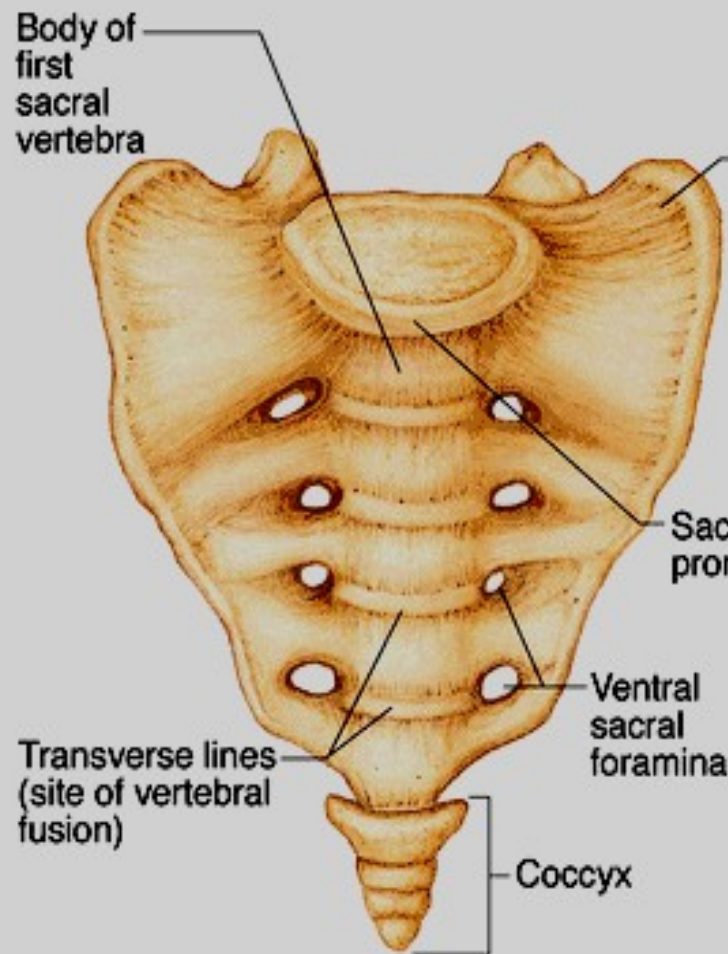
(a) Superoanterior view

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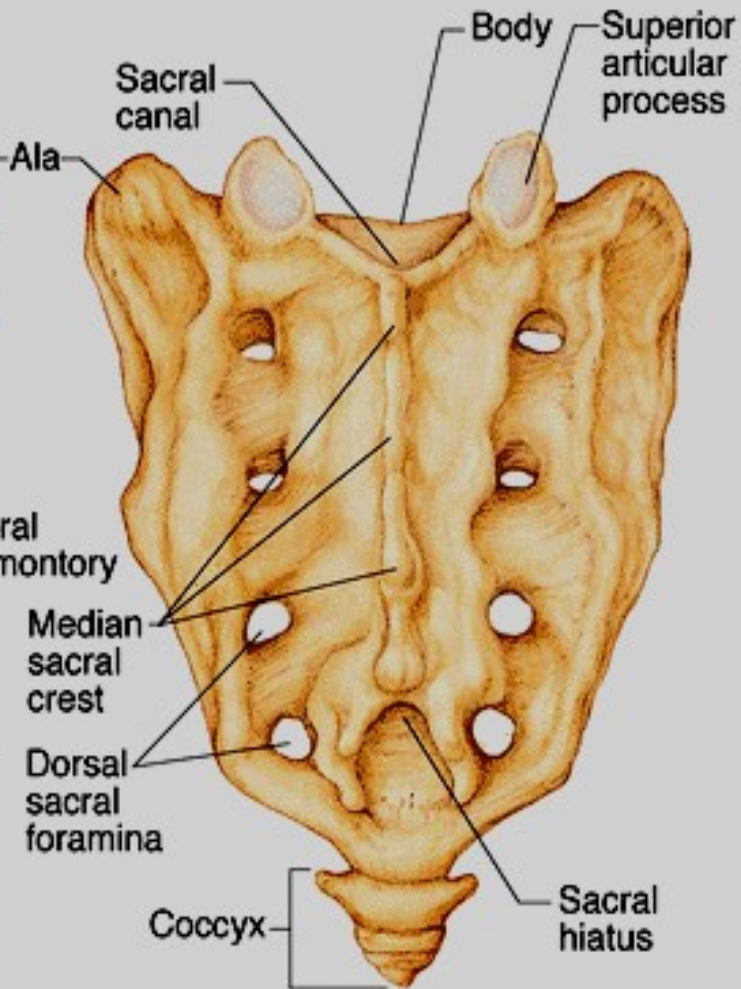


Coccyx

- tail bone
- composed of 4 fused vertebrae
- articulates with sacrum



(a) Superoanterior view



(b) Posterior view



Joint of the pelvic

- **Sacroiliac**
- **Lumbosacral**
- **Symphysis pubic**
- **Sacrococcygeal**
- **Iliolumbar**

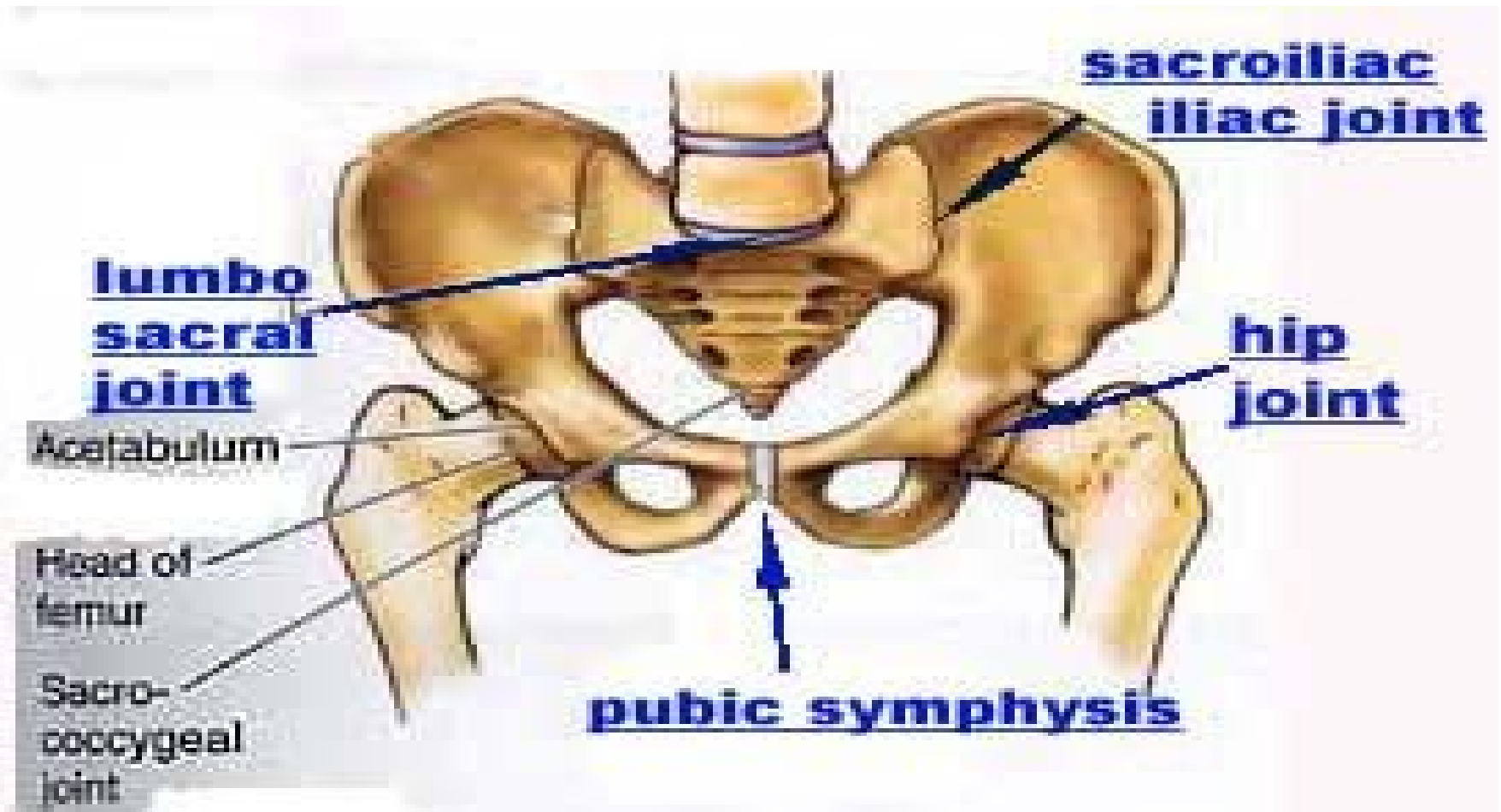
1. Lumbosacral joint-between L5 and base of the sacrum.
 - is supported by ileolumbar ligaments(anterior,posterior ,medial)
2. Sacroiliac joint- between the articular surface of sacrum and ileum.
 - is plane type of synovial joint.
 - is reinforced by anterior and posterior sacroiliac ligament.

- ligaments which prevent the sacrum from rotating in the sacroiliac joint are
 - sacrospinous – b/n sacrum and ischial spine.
 - sacrotuberous – b/n sacrum and ischial tuberosity.
3. Sacrococcygeal joint- b/n sacrum and coccyx.
- is secondary cartilaginous joint.
 - is strengthened by anterior, posterior and lateral sacrococcygeal ligament.

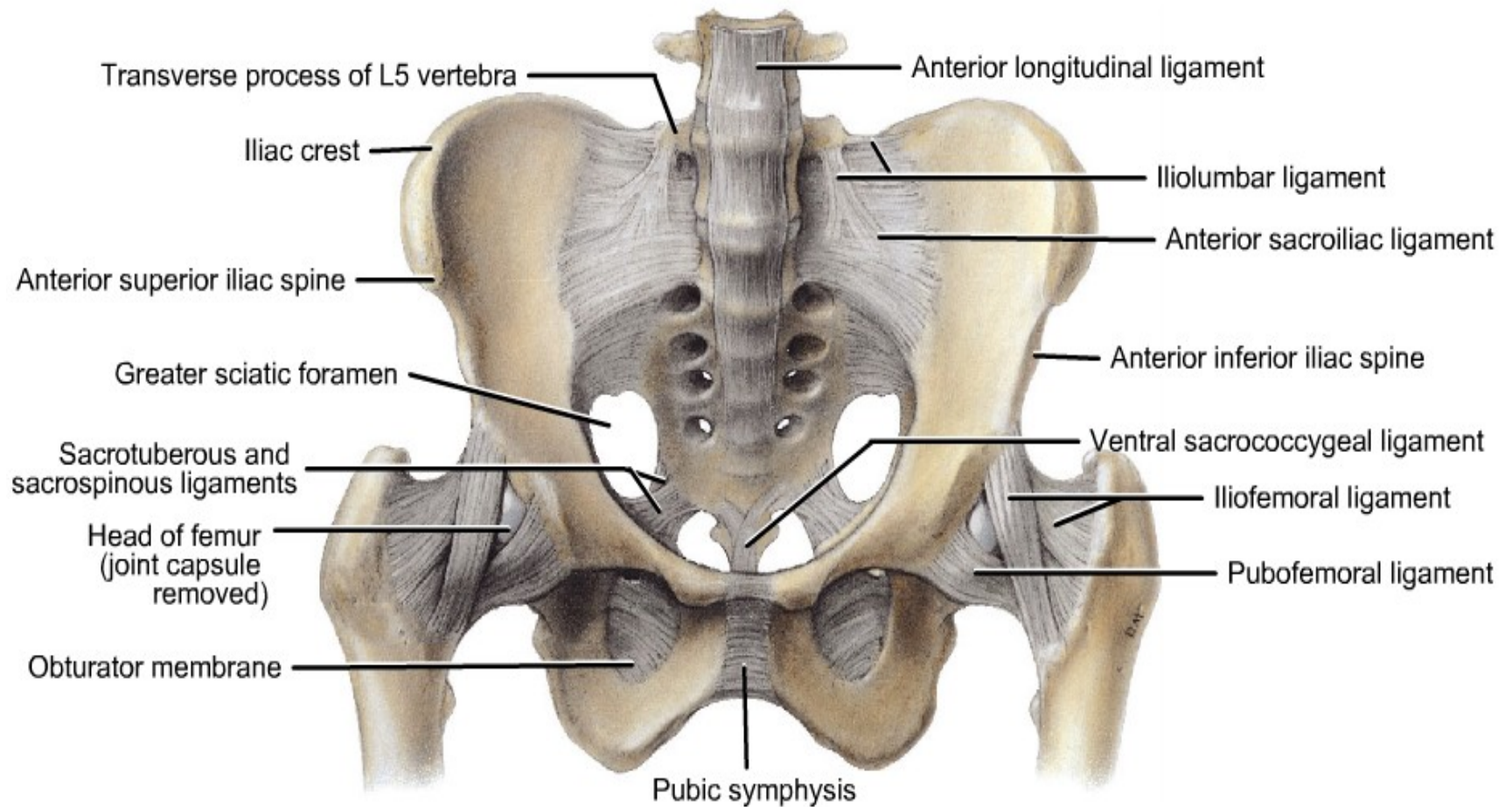
4. Pubic symphysis-b/n bodies(symphseal surface) of pubic bones.

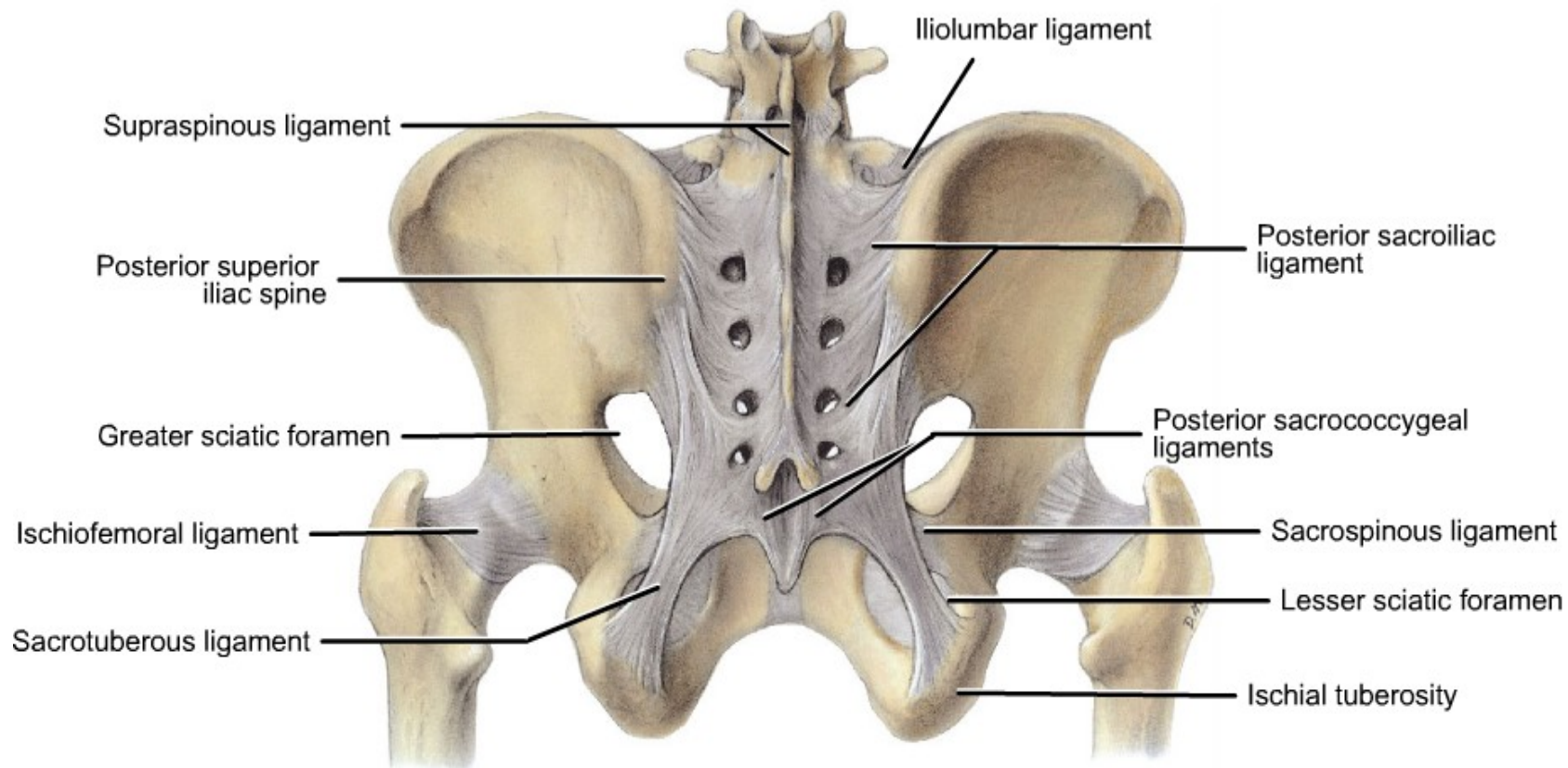
- is secondary cartilagenous joint
- supported by superior and inferior pubic(arcuate) ligament.

Joints....



Anterior view-joints of pelvis





Pelvic cavity

- The “greater pelvis” is the shallow basin formed by the 2 iliac fossa
- The “lesser pelvis” is the cavity formed below the pelvic brim
- Pelvic cavity: between the pelvic inlet and outlet
- Pelvic organs lie within in the pelvic cavity

PELVIS CAVITY

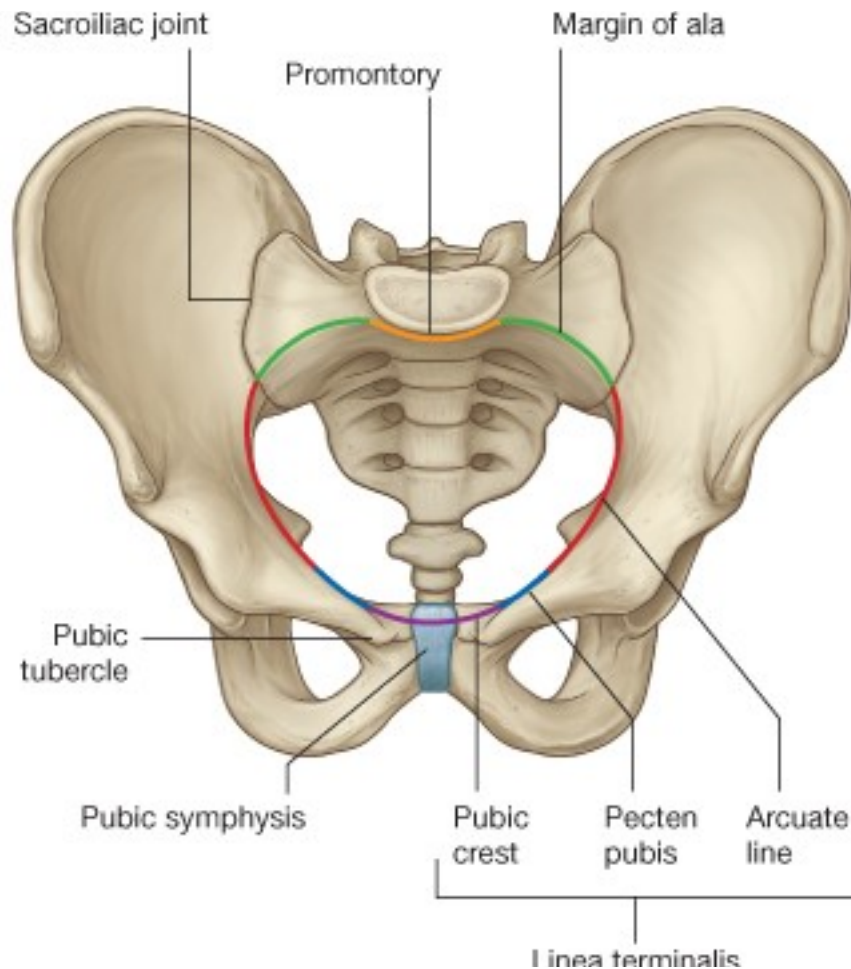
WHAT IS THE PELVIC BRIM?

- It is the inlet(superior pelvis aperture) of the pelvis which divides the pelvic cavity into false & true pelvis
- It is formed by the sacral promontory, ala of the sacrum, arcuate line of the ilium, iliopubic eminence, pectineal line of the pubis, pubic crest & the lower border of the symphysis pubis

Pelvis Cavity...

- The pelvic outlet: is bounded posteriorly by the coccyx, laterally by the ischial tuberosities, sacro tuberos ligament, sacrospinous ligament and anteriorly by the pubic arch

Bony Pelvis



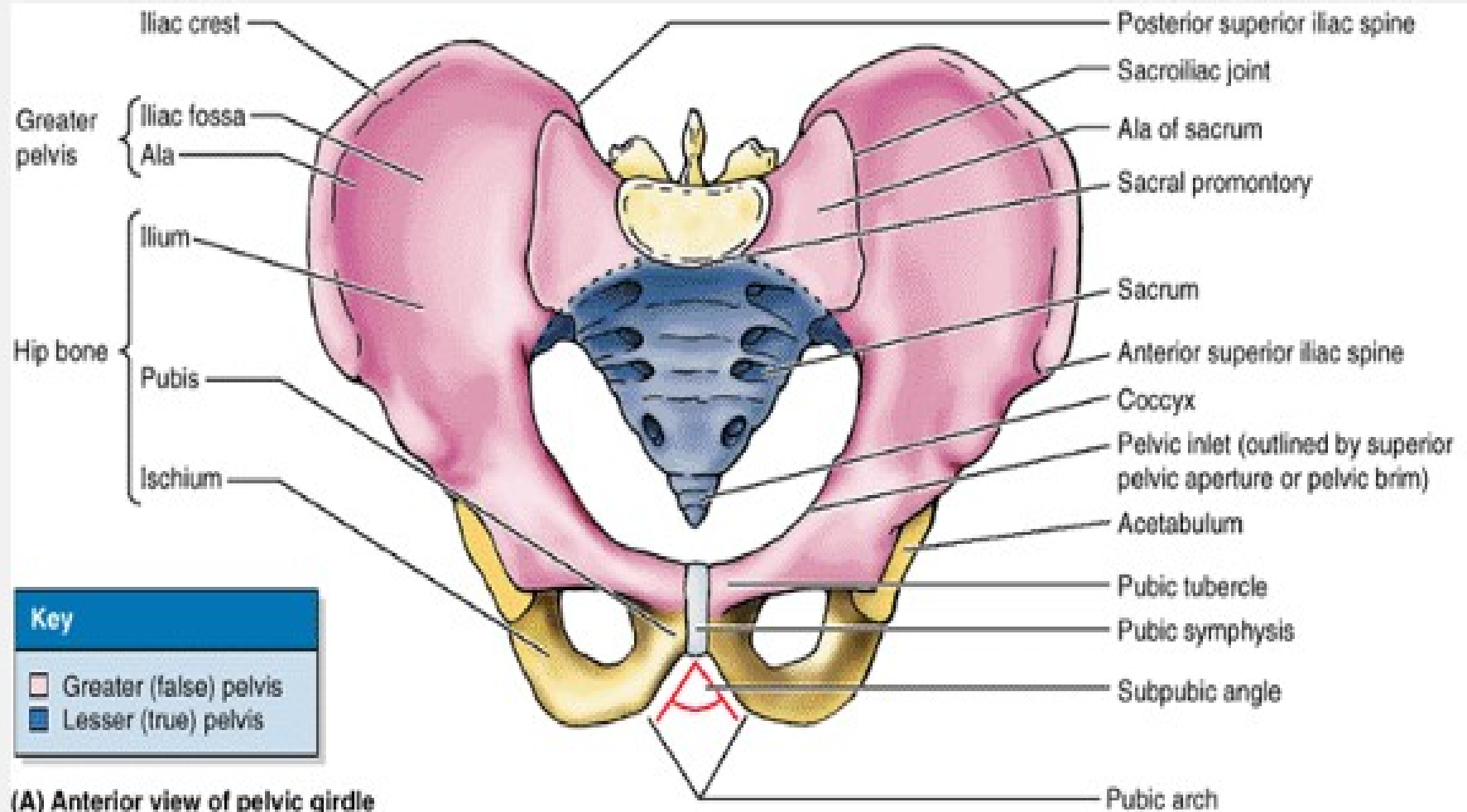
Greater Pelvis (pelvis major)

- Located superior to the pelvis inlet
- Location of some abdominal viscera (ileum and sigmoid colon)
- Bounded by abdominal wall anteriorly, the iliac fossa posteriolaterally and L5 and S1 vertebrae posteriorly
- It is also called False Pelvis

Lesser Pelvis (pelvis minor)

- Is the part of the pelvis between the pelvis inlet and the pelvis outlet
- Location of pelvic viscera – the urinary bladder and reproductive organs such as the uterus and ovaries
- Bounded by the pelvic surfaces of the hip bones, sacrum, and coccyx

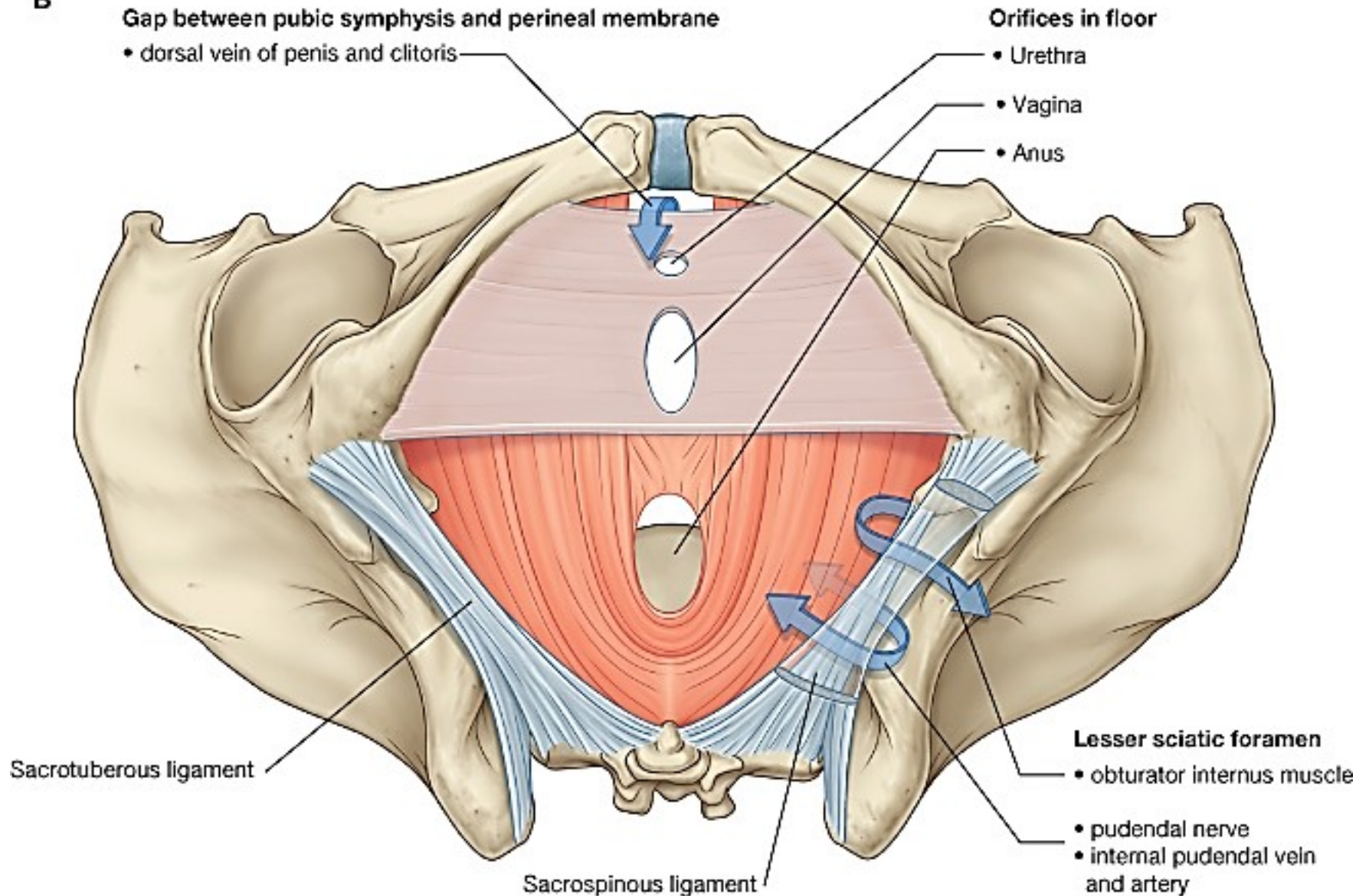
Pelvis Cavity



- Limited inferiorly by the musculofascial **pelvic diaphragm**(forms the floor of the true pelvis)
- **Pelvic floor (or pelvic diaphragm):** sheet of muscle mainly formed by levator ani muscle; lies at pelvic outlet
- Inferior to the pelvic floor is the perineum

Inferior Pelvic Border or Pelvic Outlet

B



Pelvic diameters

Pelvic inlet diameter	Female(cm)	Male(cm)
Anteroposterior(AP)	11	10
Transverse	13	12.5
Oblique	12.5	12
Pelvic outlet diameter		
AP	12.5	8
Transverse	11.8	8.5
oblique	11.8	10

Pelvic differences

- Pelvic Structure and Childbearing
- The female pelvis reflects modifications for child bearing
- It tends to be wider, shallower, lighter, and rounder than the male
- Pelvic modifications accommodate the growing fetus as well as providing a birth canal wide enough to allow the infants head to exit at birth

Sexual Dimorphism in Pelvis

Female

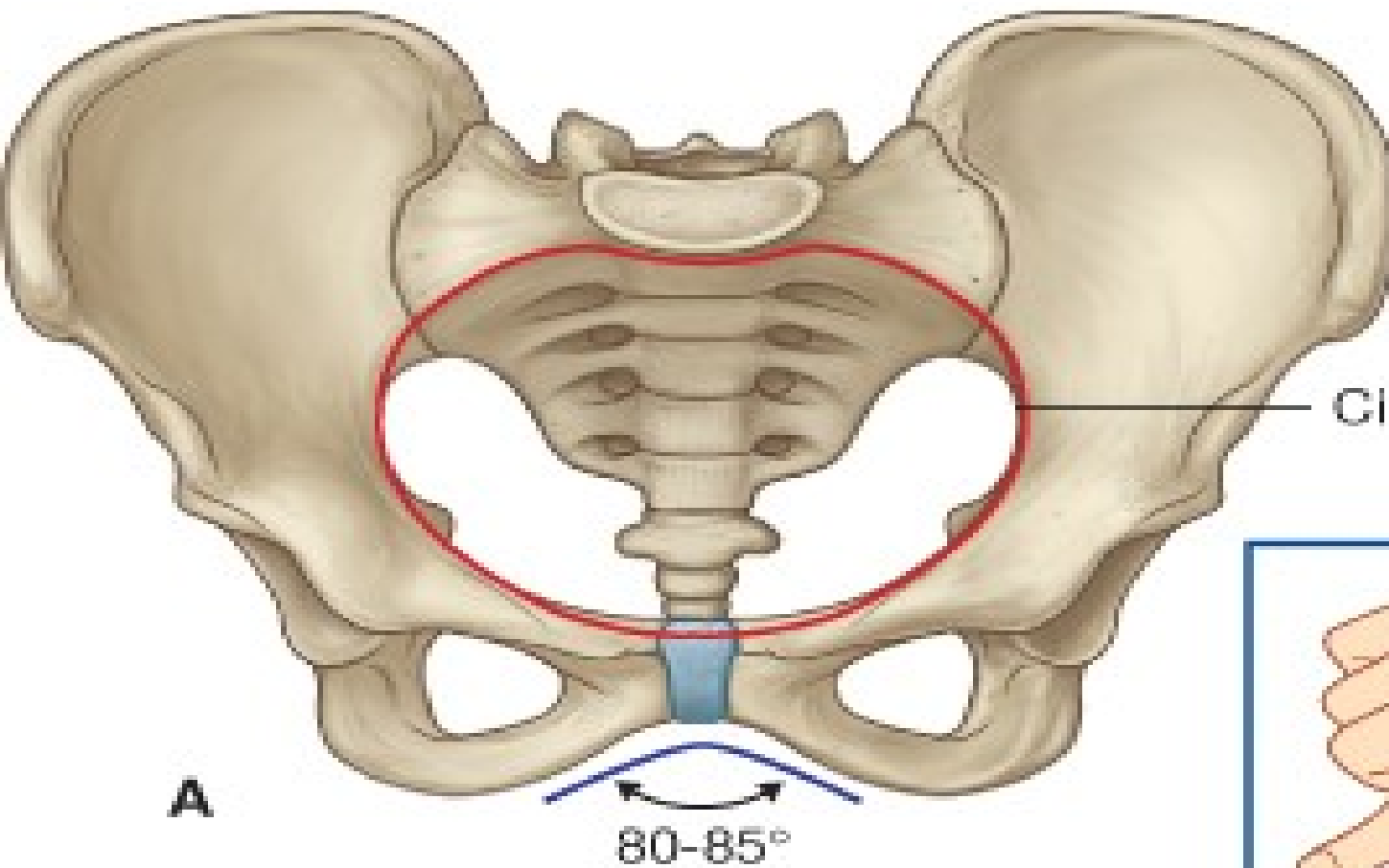
- Cavity is broad, shallow
- Pelvic inlet oval + outlet round
- Bones are lighter, thinner
- Pubic angle larger
- Coccyx more flexible, straighter
- Ischial tuberosities shorter, more everted

Male

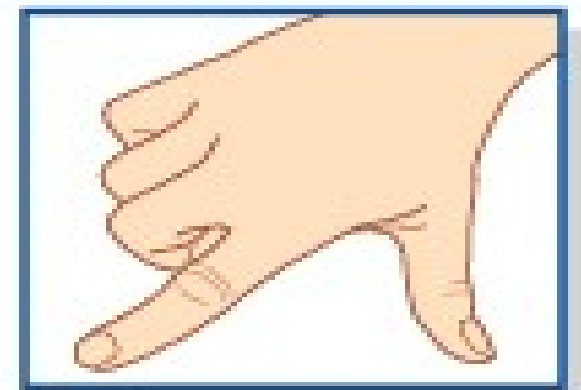
- Cavity is narrow, deep
- Smaller inlet + outlet
- Bones heavier, thicker
- Pubic angle more acute
- Coccyx less flexible, more curved
- Ischial tuberosities

Female Pelvis

Prominent
projecting ischia



Circular pelvic inlet



Male Pelvis

Prominent medially
projecting ischial spines

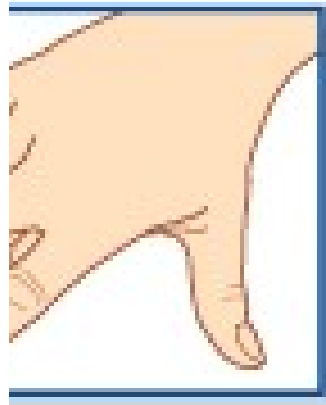
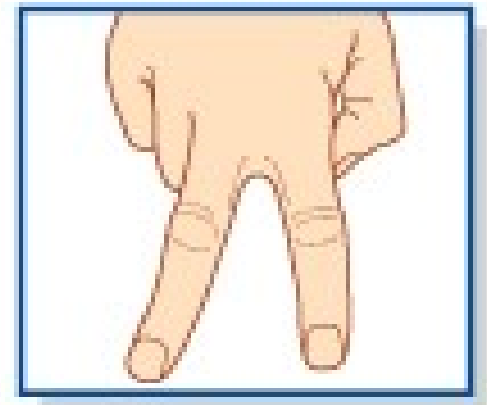
Prominent projecting
promontory

angular pelvic inlet

Heart-shaped
pelvic inlet

B

50-60°



PELVIC SHAPES

1-GYNECOID

- Typical female pelvis found in 50% of women
- oval inlet
- Straight pelvic sidewalls with roomy pelvic cavity
- sacrum is shorter,wider and less curved
- Ischial spines are not prominent
- Pubic arch is wide
- Transverse diameter is greater than the AP.

PELVIC SHAPE

2-ANDROID

- Typical male pelvis found in 1/3 white women 1/6 non-white
- Pelvic brim is heart shaped and contracted outlet.
- Pelvis funnels from above downwards (convergent sidewalls)
- Narrow pubic arch
- Prominent Ischial spines

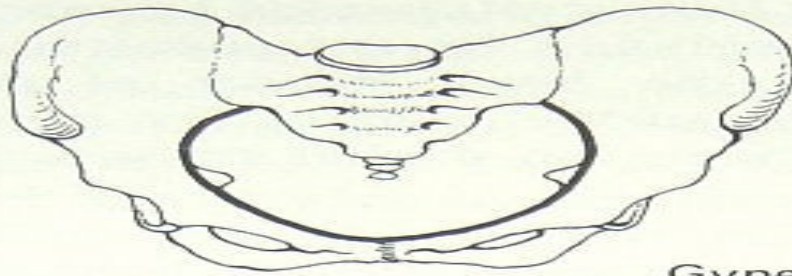
PELVIC SHAPE

3-ANTHROPOID

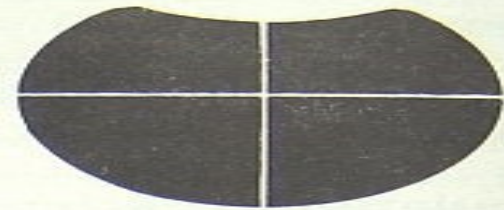
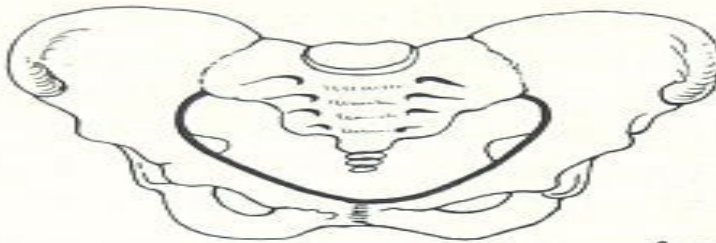
- 25% white women & 50% nonwhite
- Long & narrow pelvic canal with long sacrum.
- Pelvic brim-the AP diameter is greater than transverse.
- Straight pelvic sidewalls

4-PLATYPELLOID

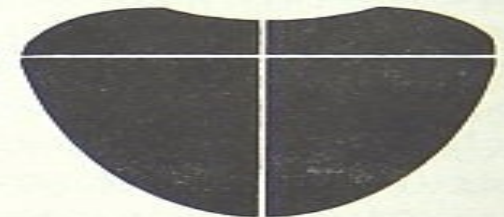
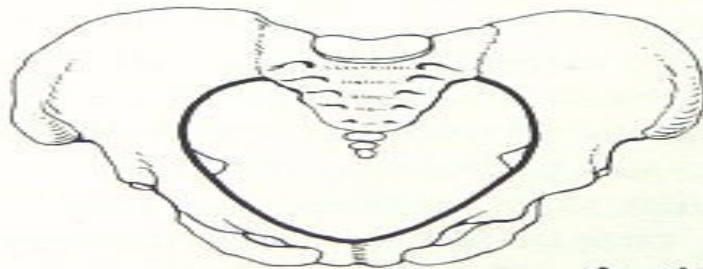
- 3% of women
- Pelvic brim $\square$ kidney shape
- Sacral promontory pushed forwards.
- Transverse diameter $\gggg$ the AP diameter both in the inlet and outlet.



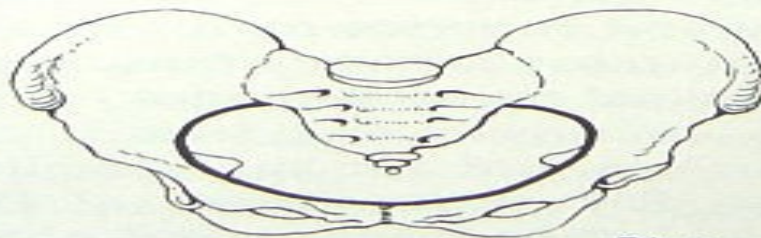
Gynecoid



Android



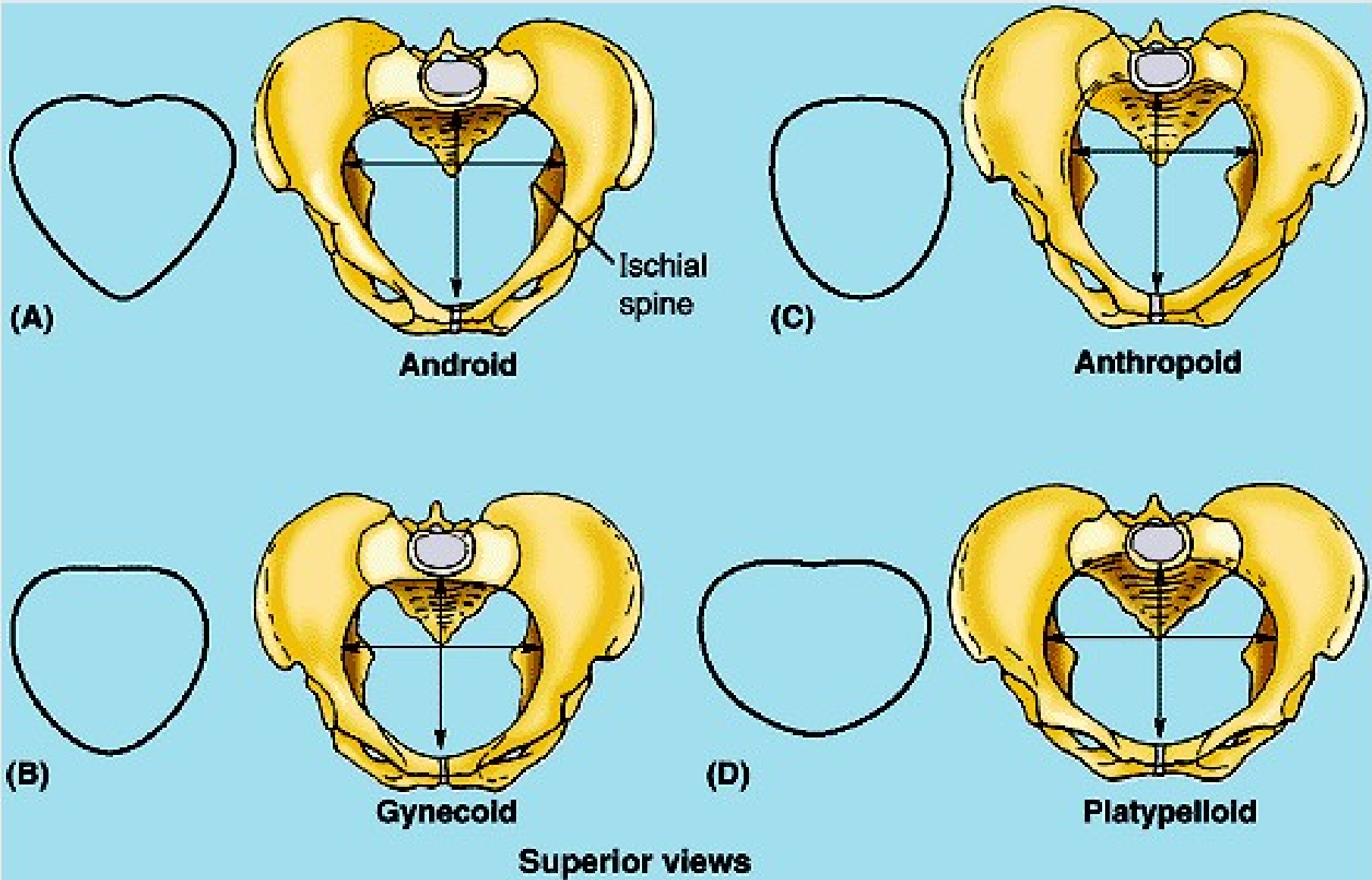
Anthropoid



Platypelloid



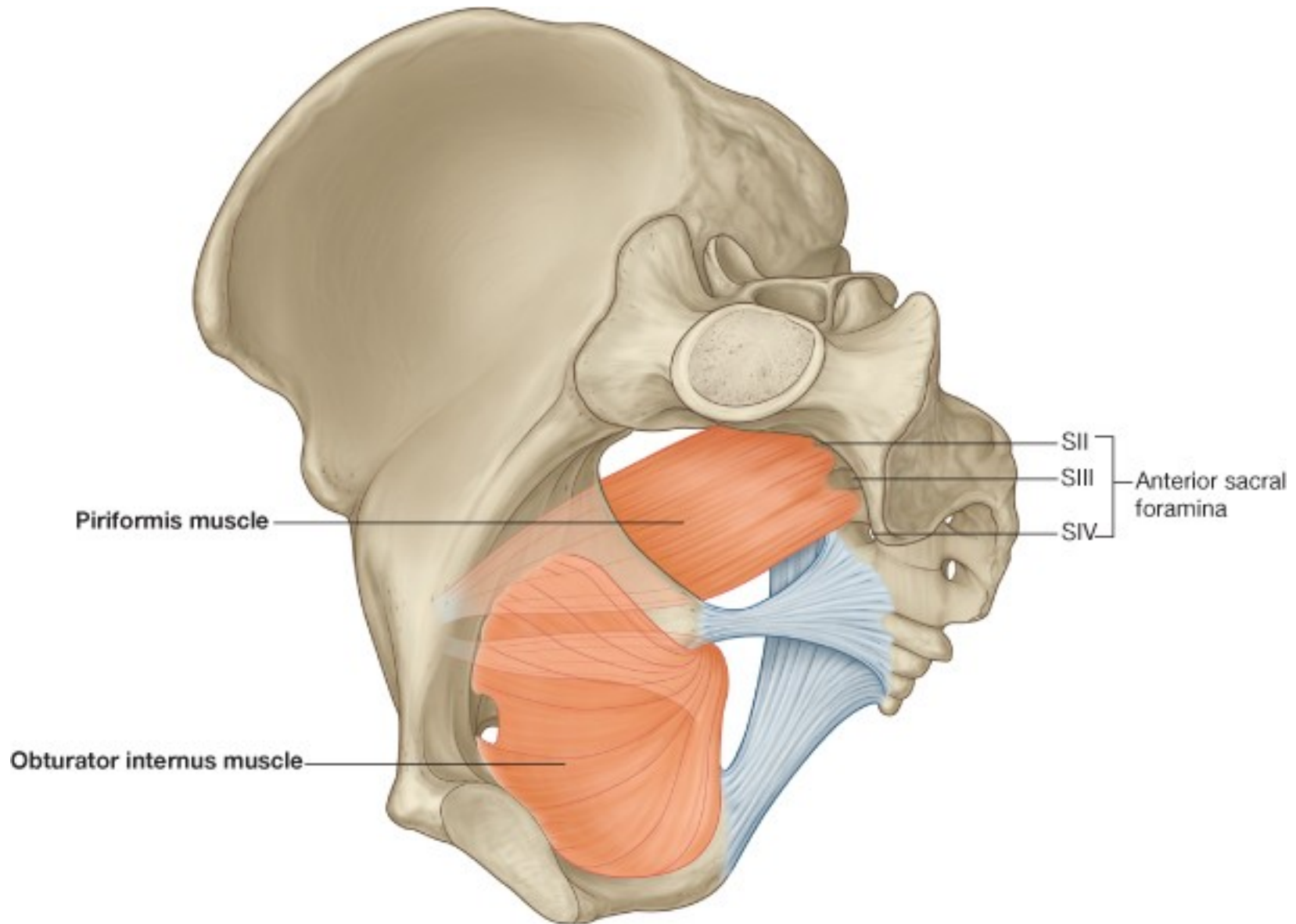
Types of Pelvis



Walls of pelvis

- Formed by framework of bones, joints, ligaments & muscles lined by membrane
- Anterior wall: pubic bones, obturator internus muscle and pubic symphysis
- Lateral wall: obturator internus with obturator membrane
- Posterior wall: sacrum, ilium, piriformis muscle
- Pelvic floor: pelvic diaphragm
- Composed of 2 levator ani and 2 coccygeus muscles with covering fascia (perineal membrane)
- Closes inferior pelvic aperture (pelvic outlet)

Posterior Pelvic Wall



Pelvic diaphragm

- Levator ani and coccygeus form the pelvic diaphragm, separating the pelvis from the ischiorectal fossa
- urethra, vagina and rectum pass through the pelvic diaphragm
- pudendal nerve and vessels go around it

Levator ani

- Muscular floor of the pelvis and supports the viscera
- The muscle can be divided into 3 parts: puborectalis muscle, pubococcygeus muscle and iliococcygeus muscle

Levator ani...

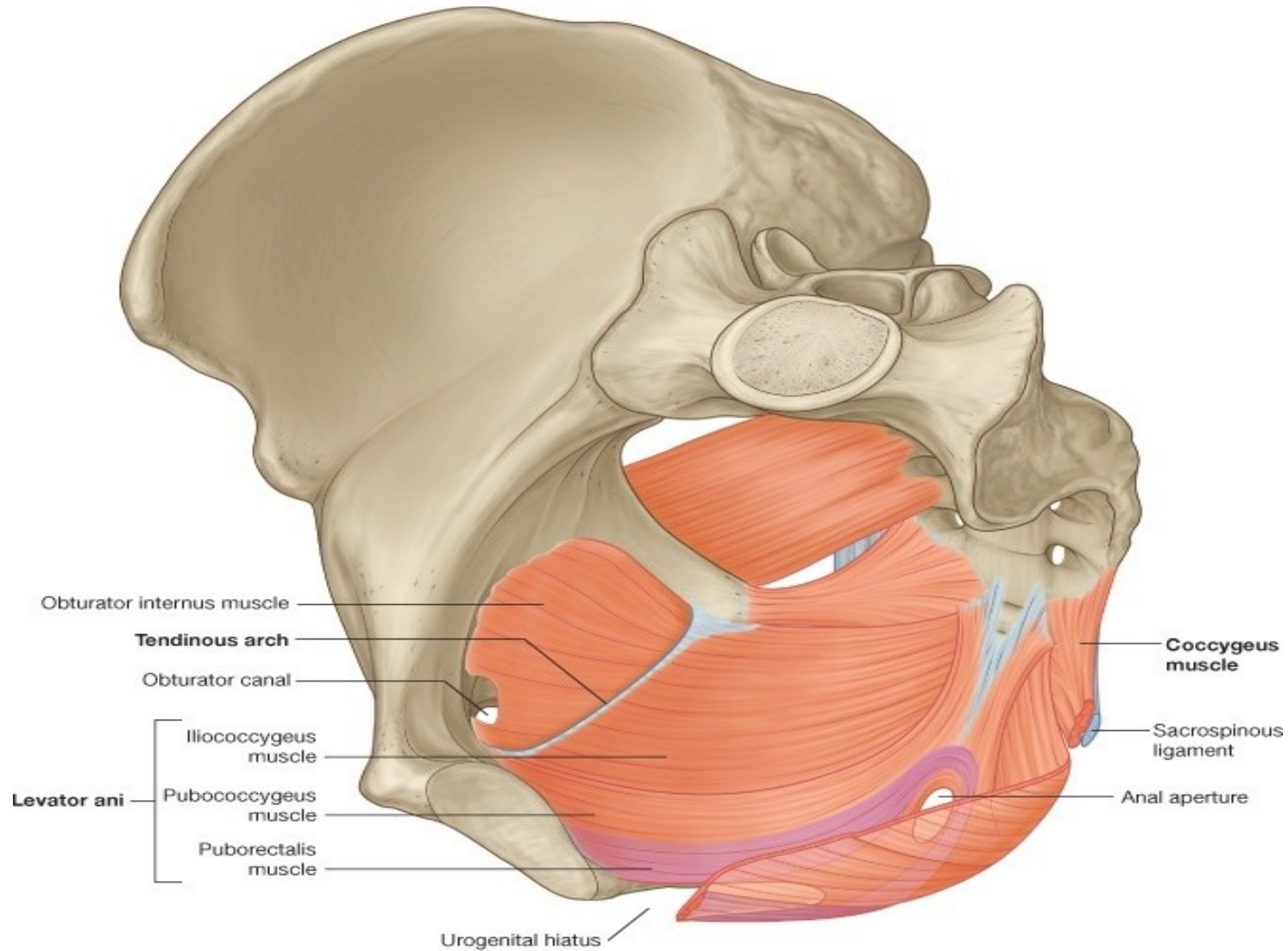
Origin

- from the back of the pubis, lateral to the symphysis, and from the spine of the ischium
- the muscle sweeps inferiorly, medially and posteriorly

Insertion

- muscles of the two sides unite to form hammock like sheet

Pelvic Diaphragm

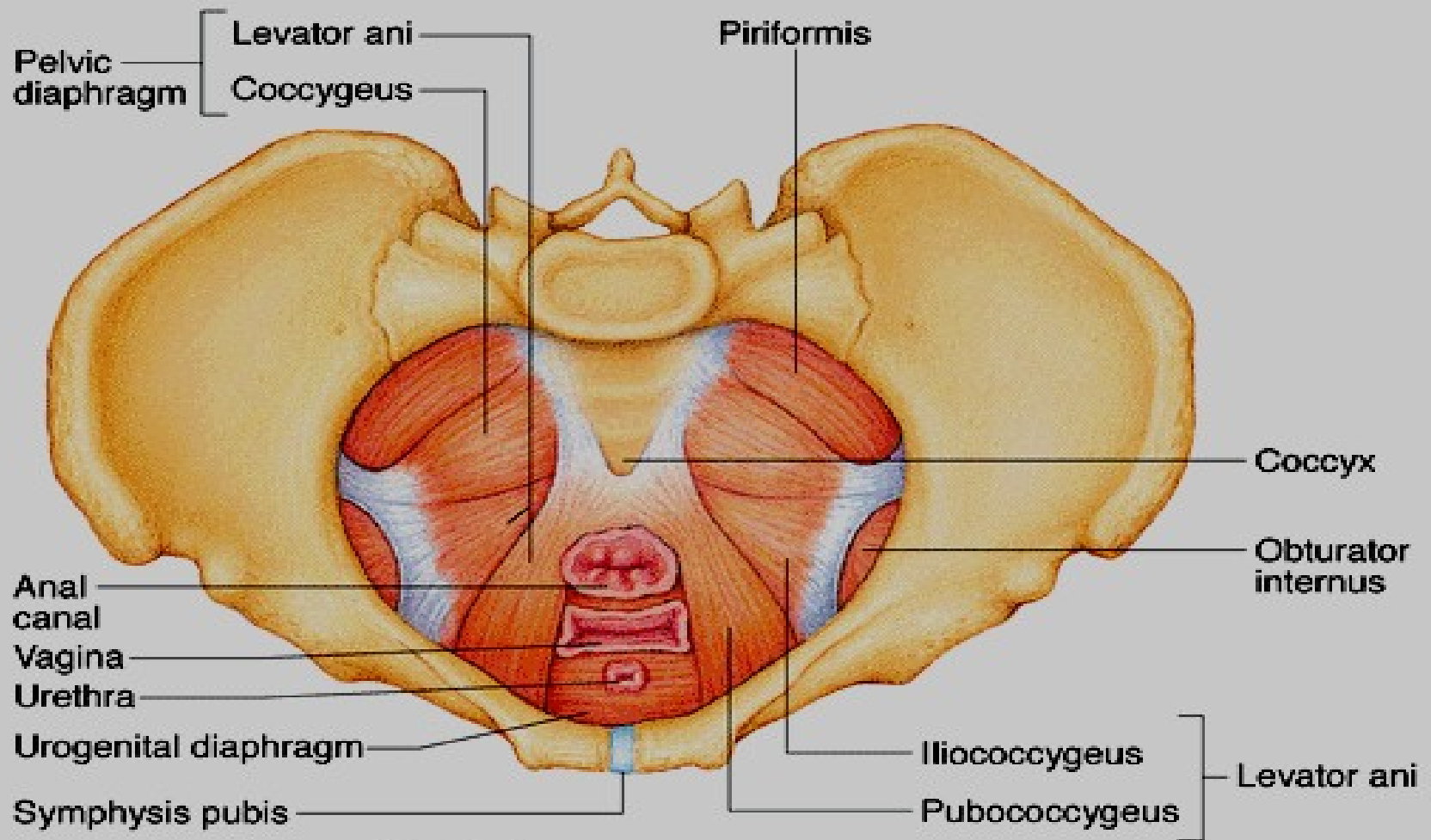


Coccygeus (ischiococcygus)

- deep to the sacrospinous ligament
- has similar attachments with levator ani
- forms posterior part of pelvic floor
- Nerve supply: branches of S4 & S5
- Action: assist levator ani

Piriformis

- Origin-from the 3 middle pieces of sacrum
- passes through greater sciatic foramen (along with sciatic nerve, superior and inferior gluteal vessels and nerves)
- Insertion - greater trochanter of femur
- Nerve supply – nerve to piriformis from sacral plexus
- Action – lateral rotator of the thigh



(a) Muscles of the pelvic diaphragm

Obturator internus

Origin - medial wall of the pelvis (margin of obturator foramen), runs through the lesser sciatic foramen

Insertion - greater trochanter of the femur

Action - lateral rotation of thigh

Nerve supply- nerve to obturator internus

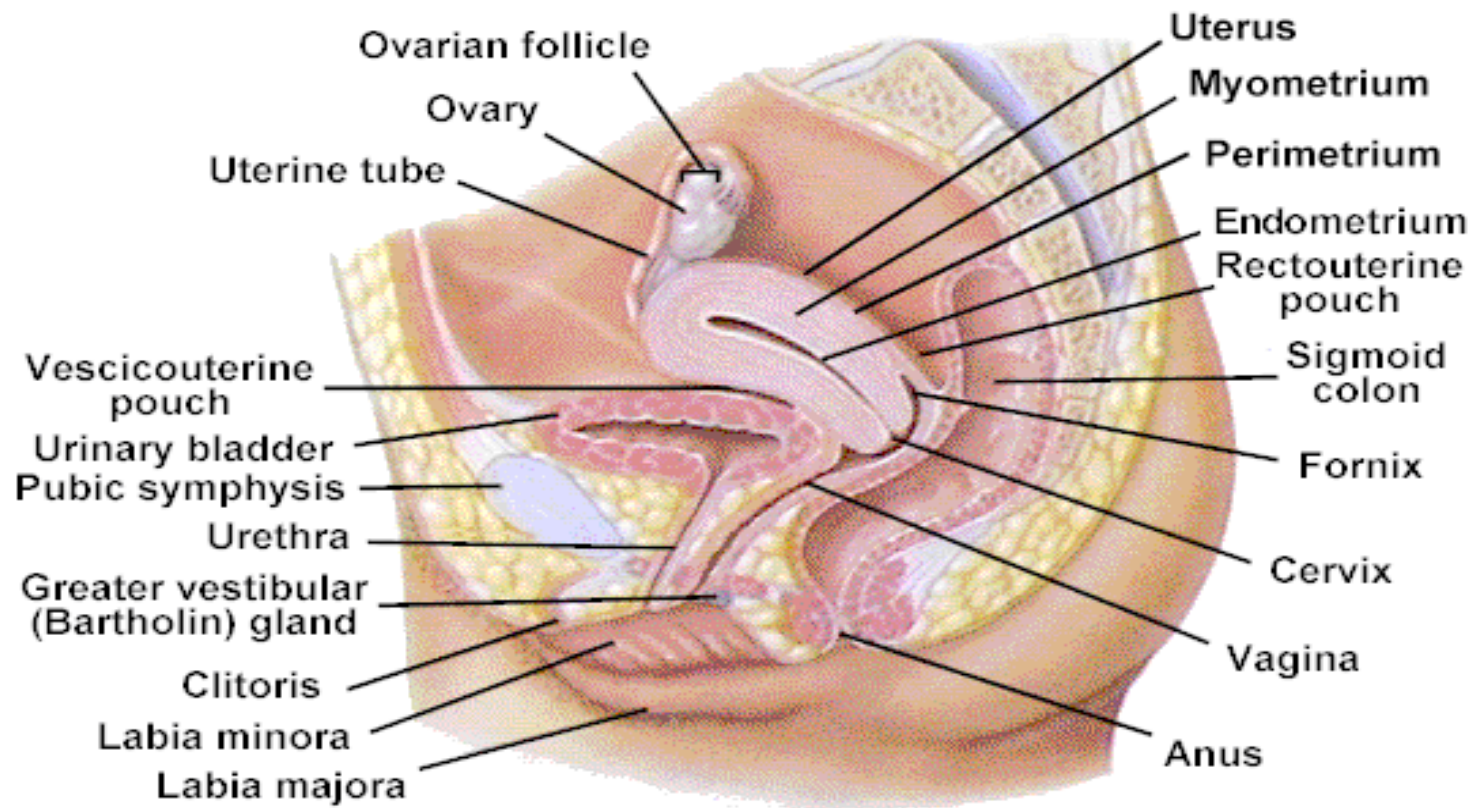
- Obturator fascia -cover medial surface of obturator internus
- partly is origin for levator ani
- Splits in the lateral wall of ischiorectal fossa to form pudendal canal

Peritoneum of the pelvis

- Cover only the superior part
- In male-it came from the anterior body wall and go superior to the pubic bone and cover the superior and part of the posterior surface of the urinary bladder and also superior tip of seminal vesicles then it will invaginate between bladder and rectum to form rrectovesical pouch.

Cont.....

- In females- It has the same course but at the end it will invaginate between bladder and the uterus to form vesicouterine pouch and between rectum and uterus to form rectouterine pouch.
- The peritoneum is folded and thickened to form ligaments which support and house NVB to pelvis.



Pelvic fascia

- Are two types-visceral and parietal.
- Superiorly the parietal fascia is thickened at neck of the bladder to form pubovesicular ligament and puboprostatic (in male).
- There are also spaces in the fascia for e.g retropubic space.

Arteries of the pelvis

- Are four
 - 2 aas –directly from aorta this are ovarian (testicular) aas and median sacral aas
 - 2 aas –indirectly from aorta
 - SMA via superior rectal aa to rectum and anal cannal.
 - from internal iliac aa- give 10 branches to supply pelvis and perinium.
- Veins accompany the arteries.

Nerves of pelvis

- Pelvis is innervated mainly by sacral and coccygeal nerves and pelvic part of ANS

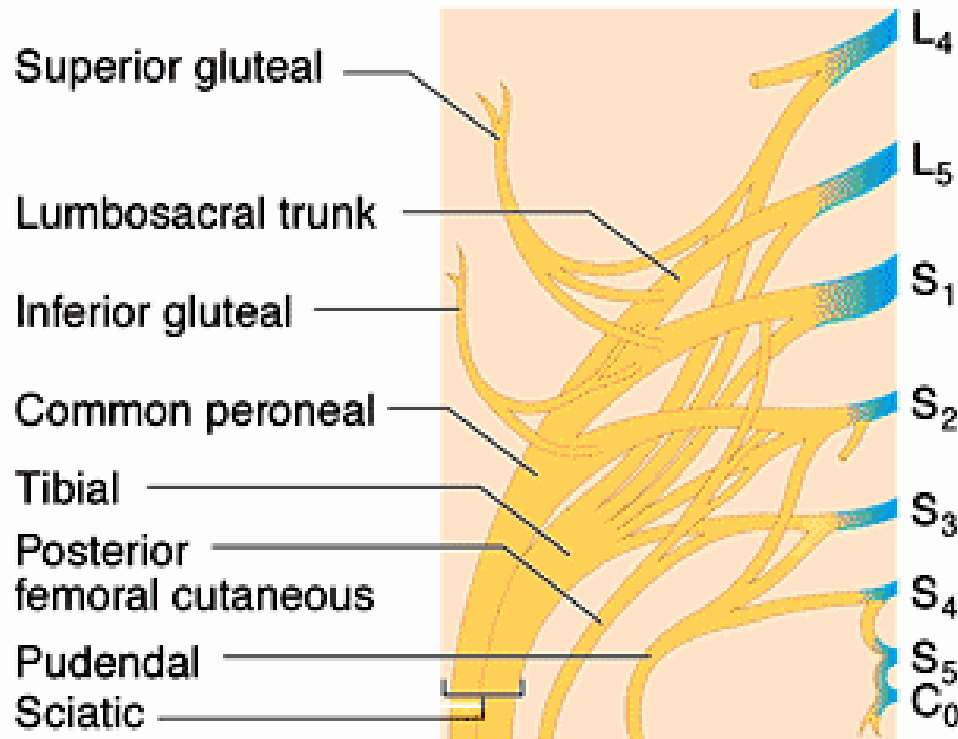
Sacral plexus

- originates from the anterior primary rami of L4, L5, S1–S4
- L4 is shared by both plexuses, a branch from it joining L5 to form the lumbosacral trunk

Cont.....

- The sacral nerves emerge from the anterior sacral foramina and unite in front of piriformis where they are joined by the lumbosacral trunk
Branches from the plexus supply:
 - the pelvic muscles
 - the muscles of the hip
 - the skin of the buttock and the back of the thigh

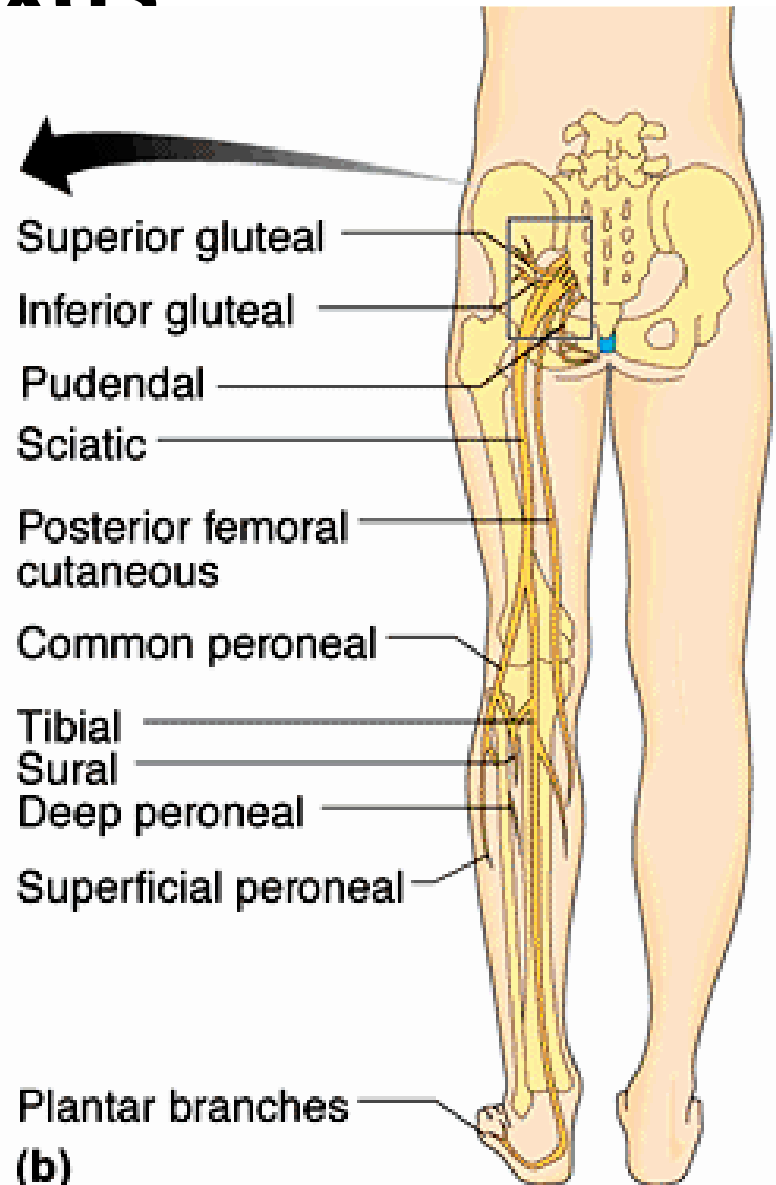
Sacral Plexus



(a)

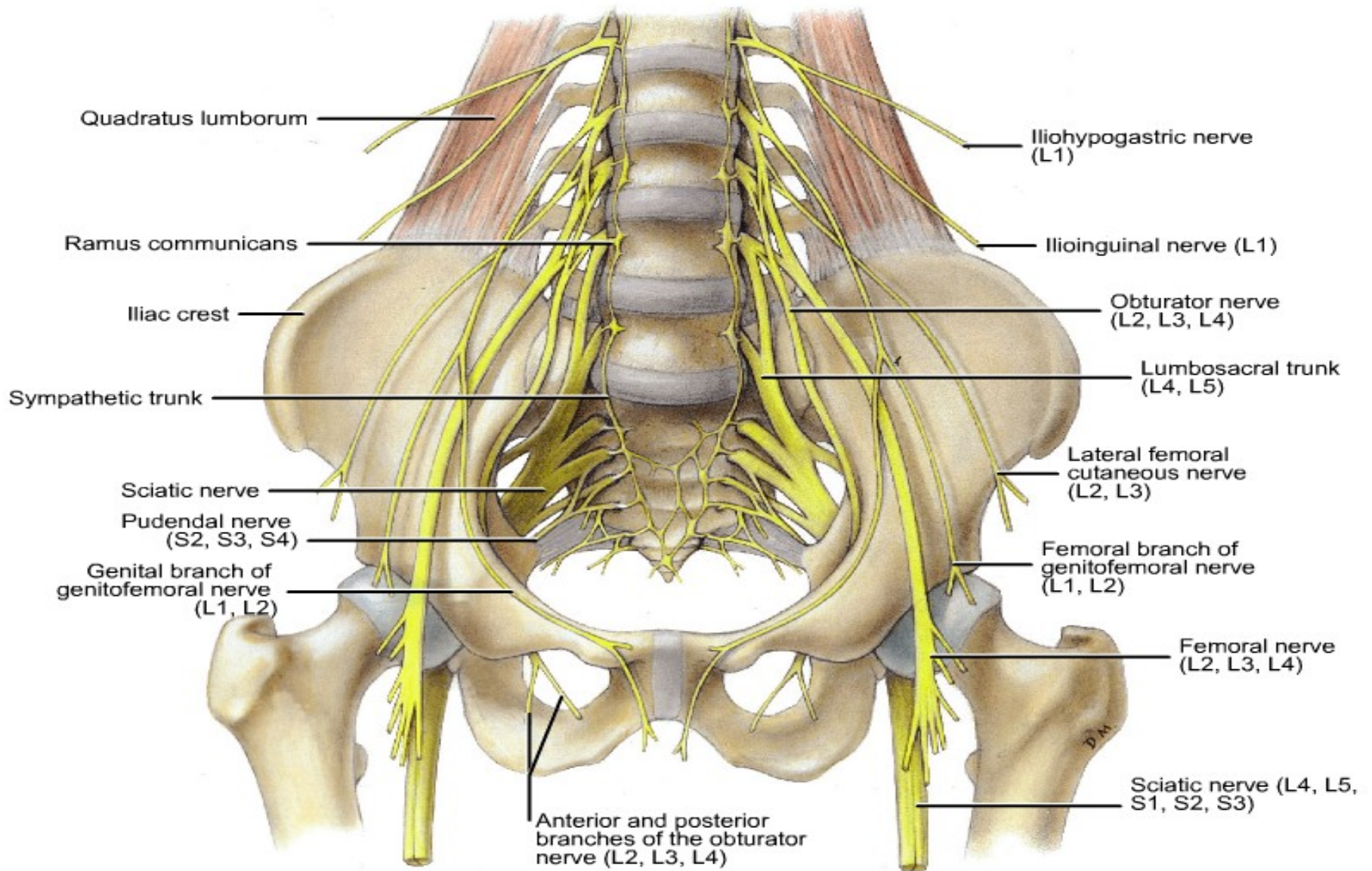
Key:

■ = Roots



(b)

Branches of Sacral plexuses



Branches

- Superior gluteal nerve - gluteus medius, minimus, tensor fascia lata
- Inferior gluteal nerve – gluteus maximus
- Nerve to quadratus femoris
- Nerve to piriformis
- Nerve to obturator internus
- Posterior cutaneous nerve of the thigh
- The plexus itself terminates as the pudendal nerve and the sciatic nerve.
- Sciatic nn-ventral rami of L4,L5 and S1-S3

Coccygeal plexus

Pudendal nerve

- forms anteriorly to the lower part of piriformis muscle from ventral divisions of S2 to S4
- It leaves the pelvic cavity through the greater sciatic foramen, inferior to the piriformis muscle, and enters the gluteal region; -supply mms of perineum, external anal sphincter and is sensory to perineum

Coccygeal plexus

- S4 and S5 and coccygeal nerve
- Supply part levator ani, coccygeus and anal sphincter

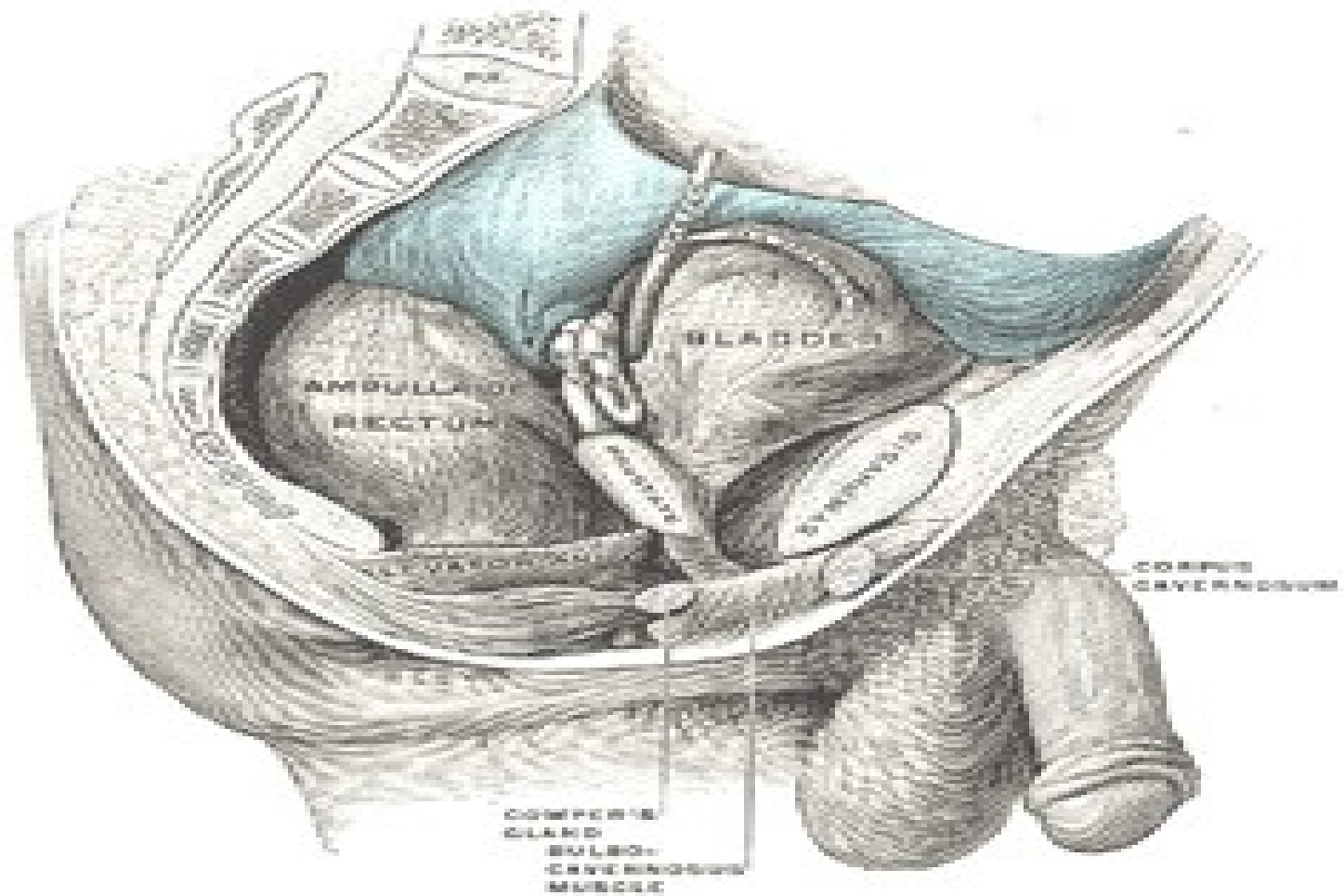
- ANS to the pelvis
 - sympathetic- Superior hypogastric plexus
 - parasympathetic-pelvic splanchnic nn from
S2. through S4.

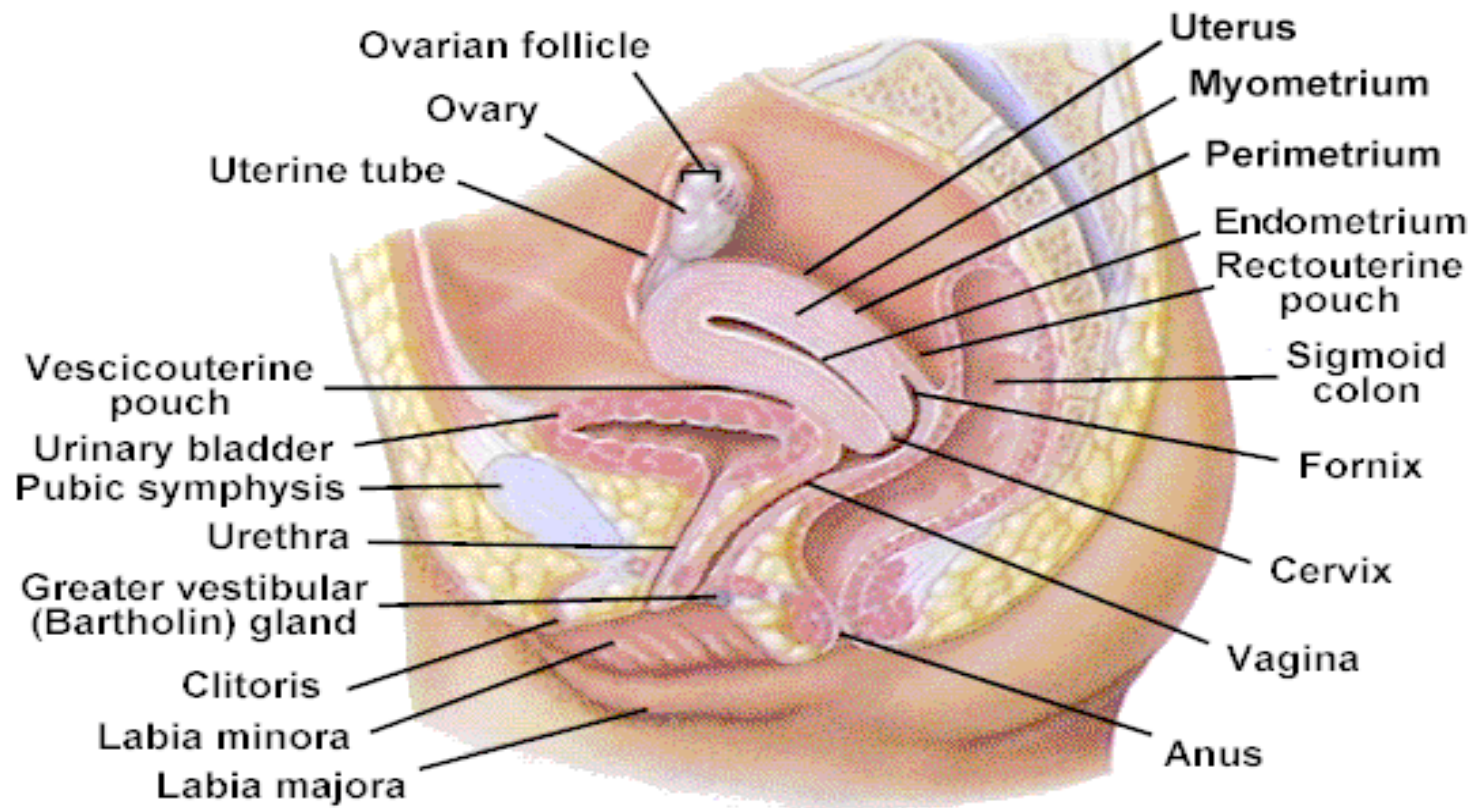
Pelvic Viscera

Pelvic viscera

Pelvic viscera include:

- the distal part of the urinary system and digestive tract
- Organs of the reproductive system
- The pelvic viscera are partly covered by peritoneum in their upper aspects but are extra peritoneal inferiorly





Urinary organs

Ureters – muscular (smooth) tubes running from kidneys to bladder 25 to 30 cm long

- The ureters descend retroperitoneally in to the pelvis passing inferior to the ductus deferens of the male and the uterine artery of the female.
- The ureter penetrates the bladder wall obliquely from its posteroinferior angle creating a one way valve

Urinary bladder

- A smooth, collapsible, muscular sac that stores urine

Position

- shape, size and position vary with amount of urine and age
- In adults: empty bladder lies in pelvis minor posterior and slightly superior to pubic bones

- In infants: found in abdomen
- Enters pelvic major at about 6 years of age and pelvic minor at puberty
- Found between the 2 levator ani muscles
- When filled ascends to pelvic major and abdomen

Urinary bladder...

Parts

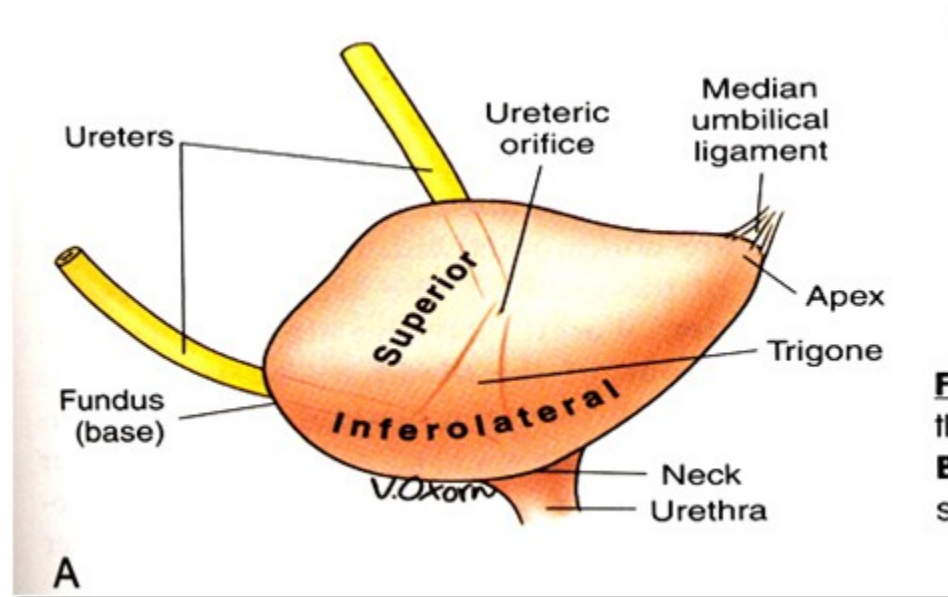
- empty bladder has the form of pyramid
- 4 surfaces: superior, 2 inferolateral and posterior (fundus)
- anterior end is termed as apex
- inferior end is termed as neck
- from apex, median umbilical fold pass superiorly to umbilicus (remnant of urachus)

Urinary bladder...

- The bladder is very distensible and uniquely suited for its function of urine storage
- It can expand for storage or collapse when empty
- When empty its walls are thick and thrown into folds (rugae)
- As it expands it becomes pear shaped and rises in the abdominal cavity

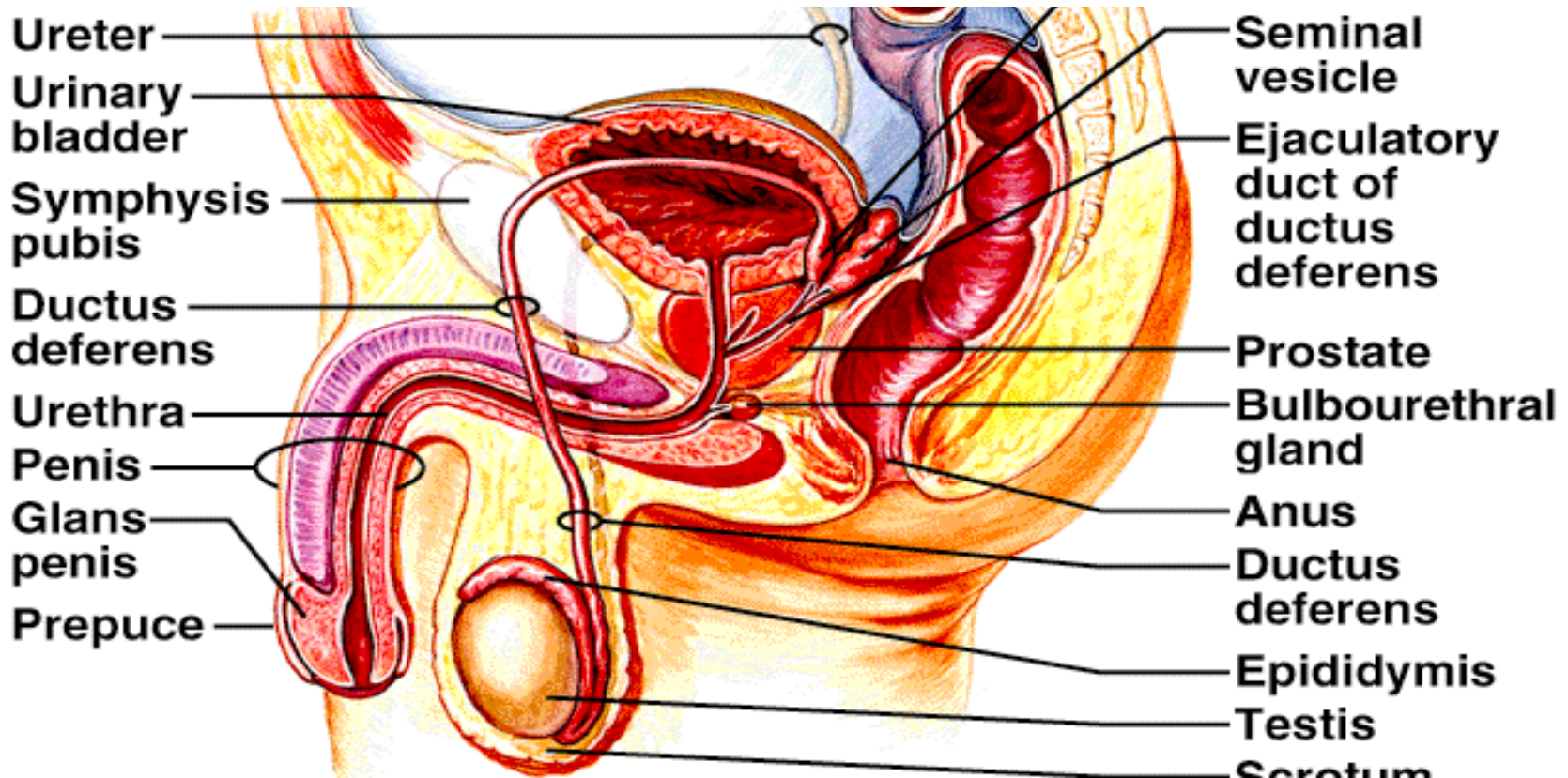
Parts of urinary bladder:

- ❖ Apex
- ❖ Base (fundus)
- ❖ body
- ❖ Neck
- ❖ Superior surface
- ❖ 2 Inferolateral surface
- ❖ Posterior surface
- ❖ 4 angles from which ducts open
 - anterior-urachus
 - 2 posterioinferior- ureter
 - inferior- urethra

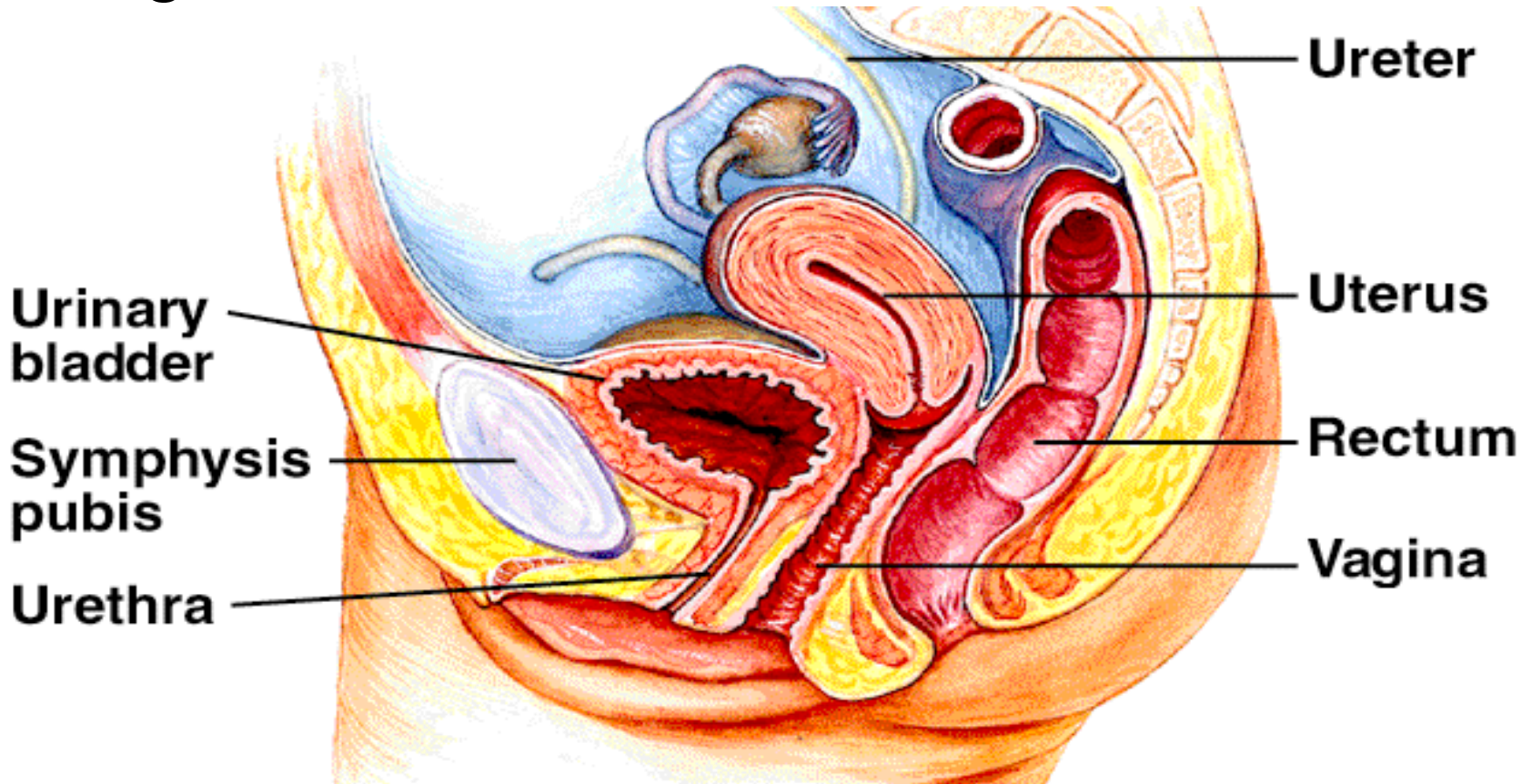


position

- In males, the bladder lies immediately anterior to the rectum



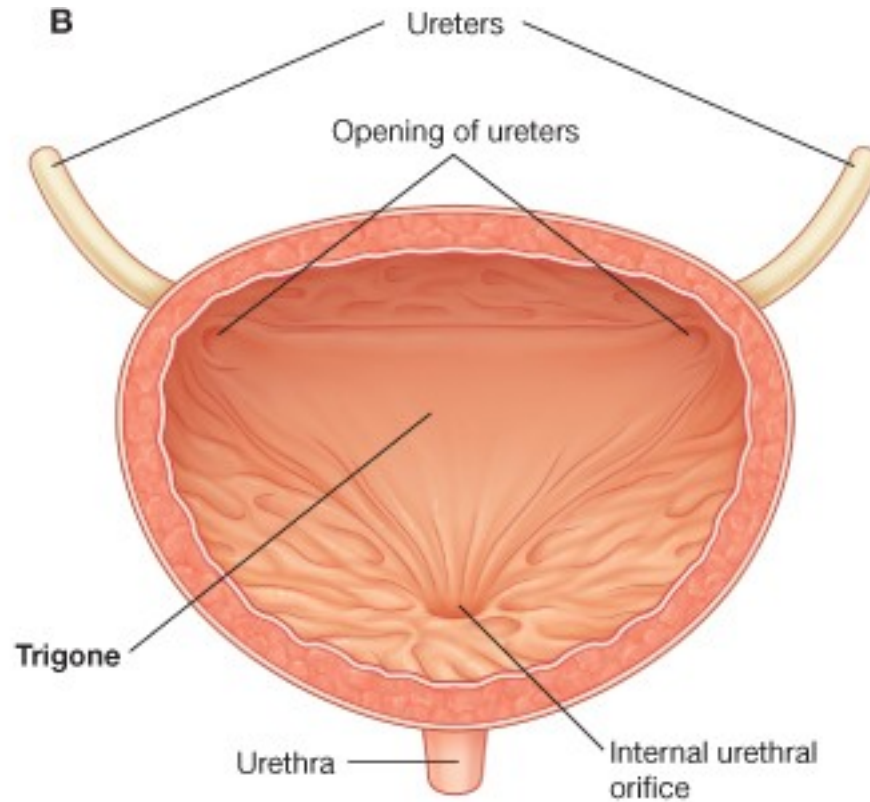
- In females, the bladder is anterior to the vagina and inferior to the uterus



Internal structure

- The interior of the bladder has openings for both ureters and the urethra
- The triangular region of the bladder base outlined by these openings is called the **trigone**
- The ureters open at superior angle of trigone and the urethra open at inferior angle.
- The urethral orifice has a **sphincter vesicae**, which, in the male, prevents semen reflux during ejaculation

Bladder



The bladder wall

- The bladder wall has three layers
 - mucosa
 - thick muscular layers
 - fibrous adventitia

Mucosa

- lined by transitional epithelium
- loosely connected to muscular wall and thrown into folds except over the trigone
- A smooth muscle, the **detrusor muscle** arranged in 3 layers and at neck form internal sphincter

Arterial supply

- Branches of internal iliac arteries
- **Superior vesical artery:** supply anterosuperior parts
- **Inferior vesical artery** and **Vaginal artery:** supply fundus (posterior/inferior) in male and female, respectively

Venous drainage

- Correspond to arteries and drain into internal iliac vein

Lymphatic drainage

- Superior part: to external iliac lymph nodes
- Inferior part: to internal iliac lymph nodes

Cont...

- Nerve supply-by vesical plexus(from inferior hypogastric plexus).
- Components
 - sympathetic-from lumbar segment
 - parasympathetic- from sacral segment

Urethra

Urethra

- tube extend from internal urethral orifice to exterior
- passage way for discharging urine (and semen in male)

Male urethra

- long, about 15-20cm
- has 3 portions: prostatic, membranous and penile (spongy).

prostatic urethra

prostatic urethra

- about 3cm long
- passes through prostate
- widest and most dilatable part
- posterior wall feature median longitudinal ridge called urethral crest and grooves on sides called prostatic sinus in which prostatic ductules open
- Ejaculatory ducts open on each side of prostatic utricle

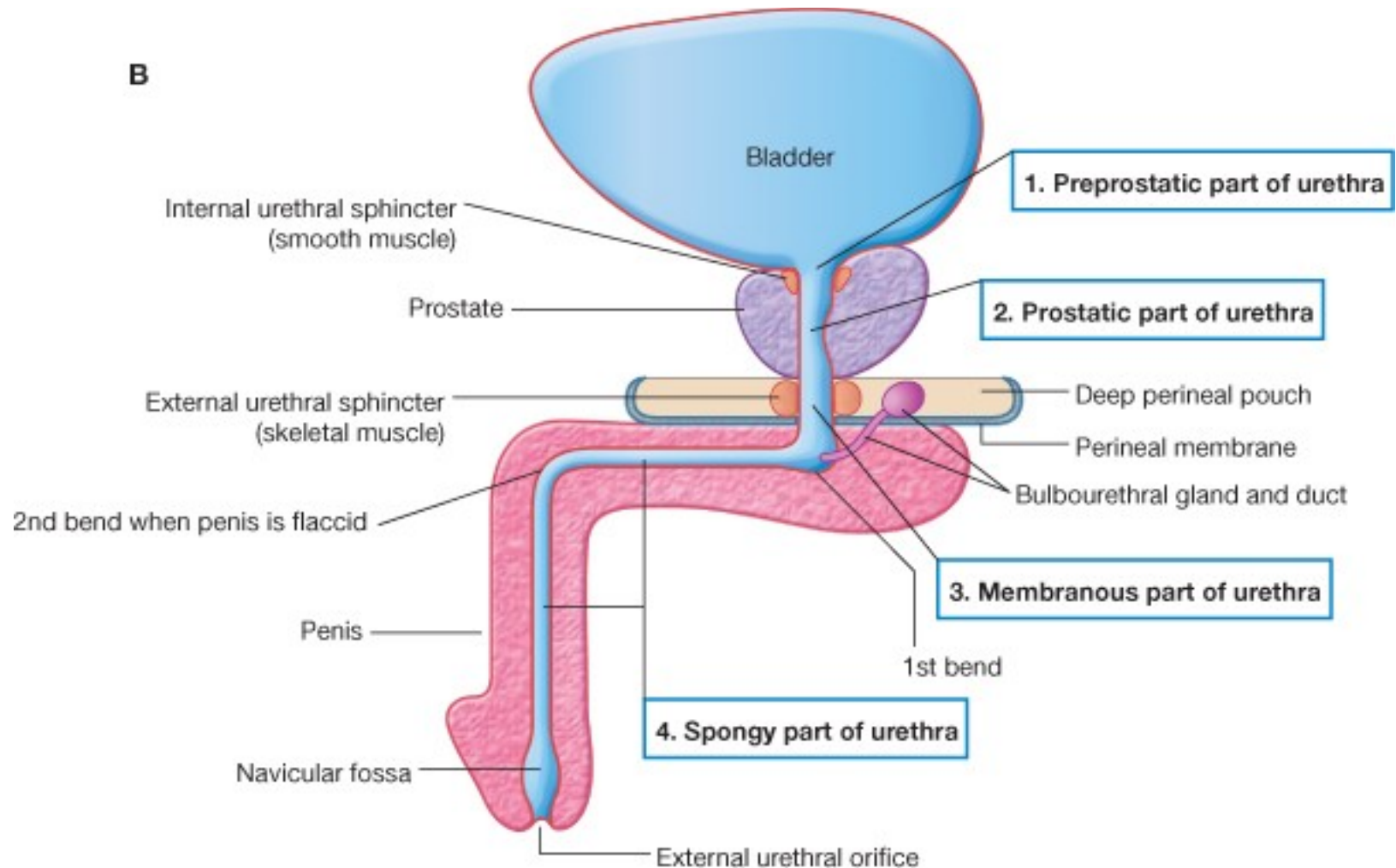
Membranous urethra

- shortest (1-2cm), thinnest and narrowest (except external urethral orifice)
- traverse urogenital diaphragm
- surrounded by sphincter urethrae muscle and perineal membrane
- posterolateral to it on each side is bulbourethral gland and duct

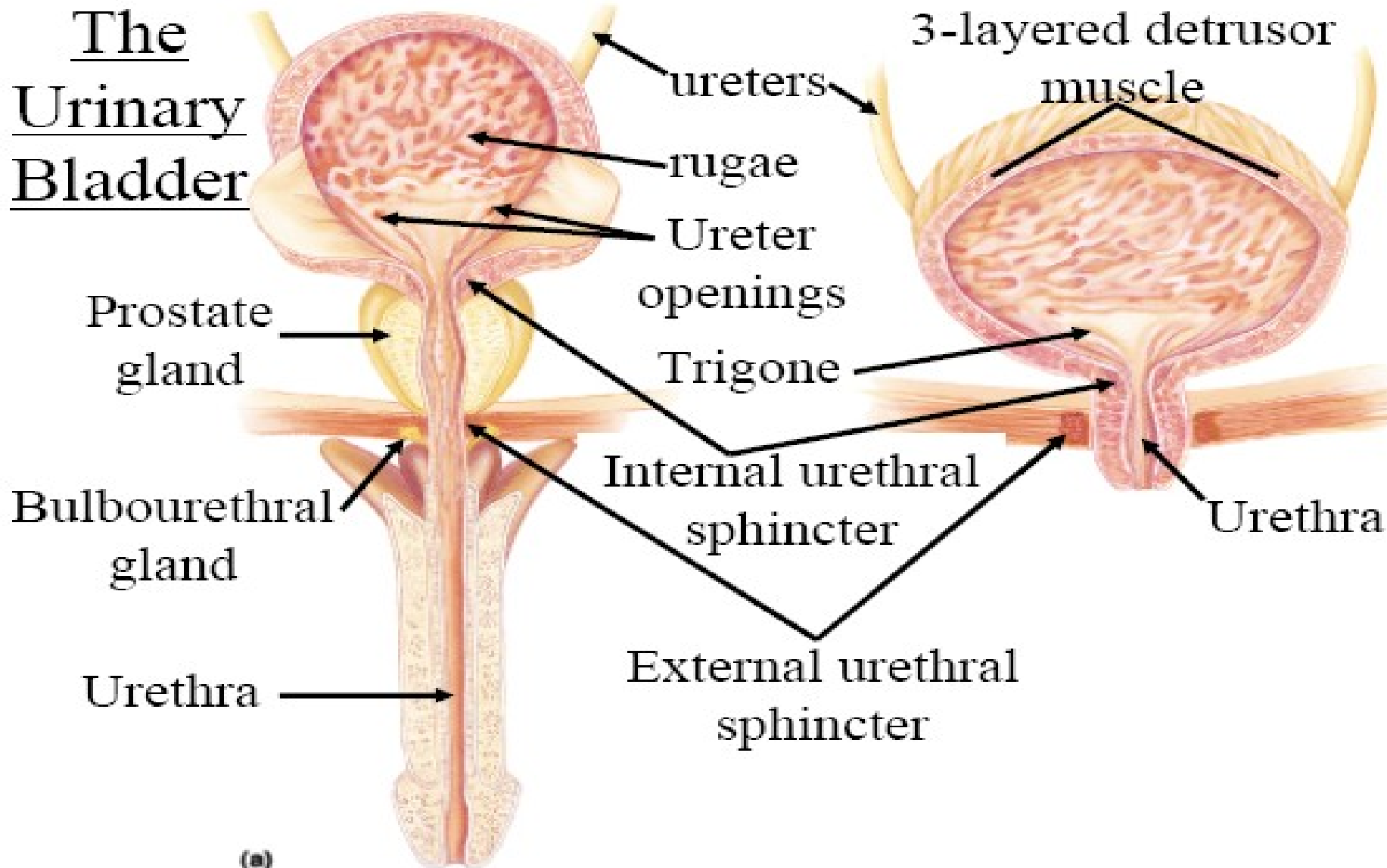
spongy urethra

- Longest, about 15 cm
- Passes through bulb of penis and corpus spongiosum and ends at external urethral orifice
- Ducts of bulbourethral glands opens into proximal part
- Expanded in bulb and in glans penis

Male Urethra



The Urinary Bladder



(a)

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Cont..

- There are three anatomic narrowing and widening of the male urethra
- The narrowing are
 1. At internal urethral orifice
 2. At membranous part surrounded by sphincter urethra
 3. At external urethral orifice.
- The widening
 1. Prostatic part
 2. Navicular fossa

Blood supply

Blood supply

- arteries: are region dependent
 - Prostatic part- inferior vesical, middle rectal.
 - Membraneous part- aa of bulb of penis.
 - Spongy part-urethral aa,dorsal deep aa of penis.
- veins: to prostatic plexus and internal pudendal

Innervations

- branches of pudendal nerve
- afferents run in pelvic splanchnic nerves

Female urethra

- Shorter (about 4cm) and simpler
- Passes anteroinferiorly from urinary bladder, posterior and then inferior to pubic symphysis
- Embedded in the anterior wall of the vagina and passes with it through pelvic and urogenital diaphragm
- It opens 2 cm posterior to the clitoris in vestibule of vagina
- Its inferior end is surrounded by sphincter urethrae muscle

Female urethra...

- Urethral glands are found in superior part called paraurethral glands
- Blood supply: internal pudendal and vaginal vessels
- Innervation: pudendal nerve and pelvic splanchnic nerves
- Lymphatic drainage: sacral and internal iliac lymph nodes

- Urethral sphincter –are two
 - internal-control the neck of the bladder and prostatic urethra.
 - is smooth muscle so is supplied by ANS.
 - external-surround membranous part .
 - is skeletal muscle supplied by perineal branch of pudendal nn.

Rectum

- 12cm long
- From superior of S3 vertebrae to puborectalis muscle and it follow curvature of sacrum and coccyx.
- Peritoneal covering
 - Superior 1/3-anterior and lateral surface
 - Middle 1/3- anterior surface
 - Distal 1/3-none
- Have three sharp curves (flexures)- follow the sacrocooccygeal curve and form transverse rectal folds(houston's valve).
- Their function is to prevent passage of feces during passage of flatus.

NVBs of rectum

- Arterial supply- are 3
 - superior rectal-terminal of IMA
 - middle rectal- from internal iliac aa
 - inferior rectal-from internal pudendal aa
- Venous drainage- to rectal venous plexus
- Nn-ANS-sympatetic is from inferior hypogastric and parasympatetic is from pelvic splanchnic.

Anal cannal

- 4 cm long.
- From puborectalis mm to anus.
- Interior of the anal cannal is divided in to two
 - upper 2/3- is visceral part which belong to the intestine.
 - lower 1/3 -is somatic part which belong to the perineum..

- **Anal sphincter**

- internal-** is thickening of the smooth muscle of the lower part of the rectum.

- surround superior 2/3 of the anal canal and is involuntary(ANS).

- External-**is skeletal mm.

- surround lower 1/3

- voluntary control so is by somatic nervous system.

- has three parts

- subcutaneous**-surround the anal orifice.

- superficial**-from the tip of coccyx to central tendon.

- deep**-from central tendon to levator ani mm.

NVB of anal cannal

- Blood supply- by superior and inferior rectal artery.
- Vv-superior and inferior rectal veins.
- Nn- ANS ,SNS
 - ANS –sympatetic-above pectinate line is by inferior hypogastric and parasympatetic is by pelvic splanchnic.
 - below pectinate line is by inferior rectal nn and is sensory nn to touch and pain.

Cot..

- The two important factors to maintain fecal continence are
 - support of 80 degree anorectal flexure by puborectalis mm.
 - relaxation of the lower part of the rectum (ampulla) to accommodate fecal mass.

Male internal genital organs

Ductus (vas) deferens

- Thick walled muscular tube, about 45cm
- Continuation of ductus epididymis

Course

- Begins in tail of epididymis and ends by joining duct of seminal vesicle
- Ascends in spermatic cord, passes through inguinal canal and cross over external iliac vessels to enter pelvis minor

Ductus (vas) deferens...

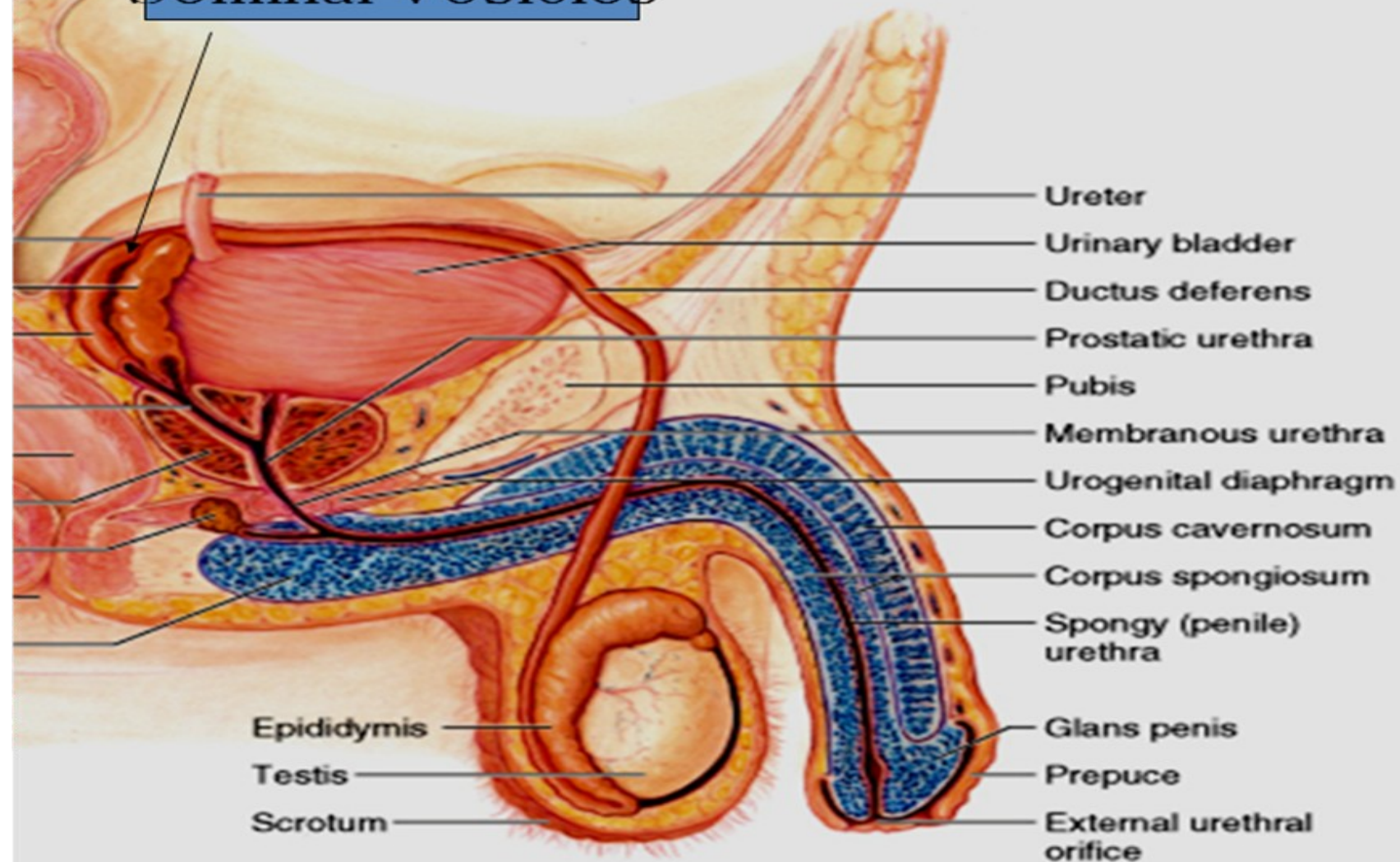
- Enlarges to form **ampulla** posterior to bladder
- Finally, it narrows and joins duct of seminal vesicle to form **ejaculatory duct**
- **Vasectomy**: a method of sterilizing males in which part of ductus deferens is ligated or excised

Seminal vesicles

- Posterior to the bladder above the prostate.
- Thin-walled and pear-shaped
- About 5 cm long
- The seminal vesicles secrete a fluid which contributes to the semen.
- The secretion of the vesicles accounts for about 60% of the volume of the semen
- It is a yellowish, viscous, alkaline fluid

- The ducts of the seminal vesicles join with the vas deferens to form the ejaculatory ducts.
- Sperm and seminal fluid mix in the ejaculatory duct to enter the prostatic urethra together during ejaculation.

Seminal Vesicles



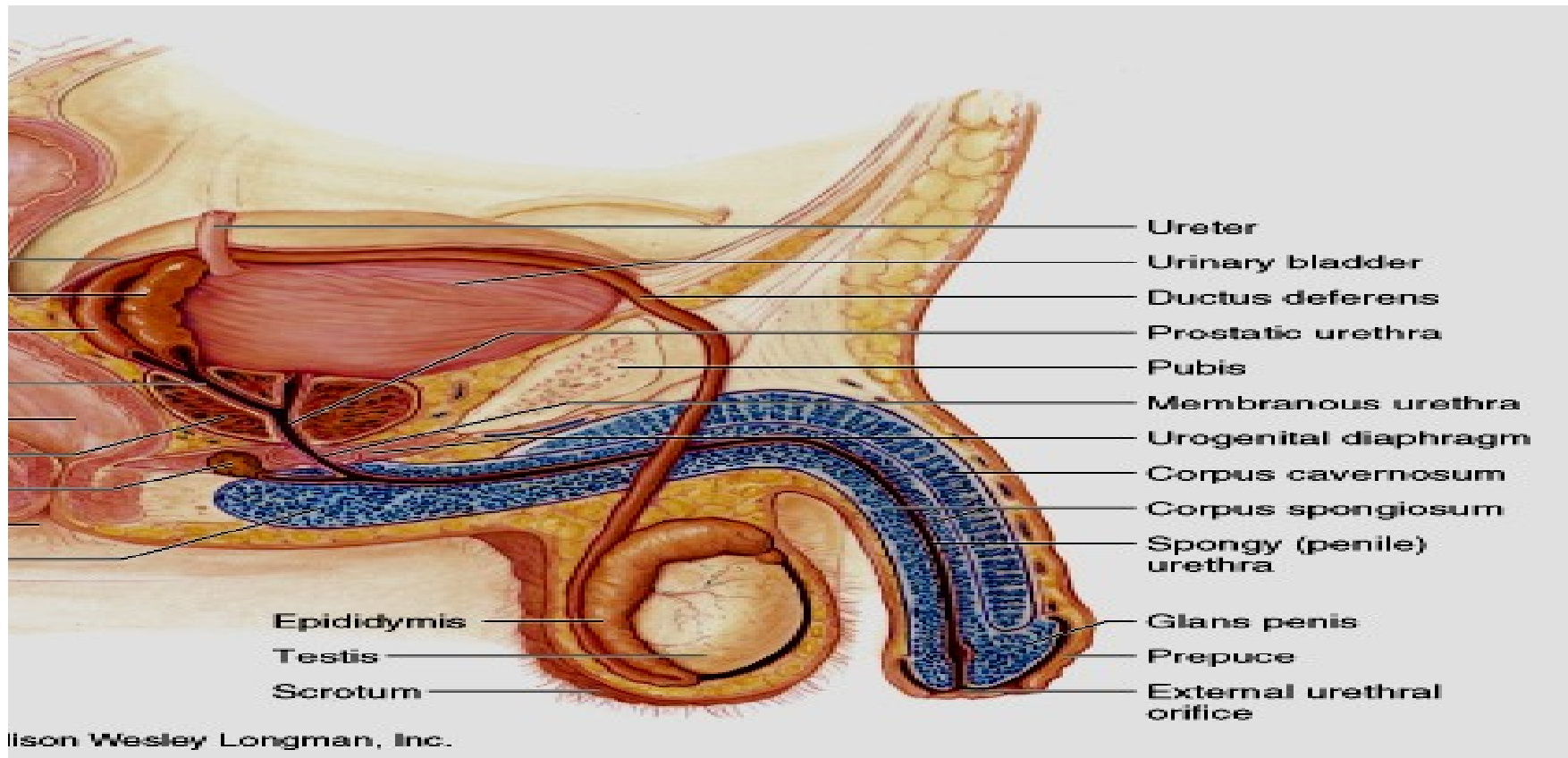
Ejaculatory ducts

- Formed by union of ducts of seminal vesicle and ductus deferens

Prostate

- Surrounds prostatic urethra
- the internal urethral orifice leads directly to the prostatic urethra, the gland being immediately below the bladder.
- Parts: base, apex, 4 surfaces (posterior, anterior and 2 inferolateral)

- The prostatic gland secretion accounts for one third of the semen volume
- milky, slightly acid fluid

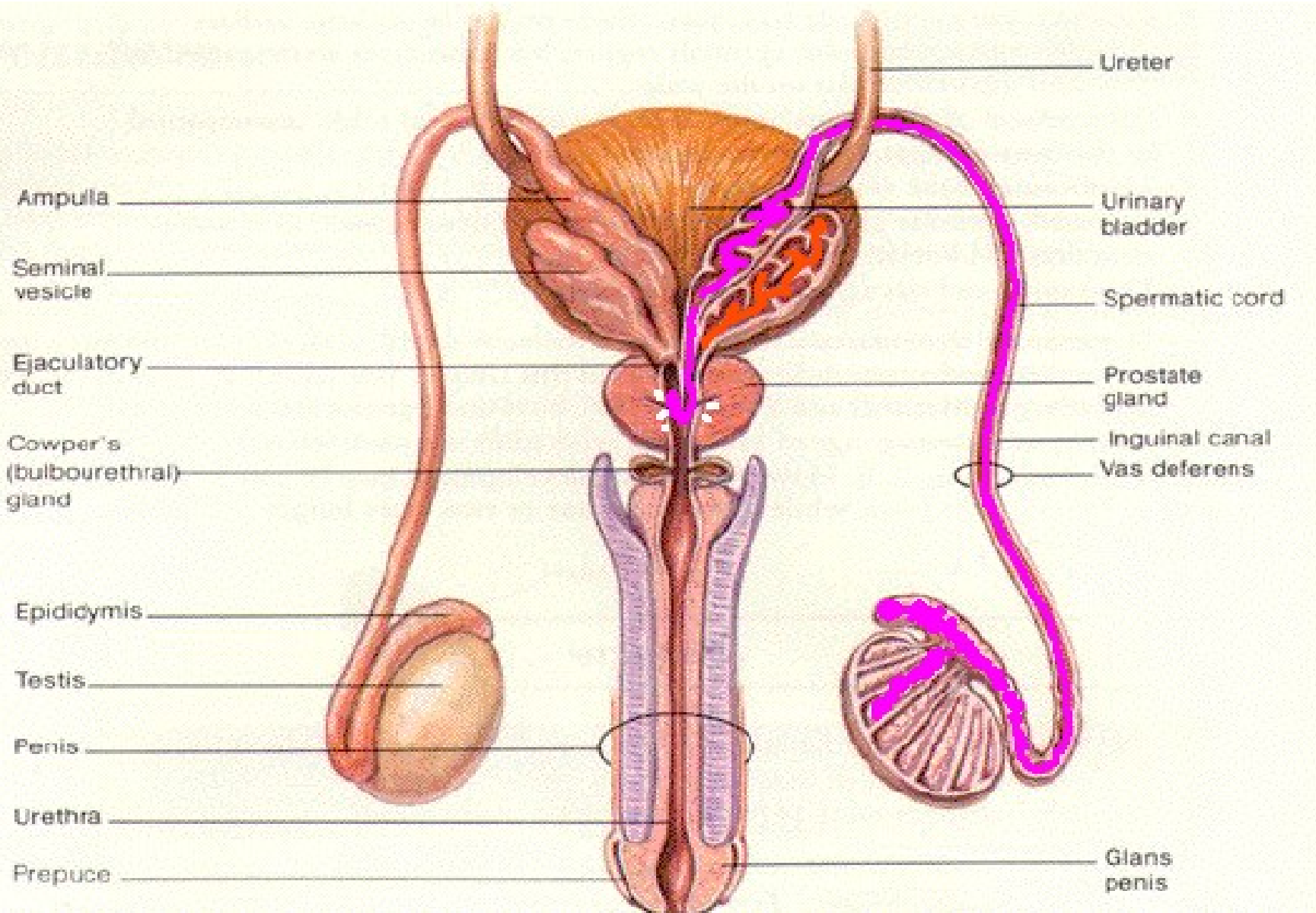


Cont..

- Prostate have five lobes.
 - anterior lobe- infront of the urethra
 - it lack glandular substance.
 - middle (median)lobe –between urethra and ejaculatory ducts.
 - posterior lobe- behind the urethra
 - contain glandular tissue.
 - right and left lateral lobes-on either side of the urethra.
 - contain main mass of the glandular tissue.

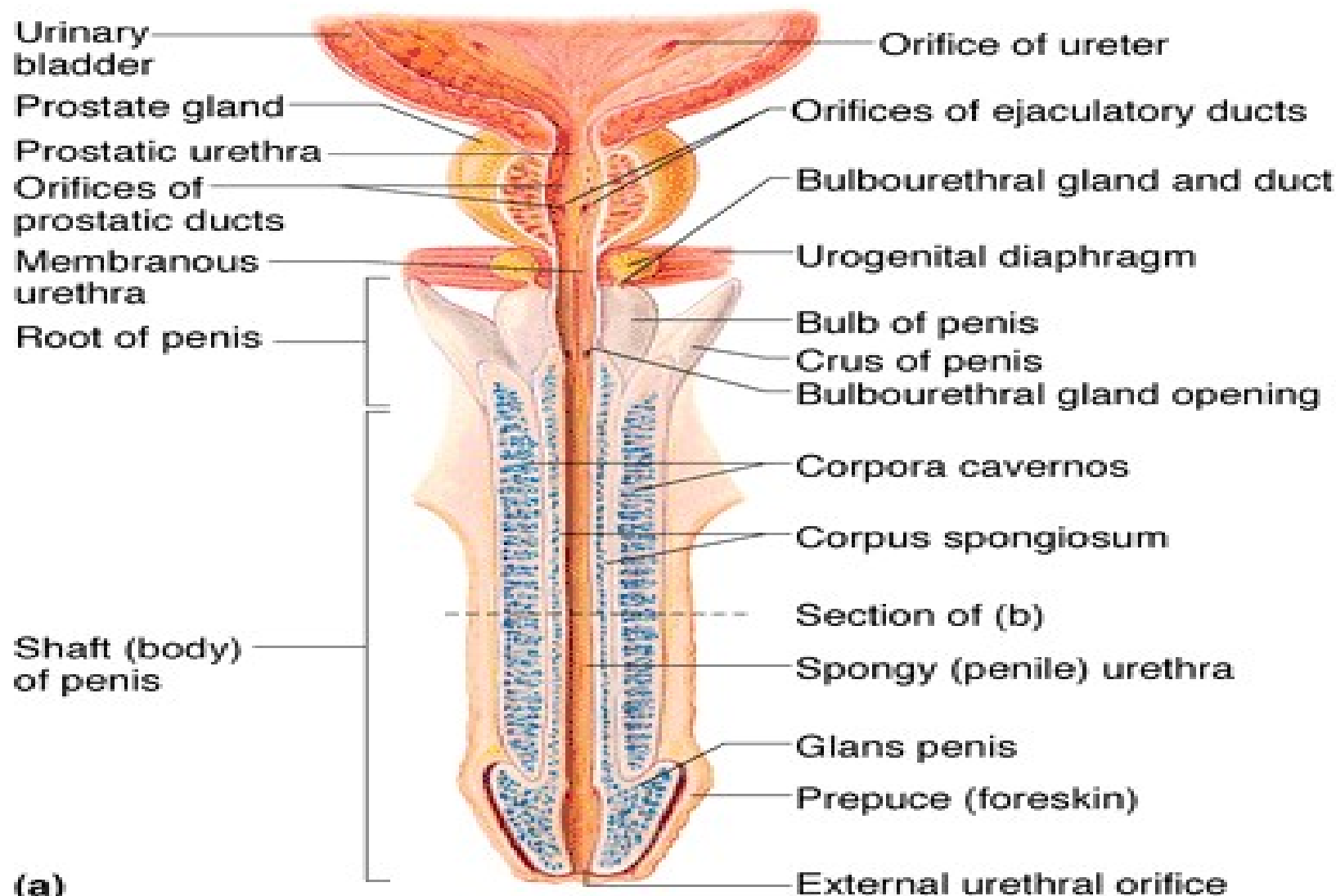
NVB of the prostate

- aa- inferior vesical , middle rectal , internal pudendal aa.
- Vv- via prostatic venous plexus to IIV.
- Nn- symp-inferior hypogastic and parasympathetic is by pelvic splanchnic.



Bulbourethral gland

- lie posterolateral to membranous urethra, embedded in sphincter urethrae muscle
- duct passes through perineal membrane and open in proximal spongy urethra.
- Secret mucos which lubricate the urethra.



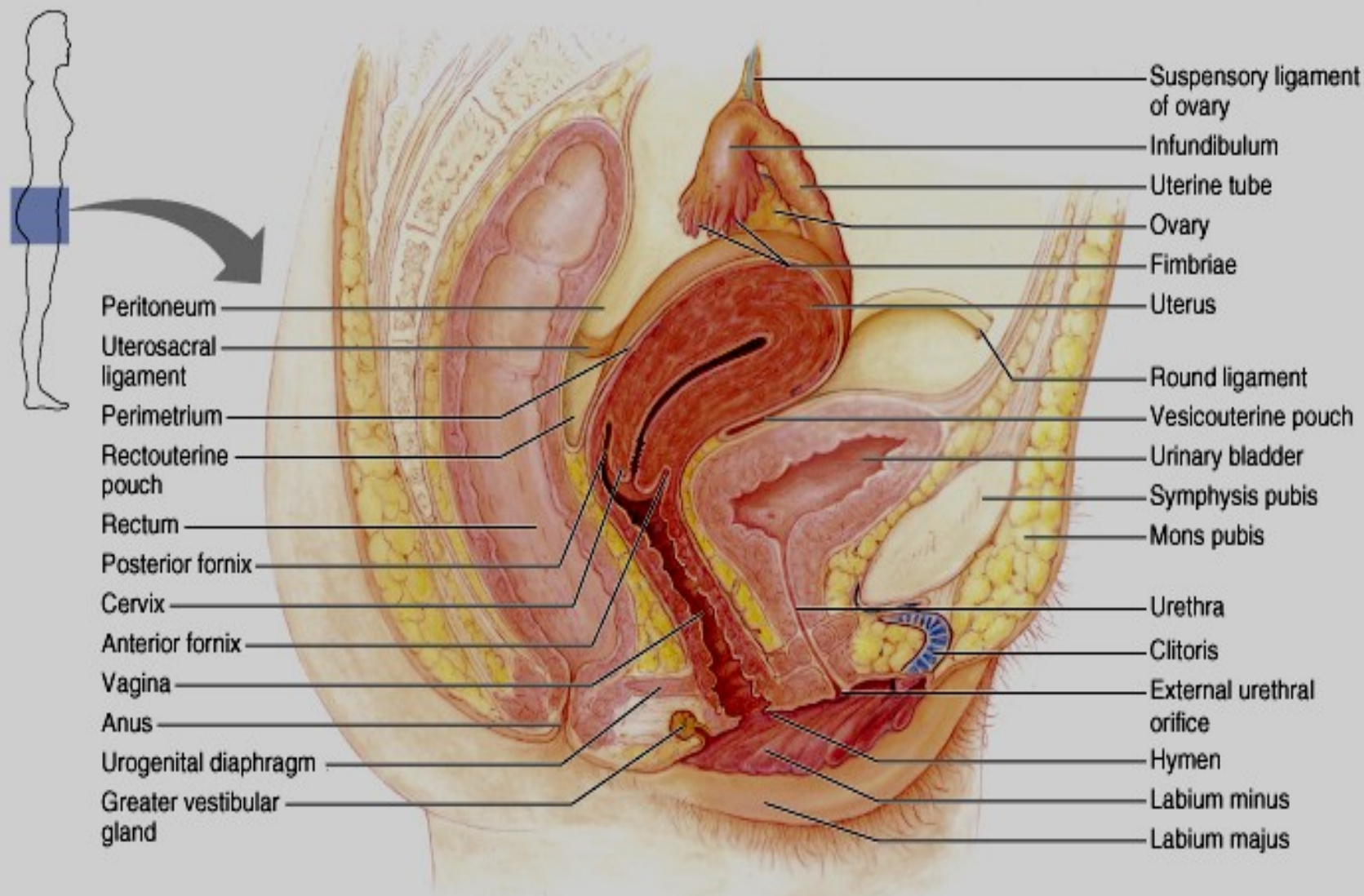
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Female Reproductive Anatomy

Female internal genital organs

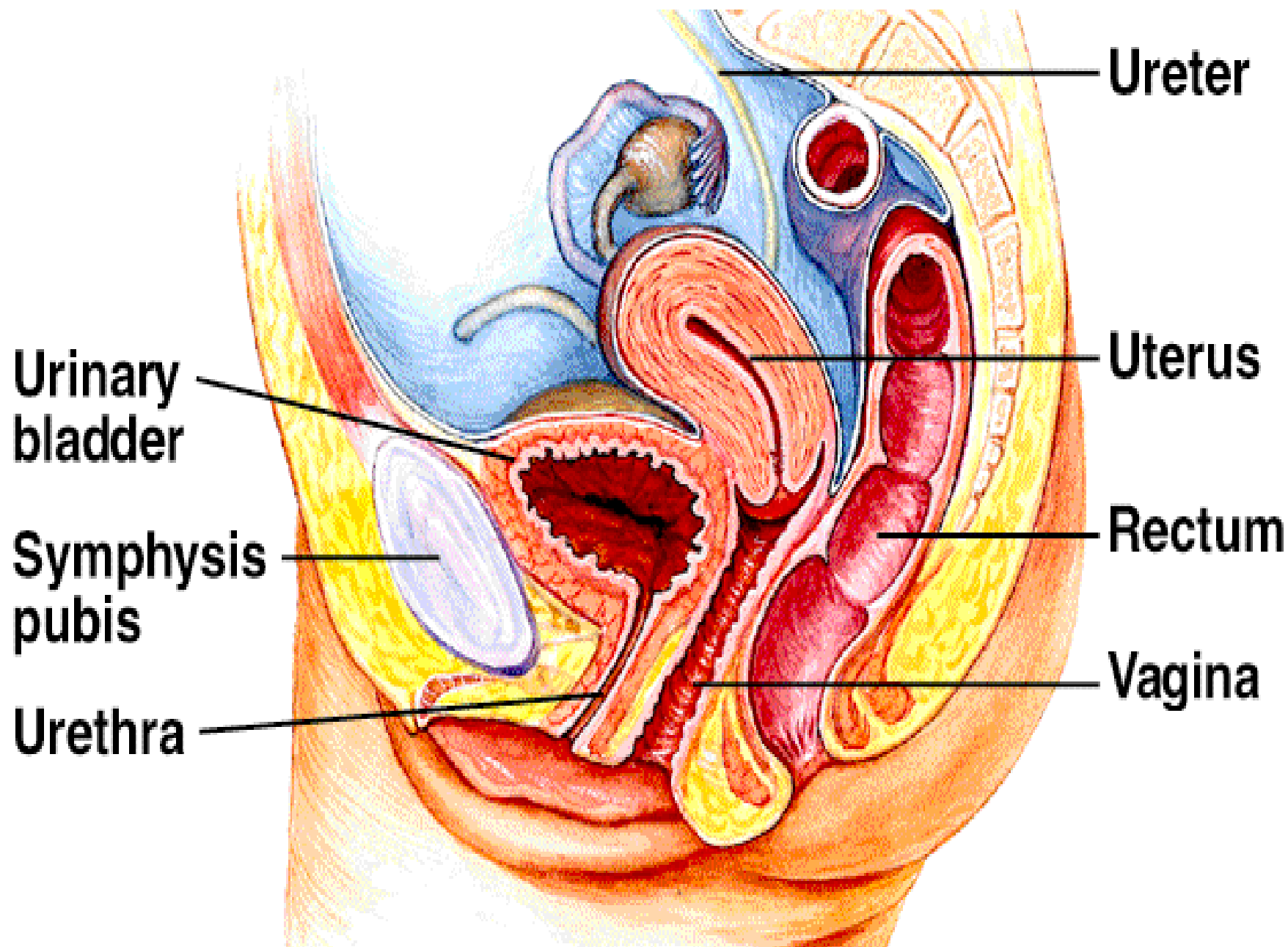
- Ovaries, the female gonads, are the primary reproductive organs of the female
- Like the testes of the male, ovaries serve a dual purpose
 - Produce gametes
 - Produce female sex hormones (estrogen and progesterone)
- The accessory ducts (uterine tubes, uterus, and vagina) transport or otherwise serve the needs of the reproductive cells and fetus

- The ovaries and duct system, collectively known as the internal genitalia are mostly located in the pelvic cavity
- The female's accessory ducts are the uterine tubes, uterus and vagina
- The external sex organs of the females are referred to as the external genitalia



Uterus(womb)

- hollow, thick walled, pear-shaped muscular organ
- functions to receive, retain, and nourish the ovum .
- located between bladder and rectum.
- In a pre-menopausal woman who has never been pregnant, the uterus is about the size and shape of an inverted pear
- 7-10cm long, 4-5cm wide, 2-3cm thick wt-50gm
- It is larger in woman who have born children
- projects superoanteriorly over bladder



Parts

- **fundus:** superior rounded part of body
- **body:** expanded superior 2/3.
 - between the fundus and isthmus.
- **isthmus:** junction between body and cervix
- **cervix:** cylindrical inferior third.
 - has three regions-internal and external os and cervical cannal.

Cervix

- narrow neck, or outlet, which projects into the vagina inferiorly
- The lumen of the cervix (cervical canal) is smaller than that of the body
- constriction between the two is called internal os
- The opening of the cervix into the vagina is called external os
- circular until the birth of the first child and transverse slit after

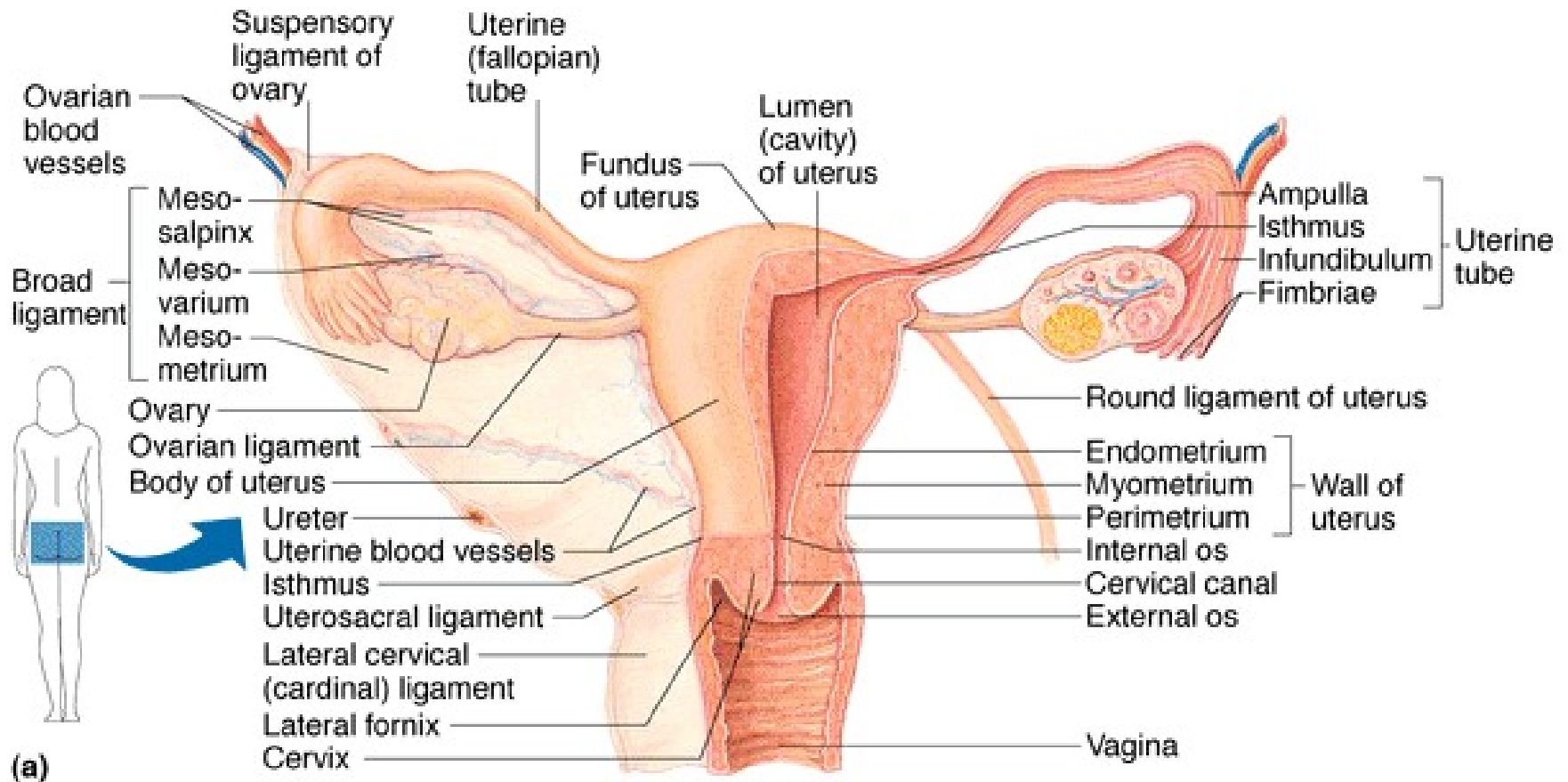
Cervix...

- The vaginal portion of the cervix protrudes into the vagina, surrounded by the anterior, posterior and lateral vaginal fornices
- The mucosa of the cervical canal contains cervical glands that secrete a mucus that fills the cervical canal and covers the external os, presumably to block the spread of bacteria from the vagina into the uterus
- Cervical mucus also blocks the entry of sperm, except at midcycle, when it becomes less viscous and allows sperm to pass through

Position of uterus

- the uterus is usually bent anteriorly (anteflexed) between cervix and body and the whole uterus is inclined anteriorly (anteverted)
- It is less anteverted when the bladder is full
- the uterus is often turned backward, or retroverted in older woman

Female Reproductive System



Ligaments

Broad ligament

- Enclose body of uterus
- Extends from sides of uterus to floor of pelvis
- Holds uterus in normal position
- Encloses uterine tubes
- Laterally surround ovarian vessels and form **suspensory ligament** of ovary which connects the ovary and the end of uterine tube to the side wall of the pelvis
- It includes mesosalpinx, mesovarium and mesometrium

- **Contents of broad ligament-uterine tube, uterine vessels, round ligament of uterus, ovarian ligament, ureter, uterovaginal nn plexus, lymphatic vessels.**

Transverse cervical ligament

- found near the base of the broad ligament
- extends from cervix and fornix to lateral wall of pelvis

Uterosacral ligament

- passes superiorly from cervix to

Relations of the uterus

- Anterior: bladder (vesicouterine pouch in between)
- Posterior: sigmoid colon and rectum (rectouterine pouch in between)
- Lateral: uterine artery

The Uterine Wall

- Made up of 3 layers: perimetrium (connective tissue), myometrium (smooth muscle) and endometrium (mucosa)

Perimetrium

- outermost serous layer composed of visceral peritoneum

Myometrium

- bulky middle layer, composed of interlacing bundles of smooth muscle
- contracts during childbirth to expel the baby

Endometrium

- simple columnar epithelium underlain by a thick lamina propria of highly cellular connective tissue

Blood supply

- arterial supply: uterine artery (main) and ovarian artery
- venous drainage: uterine vein
- Nn- parasympathetic is by pelvic splanchnic and sympathetic is from hypogastric.
- NB – pain from uterine contraction go back to T10-L1 so is sympathetic.
 - from lower part of the uterus and upper Vx is parasympathetic back to pelvic splanchnic.

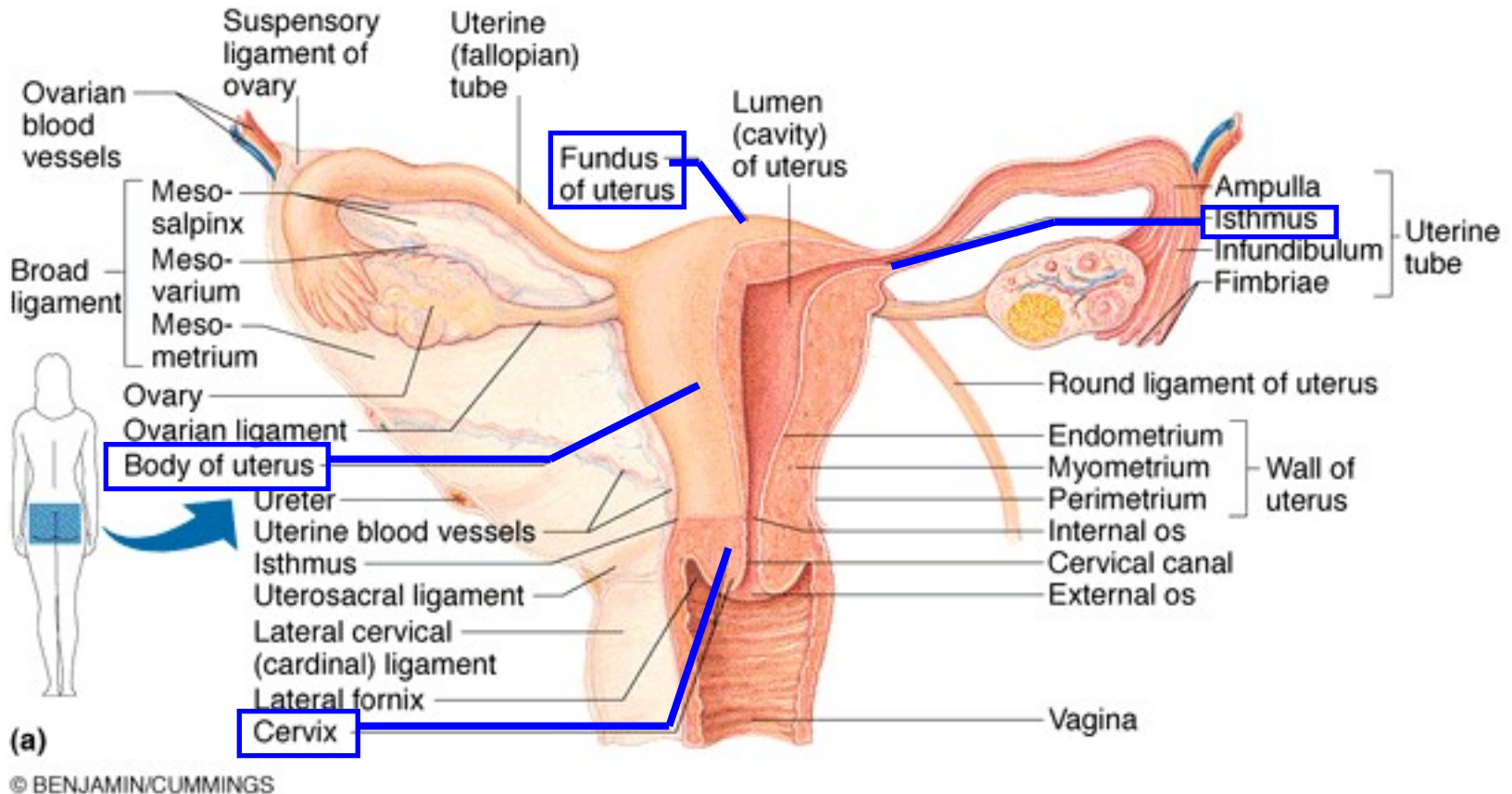
Uterine tubes(oviduct)

- 10-12cm long, extends medially from the ovary to uterus
- pass laterally from uterus lying in the broad ligament
- carry oocytes from ovaries and sperms from uterus to site of fertilization (ampulla)
- opens at its proximal end to horn of uterus and distal end into peritoneal cavity; allow communication between peritoneal cavity and exterior

Parts of the Tubes

- **infundibulum:** funnel shaped, margin have finger like processes called fimbriae which spread over ovary
- **Ampulla:** middle wide part which curves over ovary, site of fertilization
- **Isthmus:** narrow part which enters uterus
- **uterine (intramural) portion:** passes through myometrium

Female Reproductive System



Uterus consists of:

Isthmus - slightly narrower region between the body and cervix

Fundus - rounded region superior to entrance of fallopian tubes

Body - major hollow part of the uterus

Cervix - neck or narrow outlet of the uterus: projects into the vagina

The Wall of the FT

- contains sheets of smooth muscle, and its thick, highly folded mucosa contain both ciliated and nonciliated cells
- oocyte is carried toward the uterus by a combination of muscular peristalsis and the beating of the cilia
- Nonciliated cells of the mucosa have dense microvilli and produce a secretion that keeps the oocyte (and sperm, if present) moist and nourished
- Externally, the uterine tubes are covered by visceral peritoneum and supported along their length by a short mesentery called mesosalpinx

NVB of the oviduct

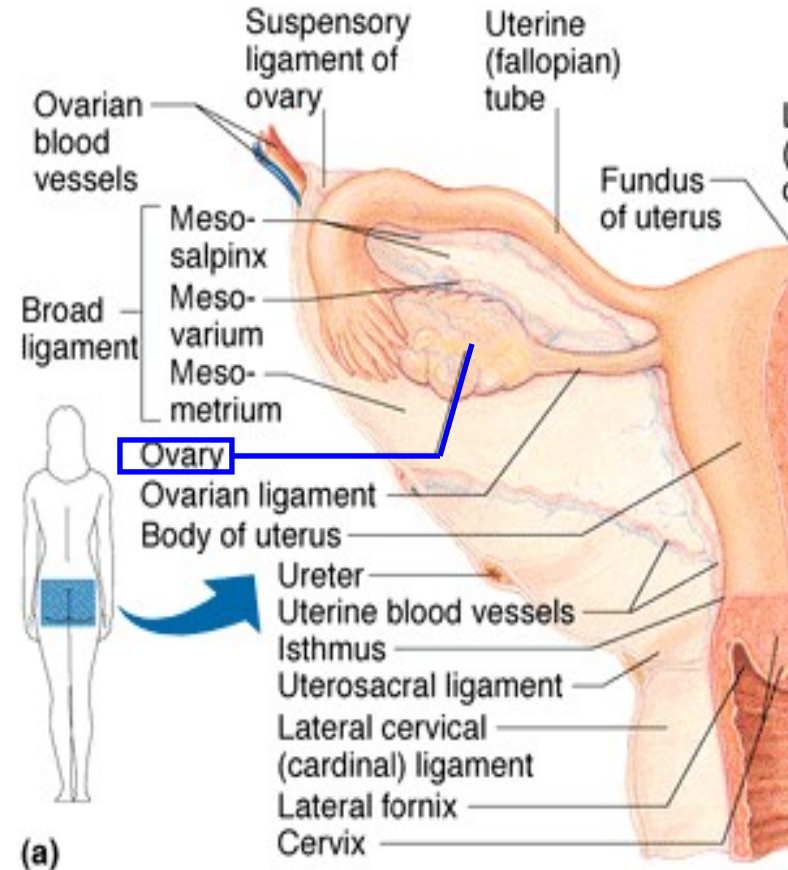
- aa – tubal branch of ovarian and uterine artery.
- Vv – same as ovaries i.e on right side go to IVC and left go to left renal vv.

Nn – by ovarian plexus.

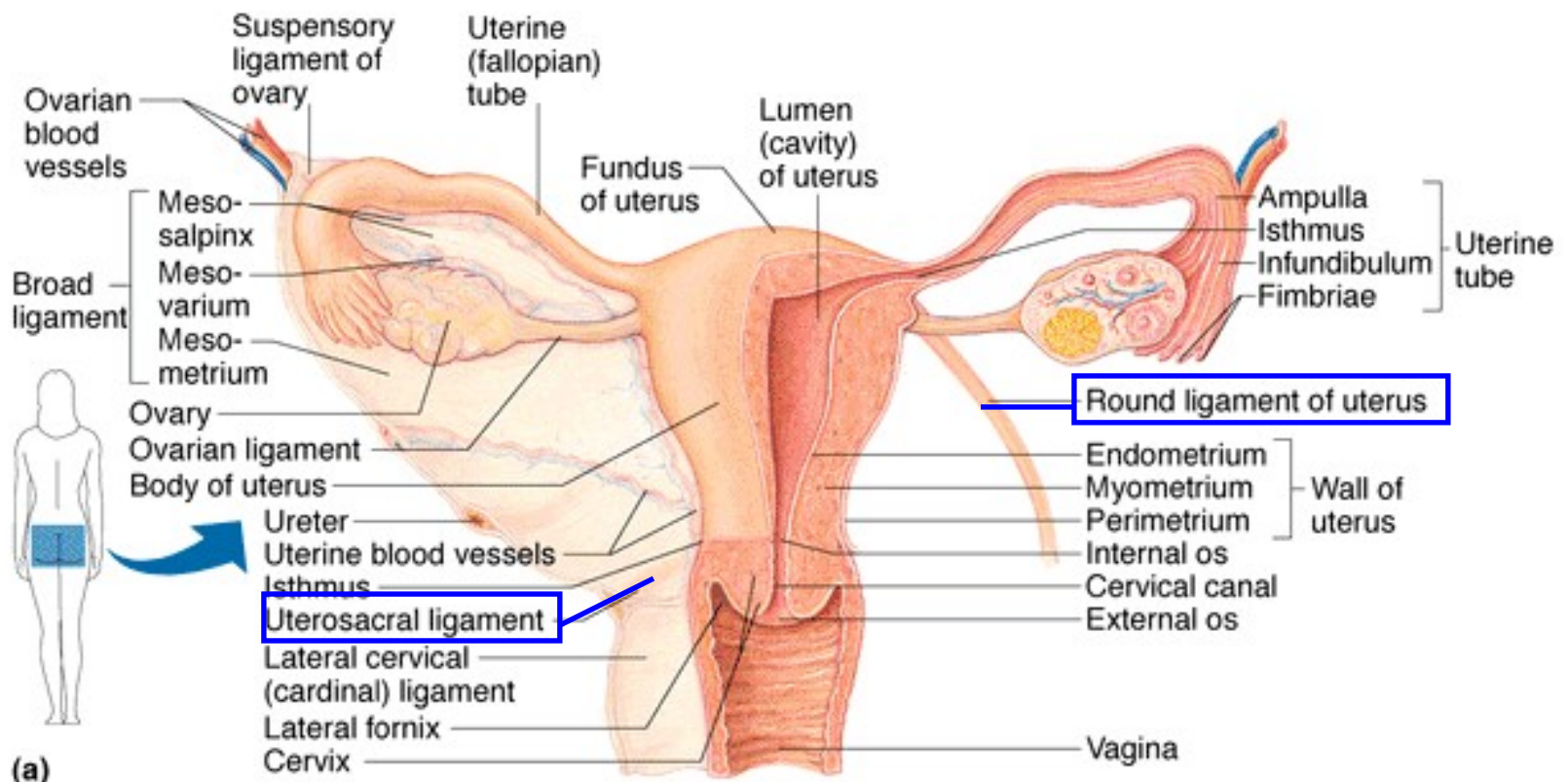
1. Ovaries

- The female gonads or sex glands
- 2 almond sized glands, either side of uterus.
- Are 3 cm long 1.5 cm wide ,1cm thick.wt-10-15gm.
- Lies between the ureters(posteriomedially) and the internal and external iliac vessels(laterally)
- They develop & expel 1 ovum/mth
- A woman is born with about 400,000 immature eggs called follicles
- During a lifetime a woman releases about 400 to 500 fully matured eggs for fertilization
- The follicles in the ovaries produce the female sex hormones, progesterone and estrogen
- These hormones prepare the uterus for implantation of the fertilized egg

Female Reproductive System



- These ligaments work with the Round and Uterosacral ligaments to suspend female reproductive system in the lower abdomen
- Significantly different from males where all structures hang



Ligaments of the ovary

- Suspensory ligament-is band of peritoneum
 - connect distal end of ovary to lateral pelvic wall.
 - bring NVB and lymph supply to ovary.
- Ovarian ligament-is a fibromuscular cord.
 - it attach ovary to lateral wall of the uterus.
 - 4cm long.
 - content-ovarian branch of uterine aa.
- Mesovarium-is a fold of peritoneum and is part of broad ligament

NVB of the ovary

- Blood supply- ovarian aa which is directly from abdominal aorta.
 - ovarian branch of uterine aa.
- Vv –Rt ovarian vv will drain in to IVC
 - Lt ovarian vv will drain in to Lt renal vv.
- Nn –parasympathetic is vagus and symph. Is from hypogastric.

Vagina

- Female organ of copulation
- Often called the birth canal, the vagina provides a passageway for delivery of an infant or for menstrual flow
- Fibromuscular tube; about 7-9 cm long
- Anterior wall is shorter (7 cm) than posterior wall (9 cm) and 4 cm wide.
- It extends from cervix of the uterus to vestibule of vagina.
- In virgins the vaginal orifice is covered with folds of mucos membrane cold hymen.
- Rugae is a muscular fold on internal wall of vagina.
- There are no glands in vagina.

Perineum

PERINEUM

- Perineum is a diamond shaped region of trunk inferior to pelvic diaphragm between thighs
- Boundaries: The skeletal basis is the outlet of the pelvis
- anteriorly by the symphysis, the inferior ramus of the pubis and the ramus of the ischium
- Posteriorly it is bound by the lower part of the sacrum and the coccyx connected to the ischial tuberosity by the sacrotuberous ligament
- The superficial part of this region is called the perineum including the external genitalia (in the urogenital triangle) and the anus (in the anal triangle)
- Divided into 2 triangles by line joining ischial tuberosities

Perineum...

Divided into 2 triangles by line joining ischial tuberosities

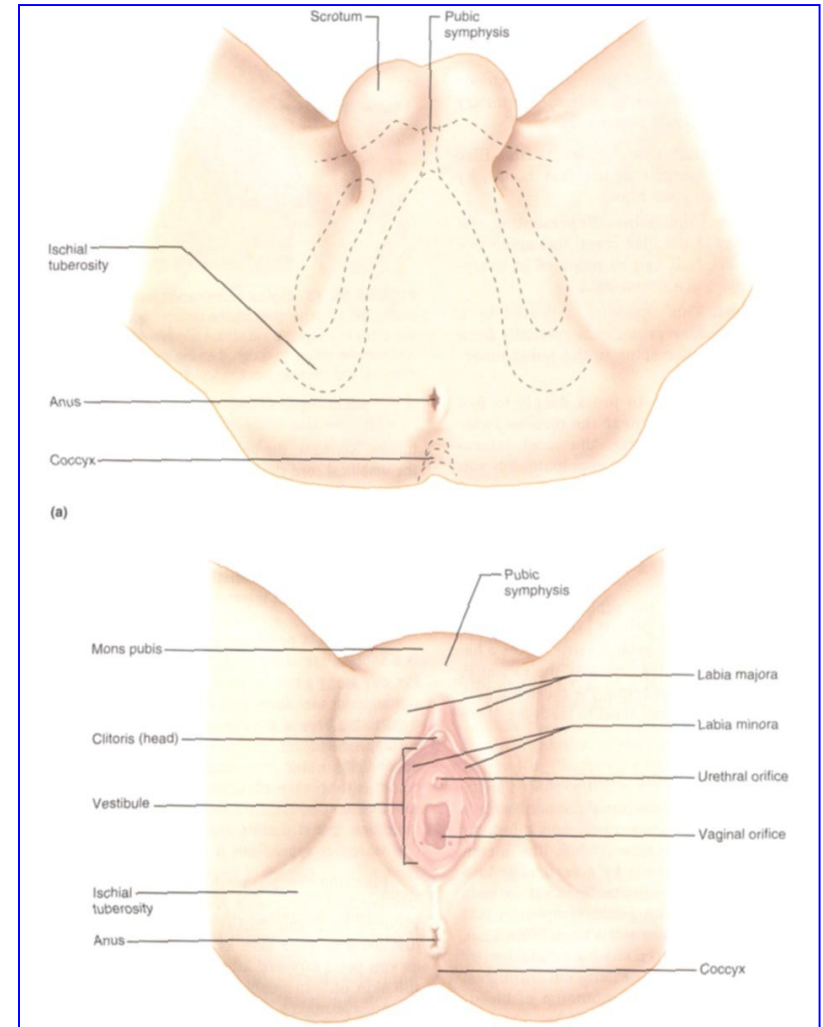
Anal triangle: contains anus and ischioanal fossa

Urogenital triangle: contains external genitalia

Inferior pelvic aperture (pelvic outlet) is closed by

Urogenital diaphragm: anterior part

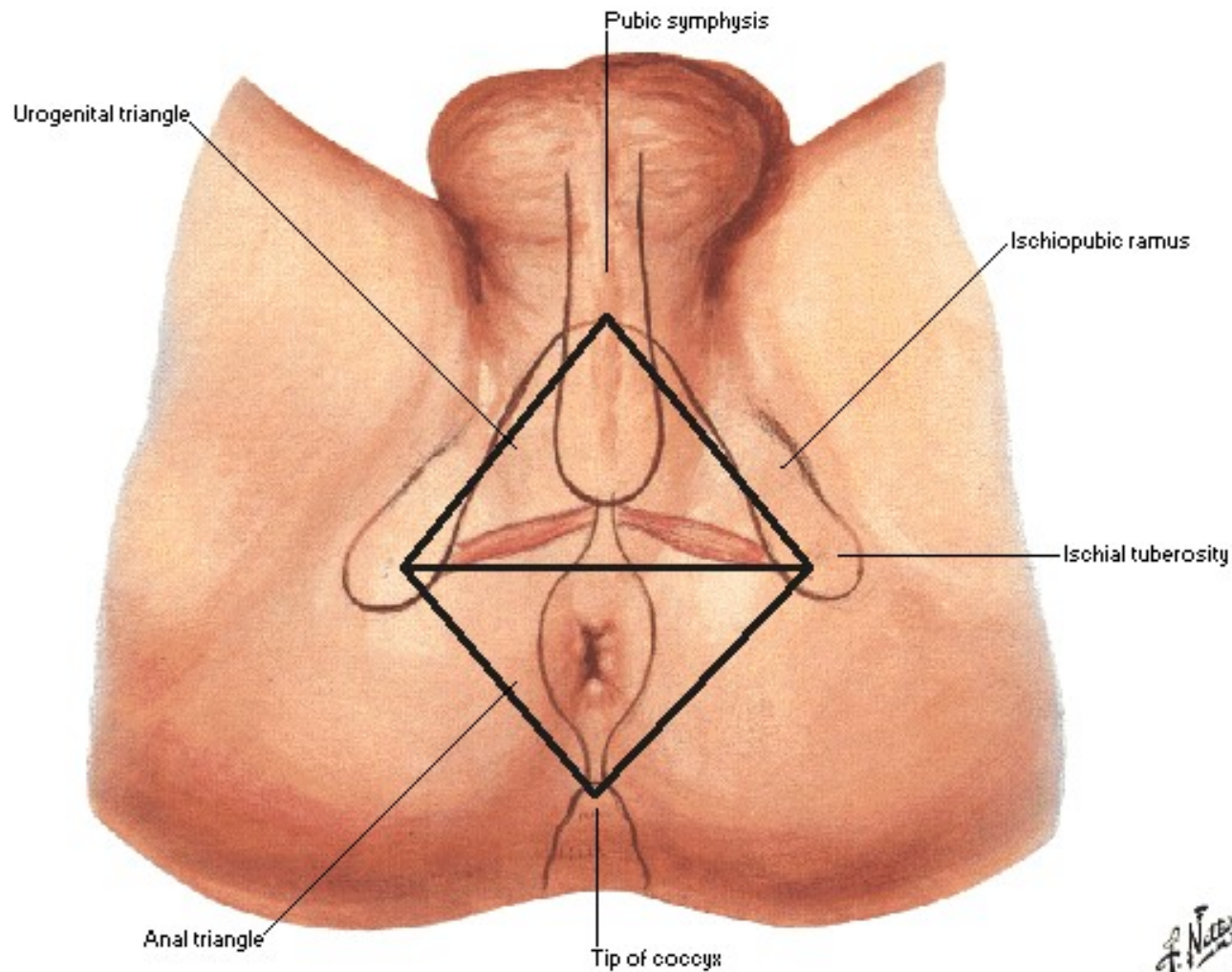
Pelvic diaphragm: posterior part



Triangles

Perineum of Male

Regions [Triangles] and Surface Topography

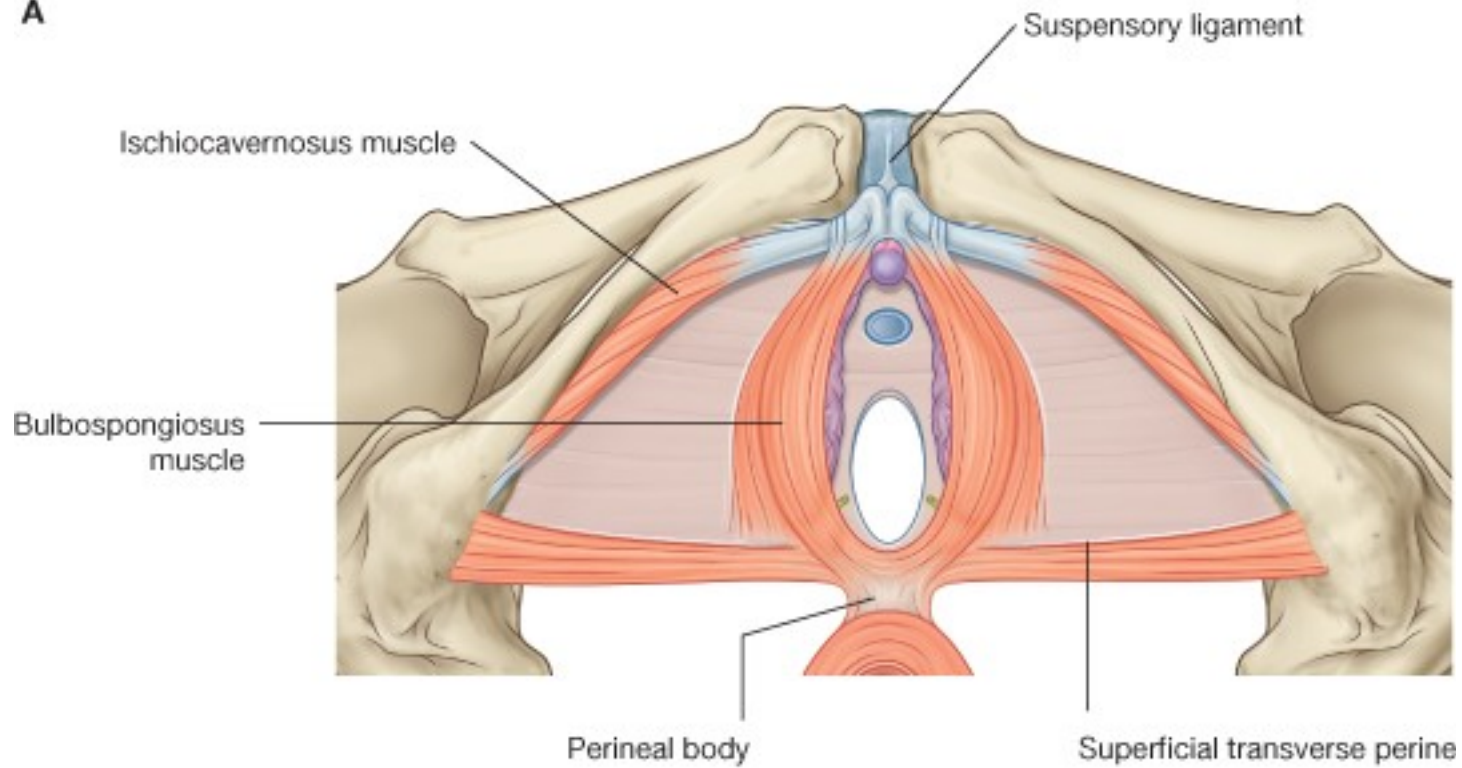


Anal triangle

- Boundaries-tip of coccyx, line joining ischial tuberosities, sacrotuberous ligament
- Contents-anal canal, external anal sphincter and ischioanal fossa.
- Ischioanal fossa is filled with pad of fat and inferior rectal aa,vv,nn
 - is space between skin of anal region inferiorly and superiorly is pelvic diaphragm.
 - is site of abscess and may communicate with rectum and anal cannal.
 - in coronal section the fossa is triangular in shape
 - laterally- is obturator mm with its fascia.
 - also pudendal cannal.
 - medially – pelvic diaphragm with its inferior fascia
 - external anal sphencter.

Perineal Body

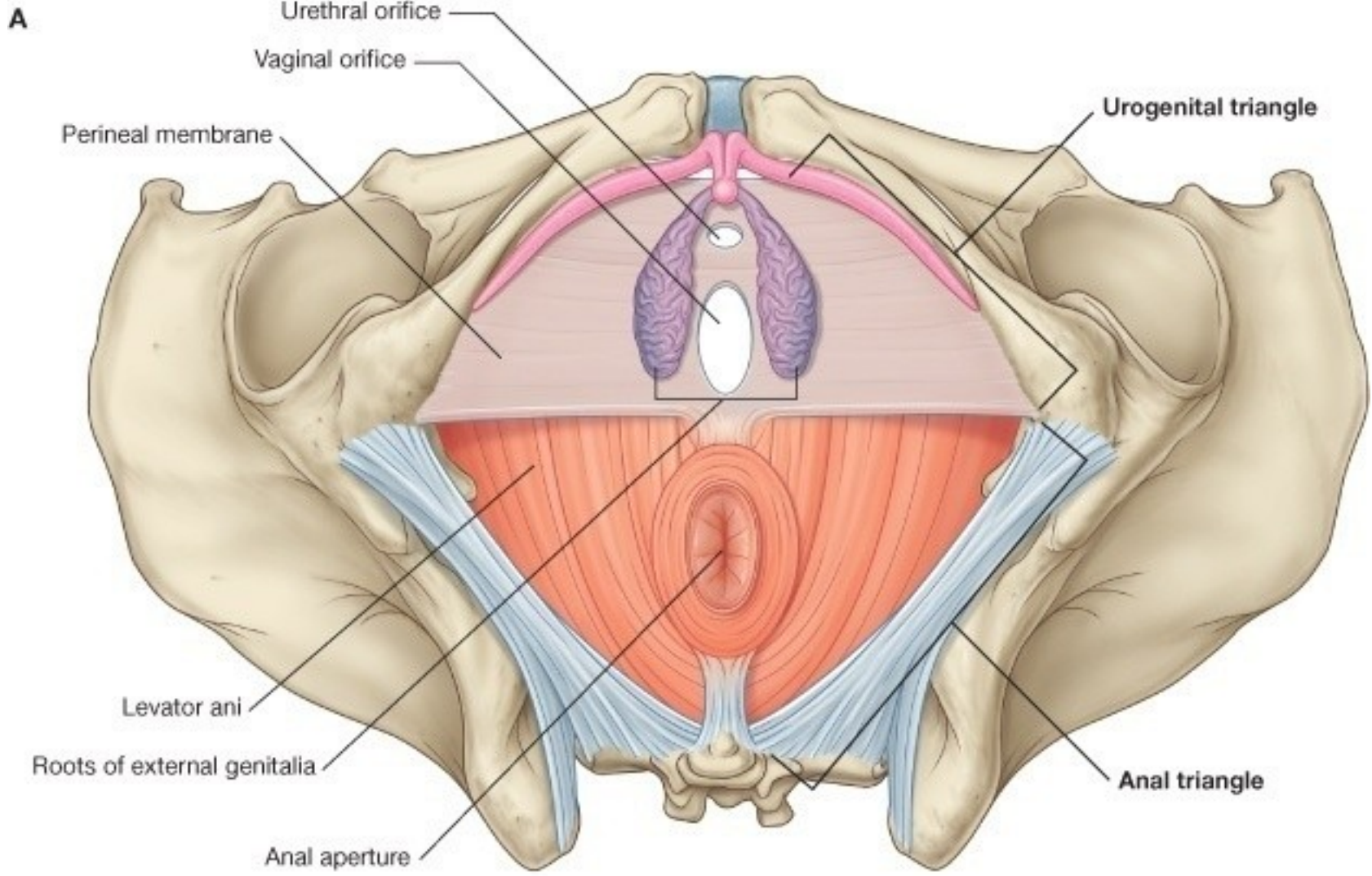
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Perineal body

- Tendinous center of perineum
- Mass of fibrous tissue
- Tearing during child birth removes support from inferior part of posterior wall of vagina resulting in prolapse of vaginal wall through vaginal orifice
- To prevent tearing, incision is often made to enlarge the orifice; episiotomy

Perineum-Female



Urogenital region

- Contents in male
 - skin
 - superficial perineal fascia
 - deep perineal fascia
 - superficial perineal space(SPS)-contain the root of penis and superficial perineal mms.
 - inferior fascia of urogenital diaphragm
 - deep perineal space(DPS)-contain urogenital diaphragm ,urethra and bulbourethral gland.
 - superior fascia of urogenital diaphragm.
- In females- same but the superficial perineal space transmit distal vagina and contain greater vestibular glands.

Superficial perineal muscles

- Are three.
 - In male
1. Bulbospongiosus-
 - origin -from perineal body and fibrous raphe on the bulb of penis.
 - insertion- to superior part of corpus spongiosus.
 - action- aid in expel urine and semen.
 2. Ischiocavernosus –
 - o-ischial ramus
 - I – penial crus
 - action- for erection
 3. Superficial transverse perineal mm
 - o- ischial ramus
 - I -perineal body
 - nerve supply of all the three mm is pudendal nn

Deep perineal muscles

- Is urogenital diaphragm
 - in male is pierced by urethra
 - in females is pierced by urethra and vagina.
- Contain two mm- the deep transverse perineal mm and sphenicter urethra.

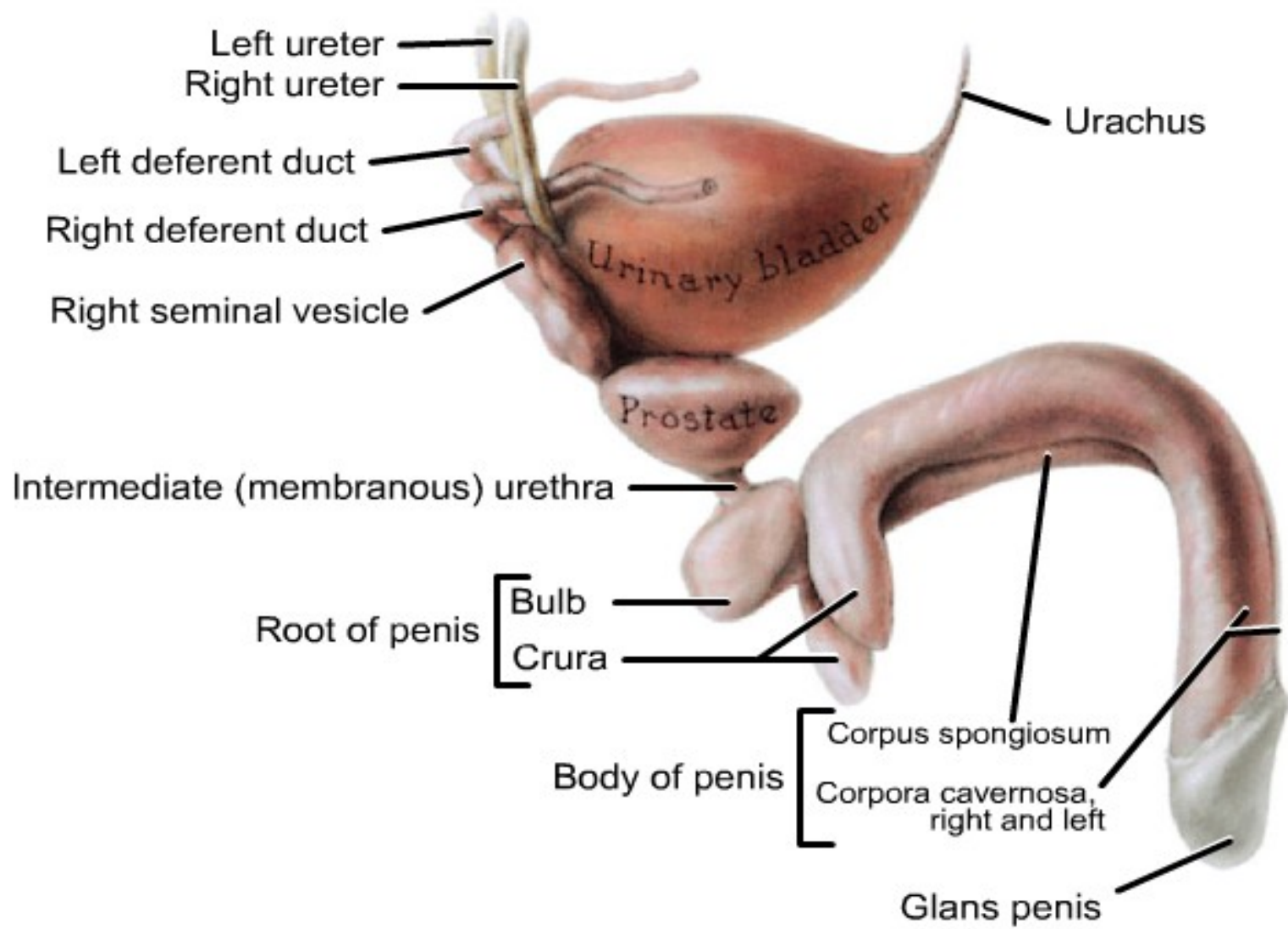
Male external genitalia

- **Are penis and scrotum.**
- **Penis** - Organ of copulation and common outlet for urine and semen.
 - has root(in perineum covered by bulbospongiosis) and body(shaft).
 - **prepuce** - foreskin; removed during a circumcision
 - **glans penis** - enlarged tip at the end
 - **erectile tissue (bodies)**
 - ✓ **corpus spongiosum** - lines the urethra
 - ✓ **corpora cavernosa** - make up most of the mass of the penis

- **Corpora cavernosa** penis-dorsal
- **Corpus spongiosum** penis-ventral
- the penile (spongy) urethra runs through it to open at the external urethral orifice
- Penis
- root-attached portion

Body

- free part

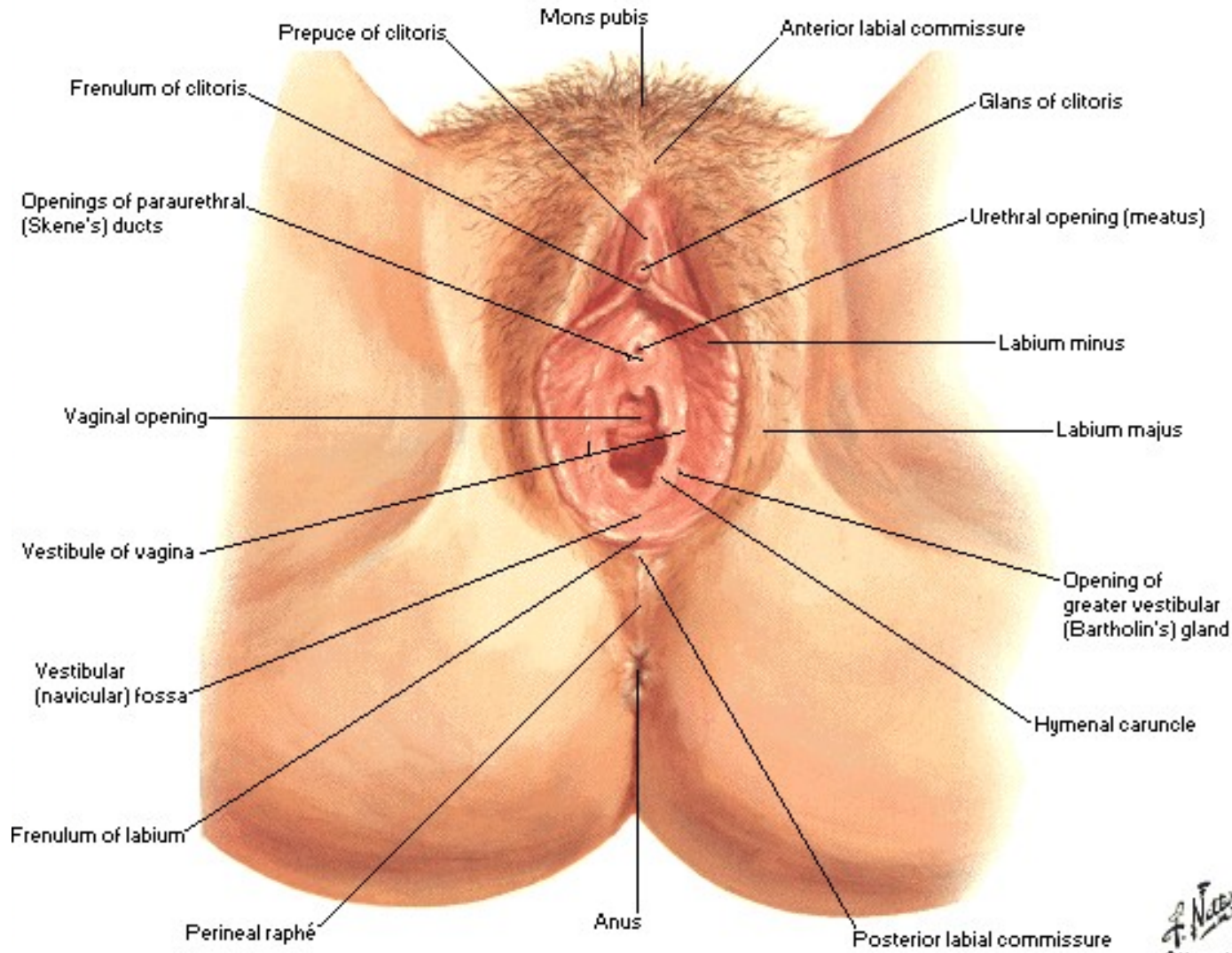


Female external genital organs

- The external genitalia also called vulva include
- Mons pubis
- Labia
- Clitoris
- Vestibule structures

Superficial Perineum Female

Perineum and External Genitalia of Female



Mons pubis

- Consists of pad of fatty tissue, after puberty this area is covered with pubic hair

Labia majora

- Two symmetrical hair covered, fatty skin folds
- the female counterpart of the male scrotum

Labia minora

- Thin, hair free folds of skin between labia majora

Vestibule of vagina

- Space between labia minora
- Vaginal orifice lies posterior to urethral orifice
- Surrounded by thin fold of mucous membrane called hymen

Vestibular glands

- The greater vestibular (Bartholin's) glands
- pea sized

Clitoris

- Contains erectile cavernous tissue like the penis
- Richly supplied with nerves, and so is one of the most sensitive areas for women
- Engorges with blood upon sexual arousal
- Housed in a hood of tissue (prepuce) formed by the junction of labia minora
- Highly sensitive organ composed of nerves, blood vessels, and erectile tissue
- Key to sexual pleasure for most women

