



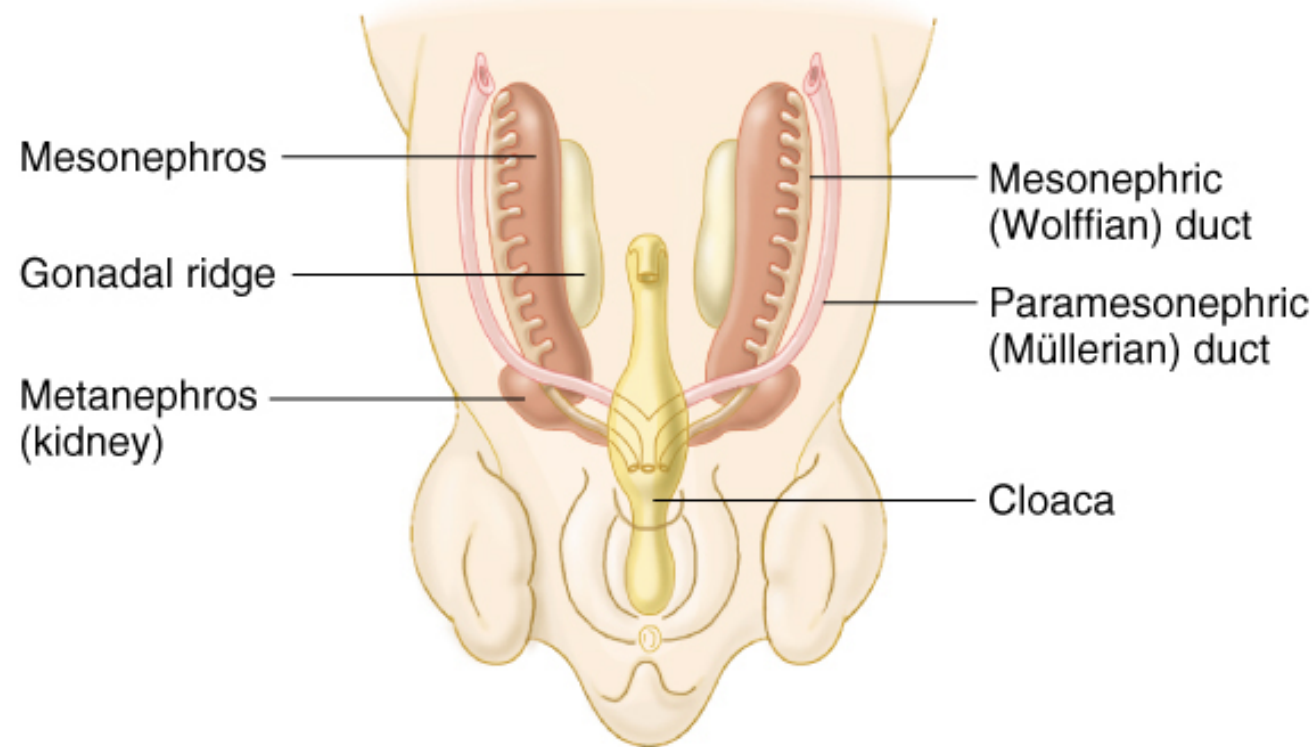
# **REPRODUCTIVE SYSTEMS**

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# The Reproductive System

- Reproductive and urinary systems closely related
  - *Female primates*: separate systems
- Organs not always distinct
  - Many have same origin in fetus
  - Called “homologous structures”

# Embryonic Development of the Sex Organs: FYI

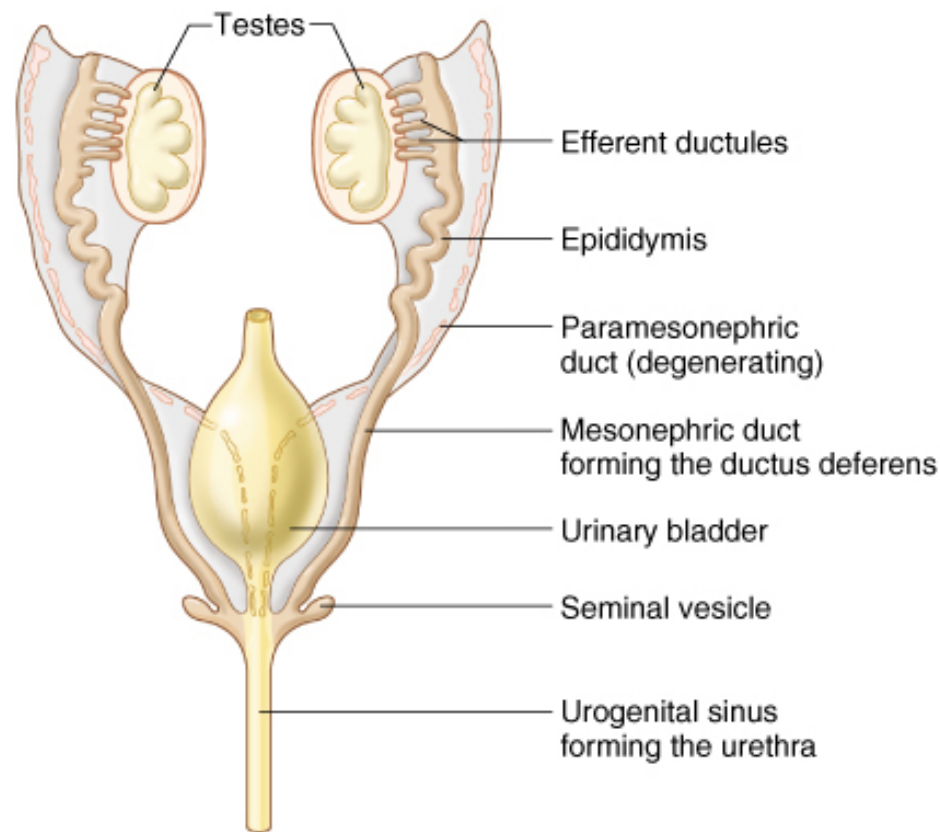


**5–6 week embryo  
sexually indifferent stage**

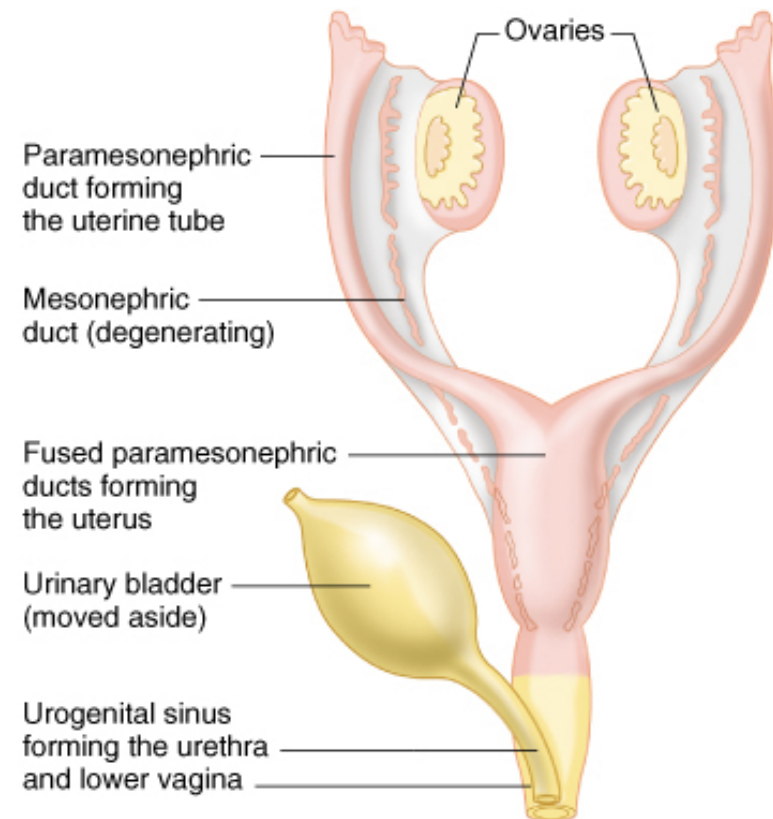
# The Reproductive System

- **Gonads:** essential organs of reproduction
  - *Testes* in males
  - *Ovaries* in females
    - Homologous to testes
- secrete hormones
  - Testosterone
  - Estrogen/progesterone

# Embryonic Development of the Sex Organs: FYI



**7-8 week male embryo**



**8-9 week female fetus**

Figure 24.28

# The Reproductive System

- Gonads, con't...
  - produce gametes (sex cells)
    - Spermatozoa – male gametes
    - Ova (eggs) – female gametes
      - Homologous to sperm
      - Contain 23 chromosomes

# Embryonic Development of the Sex Organs: FYI

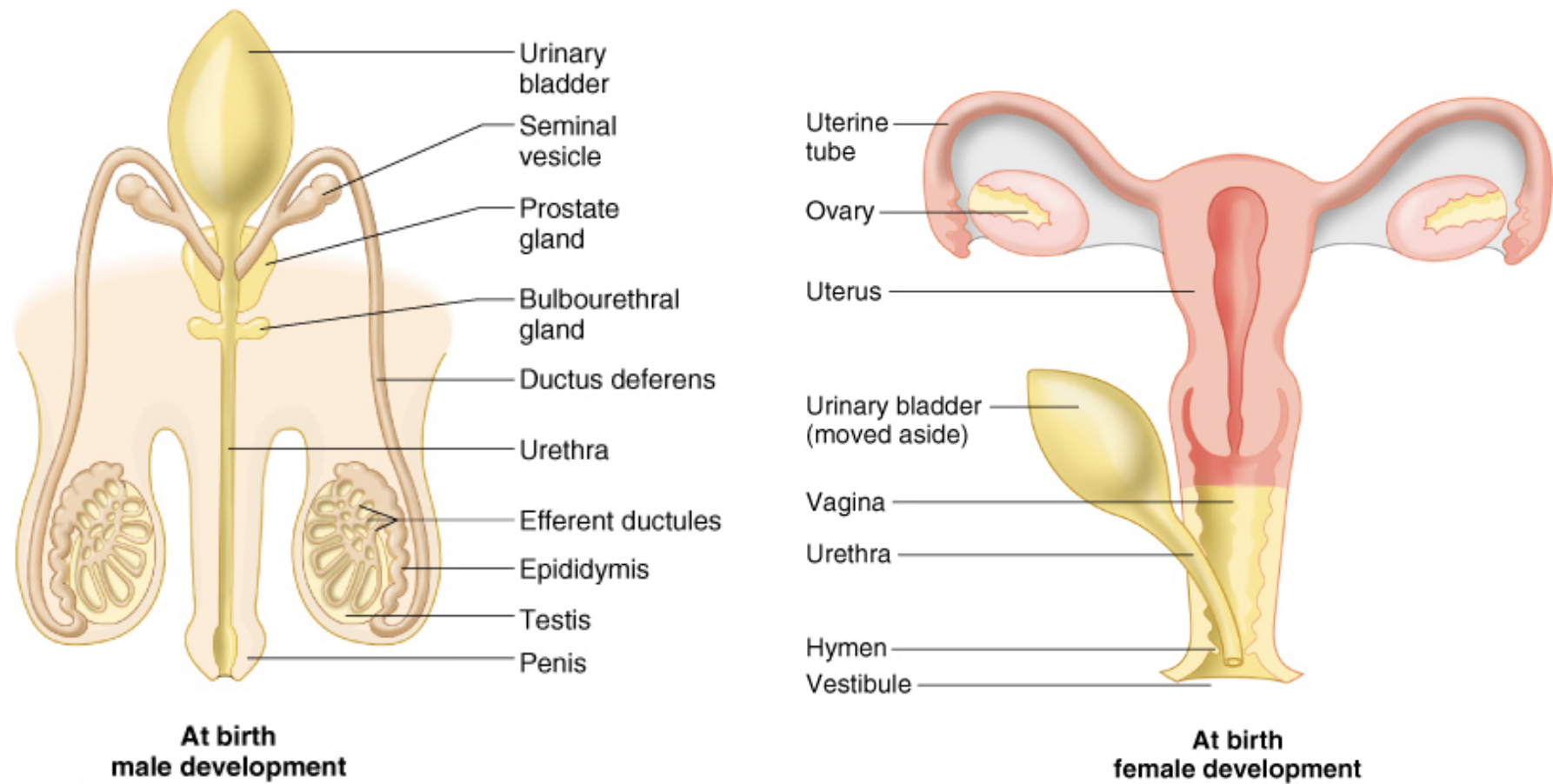


Figure 24.28

# Male Reproductive System

- **Testes**
- **Duct system**
  - **Epididymis**
  - **Ductus deferens**
  - **Urethra**

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# Male Reproductive System

- Accessory organs
  - **Seminal vesicles**
  - **Prostate gland**
  - **Bulbourethral gland**
- External genitalia
  - **Penis**
  - **Scrotum**

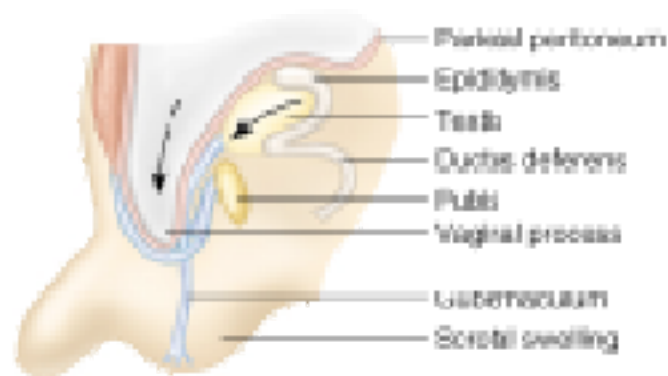
# Male Reproductive System

- **Testes**

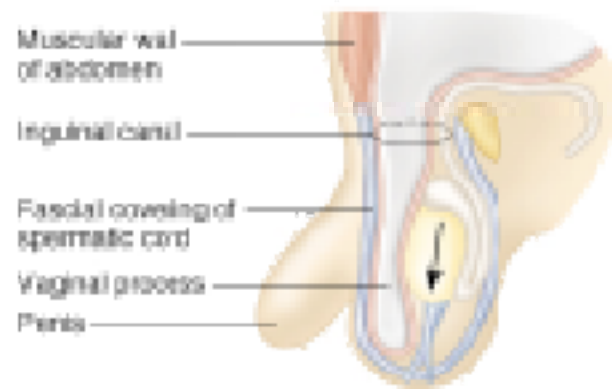
- form in the abdominal cavity
- descend to the scrotum ~1 month before birth
- pass through inguinal canal
  - cryptorchidism

# Descent of Testes: FYI

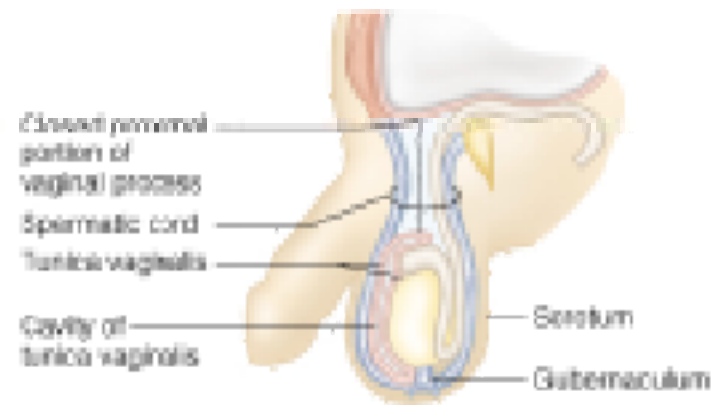
Slide 16.2b



(a)



(b)



(c)

Figure 27.2b

# Testes

- Coverings of the testes
  - *Tunica albuginea* – fibrous C.T. capsule

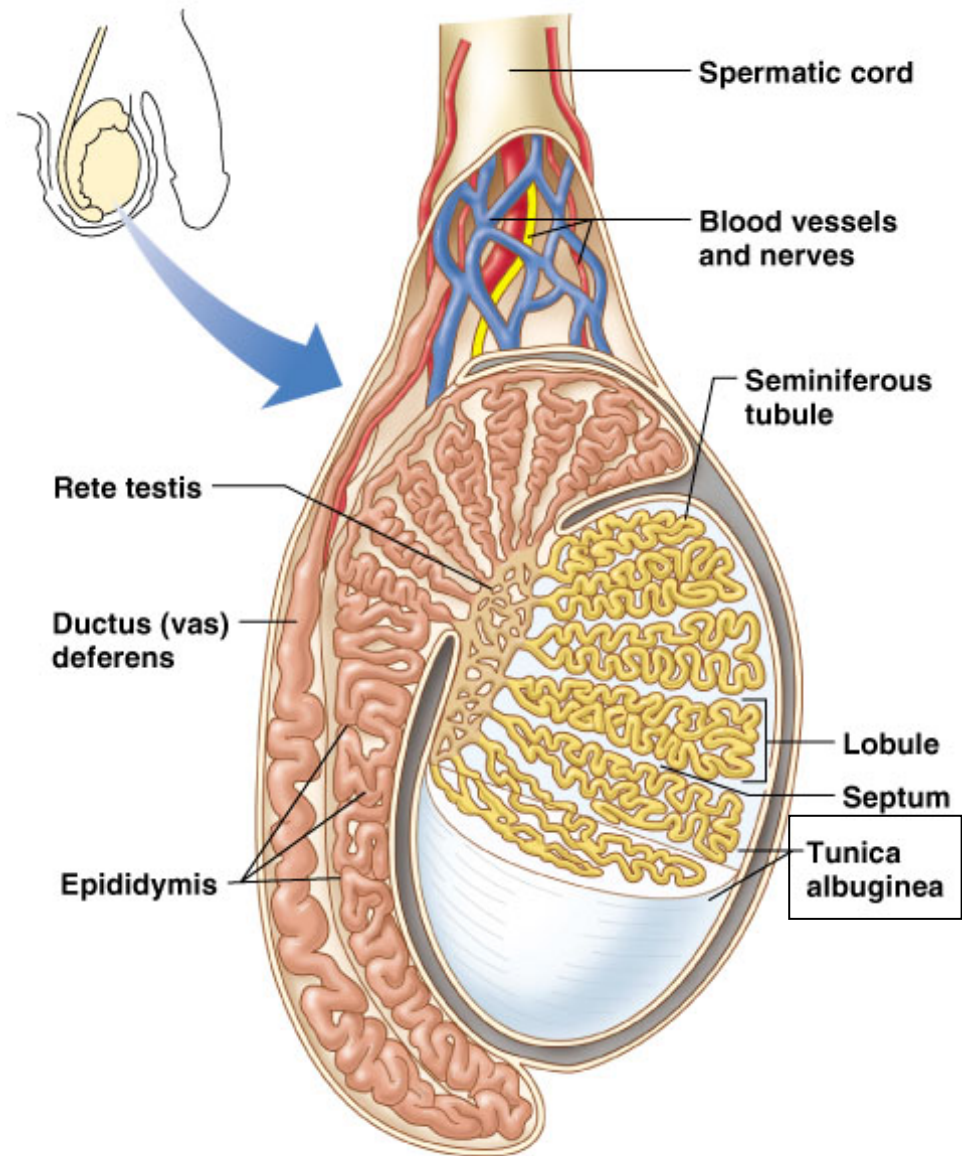


Figure 16.1

# Testes

Coverings, con't.

- *Septa*: extensions of the capsule
  - extend into the testis
  - divide it into lobules

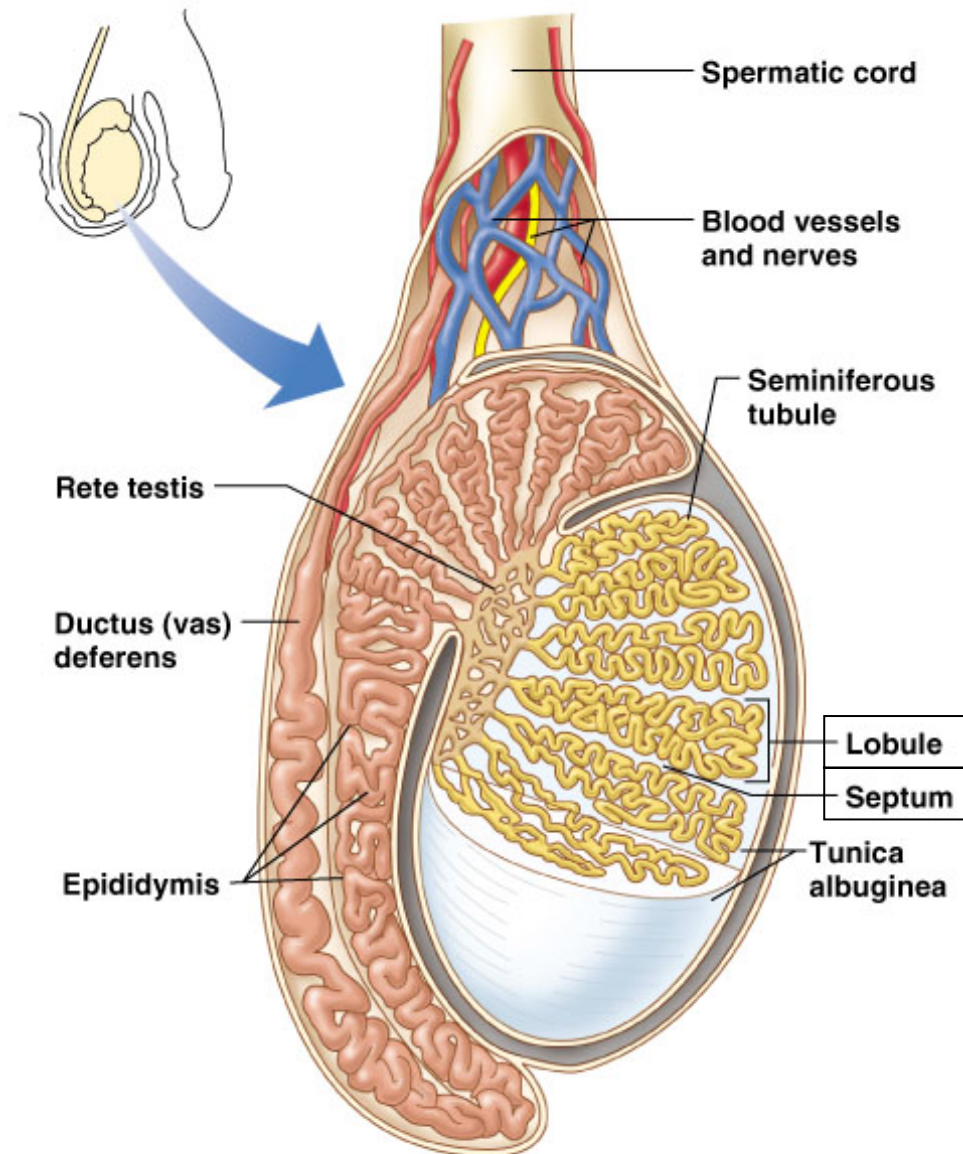
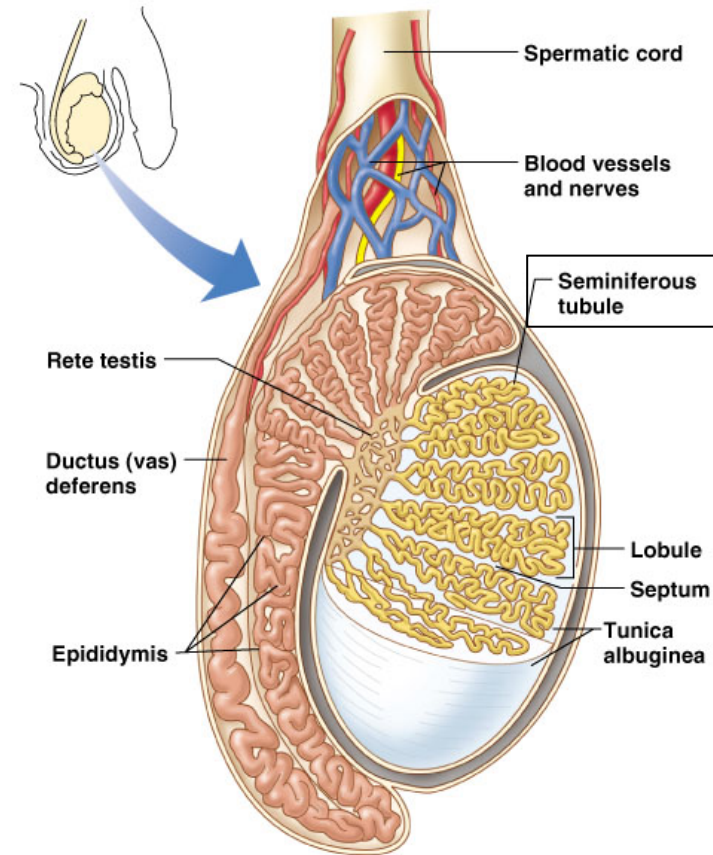


Figure 16.1

# Testes

Slide 16.4

- Each lobule contains *seminiferous tubules*
- Function: to produce sperm
- Empty sperm into the *rete testis*



# Testes

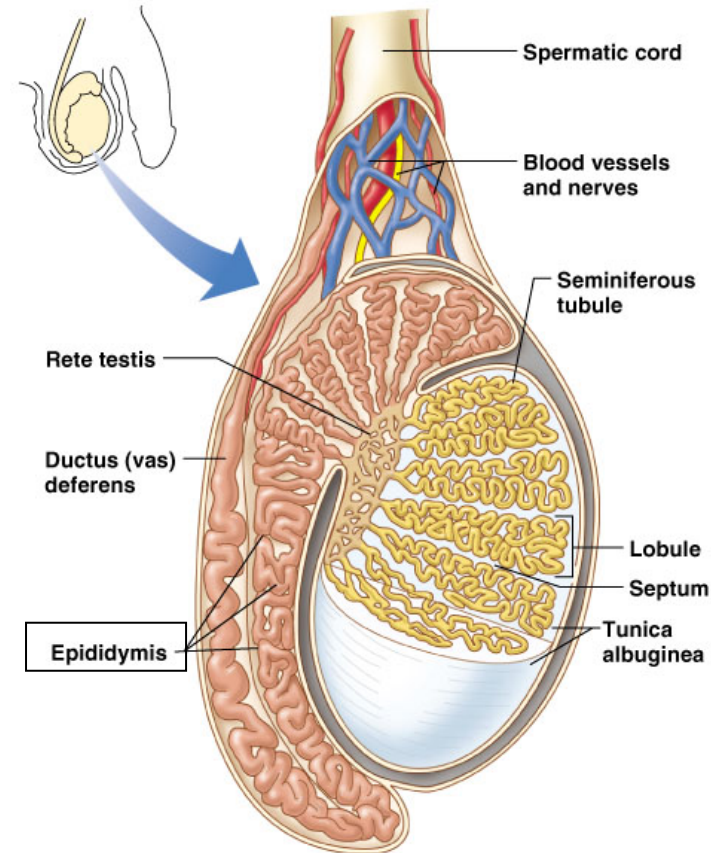
- *Interstitial cells*
  - Between seminiferous tubules
  - Produce androgens
    - Precursor to Testosterone



# Epididymis

Slide 16.5

- Sperm then move to the *epididymis*
- Comma-shaped, tightly coiled tube
  - About 15' long
- On superior, posterior part of the testis





# Male Reproductive System

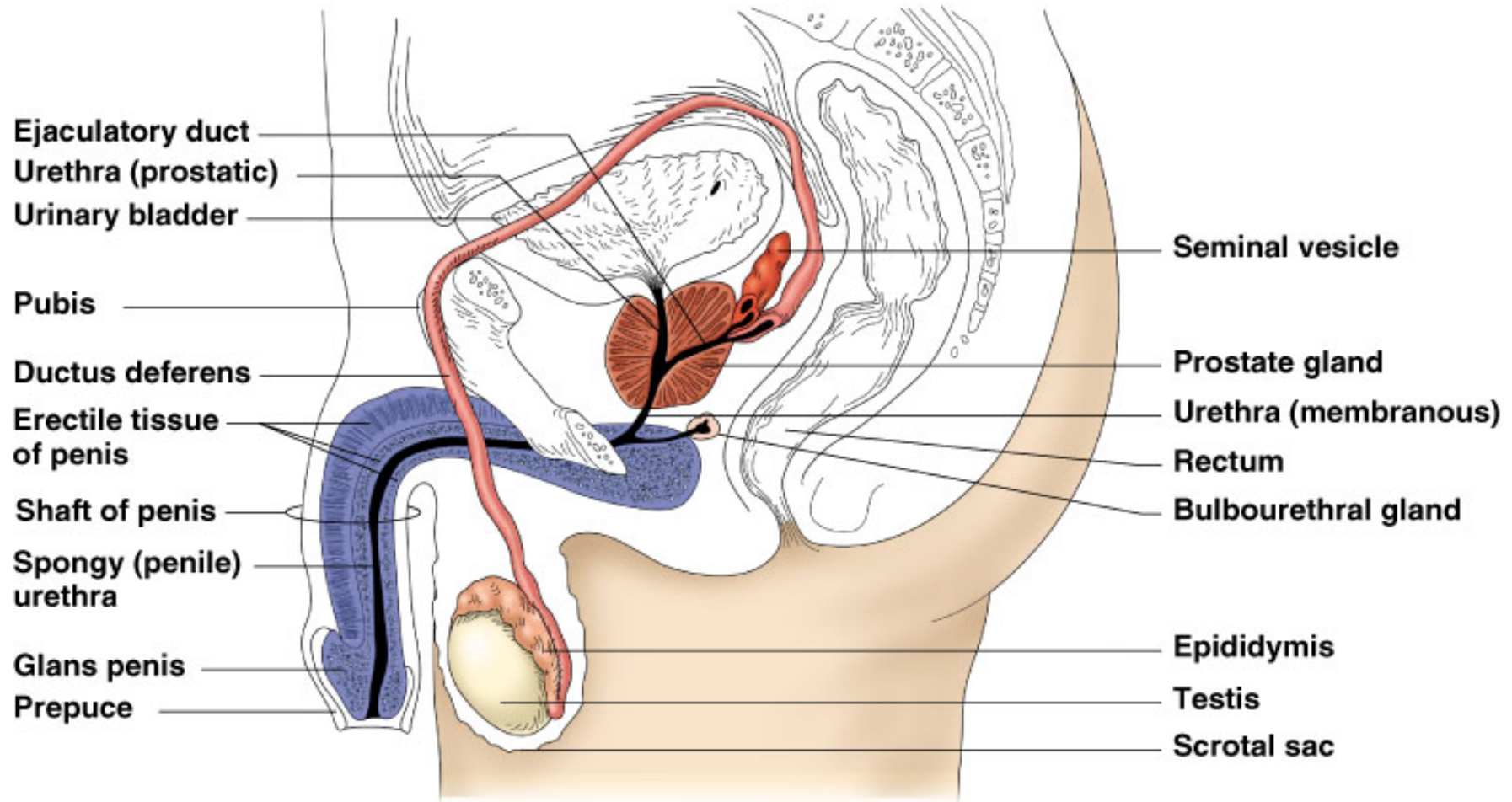


Figure 16.2

# Epididymis

- Functions:
  - Site where sperm mature (YMCA!!)
  - Stores sperm cells (~ 20 days)
- Expels sperm to the *vas deferens* during ejaculation

# Vas Deferens (Ductus Deferens)

- Paired structures
- Carry sperm from epididymis to *ejaculatory duct*
  - Pass through the inguinal canal
  - Over superior surface of urinary bladder
- Move sperm by peristalsis

# Male Reproductive System

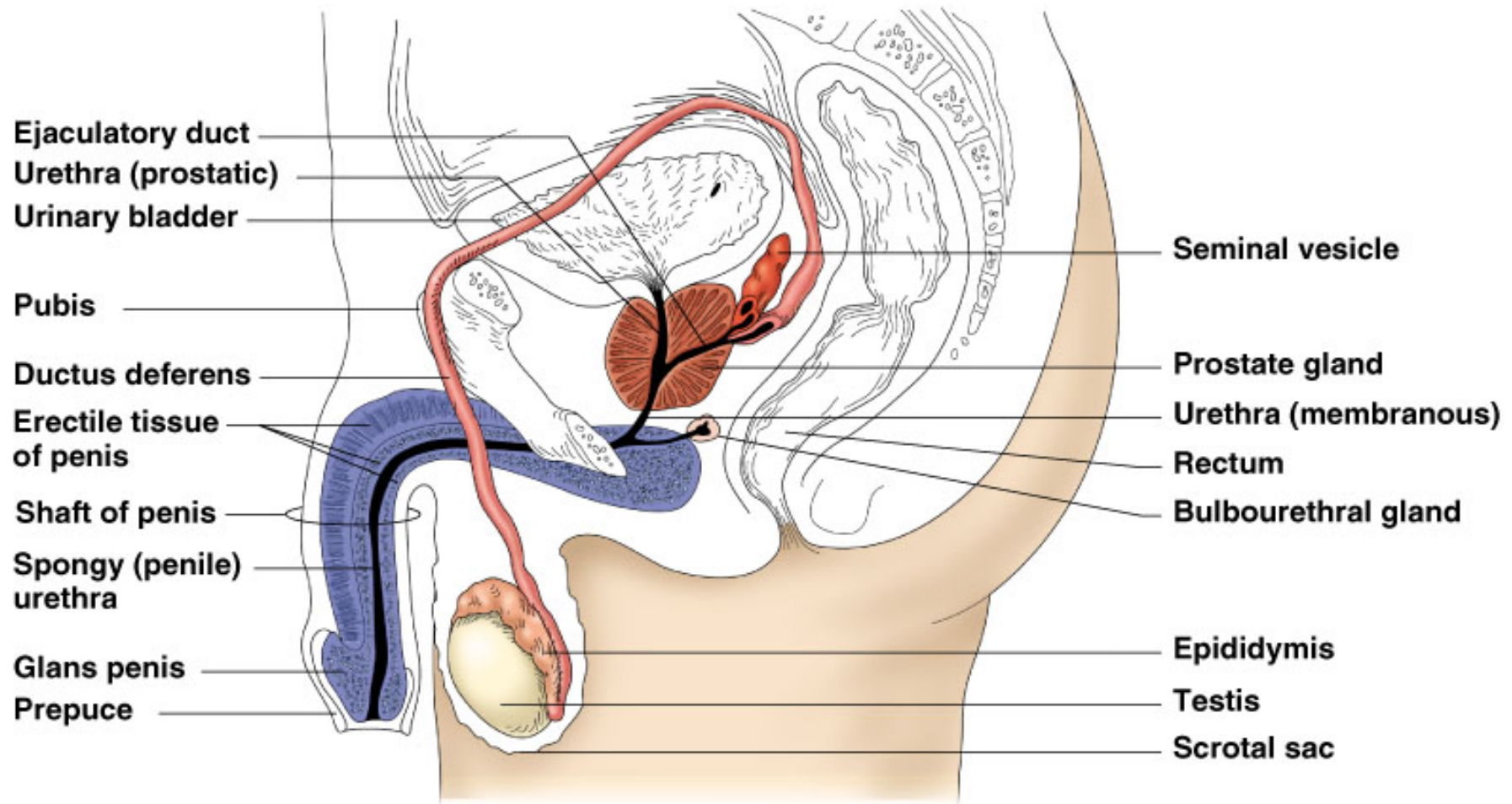


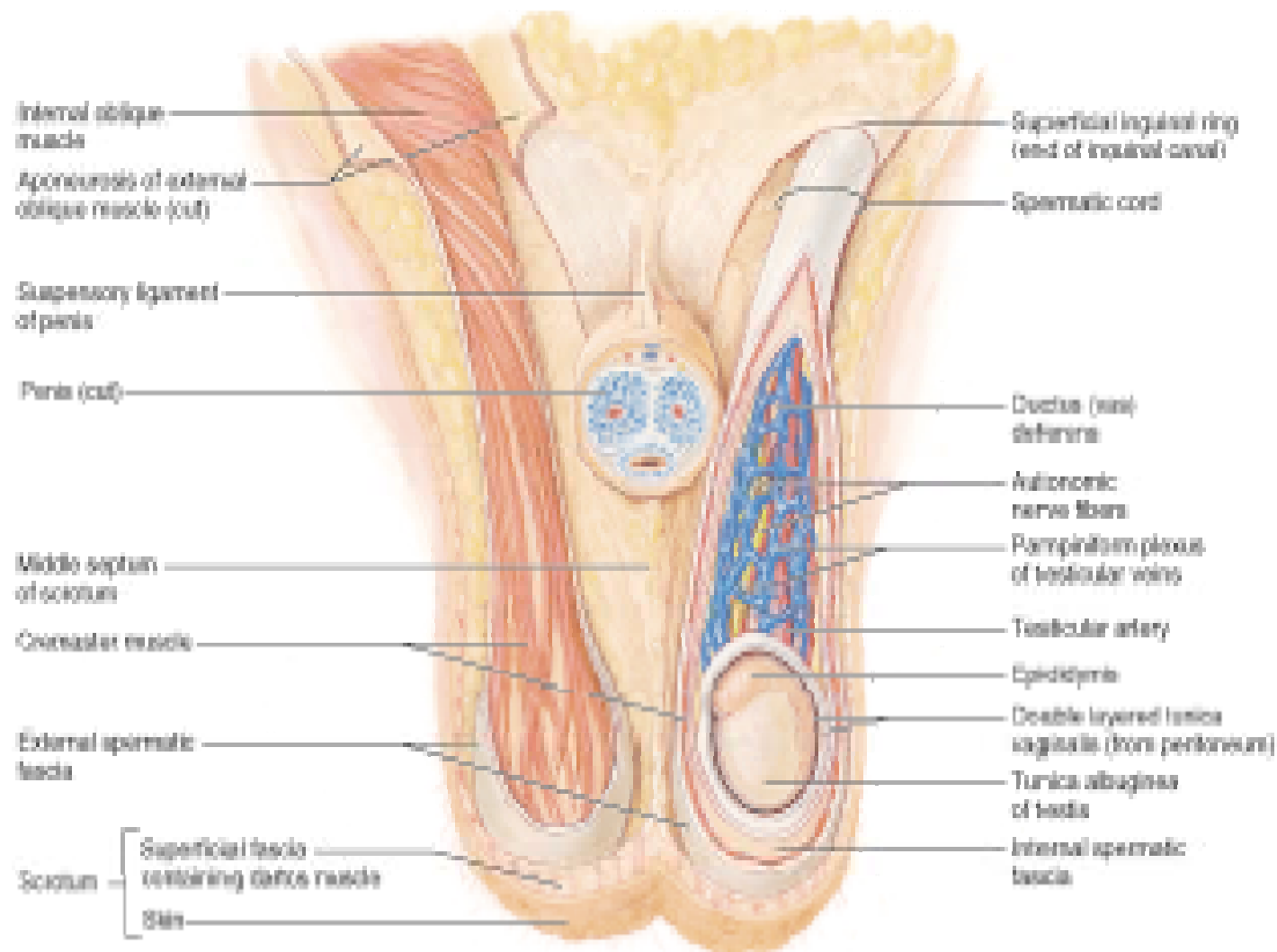
Figure 16.2

# Ductus Deferens (Vas Deferens)

- **Spermatic cord**
  - vas deferens
  - blood vessels
    - Spermatic artery and vein
  - nerves
  - in a connective tissue sheath
  - OUTSIDE body cavity

# Spermatic Cord

Slide 16.2c



Figure

Figure 24.2

# Vas Deferens

- Ends in the *ejaculatory duct*
  - unites with prostatic urethra
- **Vasectomy** – cutting the vas deferens to prevent transportation of sperm

# Urethra

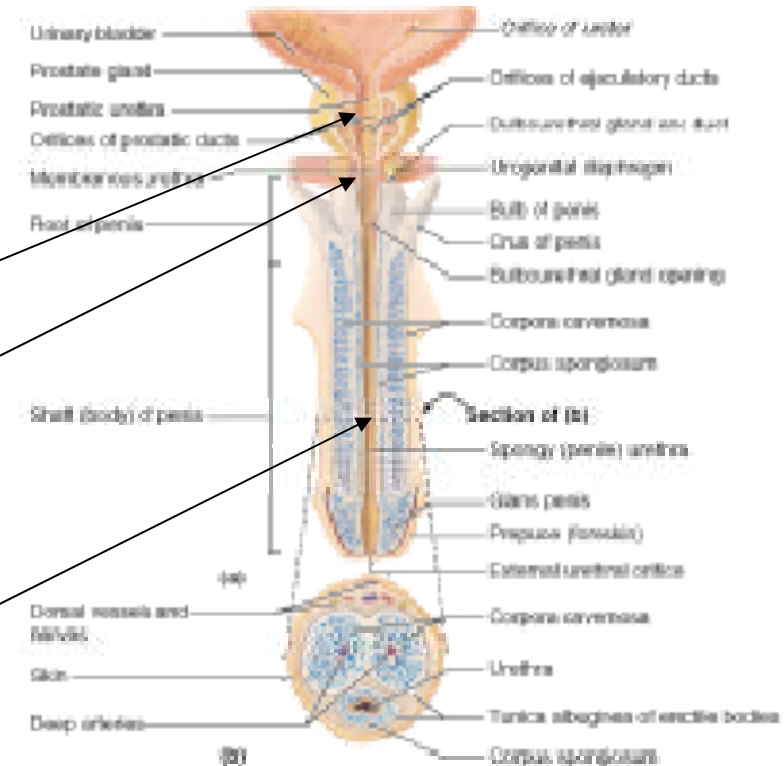
- Extends from the base of urinary bladder to tip of penis
  - ~8 cm
- Carries both urine and sperm
- Sperm enter from the ejaculatory duct



# Urethra

Slide 16.7b

- Regions of male urethra
  - *Prostatic urethra*
  - *Membranous urethra*
  - *Spongy (penile) urethra*



# Seminal Vesicles

- Paired structures
- Located posterior to urinary bladder
- Produce ~60% of semen
  - Fructose (sugar)
  - Vitamin C
  - Prostaglandins
  - Other substances

# Male Reproductive System

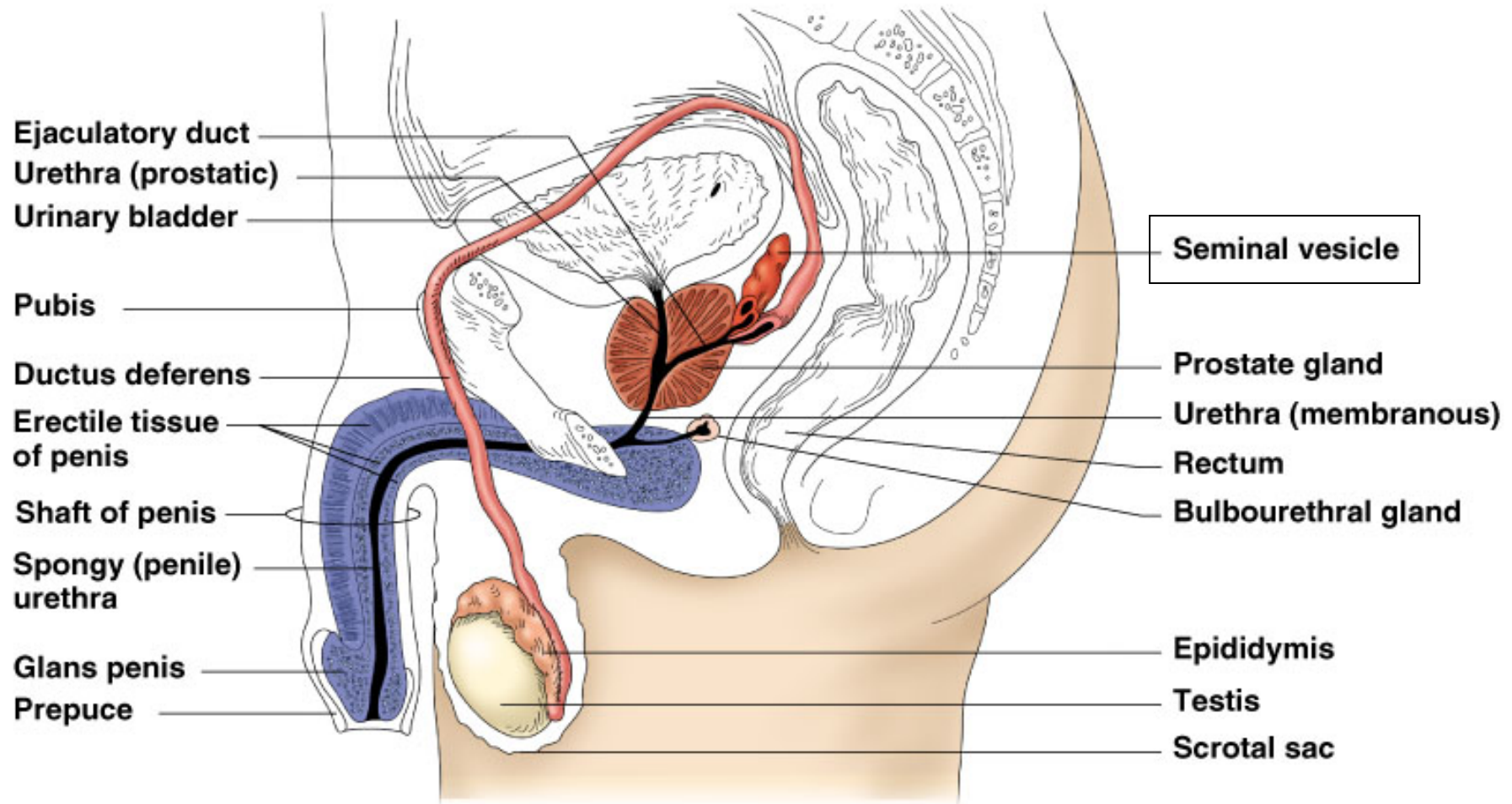


Figure 16.2

# Prostate Gland

- Attached to apex of urinary bladder
- Surrounds prostatic urethra
- Secretes a milky fluid
  - ~35% of semen
  - Helps activate sperm
  - Enters urethra via small ducts

# Male Reproductive System

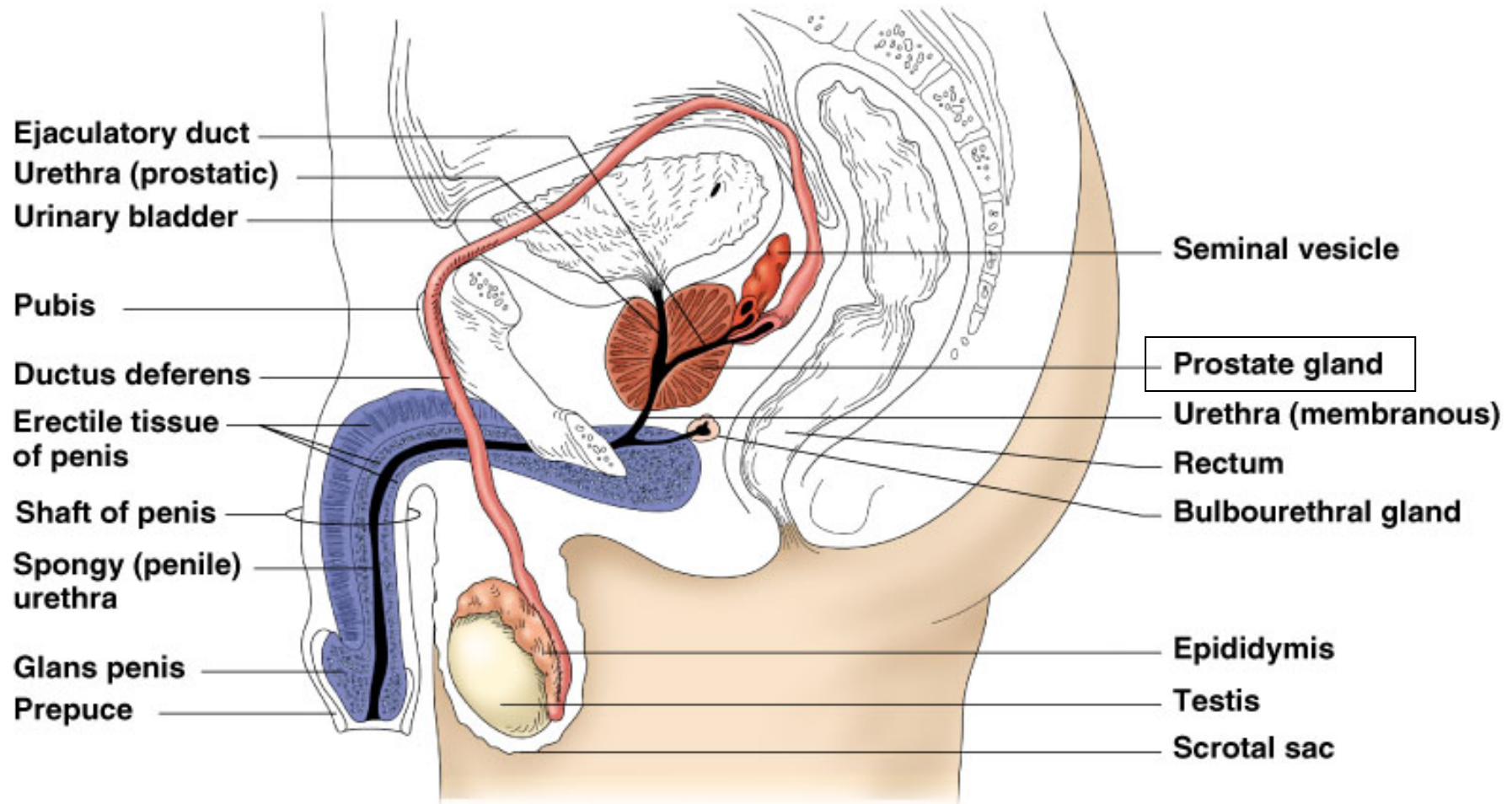


Figure 16.2

# Bulbourethral (Cowper's) Glands

- Pea-sized glands inferior to the prostate
- Produce a thick, clear mucus
  - Cleanses the urethra
  - Serves as a lubricant
  - Secreted into the penile urethra
  - May contain sperm!!

# Male Reproductive System

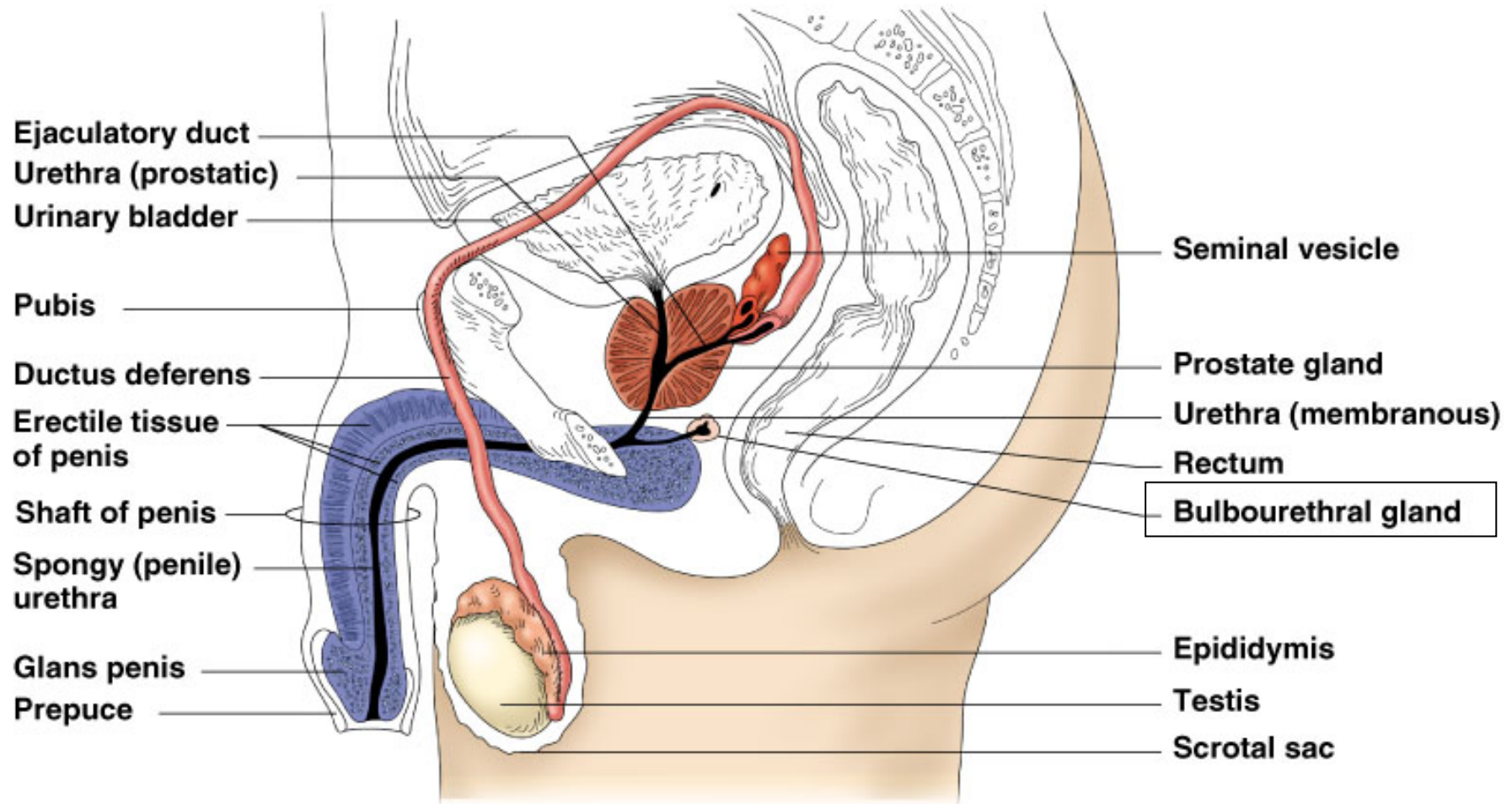


Figure 16.2



# Semen: FYI

- Mixture of sperm and accessory gland secretions
- Accessory gland secretions:
  - provide energy for sperm cells (36 kcal/tsp!)
  - Alkalinity helps neutralize the acidic environment of vagina
  - inhibit bacterial multiplication
  - contents enhance sperm motility



# External Genitalia

- **Scrotum**

- Divided sac of skin outside the abdomen
- Maintains testes  $\sim 3^{\circ}\text{C}$  lower than normal body temperature
  - protects sperm viability

# External Genitalia

- **Penis**

- Delivers sperm into female reproductive tract
- Structures:
  - Shaft
  - Glans penis (enlarged distal portion)
  - Prepuce (foreskin)
    - removed by circumcision

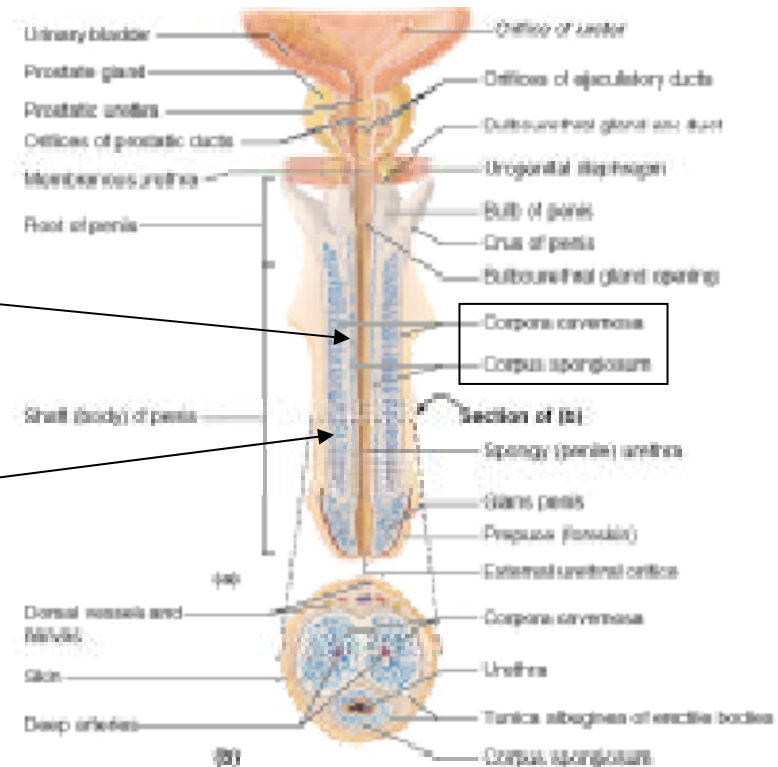
# External Genitalia

- Shaft of penis
  - three columns of spongy erectile tissue
    - 2 *corpora cavernosa*
    - 1 *corpus spongiosum*
      - Surrounds penile urethra

# Spongy Tissue of Penis

Slide 16.7b

- Erectile tissue
  - *Corpus spongiosum*
  - *Corpora cavernosa*



# External Genitalia

Shaft of penis, con't.

- Columns are filled with blood capillaries
- Engorge with blood during sexual arousal
- Cause erection of penis
- Blood drains after orgasm

# Testosterone Production

- The most important male hormone
- Produced in interstitial cells

# Testosterone Function

- Stimulates reproductive organ development
  - Causes sex drive
  - Causes secondary sex characteristics
    - Deepening of voice
    - Increased hair growth
    - Enlargement of skeletal muscles
    - Thickening of bones

# Spermatogenesis: FYI

- Production of sperm cells
- Begins at puberty and continues throughout life
- Occurs in the seminiferous tubules



# Processes of Spermatogenesis: FYI

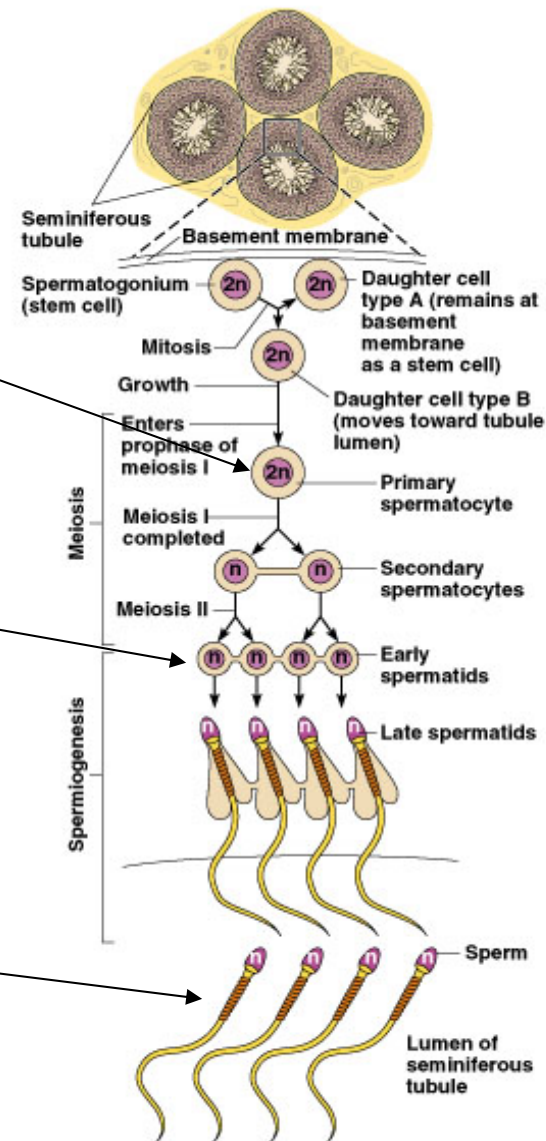
- Stem cells undergo rapid mitosis before puberty
- At puberty, FSH modifies stem cell division
  - One cell produced is a stem cell
  - The other cell becomes a primary spermatocyte

# Processes of Spermatogenesis: FYI

- Primary spermatocytes undergo meiosis
- Haploid spermatids are produced
  - Sperm cells result after maturing of spermatids
- Spermatogenesis takes 64 to 72 days
- Each ejaculation contains 2-4 *billion* sperm

# Spermatogenesis

- Primary spermatocytes
- Spermatids
- Spermatozoa



Figur

# Anatomy of a Mature Sperm Cell: FYI

- The only human flagellated cell
- DNA is found in the head

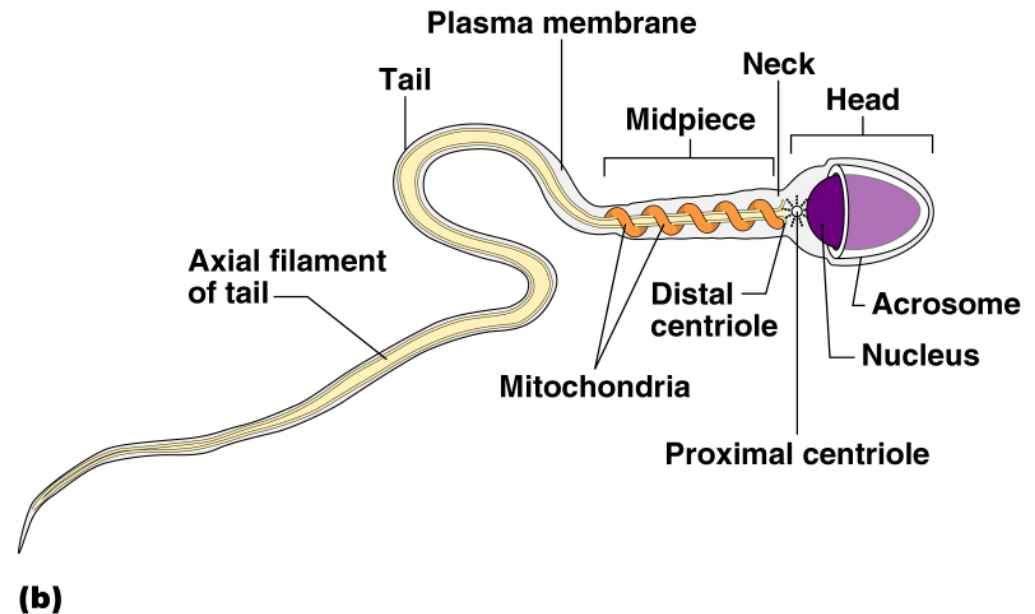


Figure 16.5