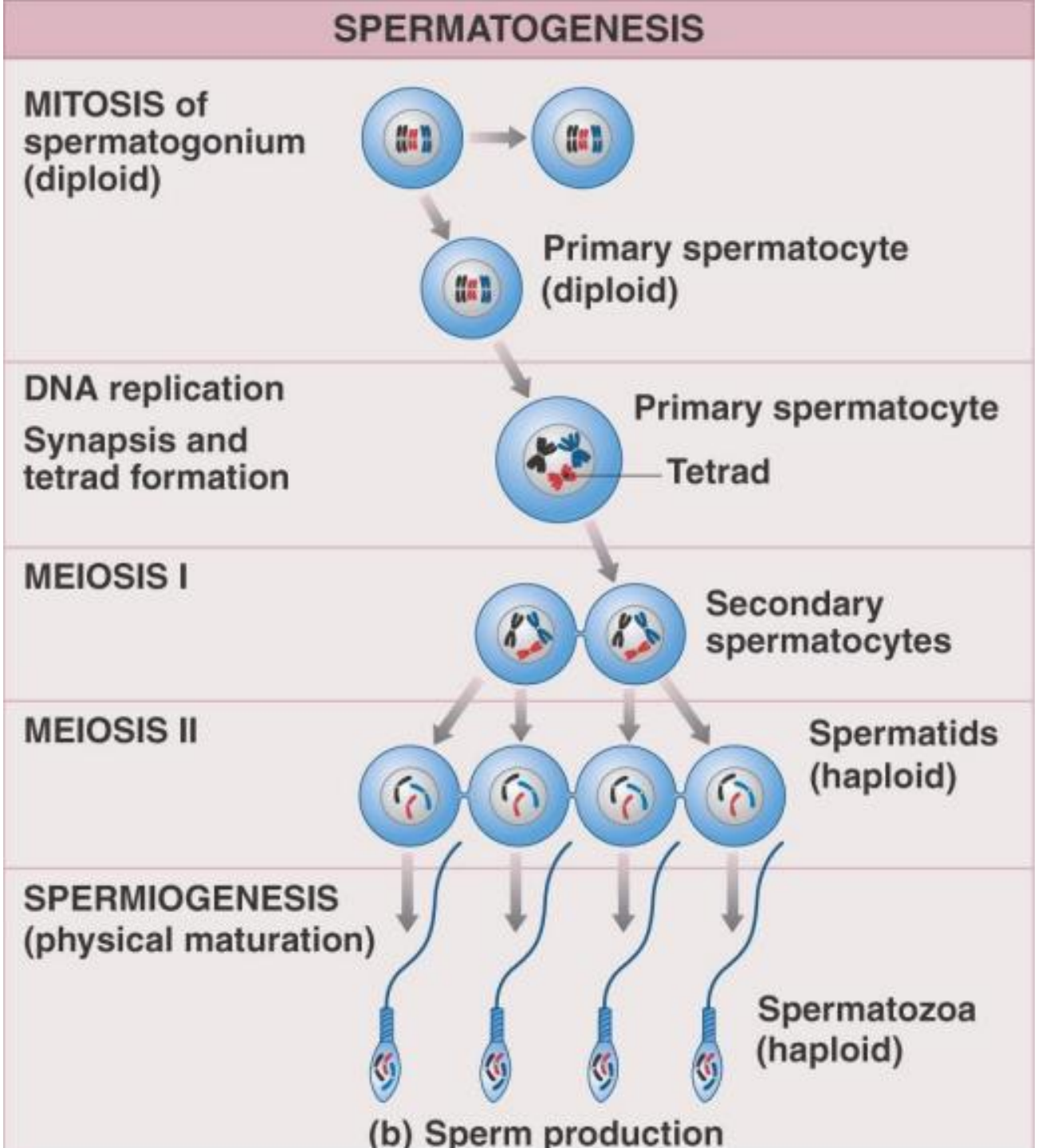
# *Male Reproductive System Histology*

# Objectives

- State the main structures comprising the MRS
- Describe the structure of the testis and seminiferous tubule
- Describe the structure of the epididymis & vas deference
- Describe the structure of prostate and seminal vesicles

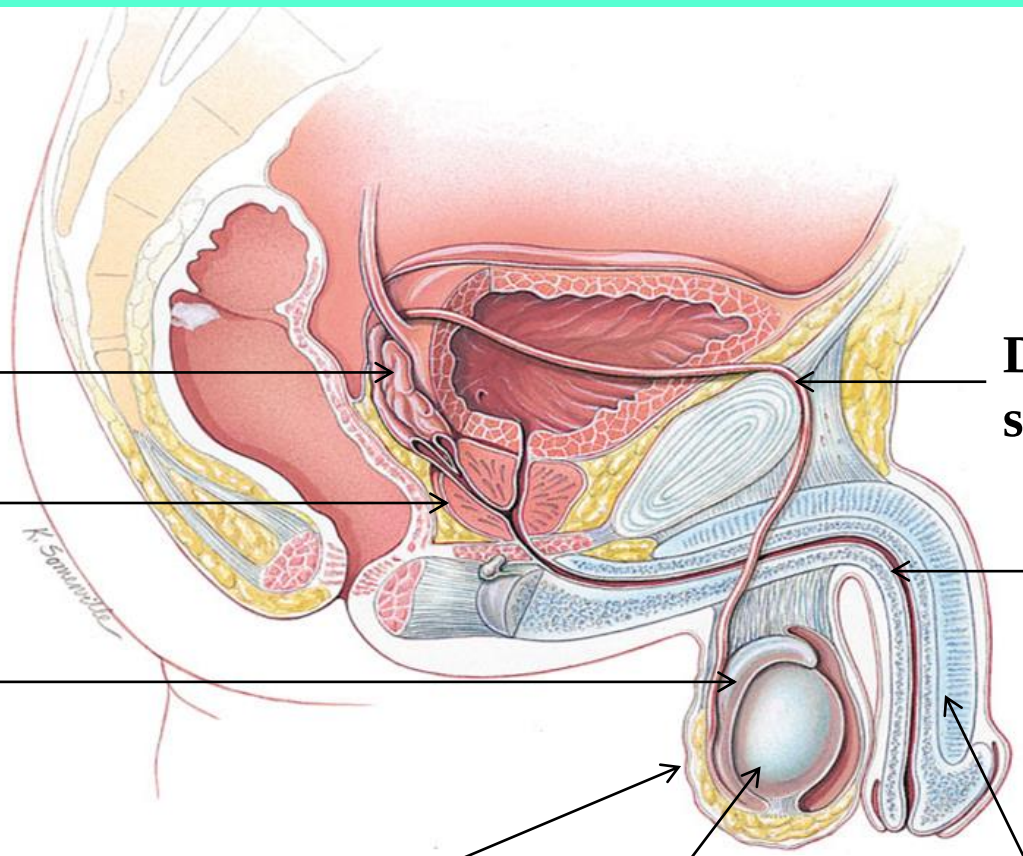
# Prerequisite Learning

- **Spermatogenesis**




(b) Sperm production

# Male reproductive system



Seminal vesicle-fluid-semen

Prostate-fluid-semen

Epididymis-sperm maturation

Scrotum-cools testis

Testis-sperm formation & sex hormones

Ductus deferens-sperm duct

Urethra-urine

Penis - Introduce spermatozoa into FRS

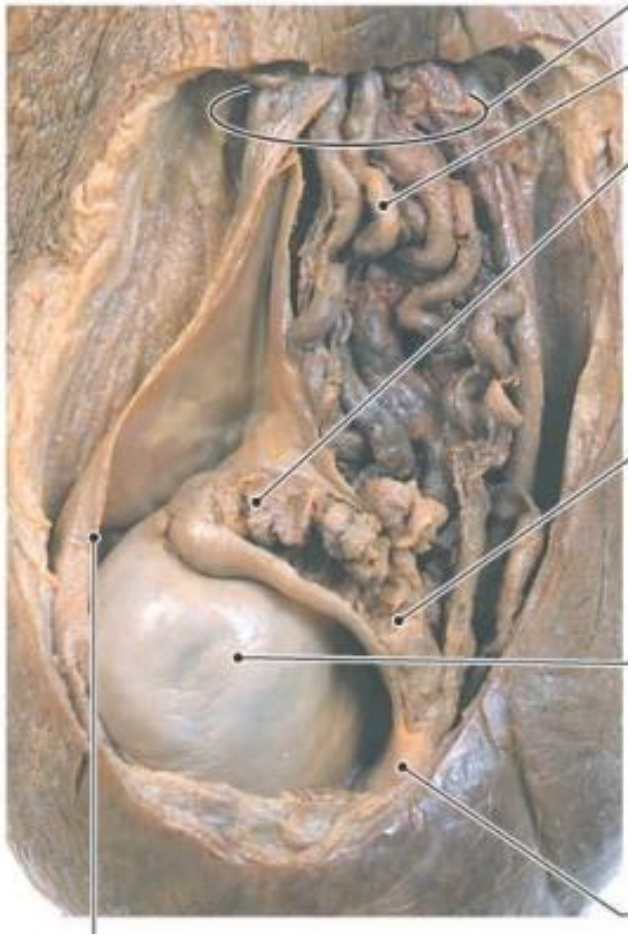
# Testis

- Male gonads- produce male gametes
- Paired organs lying in the scrotal sac
- completely surround by a double layer of mesothelium

Tunica vaginalis → parietal layer

Tunica vaginalis → Visceral layer

- Serous fluid- act as a lubricant



# Testis

- Compound tubular gland
- mixed gland
- Histology = stroma + paranchyma

## stroma

- Thick capsule : white collagen fibers : **Tunica albugina**
- Areolar connective tissue/ blood vv ↑ : **Tunica vascularis**
- Posterior thickened internal bulging of capsule } **Mediastinum testis**

**Mediastinum testis**

↓

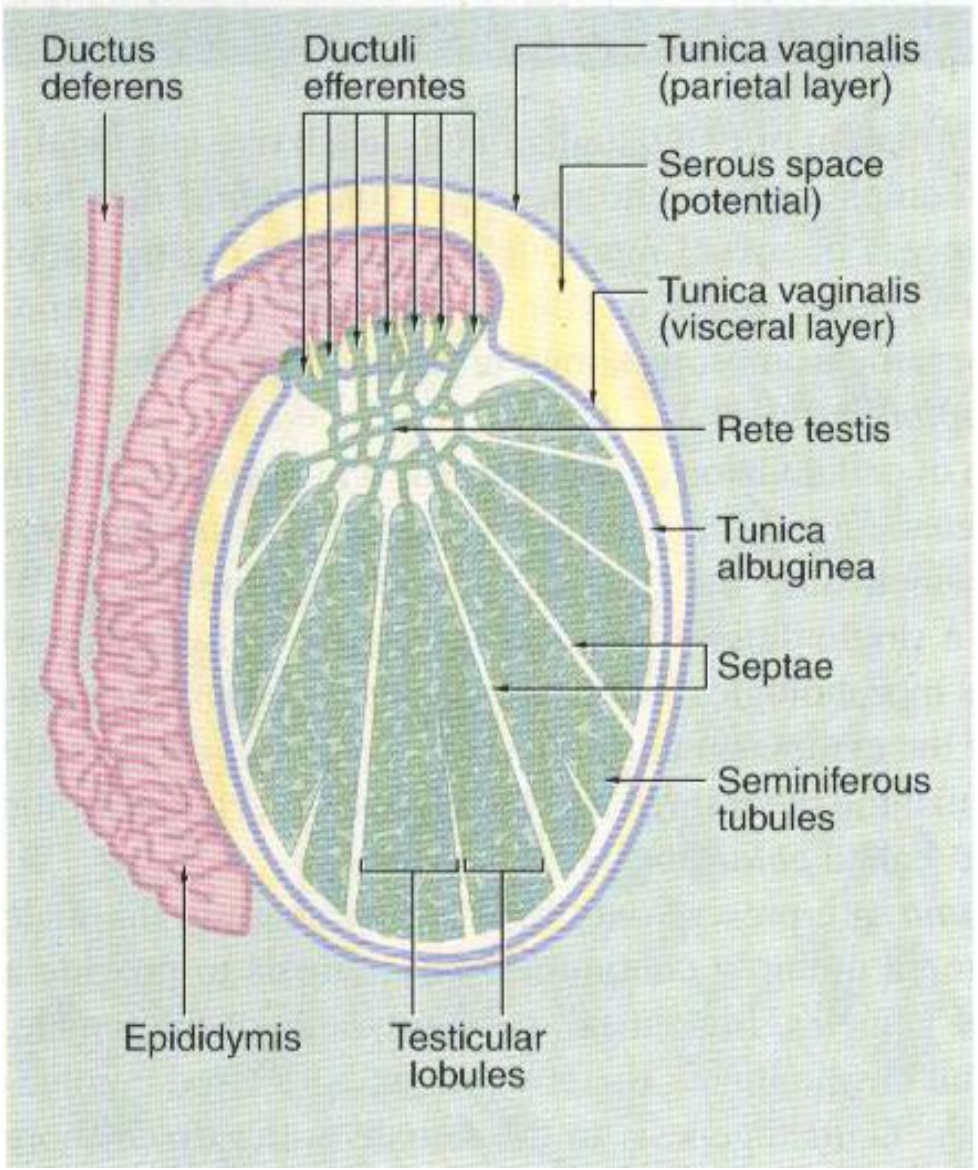
**Incomplete trabeculae / septae**

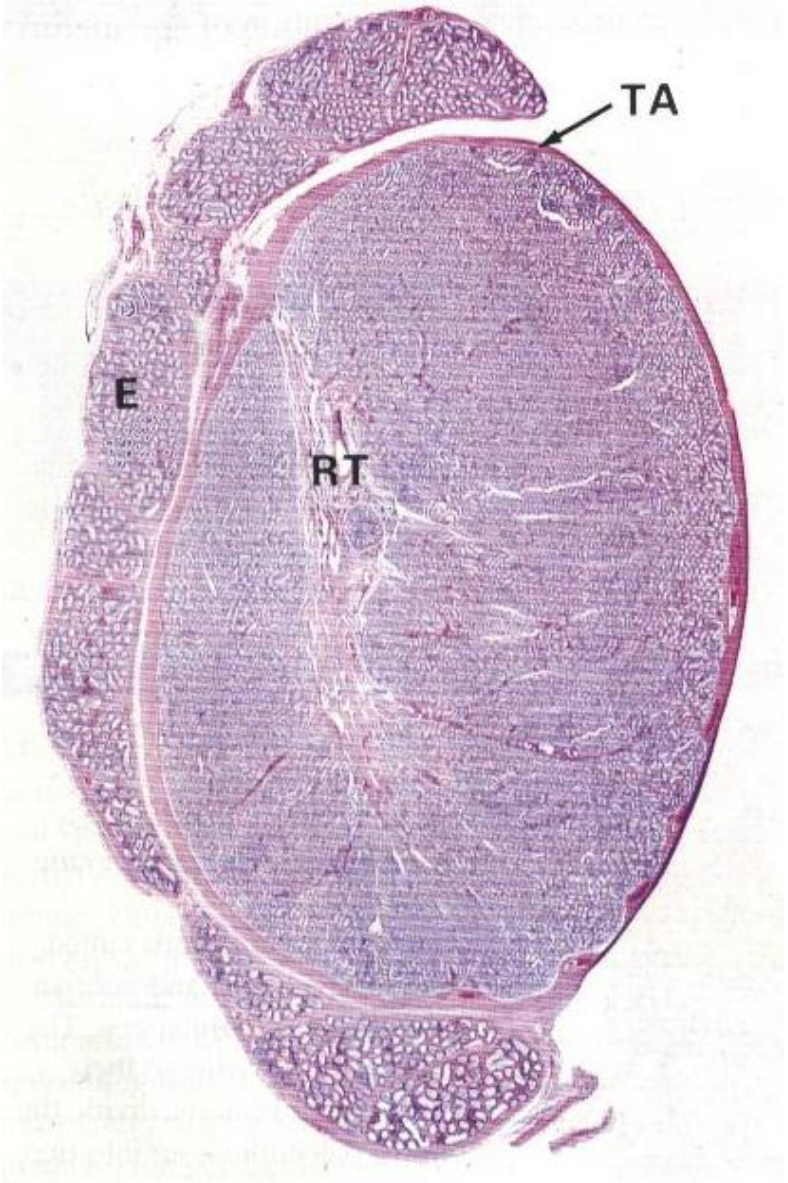
↓

**Compartments / lobules**

- Pyramidal shape
- Base- towards periphery
- Intercommunicating lobules
- 1-4 highly convoluted tubes (seminiferous tubules)

# Testis


Ductus deferens
Ductuli efferentes
Tunica vaginalis (parietal layer)
Serous space (potential)
Tunica vaginalis (visceral layer)
Rete testis
Tunica albuginea
Septae
Seminiferous tubules
Epididymis
Testicular lobules


TA
E
RT

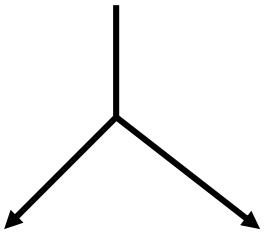
# Paranchyma

- Highly twisted looped tubules: seminiferous tubules
- seminiferous tubules separated by interstitial tissue
- interstitial tissue → loose connective tissue
  - blood vv
  - lymphatics
  - various cell types

** **Leydig cells**

*secrete androgens chiefly testosterone which Promote formation of spermatozoa & male secondary sexual characteristics*

# Testis



Endocrine part

↓

leydig cells

↓

Testosterone

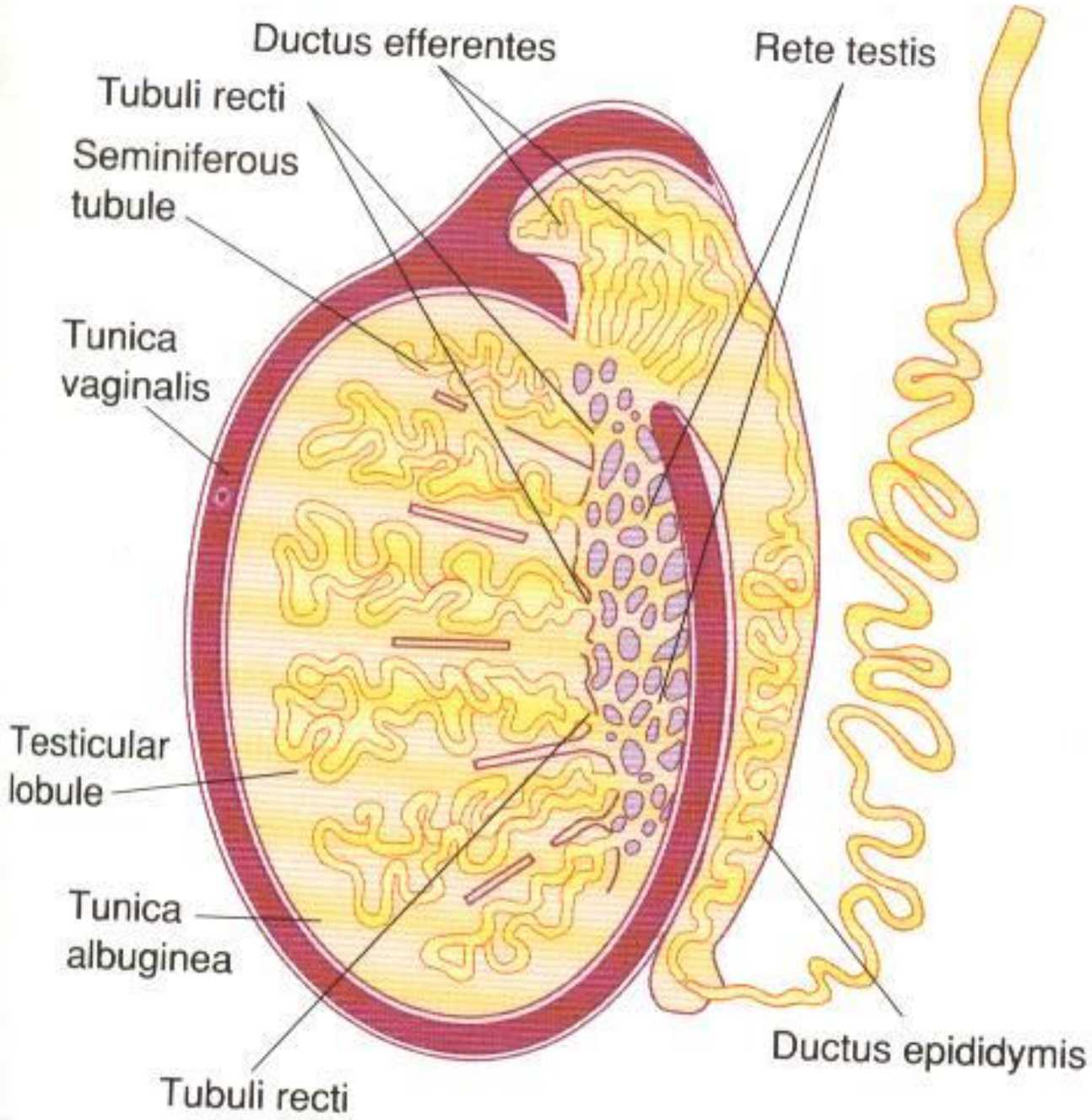
Exocrine part

↓

seminiferous tubules

↓

sperms


Ductus efferentes
Rete testis
Tubuli recti
Seminiferous tubule
Tunica vaginalis
Testicular lobule
Tunica albuginea
Tubuli recti
Ductus epididymis

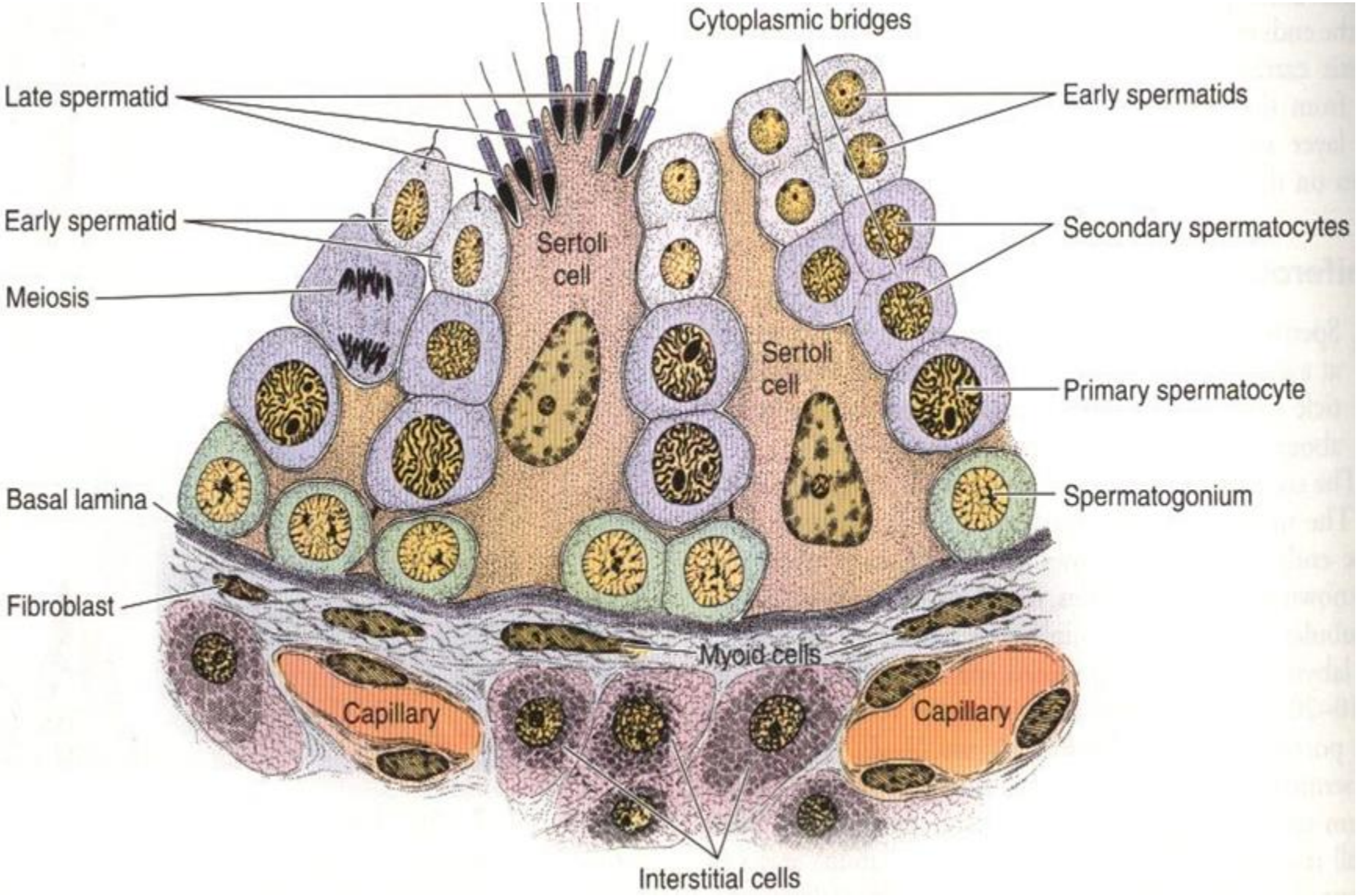
# Seminiferous tubules

# Seminiferous tubule - Structure

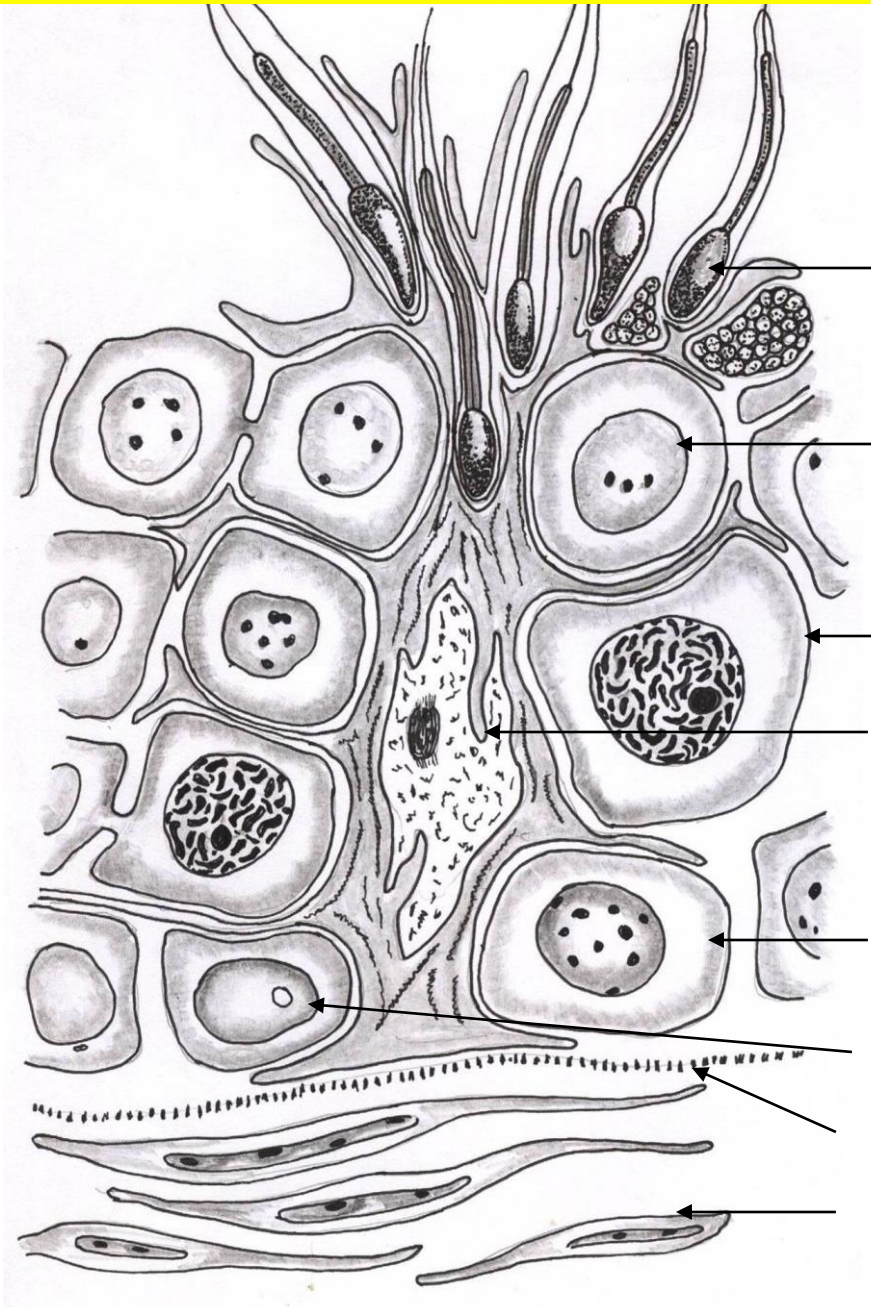
- **Basement membrane**
- **Stratified seminiferous epithelium**
  - *Non- spermatogenic cells (sertoli cells)*
  - *Spermatogenic cells*

- **Basement membrane of the epithelium covered by fibrous connective tissue with myoid cells (***contractile property & transport of spermatozoa***)**

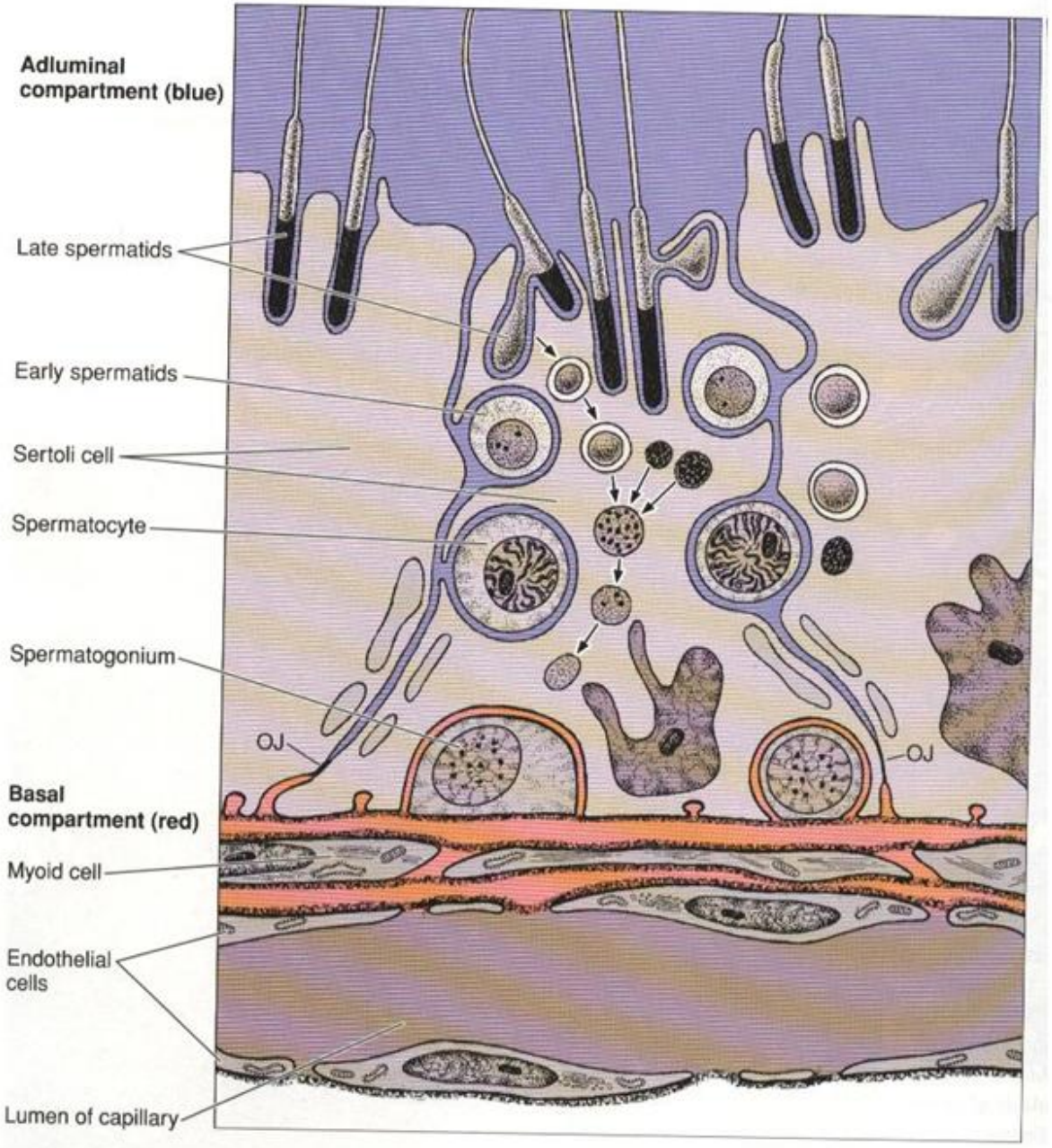
# Seminiferous tubules



# Seminiferous tubules



# Blood-testis barrier



# Sertoli cells

- Large irregular columnar cells ⟶ cytoplasm extends the entire height of seminiferous epithelium
- There are numerous pits and depressions on their sides and luminal surface into which fits the adjoining differentiating germ cells
- Nuclei are irregular in shape, possess a prominent nucleolus, pale stained and located in the basal region of the cell
- Extensive tight junctions bound the cells together
- Have receptors for FSH from anterior pituitary and testosterone from Leydig cells

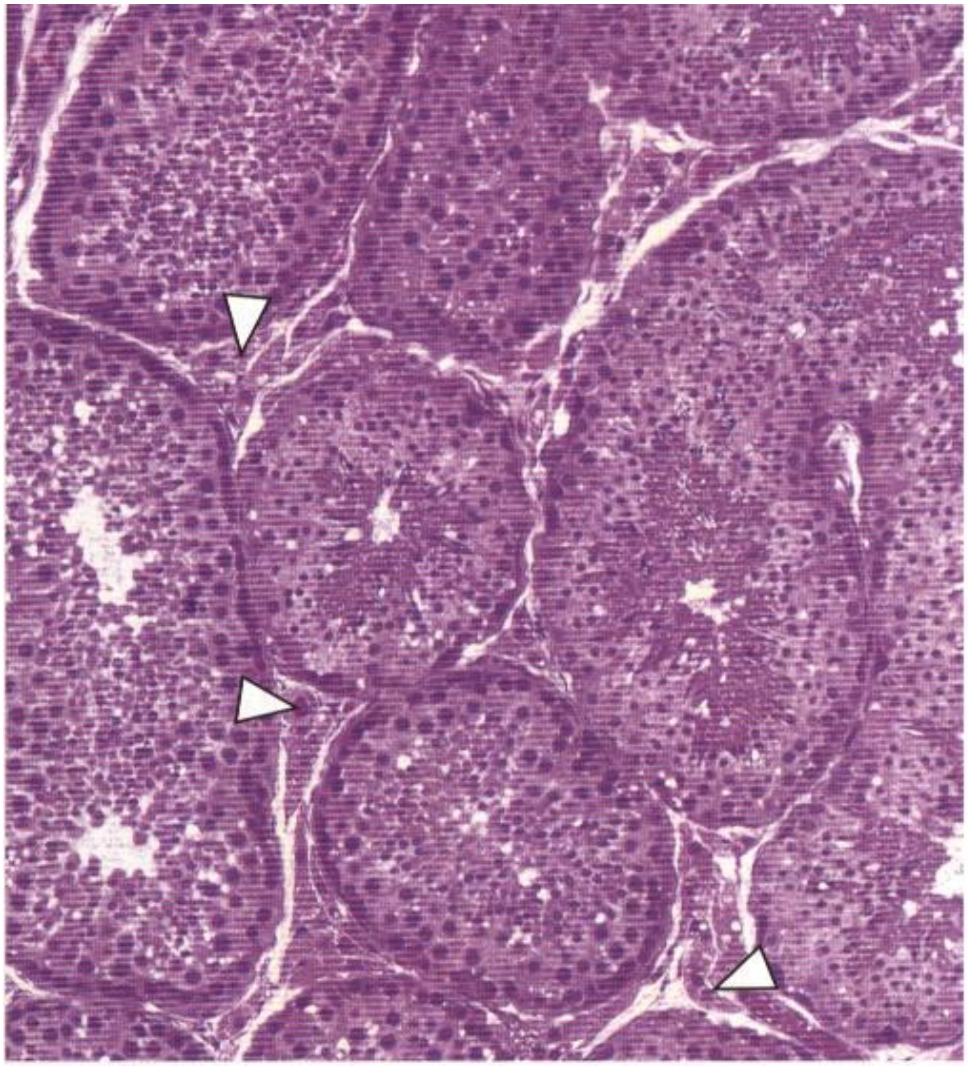
# Sertoli cells - functions

- The effect of FSH and testosterone on spermatogenesis is mediated by Sertoli cells
- **Cells have multiple functions :**
- *support and nutrition of germ cells*
- *in spermiation-release of late spermatids to the lumen*
- *Phagocytosis of residual bodies*
- *Transport of water and sodium into the lumen*
- *Secretion of various protein – androgen binding proteins*
  *transferin,inhibin, activin*
  *anti-Mullerian hormone*
- *Formation of blood testis barrier*
- *Regulation of spermatogenesis*

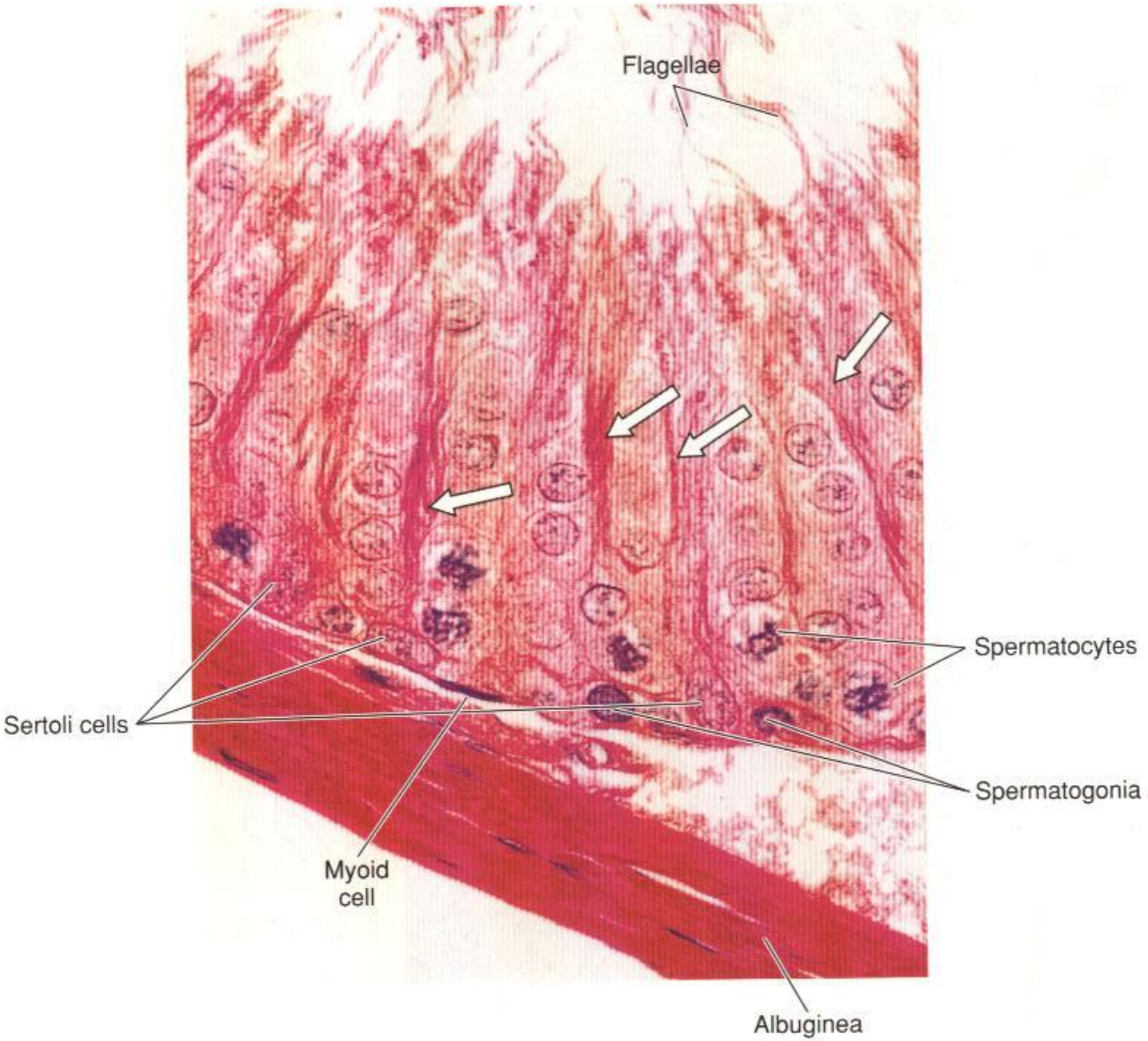
# Spermatogenic cells

- lie between cells of Sertoli
- arranged in several distinct layers
- in an orderly manner with about 4-8 cell layers
- occupying the space between the basal lamina and the lumen
- Spermatogenic cells are in all stages of differentiation

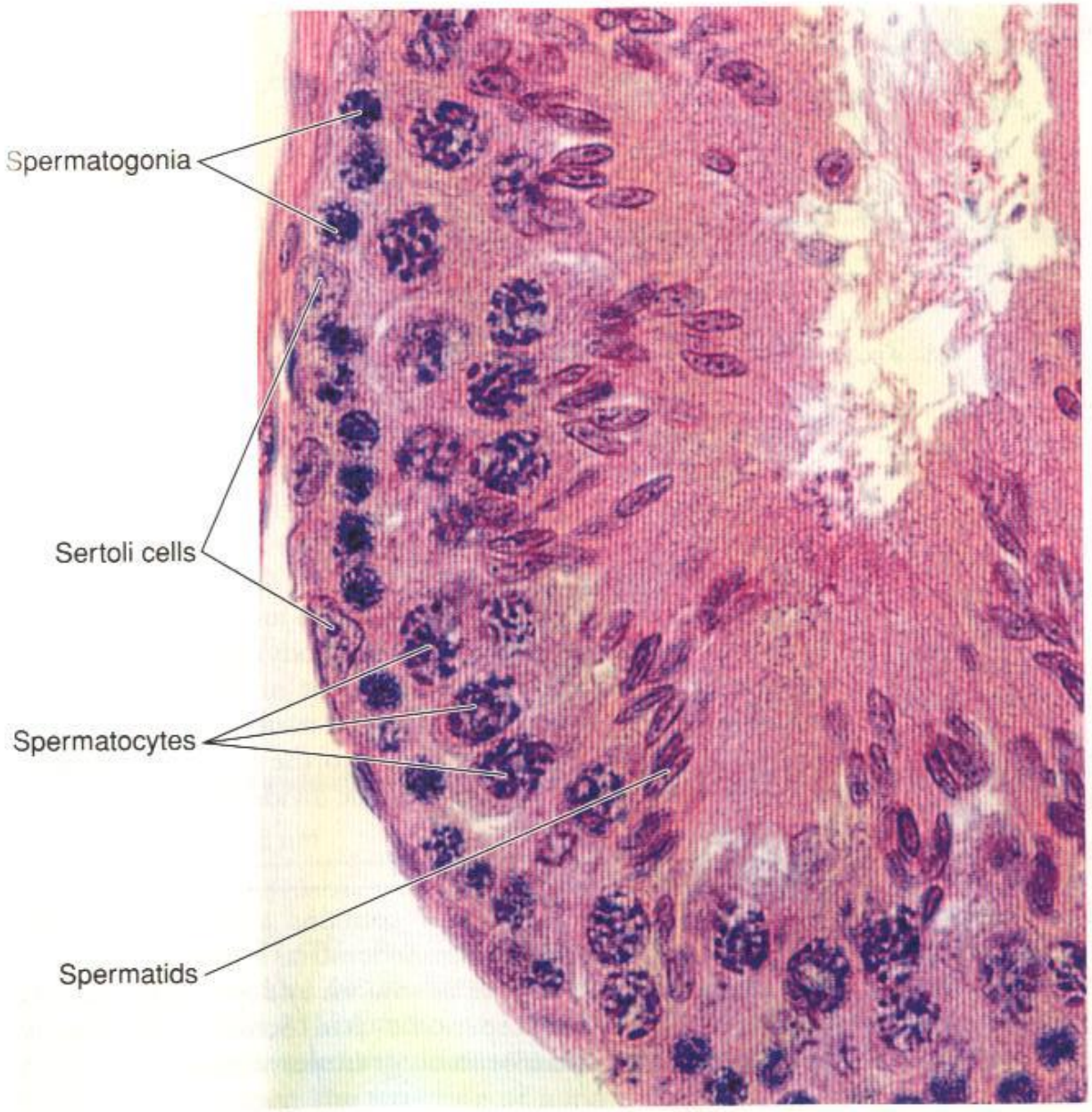
# Seminiferous tubules



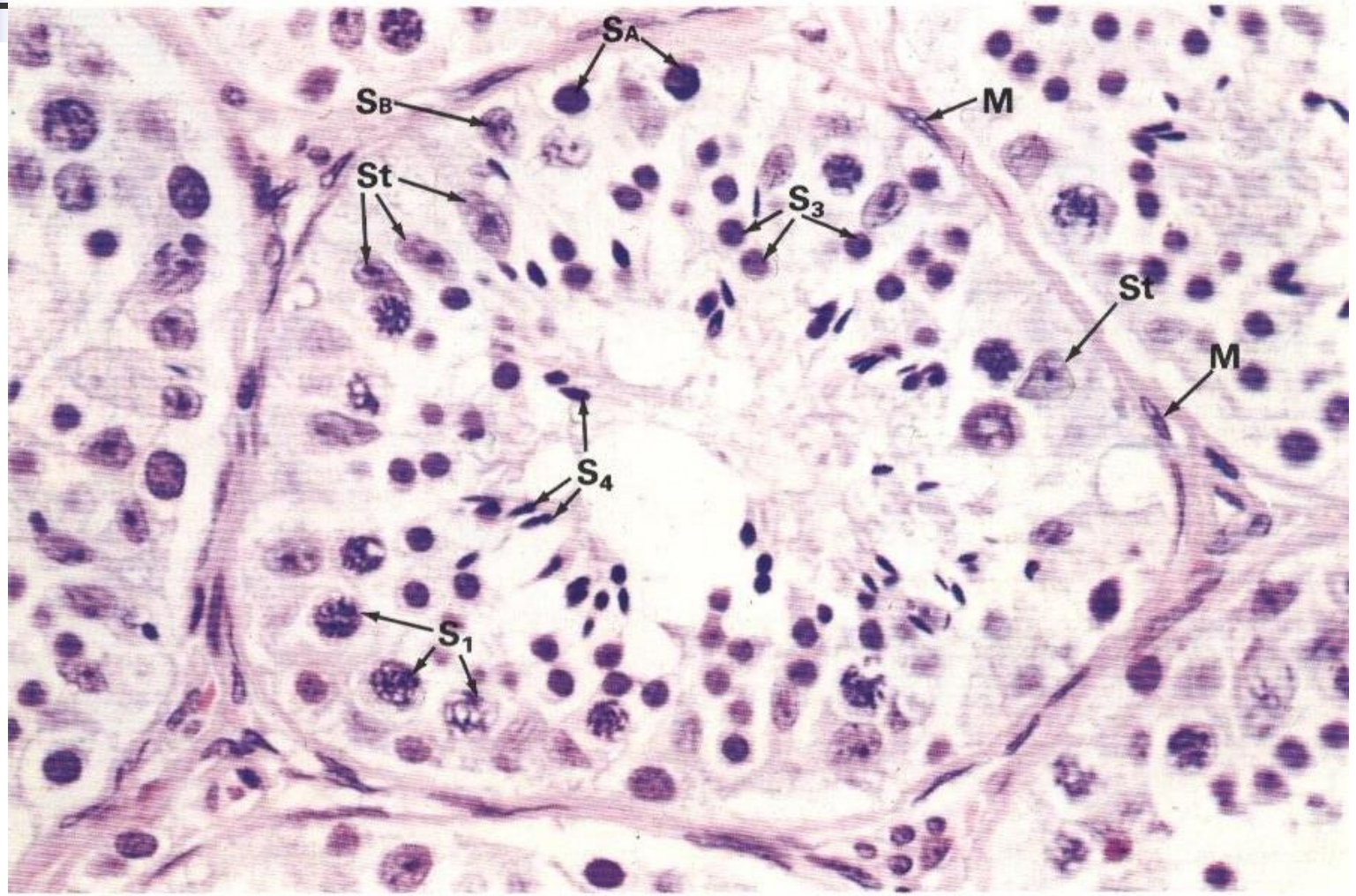
# Seminiferous tubules



# Seminiferous tubules



# Seminiferous tubules



# Spermatogenic cells

- Germ cells/ spermatogonia – basal layer of epithelium

*1 or more mitosis* → Type A spermatogonia

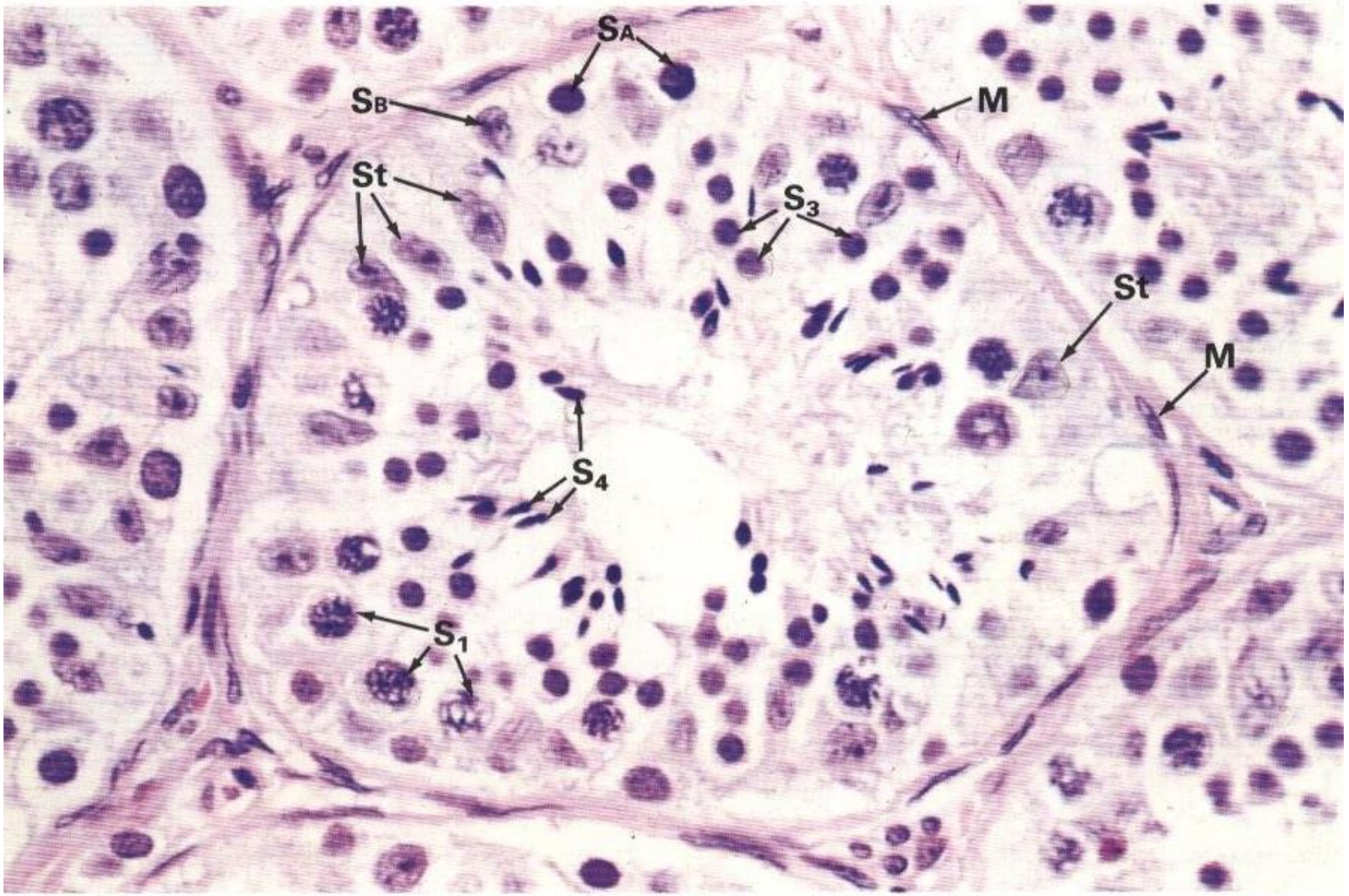
- Large round/ oval nucleus
- **Condensed chromatin**
- Nuclear vacuole
- Poorly stained cytoplasm

*Progressive mitosis* → Type B spermatogonia

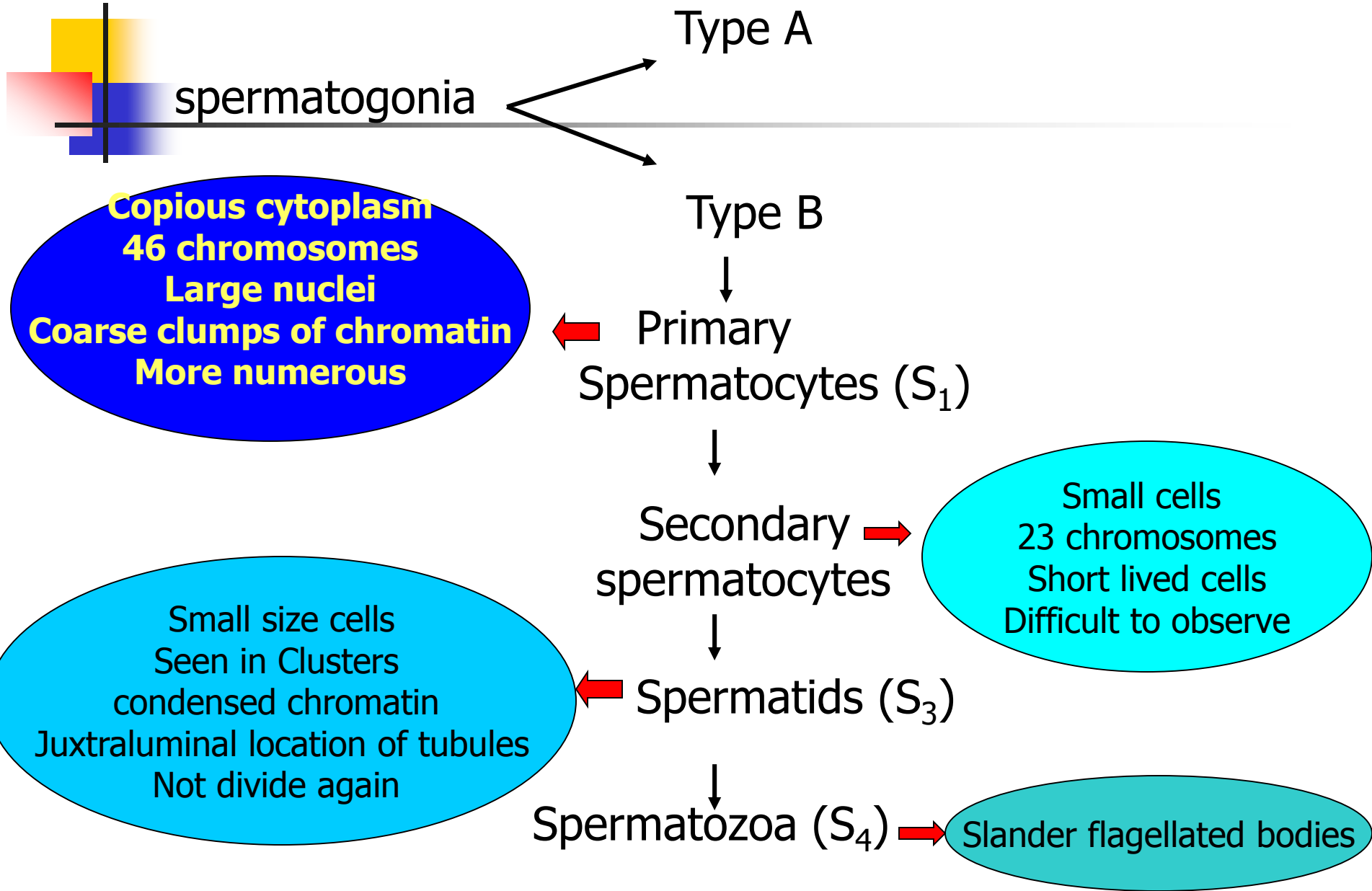
- Small round central nucleus
- **Dispersed chromatin**
- no nuclear vacuole
- Poorly stained cytoplasm

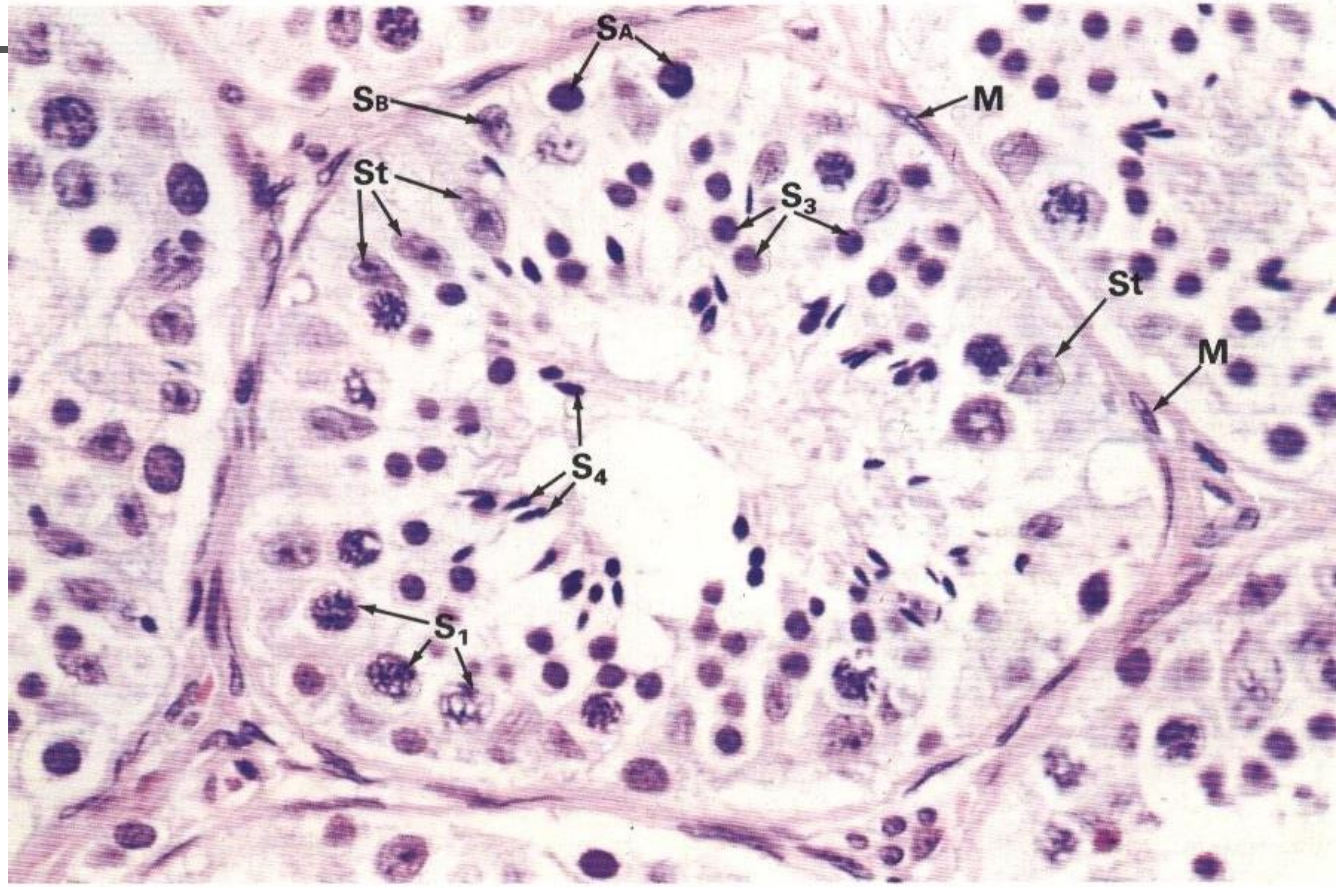
- *At sexual maturity- spermatogonia divide by mitosis produce successive generations of cells.*
- ***Type A- differentiate to Type B progenitor cells***

# Seminiferous tubules



# Spermatogenesis

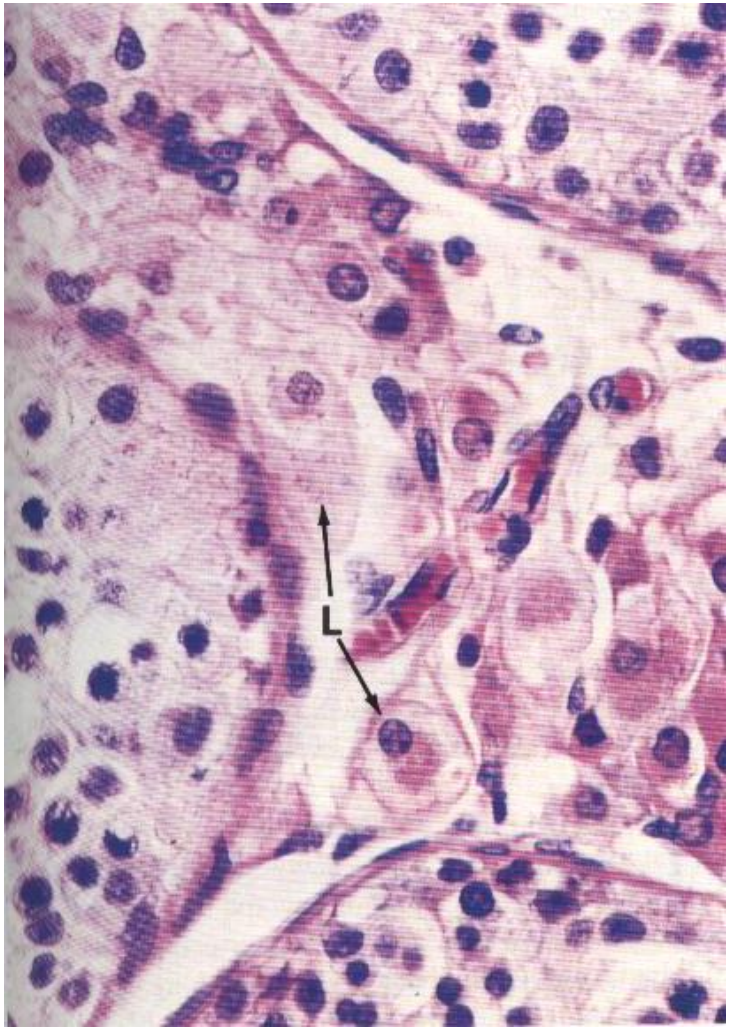




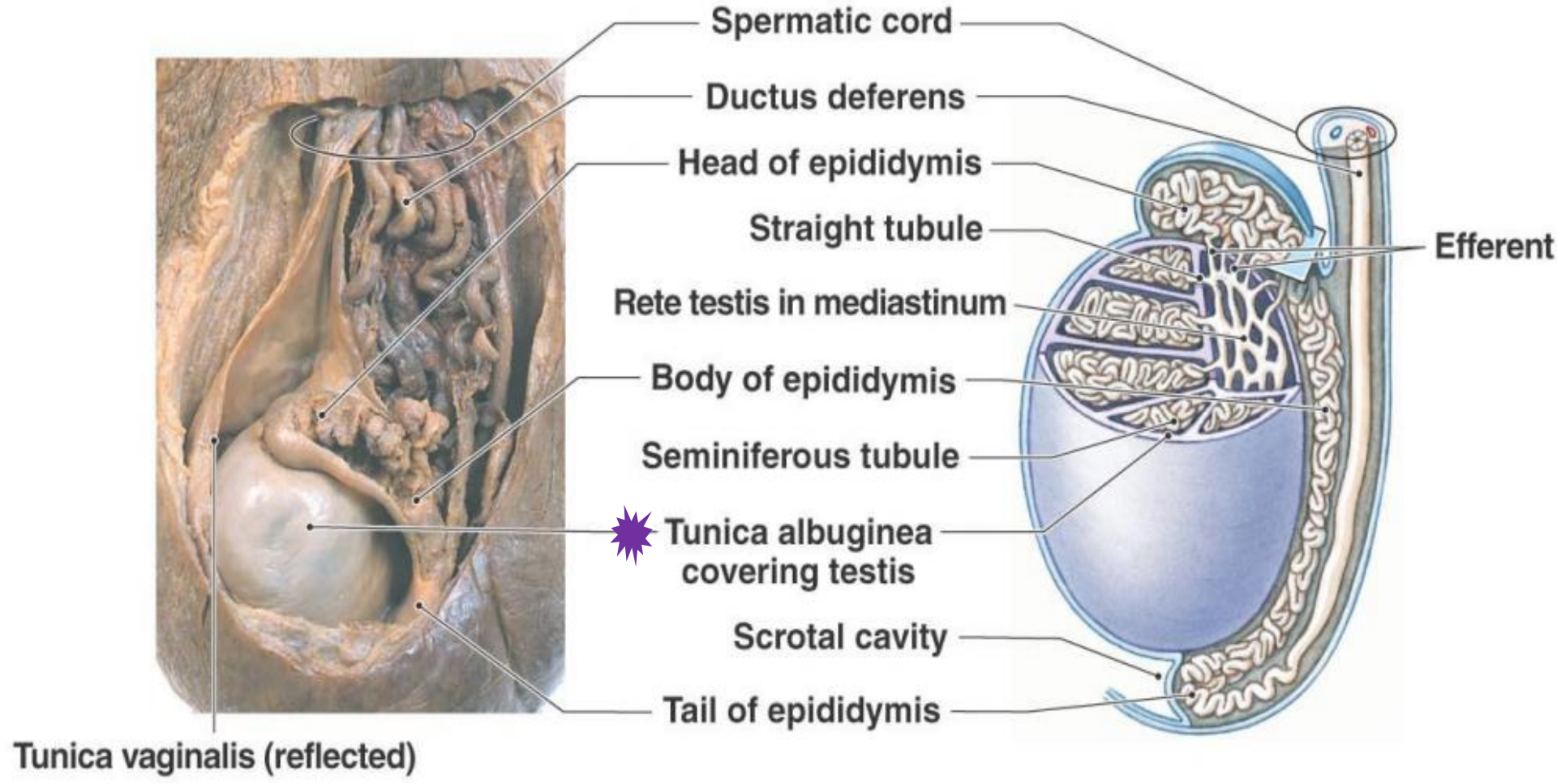

# Seminiferous tubules

# Interstitial / Leydig cells

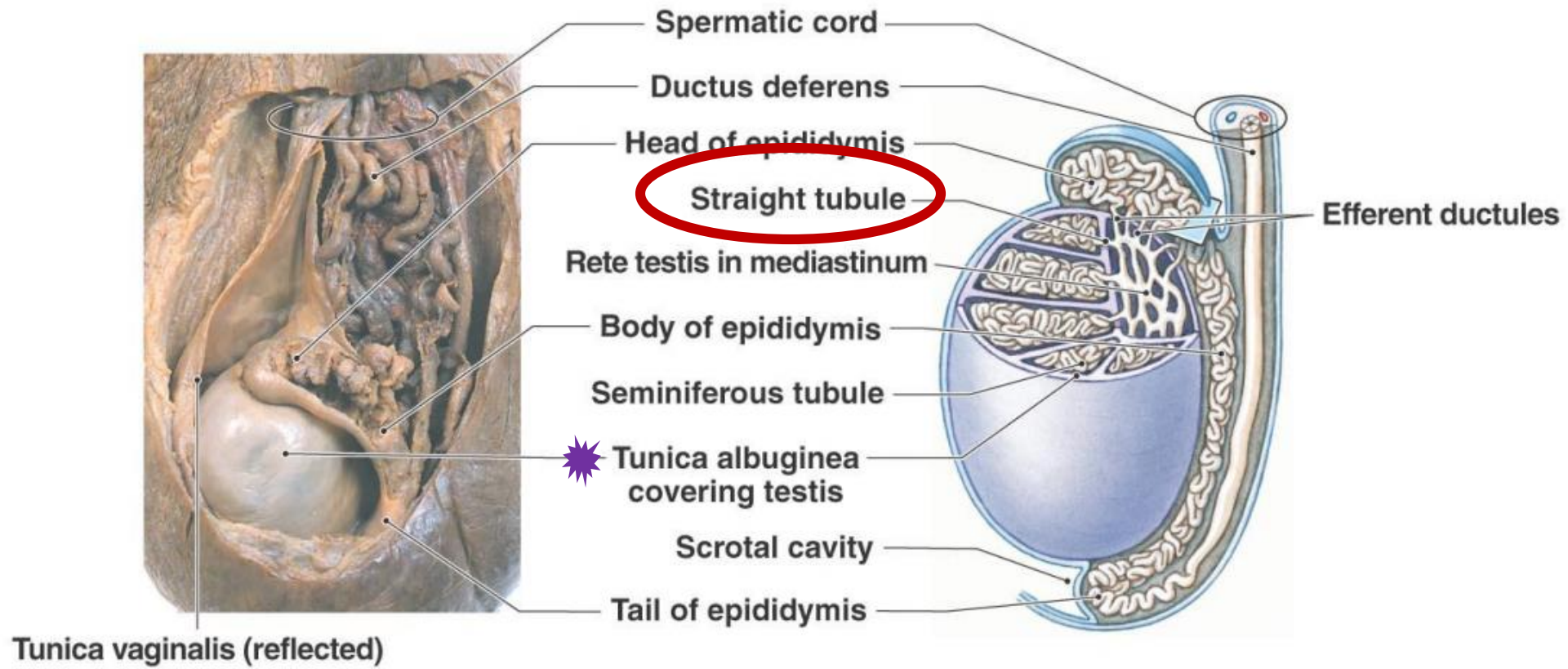
- Synthesise testosterone
- Principal cells in interstitial tissue
- Single / clumps
- Large, ovoid polygonal shape
- Large rounded/spherical nucleus
- Acidiphilic cytoplasm
- Rich in lipid droplets
- Blood vv & lymph



# Testis & epididymis



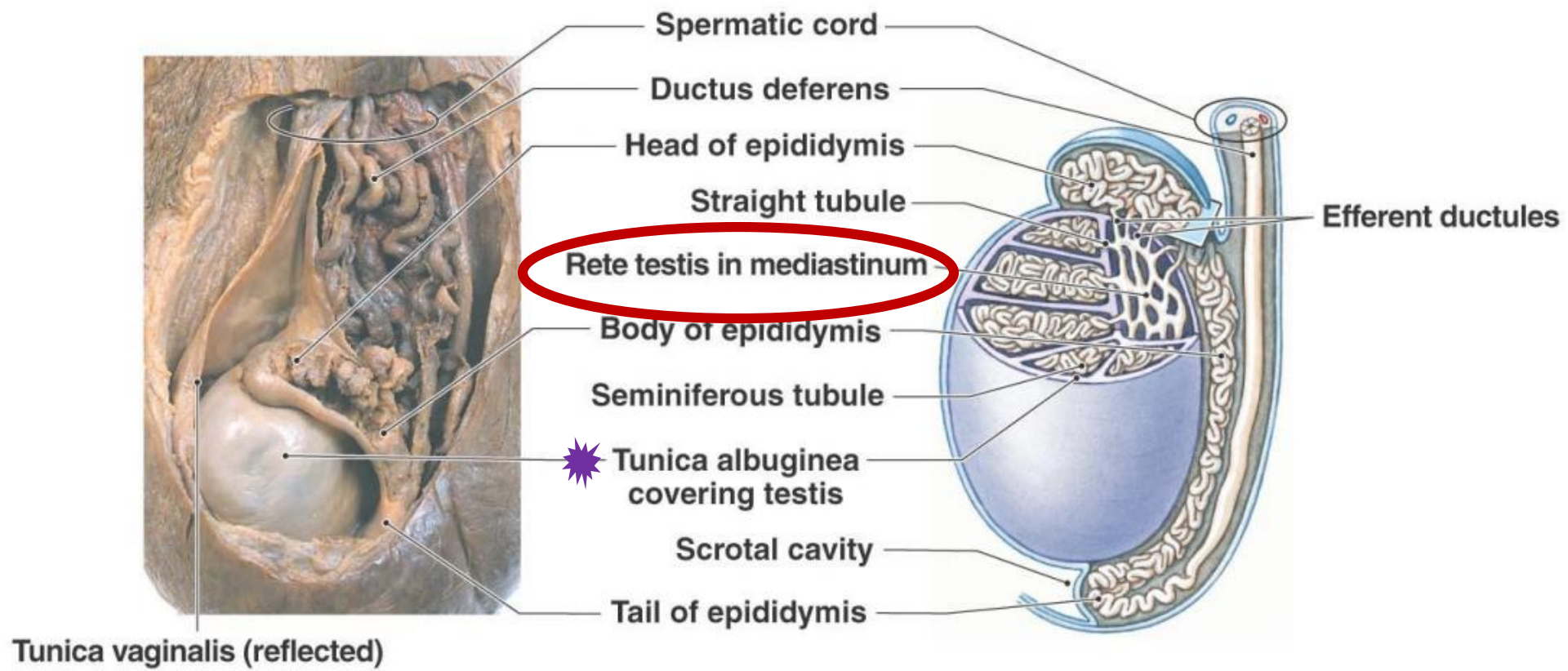
# Straight tubules



# Straight tubules

- Convoluted tubule ⟶ straight tubule
- Cuboidal / columnar epithelium
- No definite basement membrane
- Germinal cells do not reached the straight tubule

# Rate testis


Spermatic cord
Ductus deferens
Head of epididymis
Straight tubule
Rete testis in mediastinum
Body of epididymis
Seminiferous tubule
Tunica albuginea covering testis
Scrotal cavity
Tail of epididymis
Efferent ductules
Tunica vaginalis (reflected)

# Rate testis

Straight tubules/ Tubuli recti

↓

Irregular network

of tubule

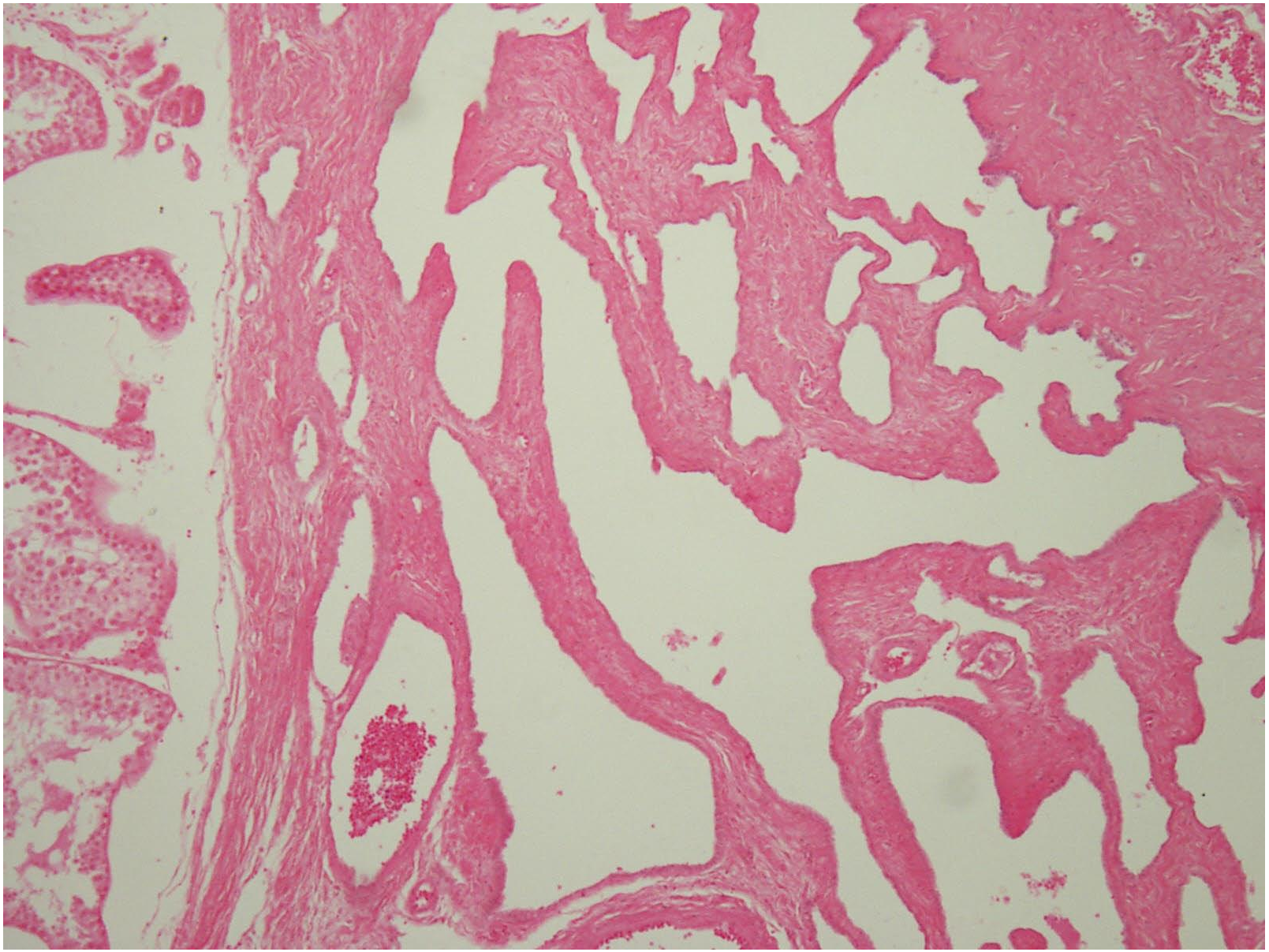
Rate testis

↓

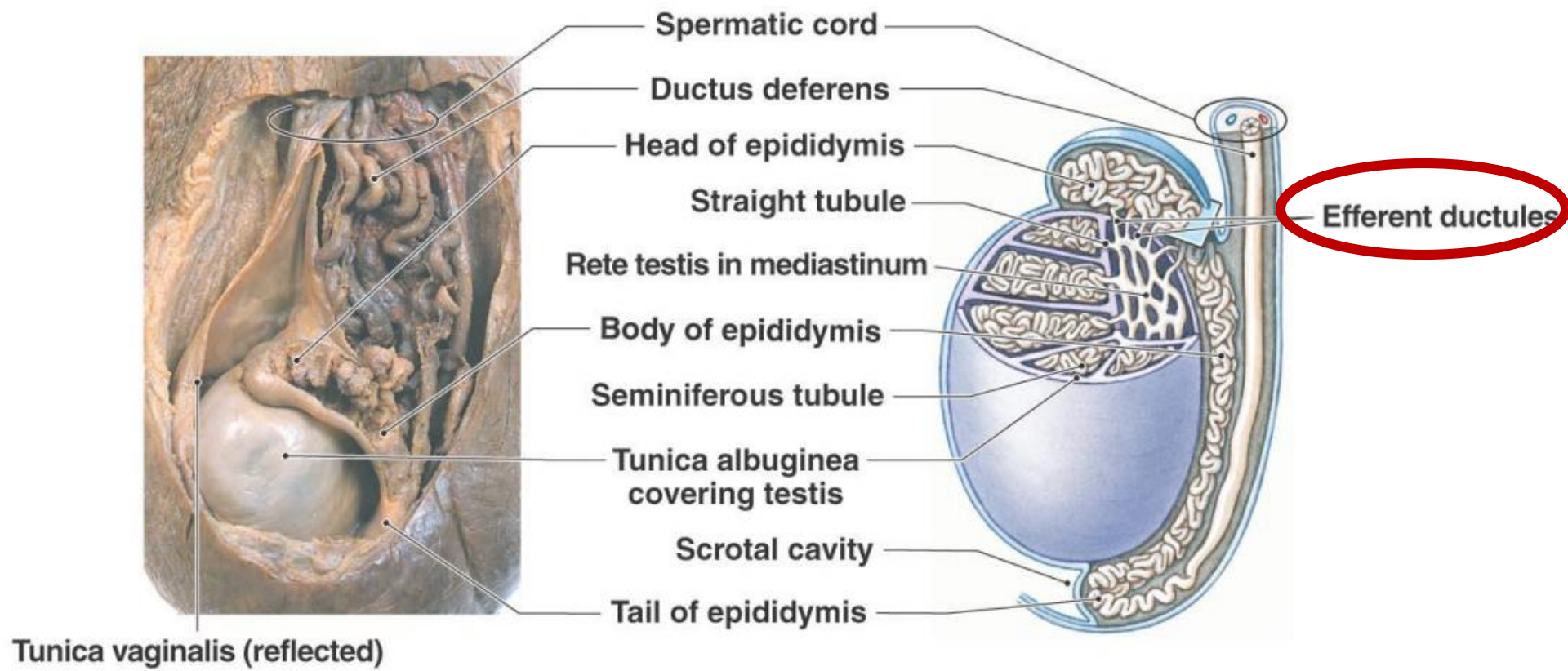
(in mediastinum testis)

- Simple cuboidal epithelium

# Rate testis



# Testis & epididymis

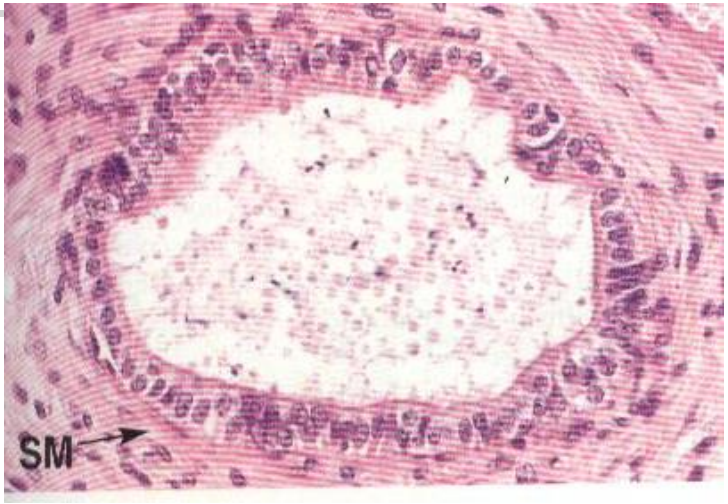


# Ductuli efferentes

Rate testis → **10/20 efferent ductules**

↓

*head of epididymis*




Single layer of epithelial cells

* scalloped appearance

* tall columnar & ciliated cells *(Cilia beat towards the ductus epididymis*

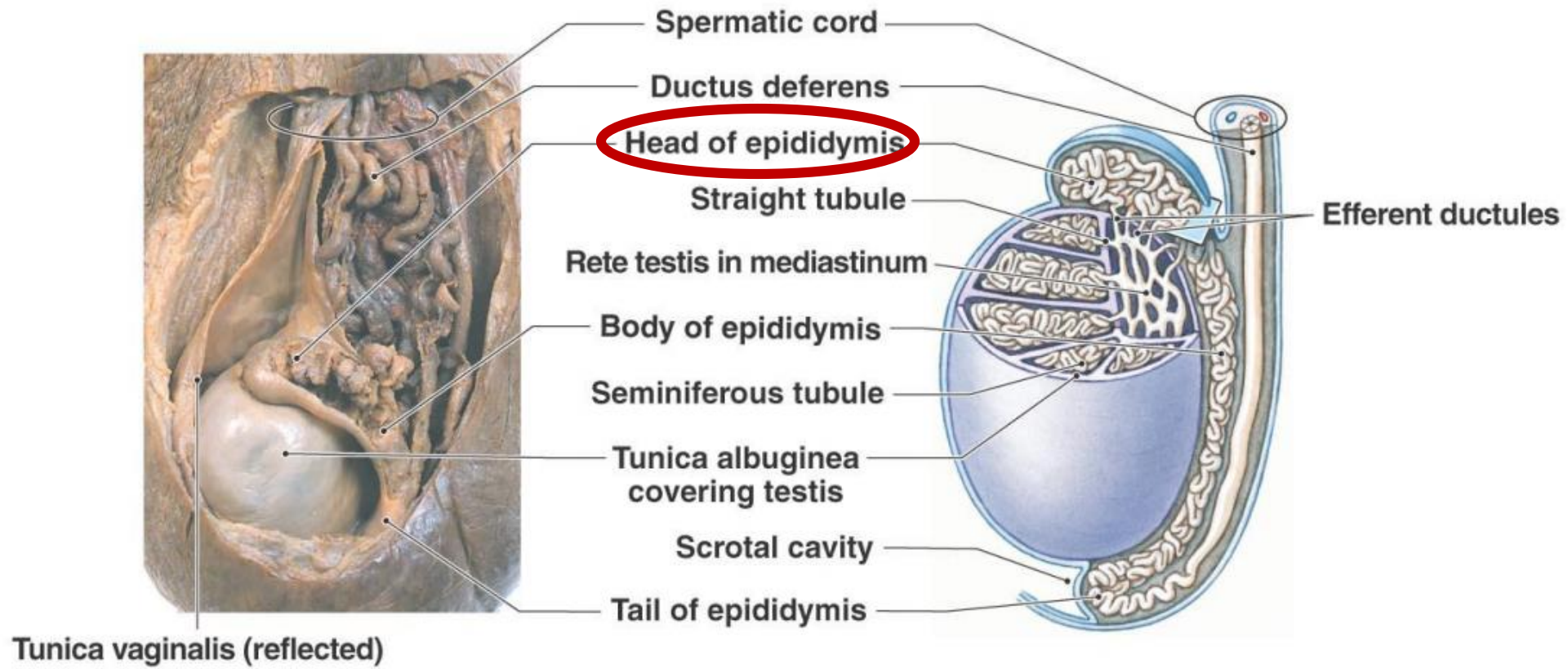
* short cuboidal & nonciliated cells

- smooth muscle

# Ductuli efferentes

- Non ciliated cells absorb the fluid secreted by the seminiferous tubule
- Activity of the ciliated cells and fluid absorption create a fluid flow that sweep spermatozoa towards the epididymis
- A thin layer of circularly arranged smooth muscles outside the basal lamina
- Ductuli fuse to form the ductus epididymis

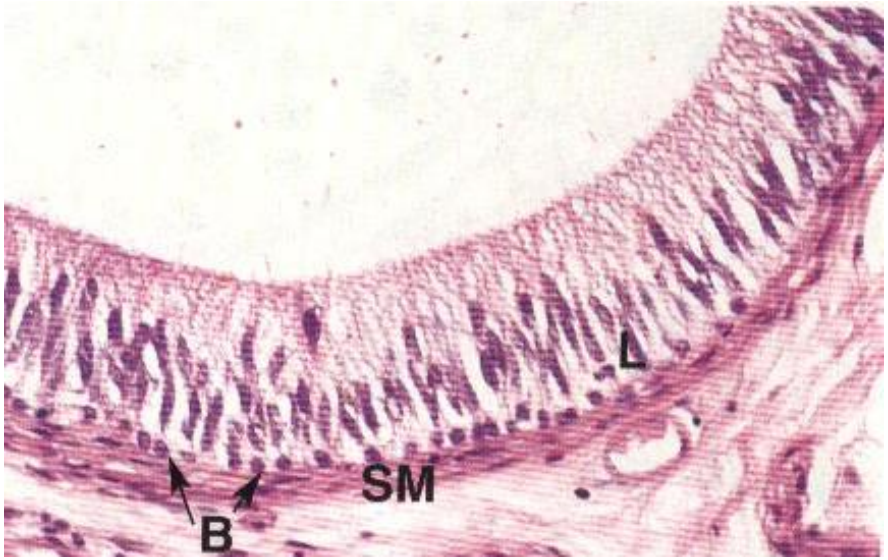
# Testis & epididymis



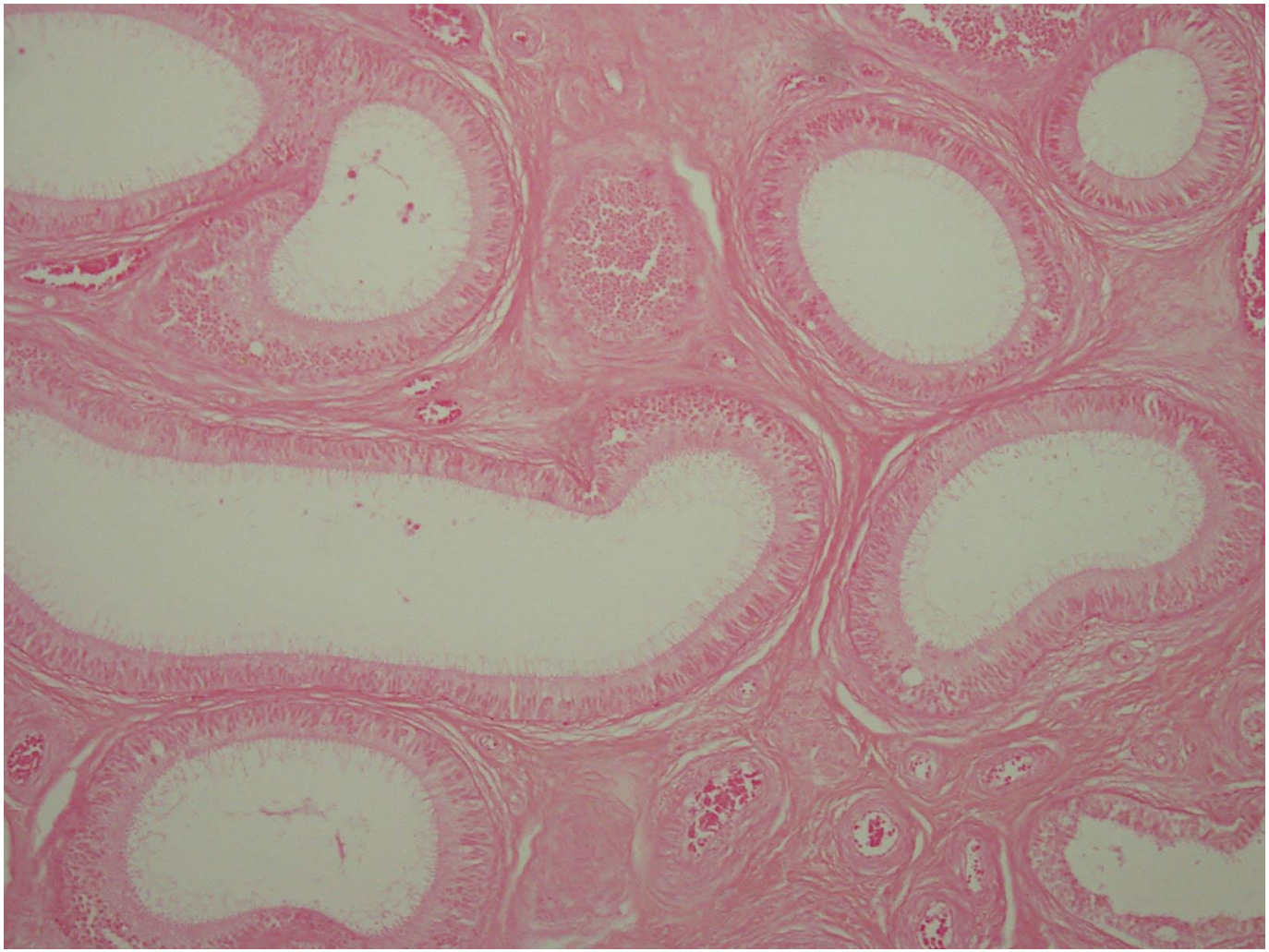
# Ductus epididymis

- Single, long extremely convoluted duct } Ductus epididymus
- Extending down the posterior aspect of testis
- Head, body, tail
- Pseudostratified columnar epithelium with stereocilia
- Stereocilia- lack microtubular arrangement of cilia
- Modified microvilli grater length and branching
- Cells are supported by basal lamina surrounded by smooth muscles which has peristaltic contractions help to move the sperms along the duct

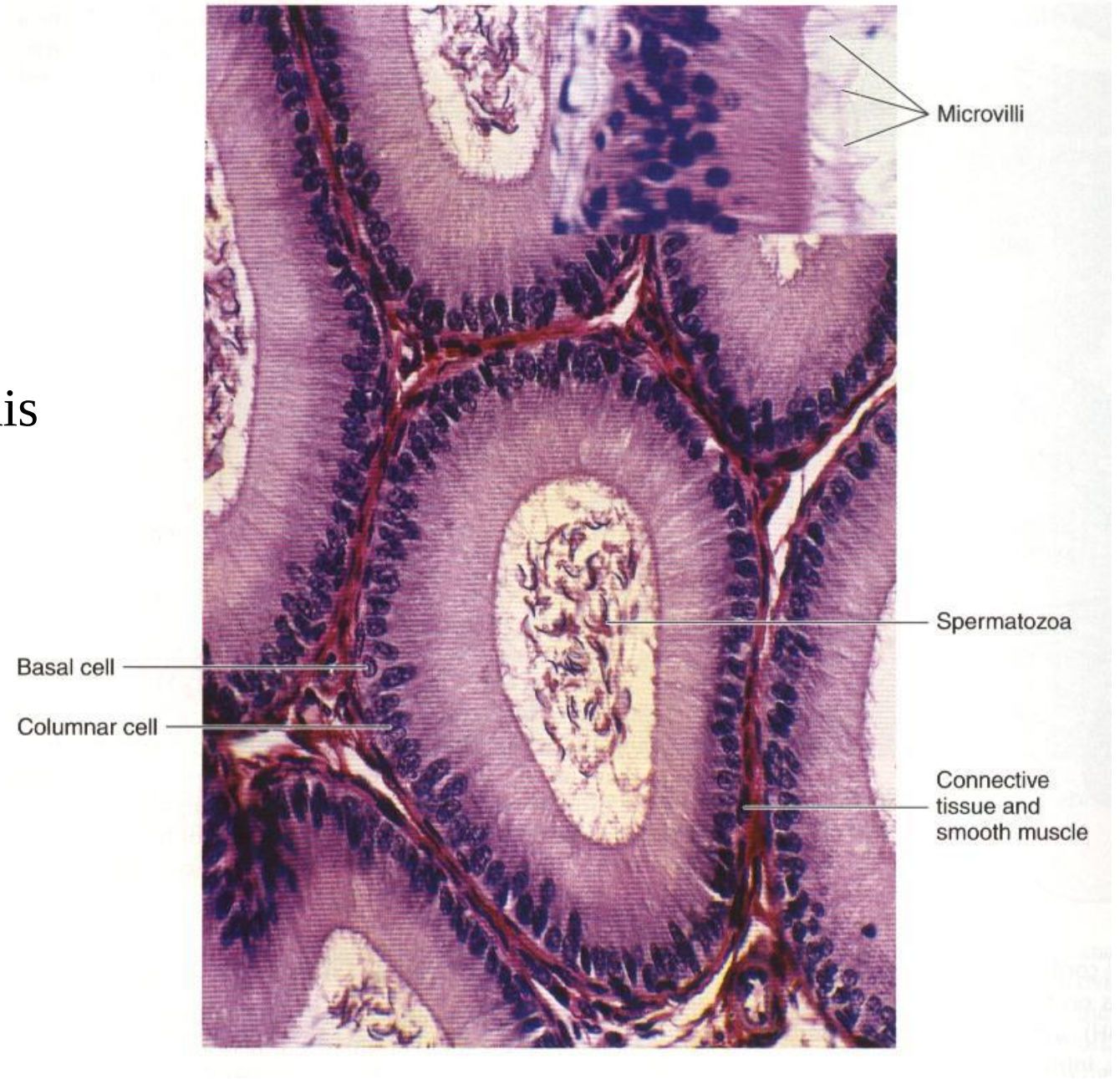
# epididymis

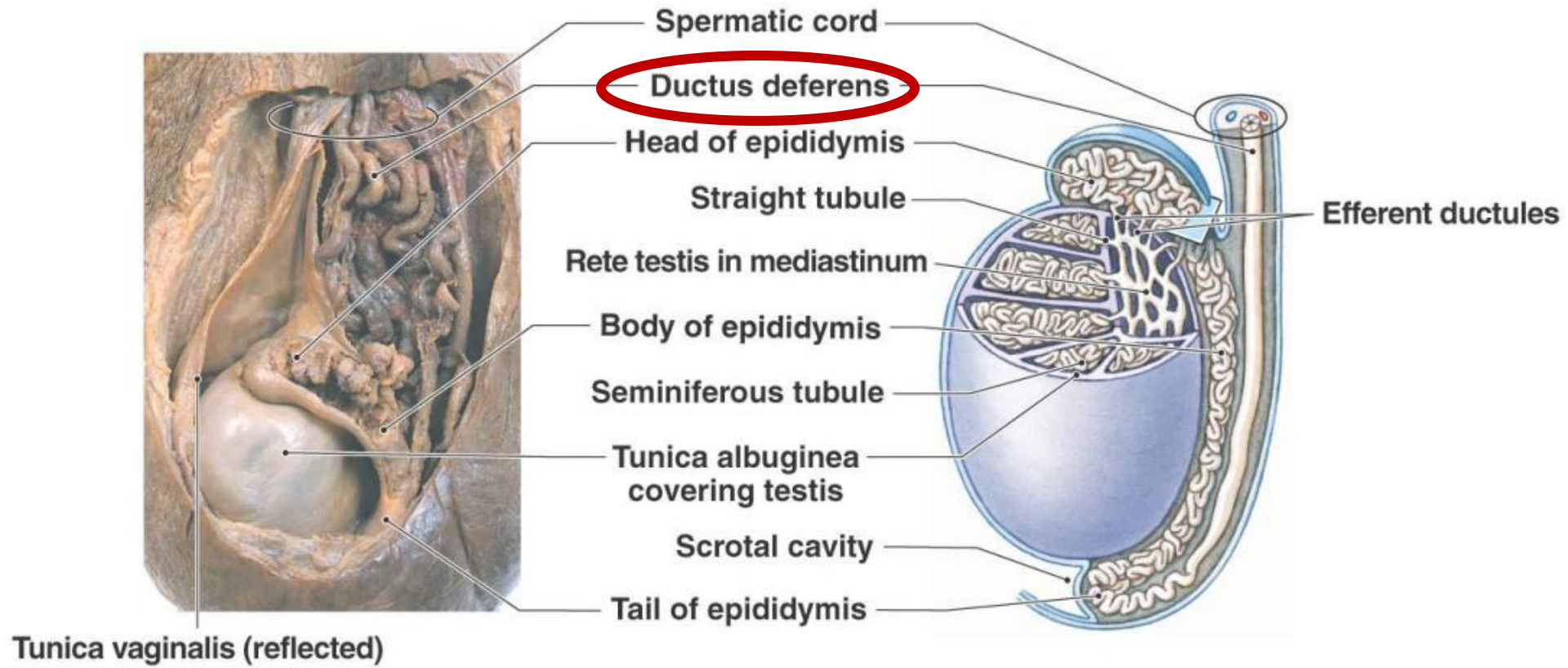
# Epididymis



Highly coiled
ductus epididymis



# Testis & epididymis



# Ductus deference/ vas deferens

- Thick walled muscular tube
- Continuation of ductus epididymus & part of the spermatic cord
- Conduct spermatozoa from

  epididymis ⟶ urethra

# Vas deferens

***** Wall made up of 3 layers**

- *Mucous layer*

  thrown into longitudinal folds → **Expansion of duct : ejaculation**

  - pseudostratified columnar epithelium with stereocillia
  - Lamina propria (elastic fibres+ C.T. + bld vv )
- *Muscular layer*
  - Inner & outer longitudinal layers, middle circular layer (strong peristaltic contractions – ejaculation)
- *Advenitial layer*
  - Loose fibrous connective tissue / blood vv / nerves

# vas deferens

Near prostate vas shows slight dilatation

↓

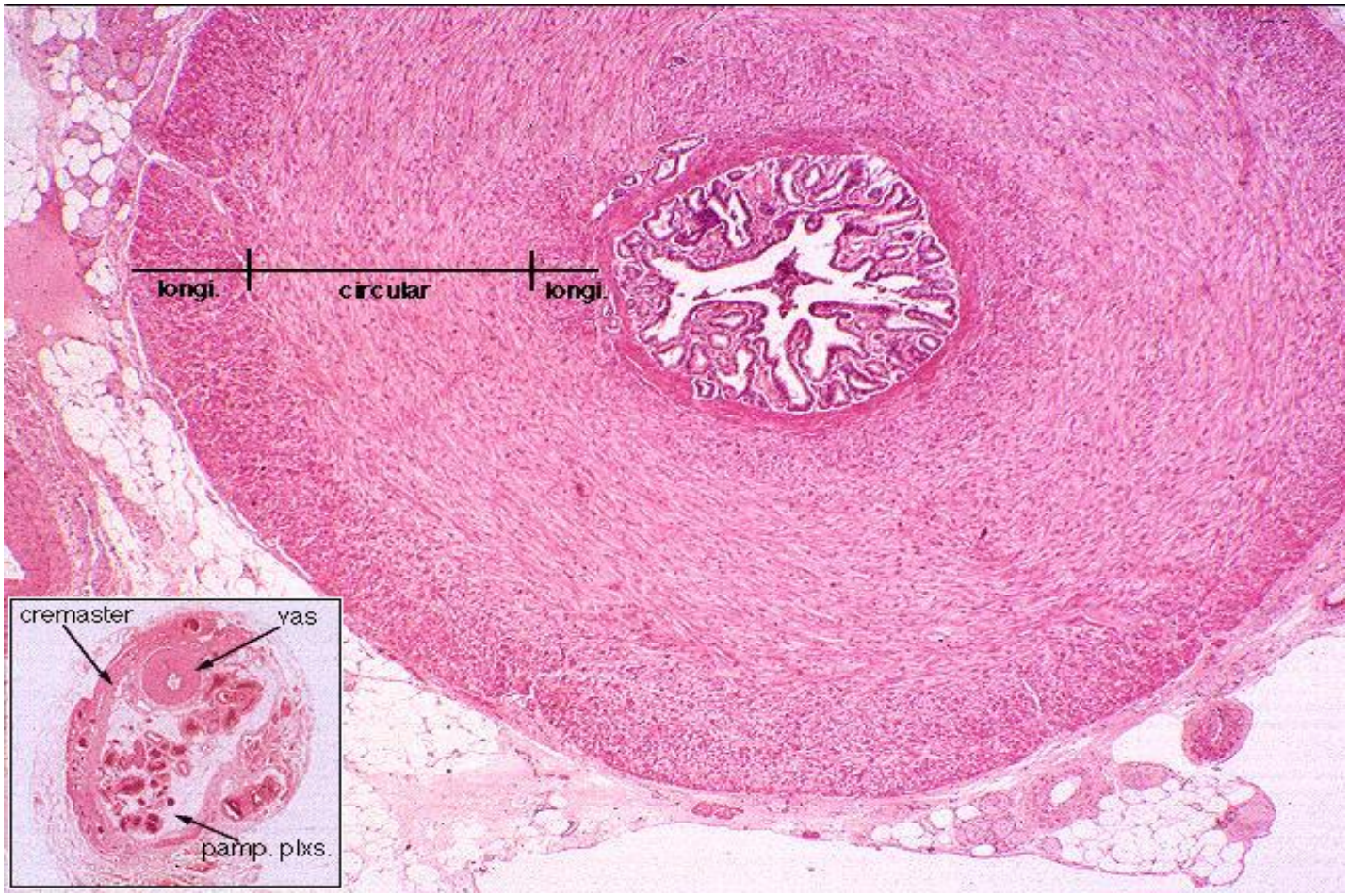
Ampulla

↑

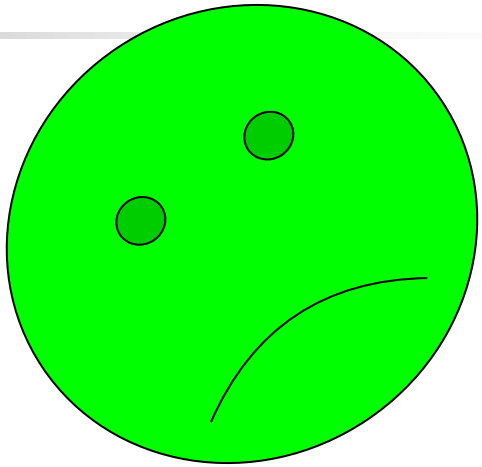
epithelium becomes thick and extensively folded

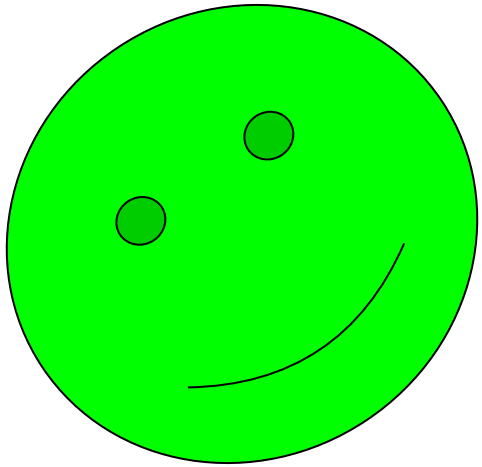
- ***Final portion of the duct joins with the seminal vesicle enters the prostate as an ejaculatory duct to enter the urethra***

# vas deferens

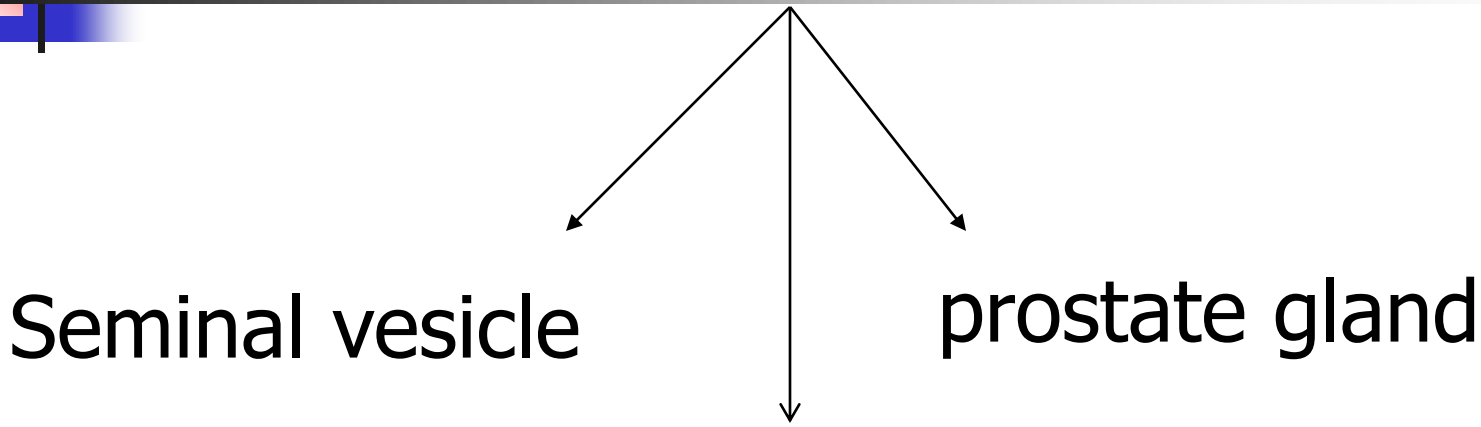


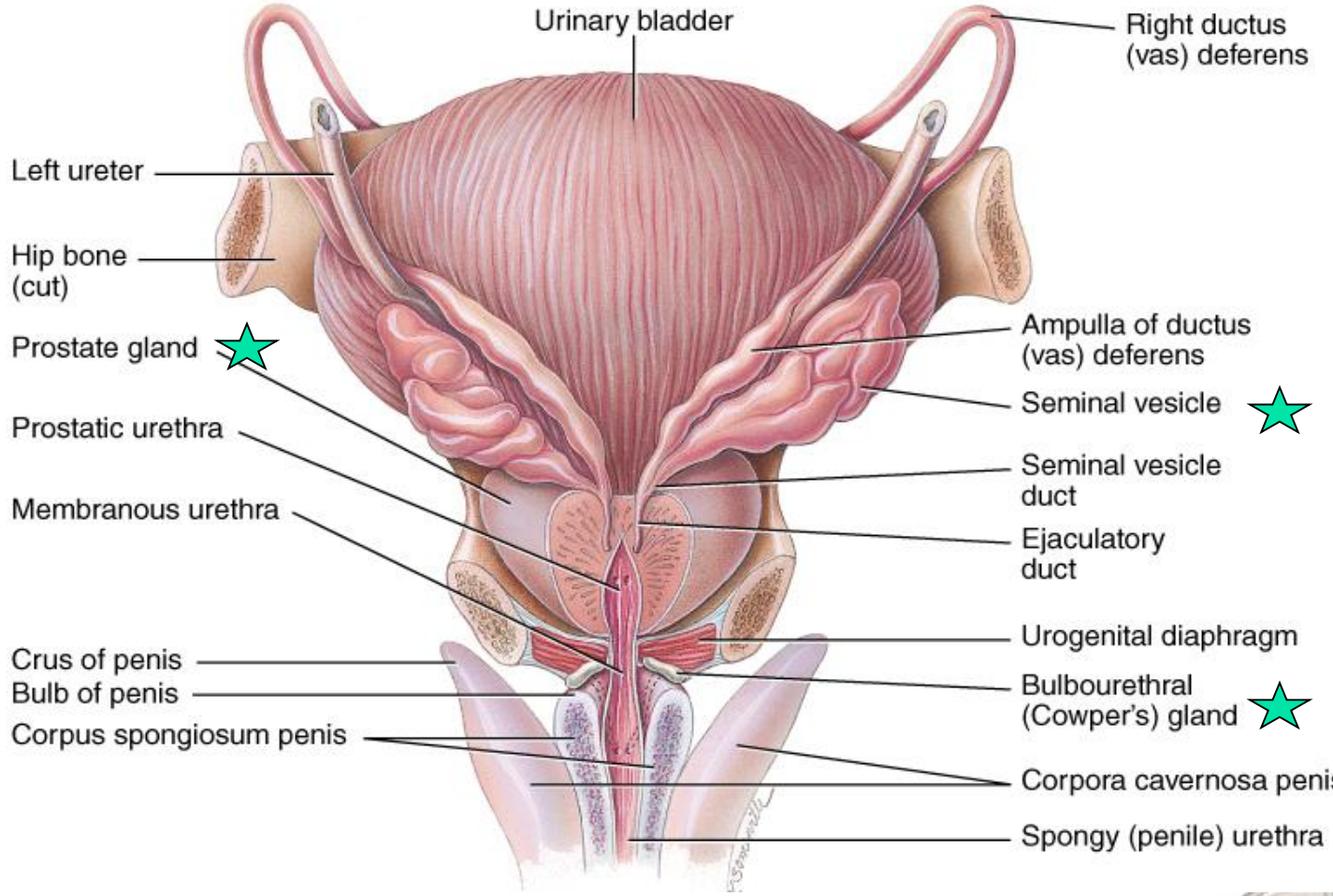
Are you awake ???

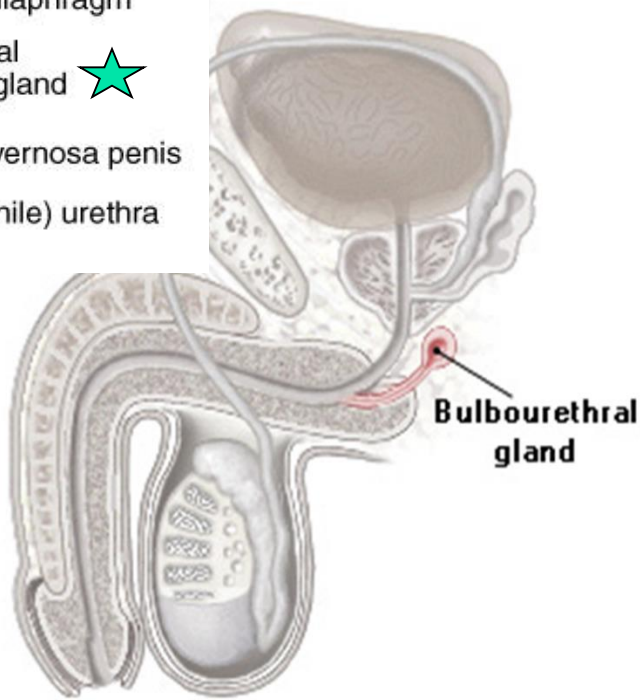




# Accessory genital glands




Urinary bladder
Right ductus (vas) deferens
Left ureter
Hip bone (cut)
Prostate gland
Ampulla of ductus (vas) deferens
Seminal vesicle
Prostatic urethra
Seminal vesicle duct
Membranous urethra
Ejaculatory duct
Urogenital diaphragm
Crus of penis
Bulb of penis
Bulbourethral (Cowper's) gland
Corpus spongiosum penis
Corpora cavernosa penis
Spongy (penile) urethra


Bulbourethral gland

# Seminal vesicle

- Associated with ductus deferens
- Elongated convoluted sacs
- Each vesicle:  5-7 cm long (uncoiled  about 15 cm)
- Produce secretion: viscid, yellowish
  - Nutritions for spermatozoa
  - Contribute more than ½ of fluid volume of semen
  - spermatozoa  activating substances

    CHO, fibrinogen,, ascorbic acid, postaglandins ,
    Fructose  - provide energy for sperm motility

# Seminal vesicle – 3 layers

- *Mucous layer*
  - pseudostratified tall columnar epithelium
    secretory cells: lipid droplets
    Lipofuscin granules
  - Lamina propria

→ Highly Folded

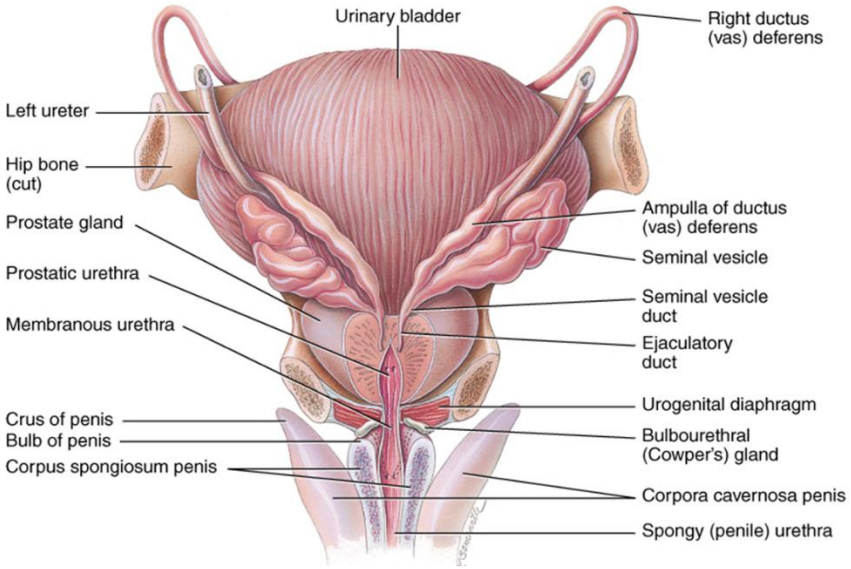
↓

Honeycombed appearance

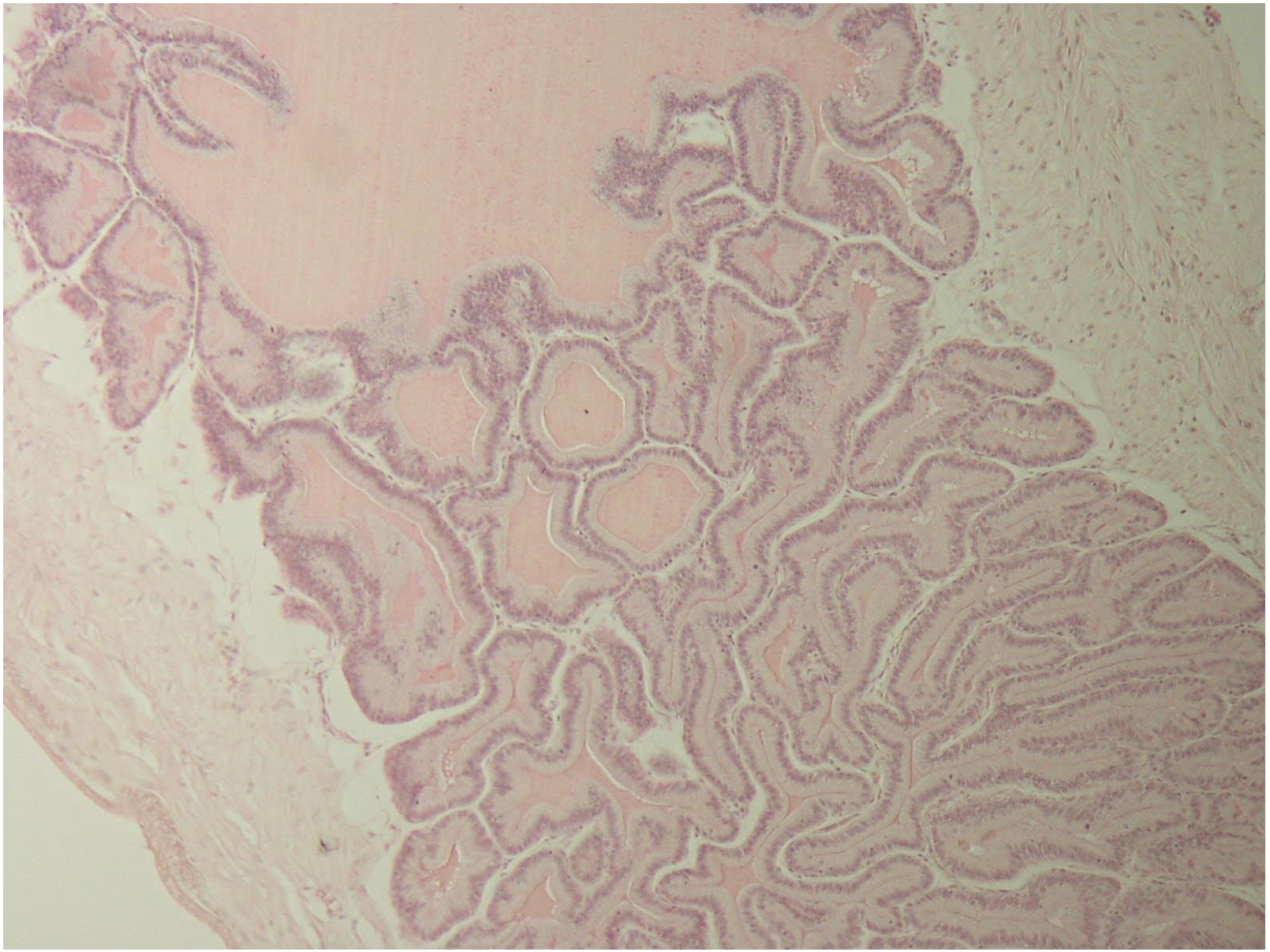
- *Muscular layer*
  - Inner circular layer
  - Outer longitudinal layer

- *A*reolar connective tissue
  - Elastic fibres


# Seminal vesicle

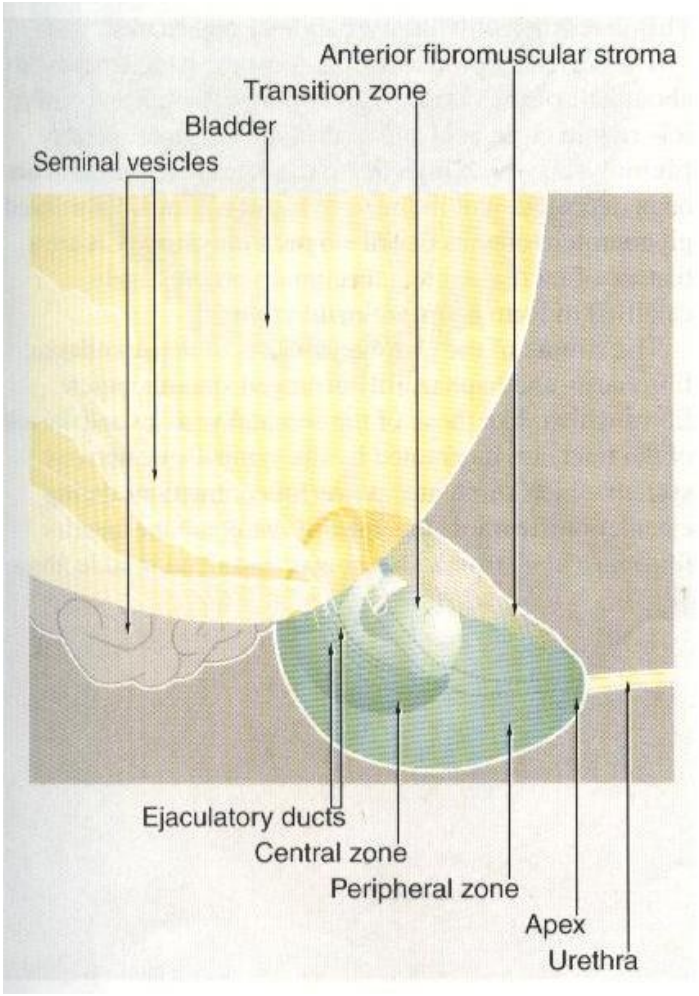


# Seminal vesicle



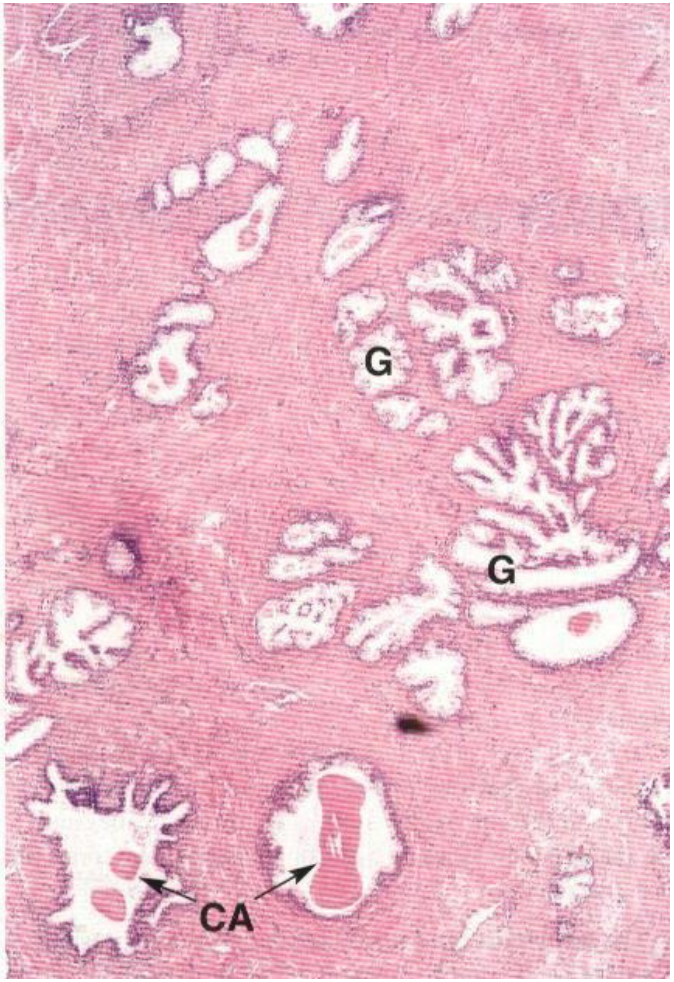
# PROSTATE GLAND

- Inverted cone shaped gland
- Surrounds bladder neck & prostatic urethra
- In the substance of the gland, urethra merges with ejaculatory ducts
- ***Branched tubulo-acinar glands*** embedded in a fibromuscular stroma
- Partial capsule , incomplete septa
- The glands number varies from 30 - 50, ducts converge to form 20 or more terminal ducts open into the prostatic part of the urethra

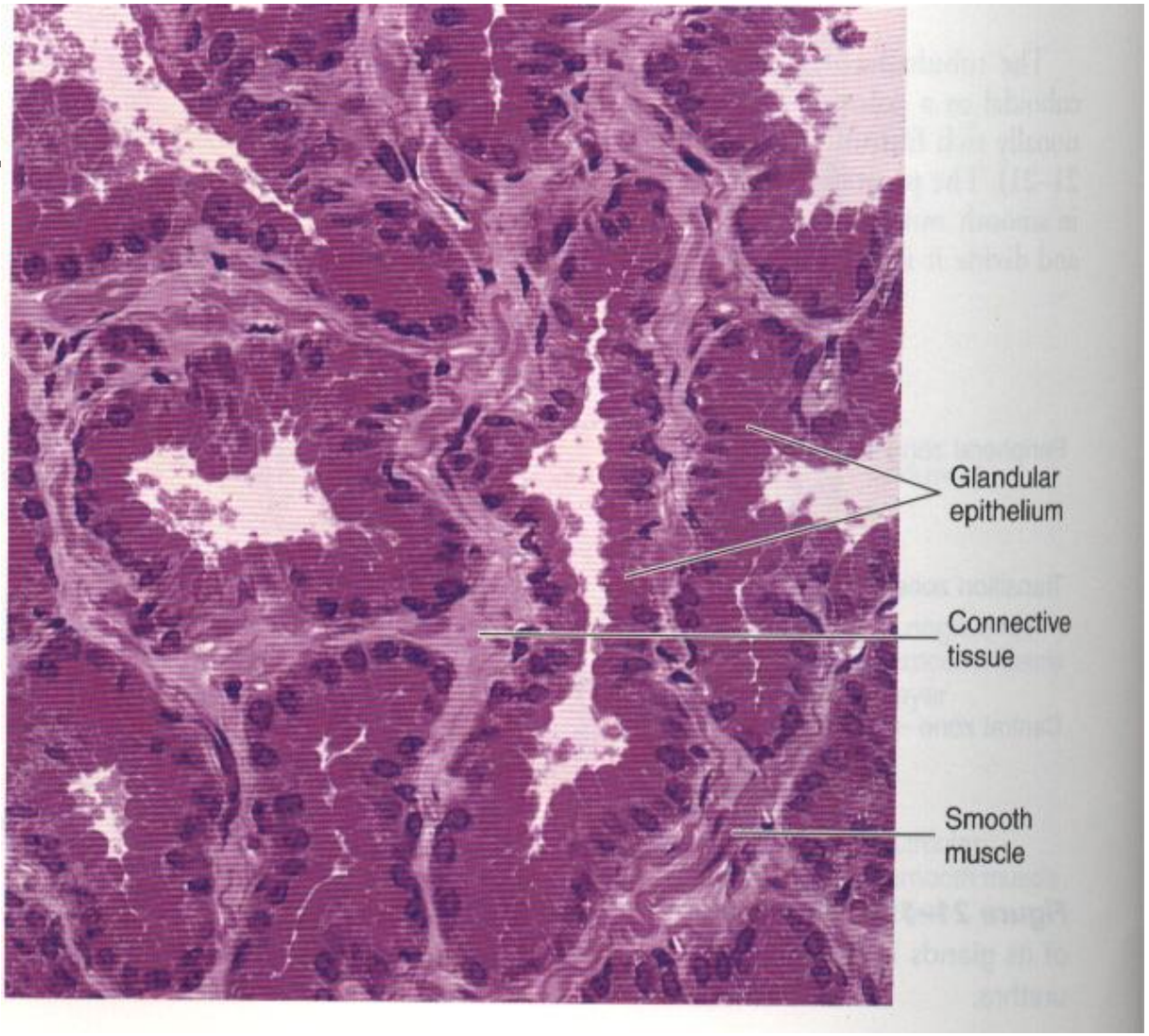


# PROSTATE GLAND

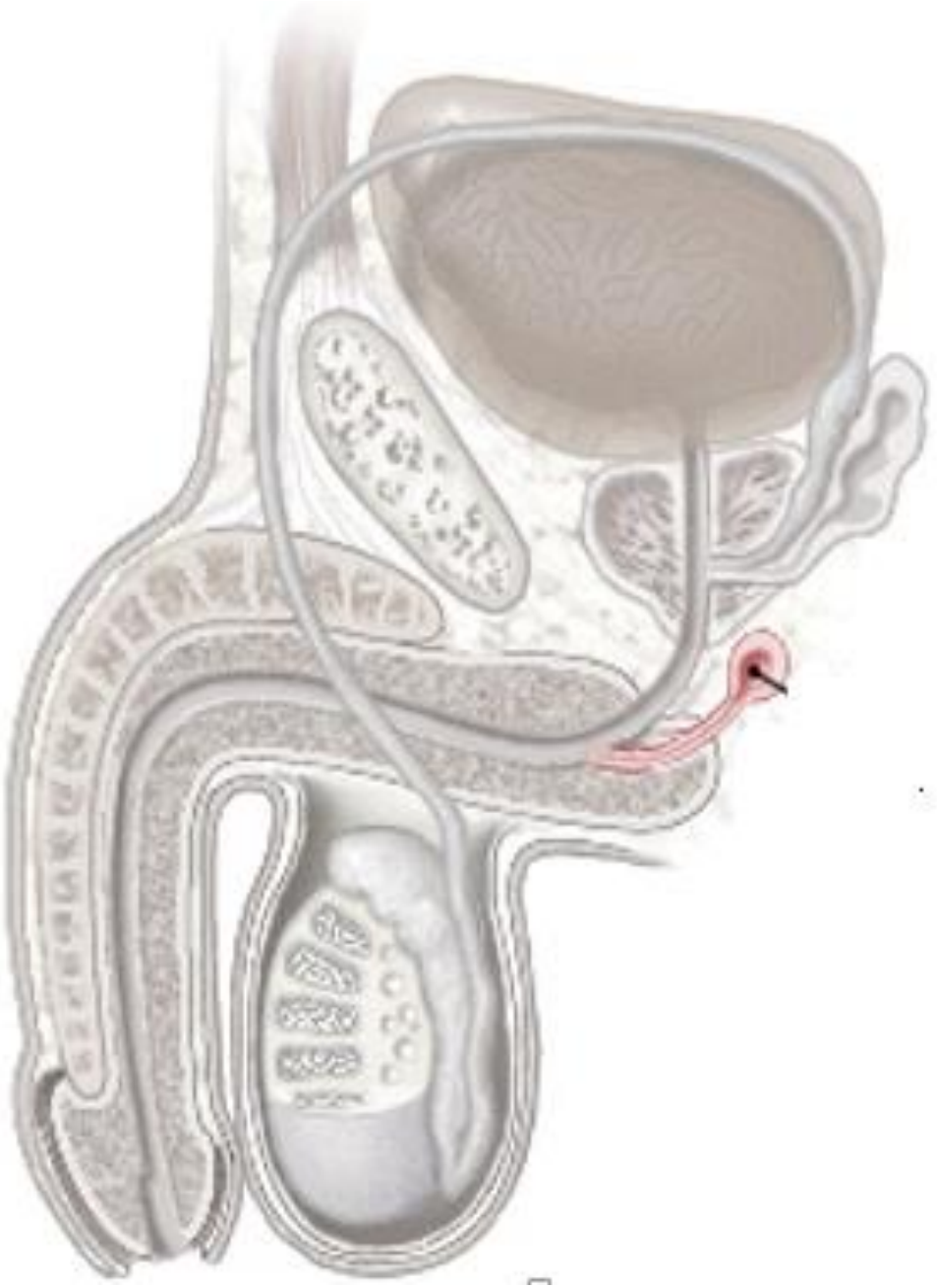
- Branch glands
- Cuboidal or columnar pseudostratified epithelium
- Epithelium folds:
  - allow expansion of glands by secretions
- Secretions-contribute to the seminal fluid : thin & milky
  - Citric acid, hydrolytic enzyme , fibrinolysin



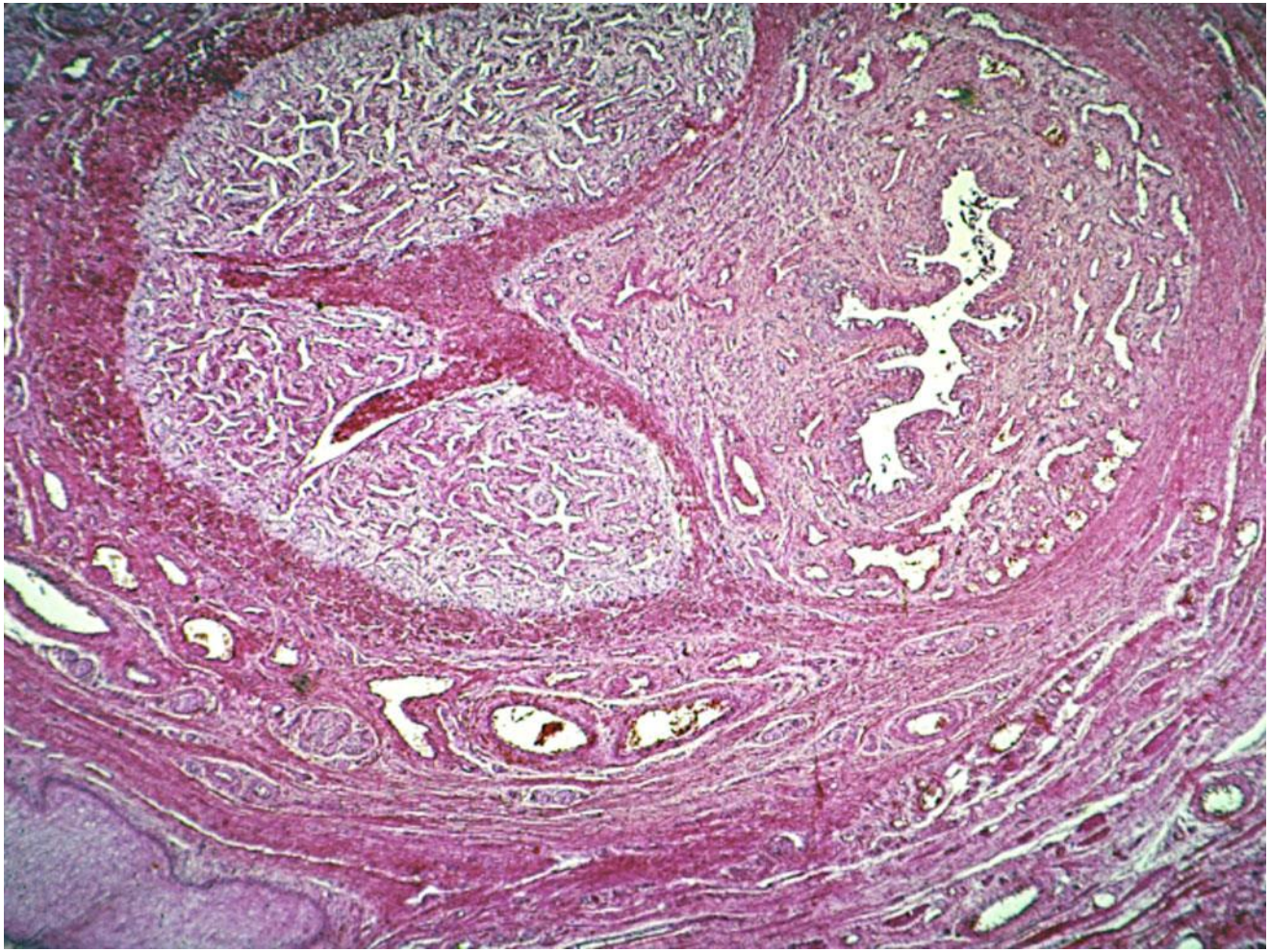
Section of the prostate
With fibromuscular tissue



# Penis



# penis



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Thank you