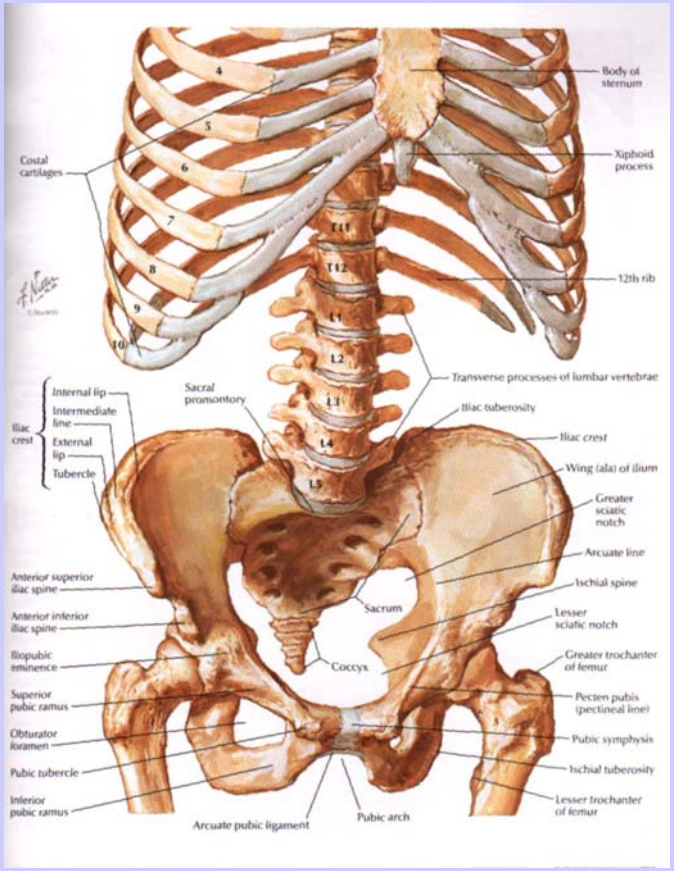
Pelvis and Contents

Reproductive Organs and System

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

Pg 187

Use lab work to learn bony landmarks of pelvis

Contents of Pelvic Cavity

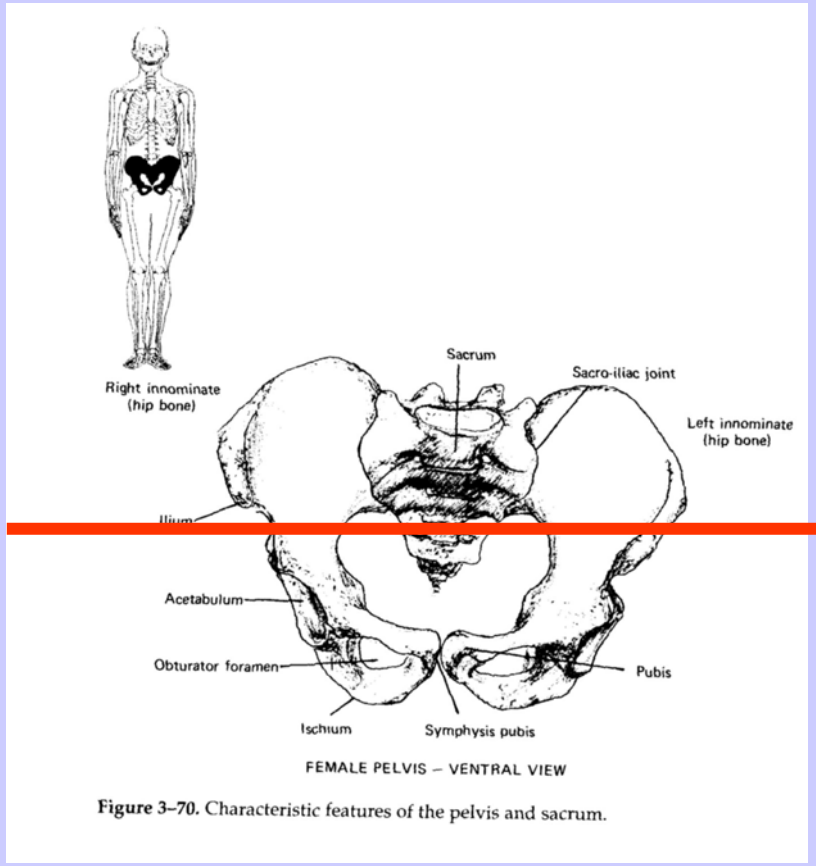


Figure 3–70. Characteristic features of the pelvis and sacrum.

- True Pelvis
  - below pelvic brim
  - space contains
    - part colon
    - rectum
    - bladder
    - uterus/ovaries (females)
- False Pelvis
  - iliac blades
  - above pelvic brim
  - contains abdominal organs
  - attachment for muscles + ligaments to body wall
- Pelvic Diaphragm = levator ani + coccygeus m

Sexual Dimorphism in Pelvis

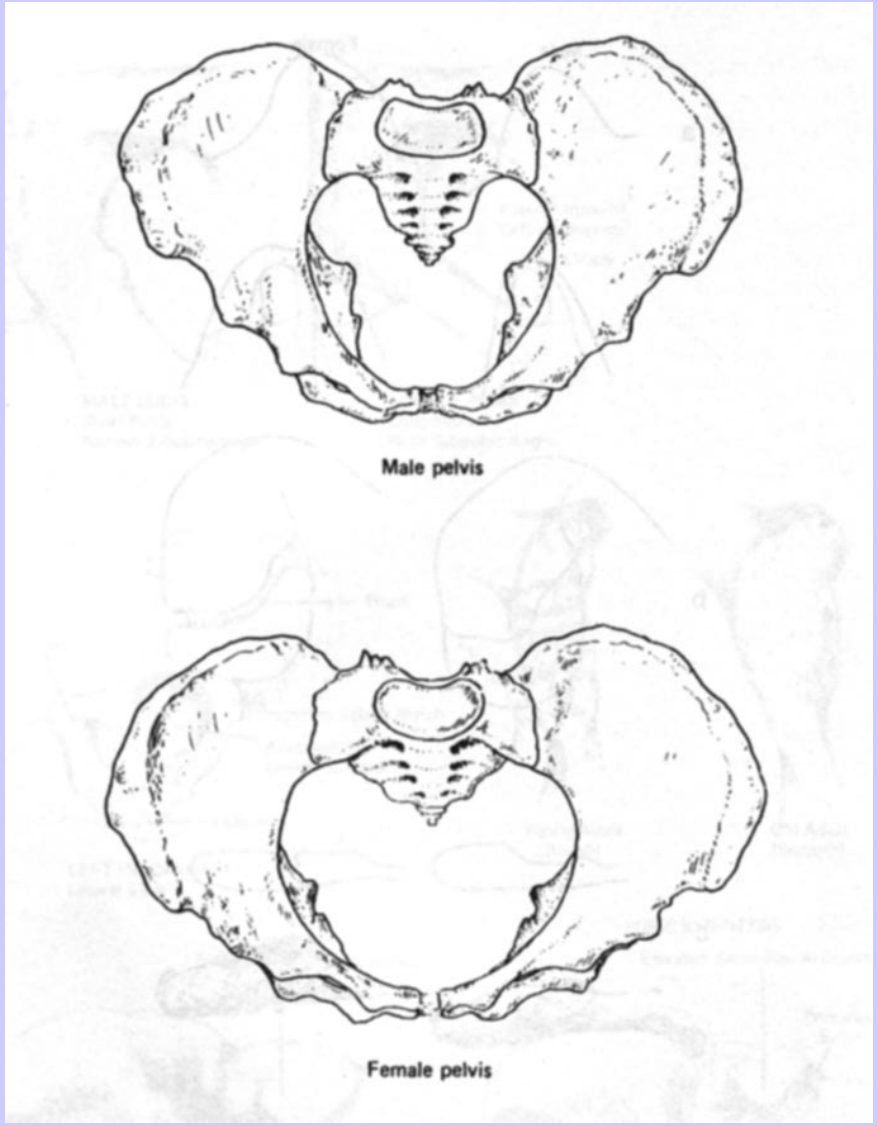
Female

- 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 longer, face more medially

Sexual Dimorphism in Pelvis



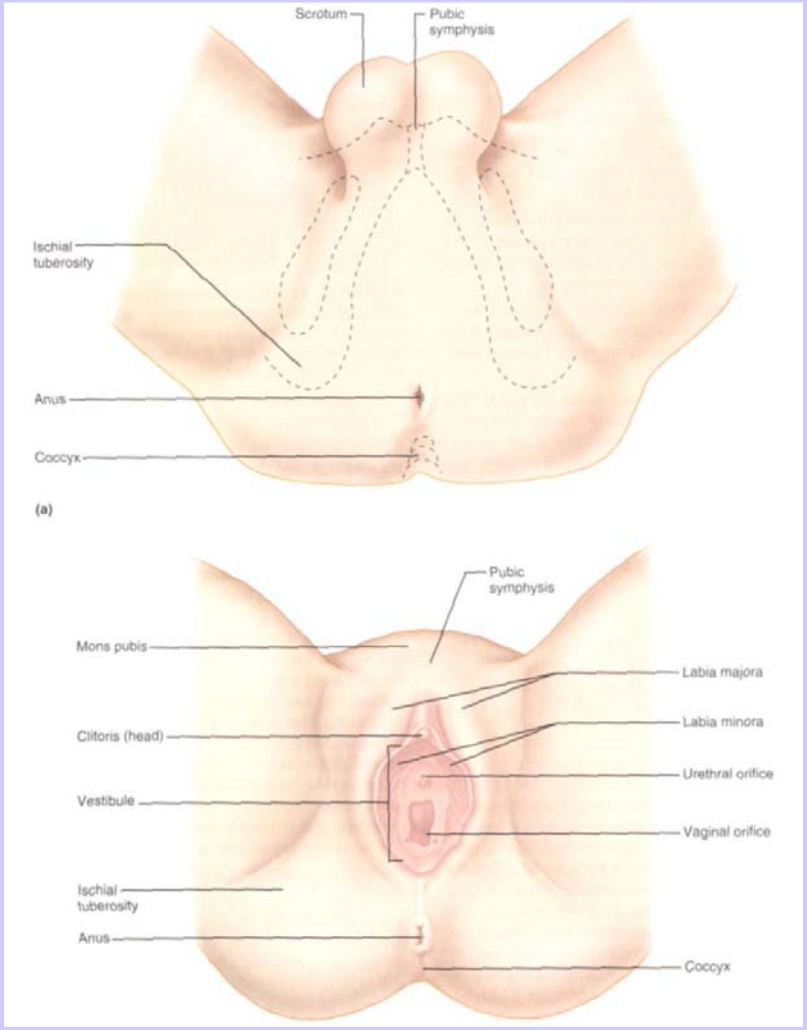
Male pelvis

Female pelvis

pg 189

Perineum

- Diamond-shaped area between
  - Pubic symphysis (anteriorly)
  - Coccyx (posteriorly)
  - Ischial tuberosities (laterally)
- Males contain
  - Scrotum, root of penis, anus
- Females contain
  - External genitalia, anus



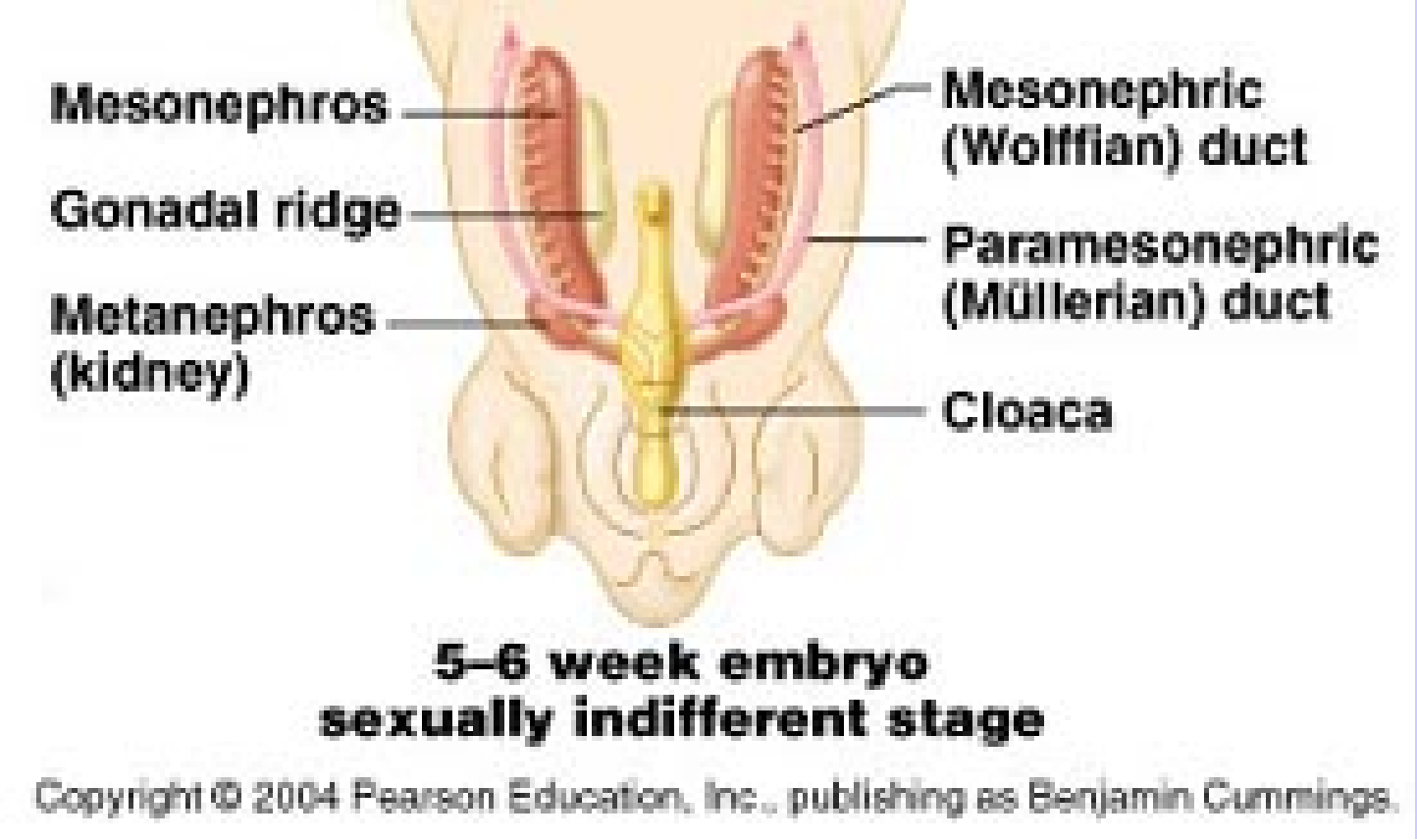
pg 744

Development of Reproductive Organs

- Gonadal ridge: Forms in embryo at 5 weeks

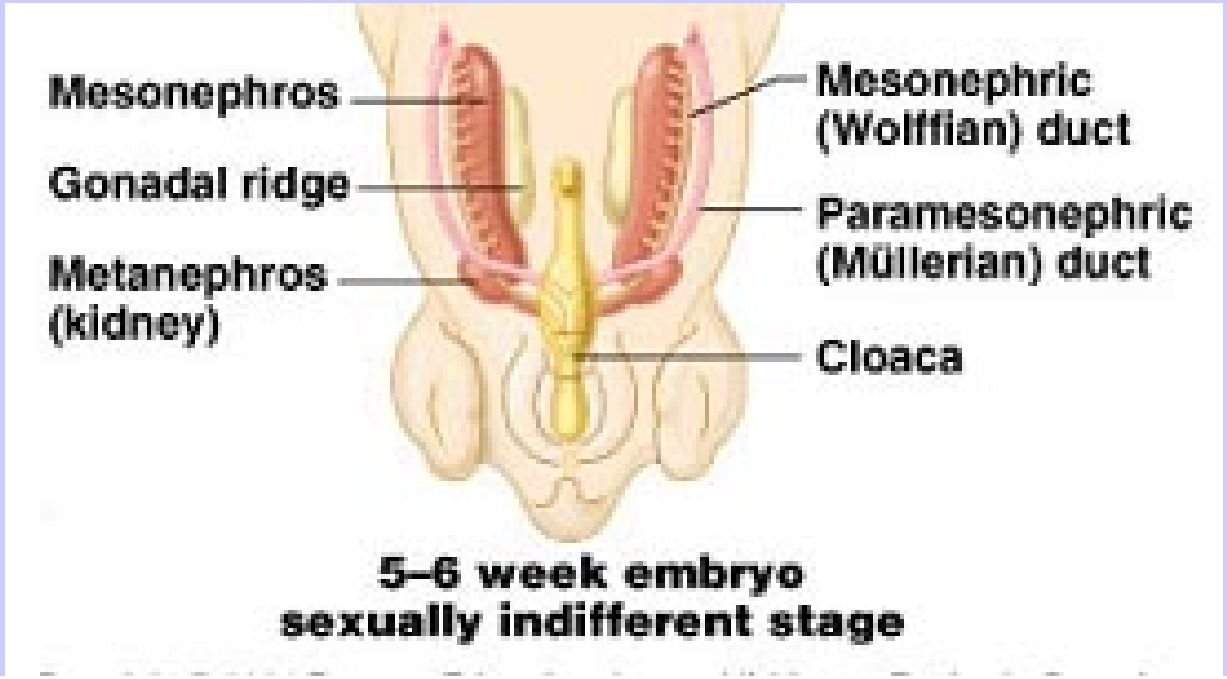
Gives rise to gonads

Male gonads = testis Female gonads = ovaries

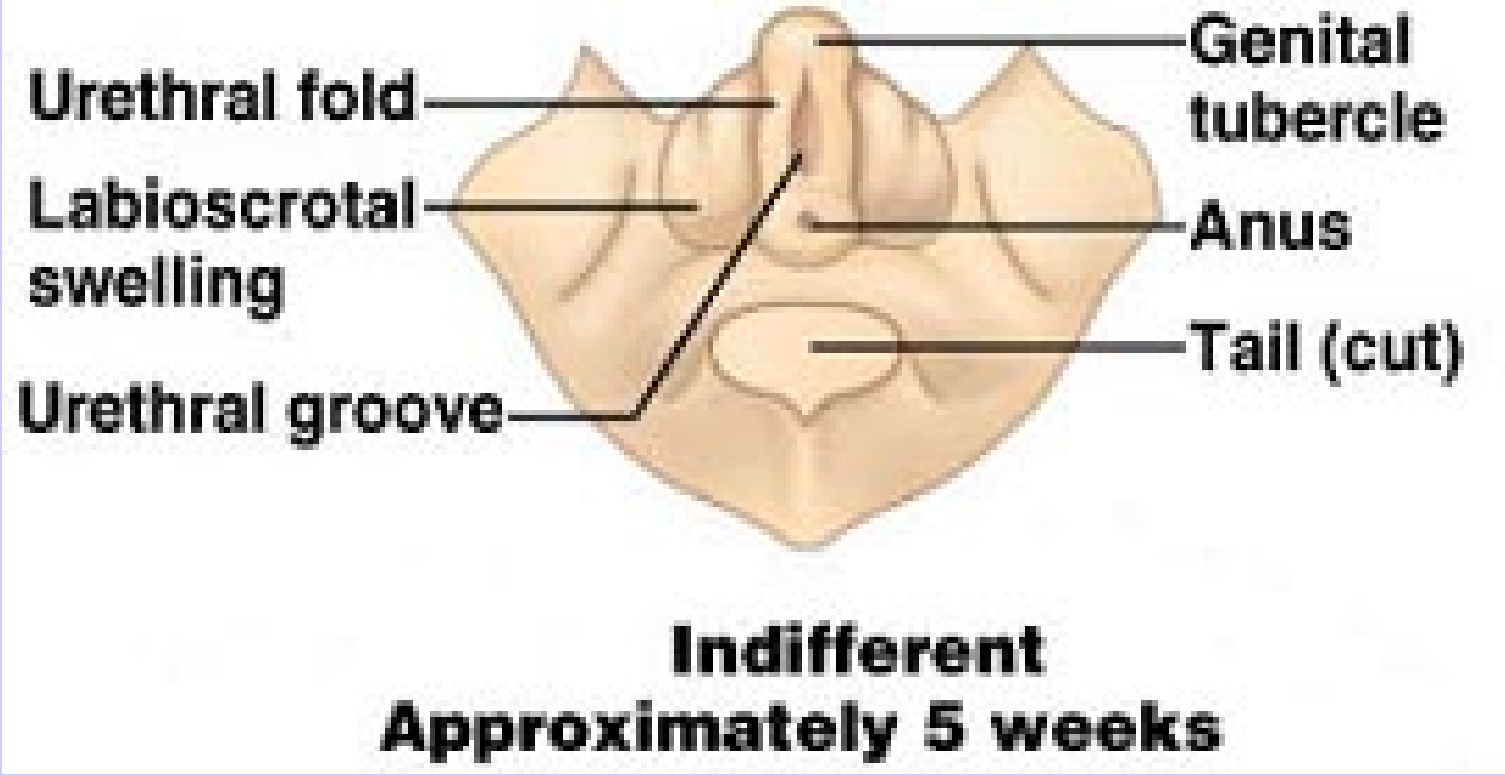


Reproductive Embryology

- Male and Female ducts are both present in early embryo, but only one set develops!
- Wolffian ducts (Mesonephric): form male ducts
  - vas deferens, epididymis
- Mullerian ducts (Paramesonephric): form female ducts
  - uterus, oviduct, vagina



External genitalia develops from same structures



Embryonic structure	Male	Female
Labioscrotal swelling	Scrotum	Labia major
Urethral folds	Penile Urethra	Labia minor
Genital tubercle	Penis	Clitoris

Male Development

- Male fetus
  - Testes descend partially at 3 months, finish at 7 months into scrotum
  - Vaginal Process: outpocketing of peritoneum forms tunica vaginalis
  - Gubernaculum: fibrous cord; attaches bottom of scrotum to testes
  - Testes Descent: partly due to shortening of gubernaculum, final descent due to testosterone and maybe increase in intra-abdominal pressure

Female Development

- Ovaries descend into pelvis
- Vaginal process: outpocketing of peritoneum guides descent
- Gubernaculum: guides descent of ovaries; attached to labia major
  - caudal portion = round ligament of uterus
  - cranial portion = ovarian ligament

Puberty: period where reproductive organs grow and can reproduce

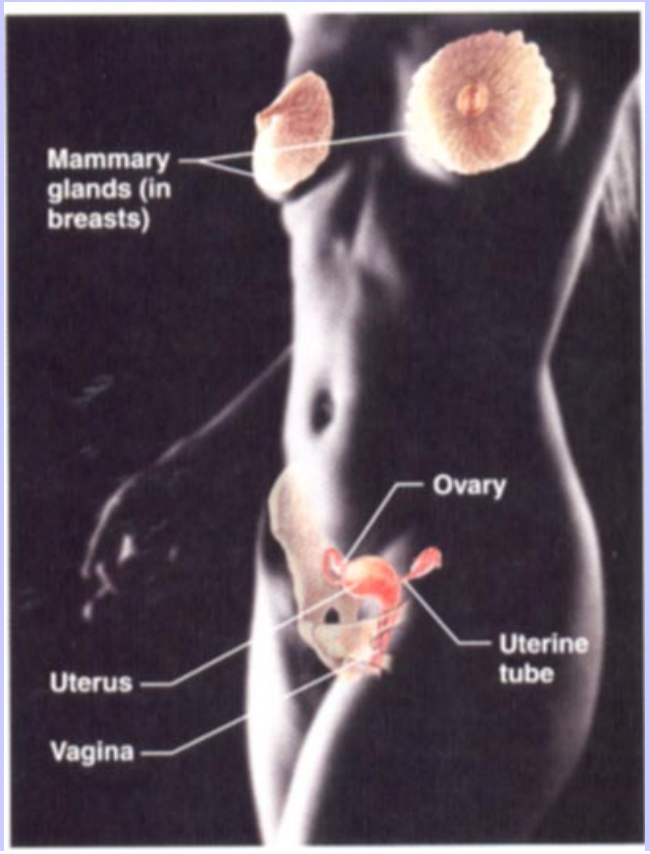
- Females = around 11
  - breasts enlarge
  - increase subcutaneous fat in hips and breasts
  - hair in pubic and axillary region
  - oily skin
  - menstruation (1-2 years later)

- Males = around 13
  - scrotum + testes enlarge
  - enlargement of larynx
  - increase in body size, musculature
  - hair in facial, pubic, axillary regions
  - oily skin

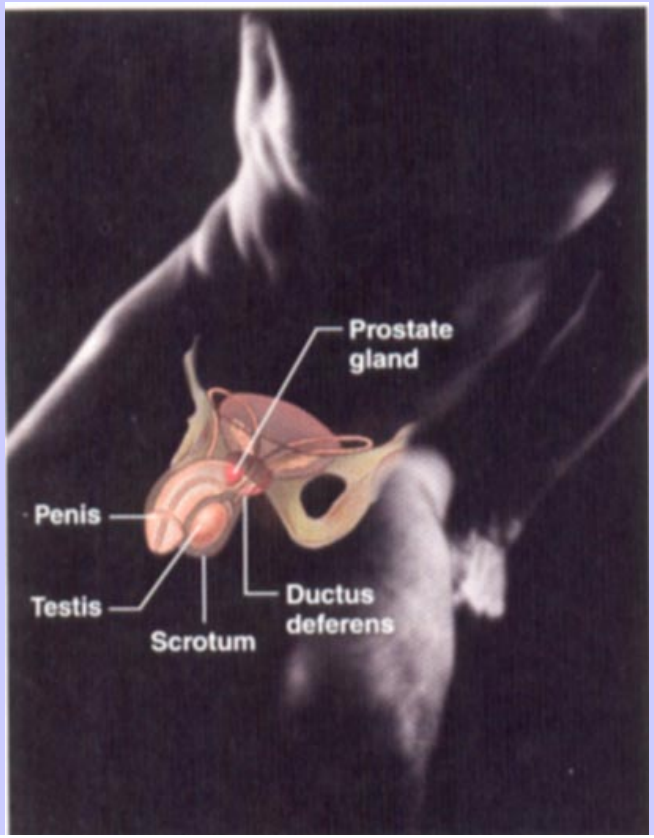
Reproductive System

Genitalia = sex organs
Primary = ovaries, testes
Secondary = glands, ducts, external genitalia

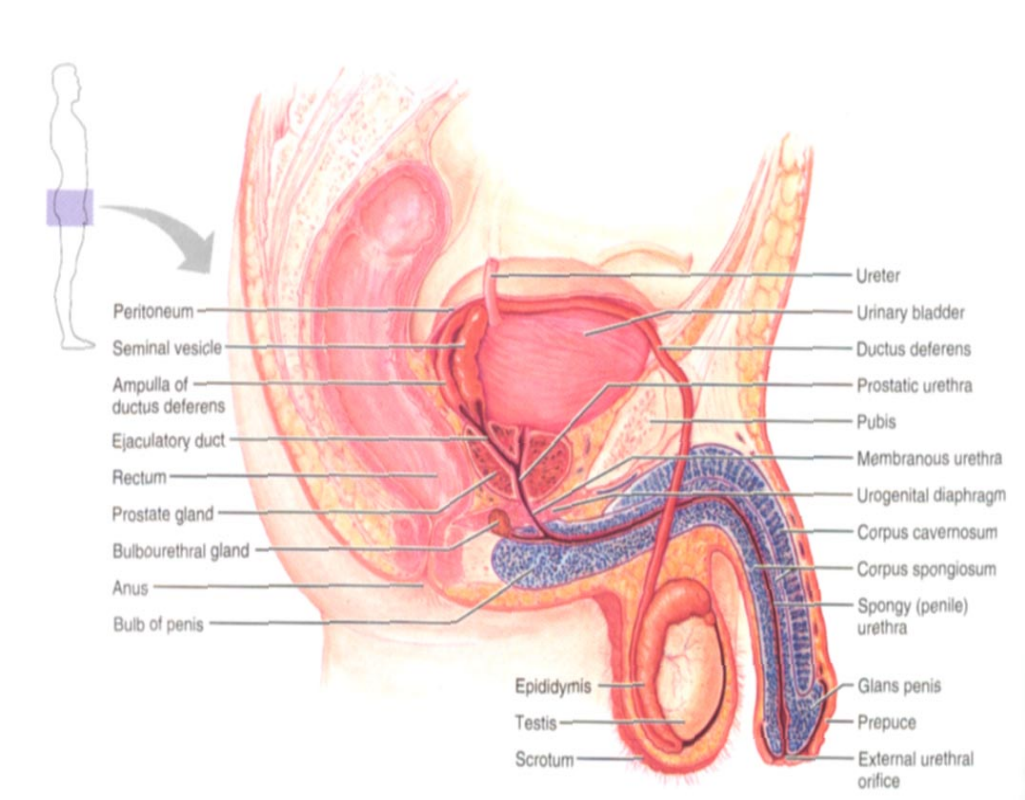
Female



Male



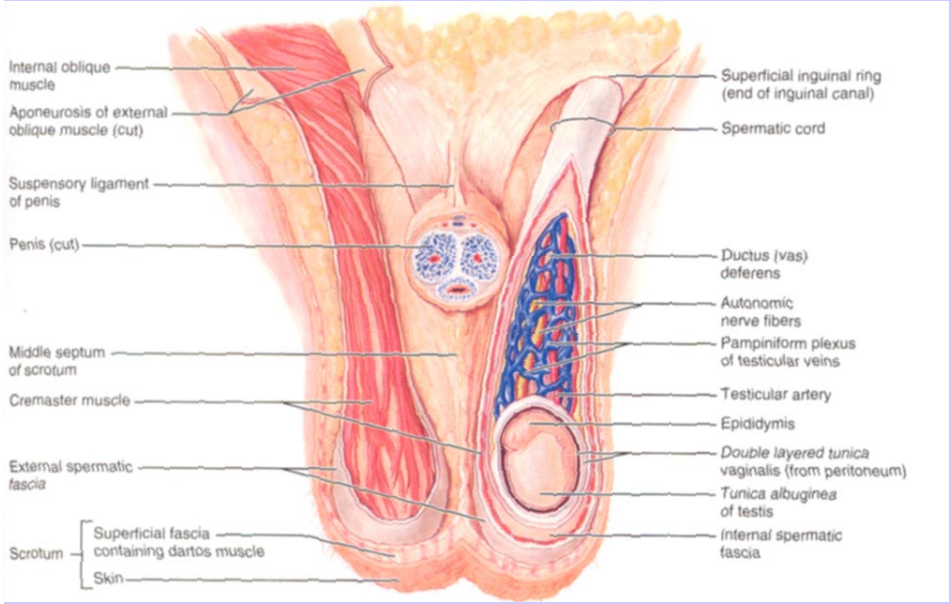
Male Reproductive System



pg 672

- Primary Sex Organs
  - testes
- Accessory Sex Organs
  - External Genitalia
    - penis
    - scrotum
  - Ducts
    - Efferent ductules (epididymis)
    - vas deferens
    - ejaculatory duct
    - urethra
  - Glands
    - seminal vesicle
    - prostate
    - bulbourethral

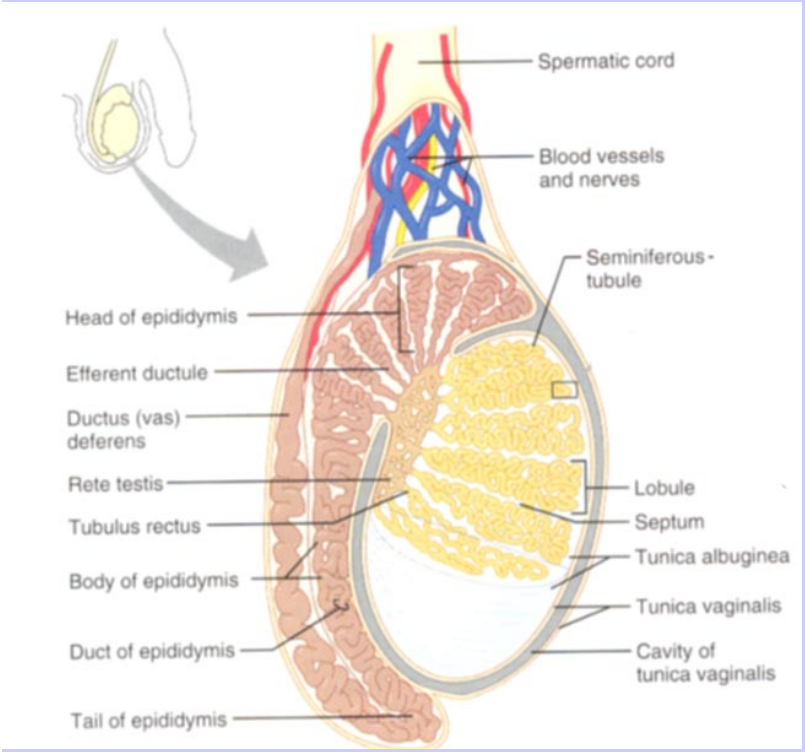
Male Reproductive Anatomy



- Scrotum
  - sac of skin + superficial fascia
  - contains testes
- Associated Muscles
  - Dartos: inside skin of scrotum
    - wrinkles skin = warm
  - Cremaster: extends into scrotum from spermatic cord
    - Fibers from internal oblique
    - elevates testes = warm
    - lower testes = cool
- Tunica vaginalis = light sac
  - covering each testis
- Tunica albuginea = fibrous
  - deep to tunica vaginalis
  - divides testes into lobules

pg 673

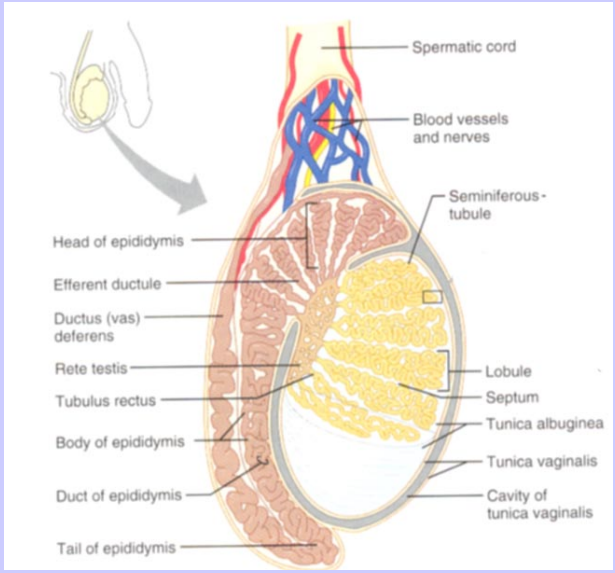
Male Reproductive Anatomy: Testes



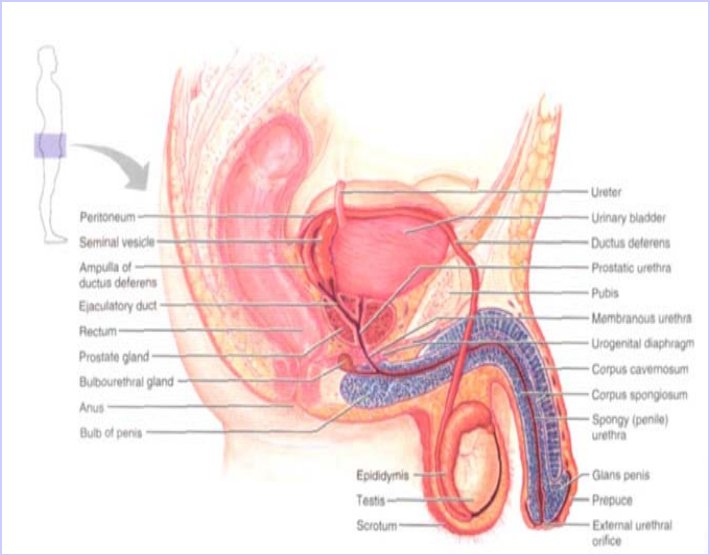
- Seminiferous Tubules
  - make-up testes
  - location of spermatogenesis
  - Divided into lobules
- Tubulus Rectus
  - convergence of seminiferous tubules
- Rete Testis
  - network of branching tubes
  - leads to epididymis

pg 674

Male Reproductive Anatomy:



pg 704



pg 672, 674

- Epididymis
  - Contains efferent ductules: tube from rete testis to duct of epididymis
  - gain ability to swim here
  - smooth muscle layer = ejaculation
  - epithelial layer lined w/stereocilia
    - resorb excess testicular fluid
    - transfer nutrients to sperm in lumen
- Vas Deferens
  - tube from duct of epididymis to ejaculatory duct
  - Vasectomy-cut vas deferens, close off end

Cell Division

- Mitosis: cell division with chromosome duplication and division →2 daughter cells = parent
  - Have Diploid = 2n number of chromosomes
  - Occurs in body (somatic) cells
- Meiosis = Reduction Division: cell division resulting in cells having half the number of chromosomes as parent
  - Have Haploid = n number of chromosomes
  - Occurs in sex cells

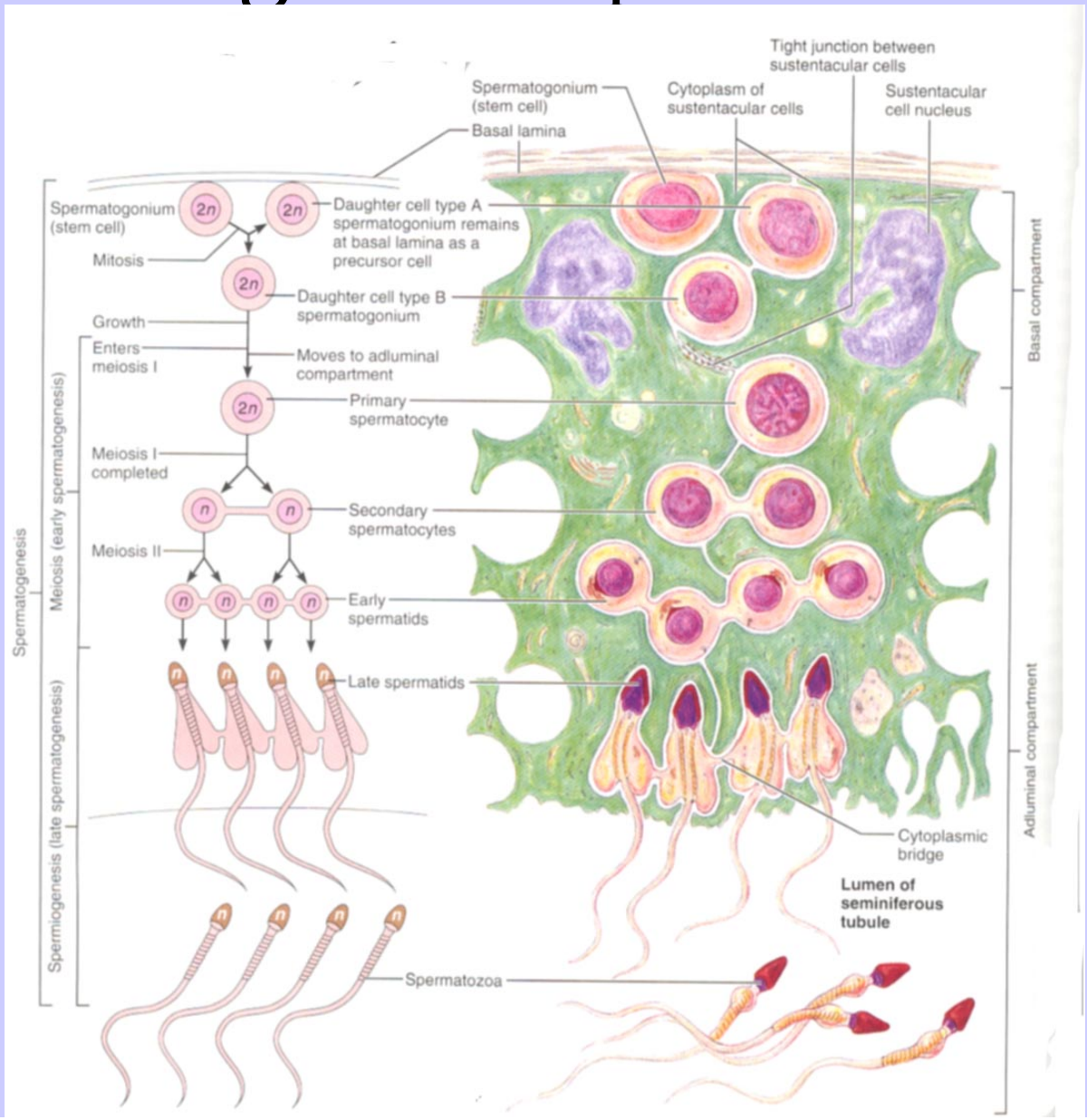
Spermatogenesis: production of sperm

- Stem cells = Spermatogonia (2n)
- Undergo Mitosis
  - Type A spermatogonia = precursor cells (2n)
  - Type B spermatogonia = primary spermatocytes (2n)
- Primary spermatocytes undergo Meiosis I
  → 2 secondary spermatocytes (n)
- 2 Secondary spermatocytes (n) undergo Meiosis II
  → 4 spermatids (n)
- Spermiogenesis: maturation of spermatids into spermatozoa (sperm)
  - Head (acrosome), midpiece, tail
- Controlled by FSH (pituitary gl.), Testosterone (testes)

Within Seminiferous Tubules

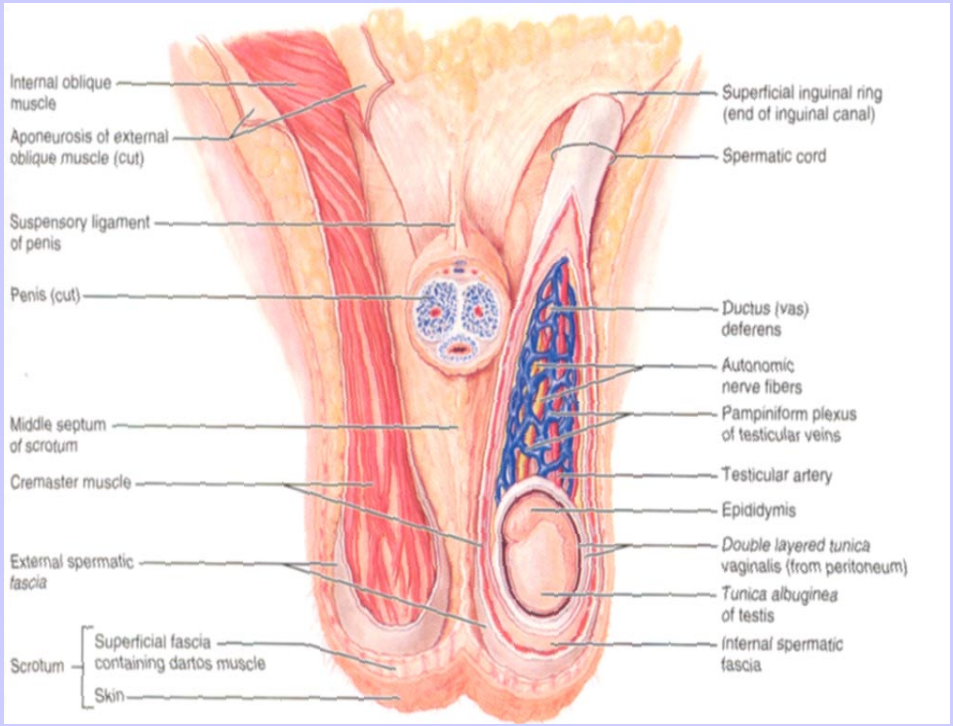
- Sustenacular (Sertoli) cells: surround spermatogonia in lumen of seminiferous tubules
  - Provide nutrients to spermatogenic cells
  - Move cells toward tubule lumen
  - Secrete testicular fluid
  - Phagocytize cytoplasm shed by developing spermatids
  - Secrete Androgen-binding protein (concentrates testosterone)
  - Secrete Inhibin: hormone slows rate of sperm production
- Blood-testis barrier: sustenacular cells bound together by tight junctions to prevent escape of membrane antigens from sperm into blood
- Myoid Cells: layer around seminiferous tubules of smooth muscle
- Interstitial (Leydig) Cells: in loose CT between seminiferous tubules secrete androgens (male sex hormones)

Spermatogenesis: production of sperm



Pg 676

Spermatic Cord

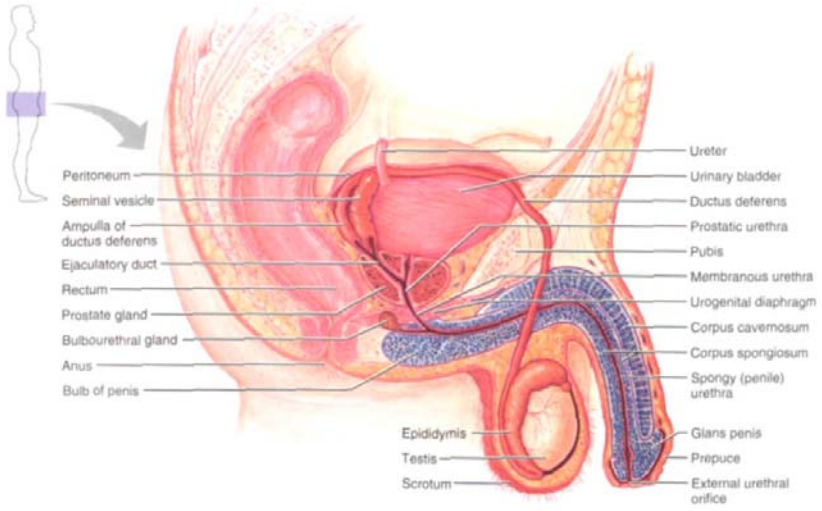


Collective name for structures associated with the scrotum

- Passes through inguinal canal
- Includes
  - Vas Deferens
  - Testicular Arteries + Veins
  - Lymphatic vessels
  - Cremaster muscle fibers
  - Nerves

pg 673

Accessory Glands

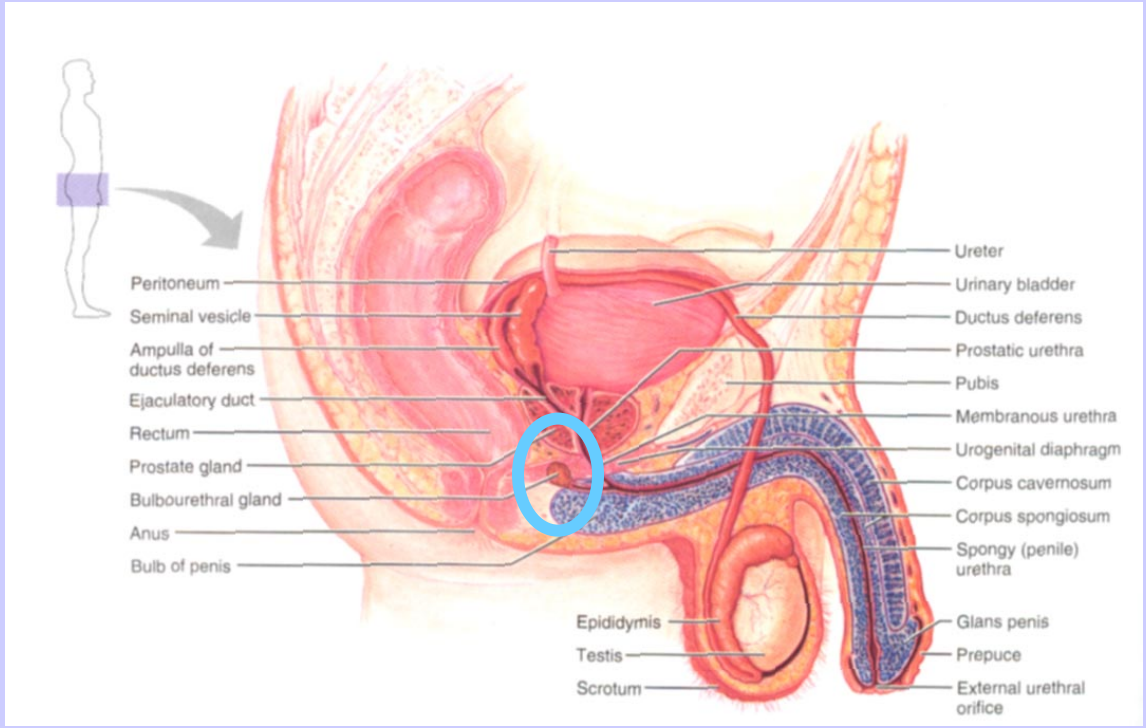


- Seminal vesicle (paired)
  - posterior surface of bladder
  - contracts during ejaculation
  - empties into vas deferens
  - Functions
    - nourish sperm
    - stimulate uterine contractions
    - suppress immune response
    - enhance sperm motility
    - clot ejaculated semen once in vagina, then liquefy sperm to allow swim
- Prostate
  - inferior to bladder, anterior to rectum
  - encircles first part of urethra
  - contracts during ejaculation
  - Functions: clot, liquefy, motility

pg 672

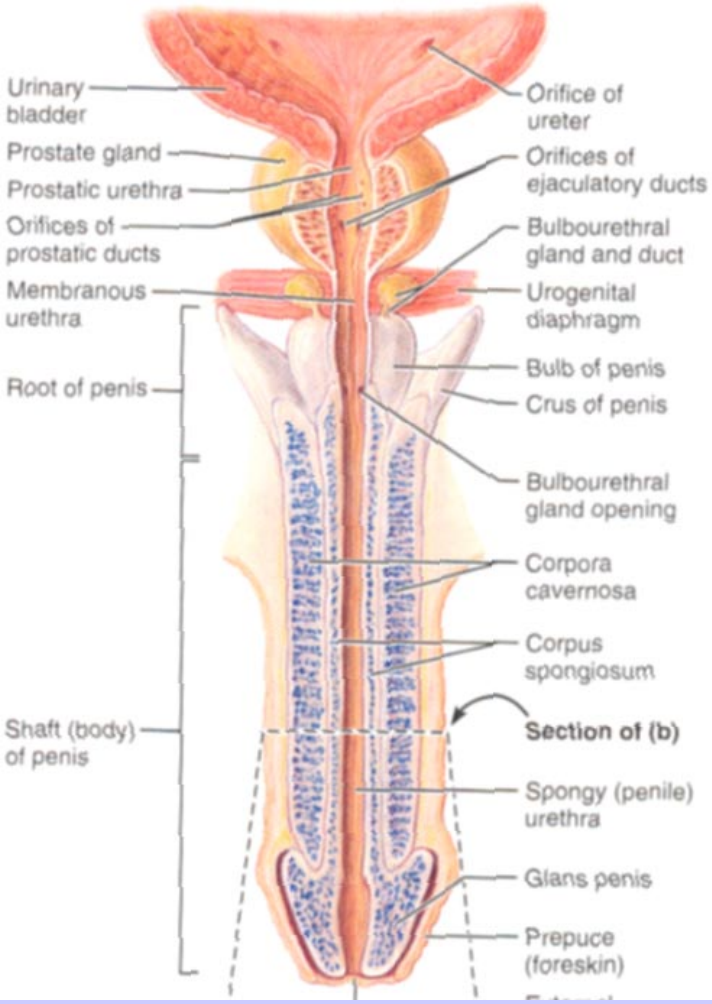
Accessory Glands

pg 672



- Bulbourethral (paired)
  - inferior to prostate
  - within urogenital diaphragm
  - empties into spongy urethra
  - Function: produce mucous
    - neutralize urine in urethra
    - lubricate semen for passage

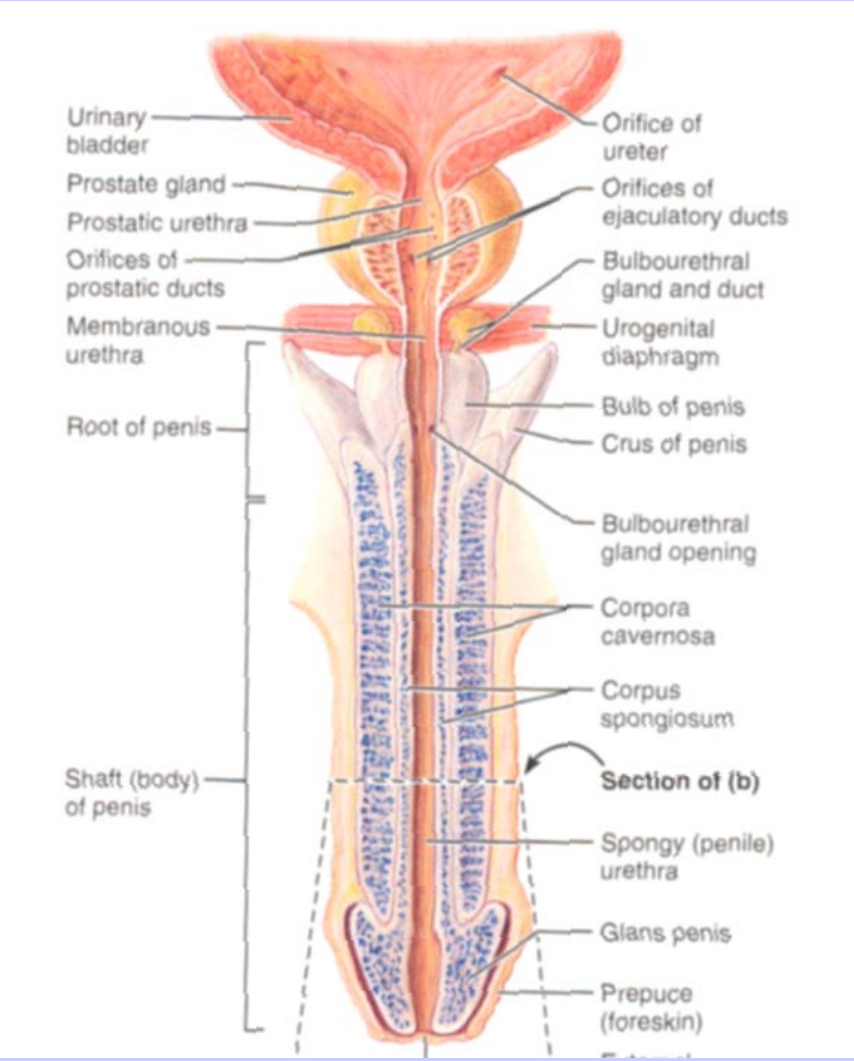
Penis



- Male external genitalia
- Function: delivers sperm into the female reproductive tract
- Anatomy
  - root = attached end
    - crura-anchored to pubic arch, covered by ischiocavernosus muscle
    - bulb-secured to urogenital diaphragm
  - shaft/body = free, not attached
  - glans penis = enlarged tip
  - prepuce = loose cuff around glans
  - spongy urethra = tube within penis

pg 680

Penis (continued)



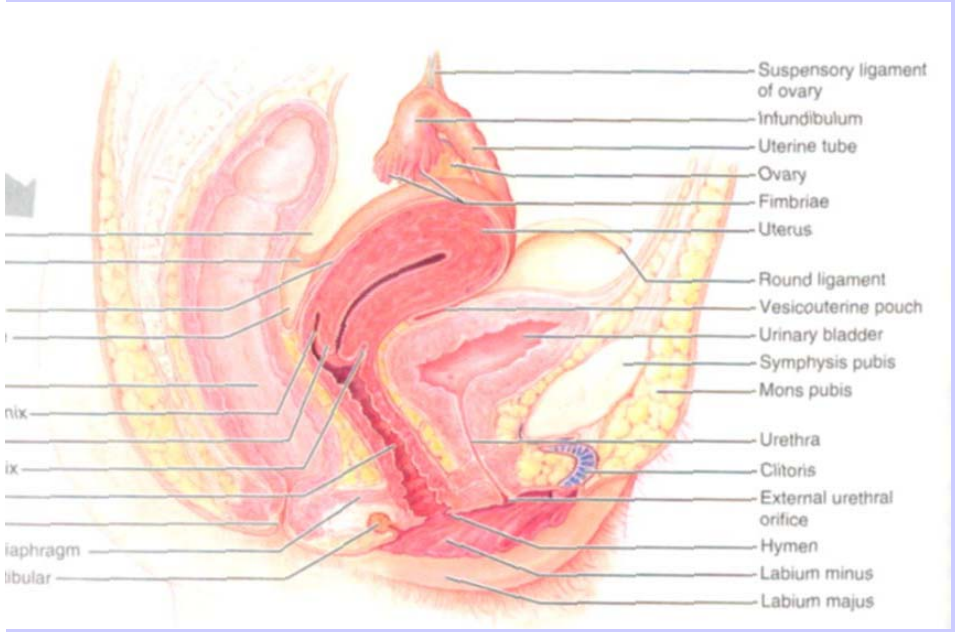
pg 680

- Erectile bodies
  - 3 long strips of erectile tissue around the spongy urethra
  - thick tube covered by dense CT and filled with smooth muscle, CT + vascular spaces
  - Corpus spongiosum
    - distally = glans penis
    - proximally =bulb of penis
    - midventral erectile body
  - Corpora cavernosa
    - proximally = root/crura of penis, covered by ischiocavernosus m.
    - paired, dorsal erectile bodies
    - make up most of mass

Penis (continued)

- Arterial Supply = branches of Internal Pudendal (branch of internal iliac)
- Innervation = branches of Pudendal (from sacral plexus) provide sensory
  - Parasympathetic: engorgement of blood in erectile bodies = erection
  - Sympathetic: contraction of smooth muscle in ducts and glands and bulbospongiosum m = ejaculation
  - Above Autonomic from inferior hypogastric plexus

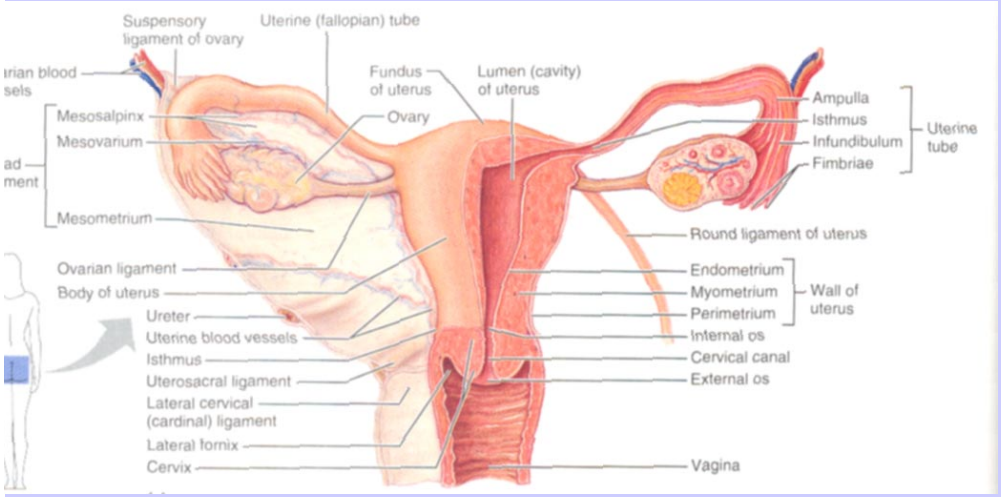
Female Reproductive System



- Primary Sex Organs
  - Ovaries = gonads
- Accessory Sex Organs
  - External Genitalia = vulva
    - Labia major + minor
    - Mons pubis
    - Clitoris
  - Ducts
    - Uterine tube = oviducts
    - Vagina
  - Glands
    - Greater vestibular gland

pg 684

Female Reproductive Anatomy



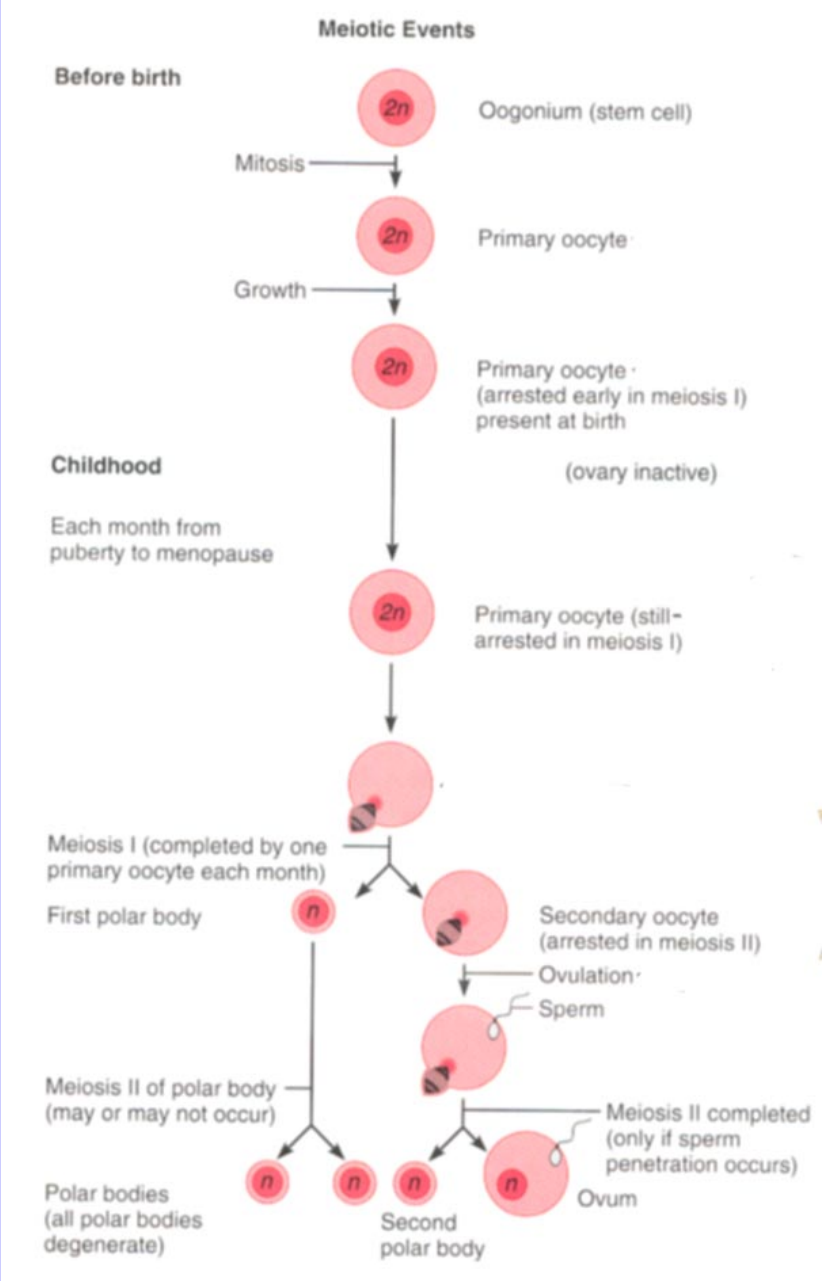
pg 685

- Ovaries (paired)
  - produce and store ova (eggs)
  - Produce estrogen
  - Tunica albuginea - surrounds each ovary
  - Germinal epithelium-external to tunica albuginea (= mesothelium)
- Arterial Supply
  - Ovarian & branches of uterine a.
- Ligaments
  - Ovarian ligament
    - connects ovaries to uterine wall (medial)
  - Suspensory ligament
    - connects ovaries to pelvic wall (lateral)
  - Broad ligament
    - supports uterus, oviducts
  - Round Ligament (part of broad)
    - Attaches uterus to labia majorum

Oogenesis: production of eggs (ova)

- Stem cells = oogonia undergo Mitosis
  - all of female's oogonia produced while fetus
- Oogonia begin Meiosis I are called primary oocytes (2n)
- Meiosis I is stalled before birth
- During ovulation, Meiosis I completed and Meiosis II begins
- Once Meiosis II begins, primary oocytes now called secondary oocytes (n)
- Meiosis II is completed when sperm penetrates egg
- When Meiosis II is completed, secondary oocyte is now called ovum (egg)
- Meiosis II results in 1 ovum and 3 polar bodies (degenerate)

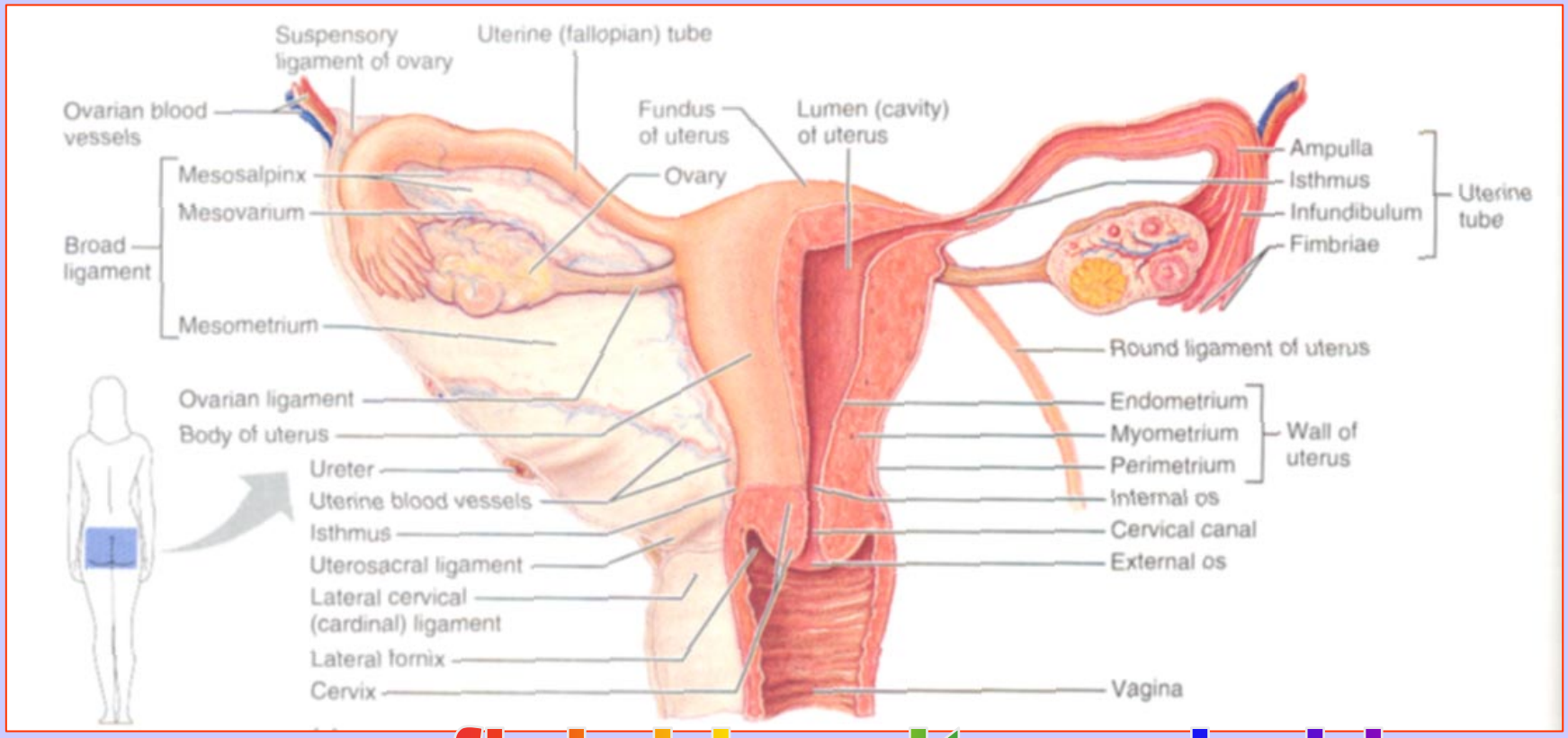
Oogenesis



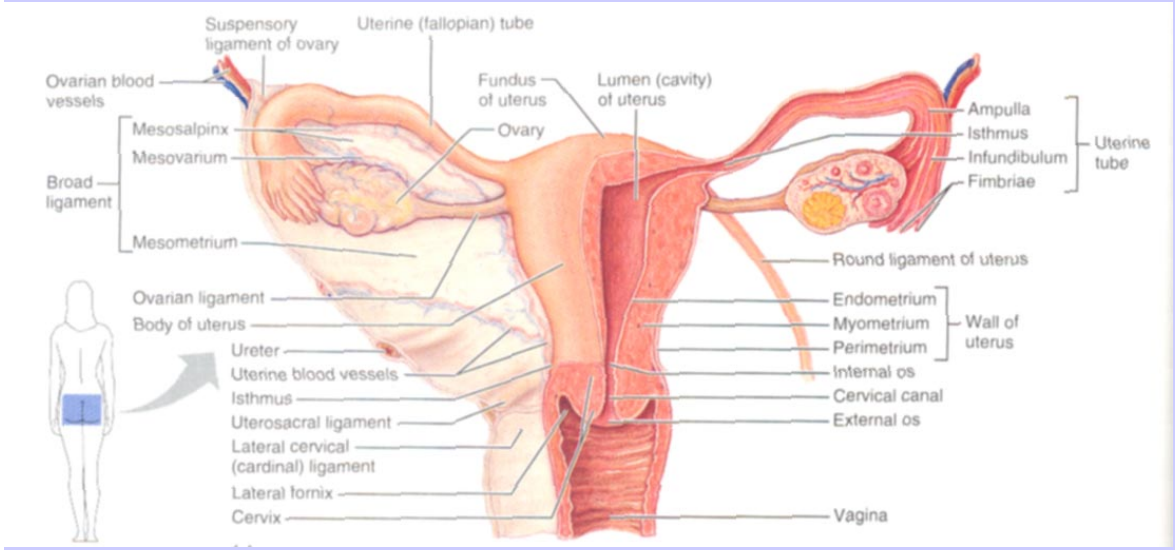
Pg 688

- Uterine Tubes = Oviducts = Fallopian Tubes
  - from near ovaries to uterus
  - Run lateral (ovary) to medial (uterus)
  - Infundibulum: lateral, funnel-shaped portion
    - Fimbrae on edges
  - Ampulla: expanded portion medial to infundibulum
    - Usual site for fertilization
  - Isthmus: narrow medial portion
  - Visceral Peritoneum, Smooth Muscle, Ciliated Epithelium
- Movement of Ova in Oviduct
  - receives oocyte after ovulation
  - peristaltic waves
  - cilia lining tube
  - contains cells to nourish ova
- Ectopic pregnancy: implantation of zygote outside of uterus

Female Reproductive Anatomy



Female Reproductive Anatomy



pg 685

- Uterus
  - 3 Layers
    - perimetrium
    - myometrium
    - endometrium
  - Anatomy
    - fundus
    - body
    - isthmus
    - cervix
  - Location
    - anterior to rectum
    - posterior to bladder

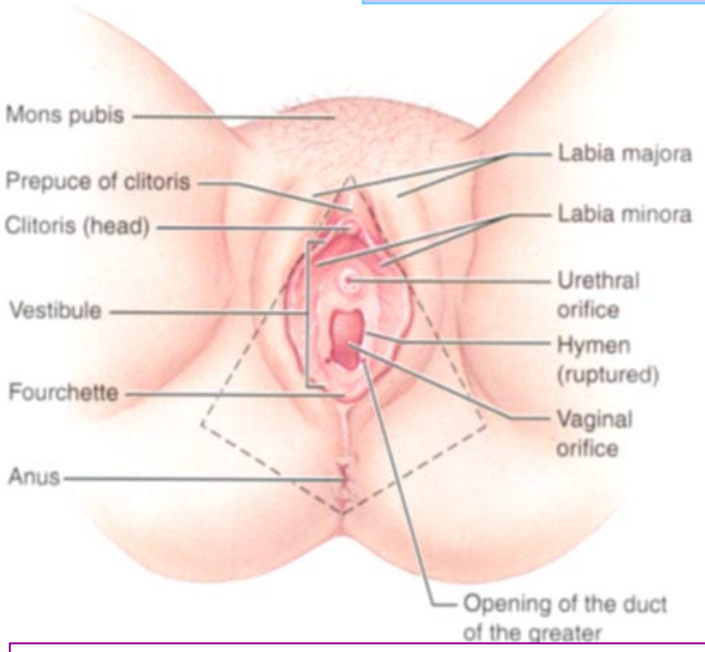
Vagina

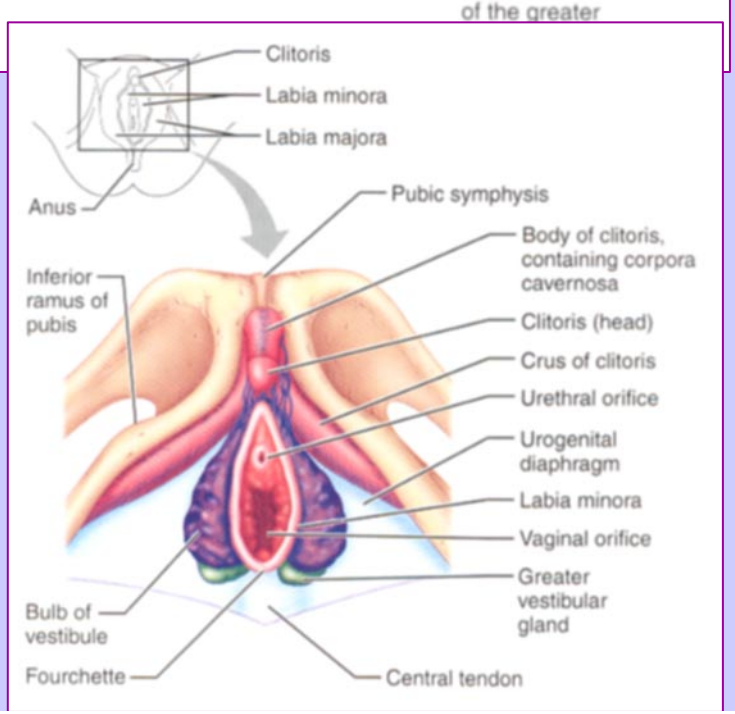
- Inferior to uterus
- External adventitia
- Muscularis
- Mucosal rugae
- vaginal orifice

- Hymen: extension of mucosa = incomplete wall

pg 694

Female External Genitalia





- Mons pubis: fatty pad over pubic symphysis
- Labia major: fatty skin folds
- Labia minor: smaller, hairless folds inside labia major
  - Fourchette = junction of labia minora
  - Central tendon = perineal body
  - Vestibule: created by labia minor; opening for urethra and vagina
- Clitoris: superior to vestibule
  - crura, prepuce, corpus cavernosum
  - NO corpus spongiosum
- Bulbs of Vestibule: erectile tissue surrounding vaginal orifice
- Greater vestibular glands: either side of vaginal opening; secrete mucus

Female Reproductive Anatomy

- Innervation: branches of Pudendal nerve (hypogastric plexus & pelvic splanchnic nerves)

- Arterial Supply:
  - Uterine arteries (from internal iliac) + arcuate branches of = uterus
  - Ovarian arteries (from abdominal aorta) + ovarian branches of uterine arteries = ovaries

Fertilization: sperm meets egg

Path of sperm:

Seminiferous tubules→tubulus rectus →rete testis→efferent ductules→ duct of epididymis→ vas deferens→ urethra→female's vagina→ uterus→oviduct

Path of egg:

ovary→peritoneal cavity→infundibulum (oviduct) →oviduct

The meeting:

Sperm + egg meet in uterine tube →sperm penetrates egg = fertilization

Zygote→uterus for implantation in uterine wall

Last Quiz = Pelvic Cavity & Reproductive Structures

- DUE Wednesday, 12/15 in my mailbox by 1:00 pm
- You are to create and hand in:

  1) An anatomy quiz
     - It must have 15 questions
     - It must be typed
     - Any format (other than essay)
     - It should **NOT** be filled in

  2)An Answer Key
     - It should match the quiz
     - It should have the correct answers
- You will lose points if you do not follow these instructions!