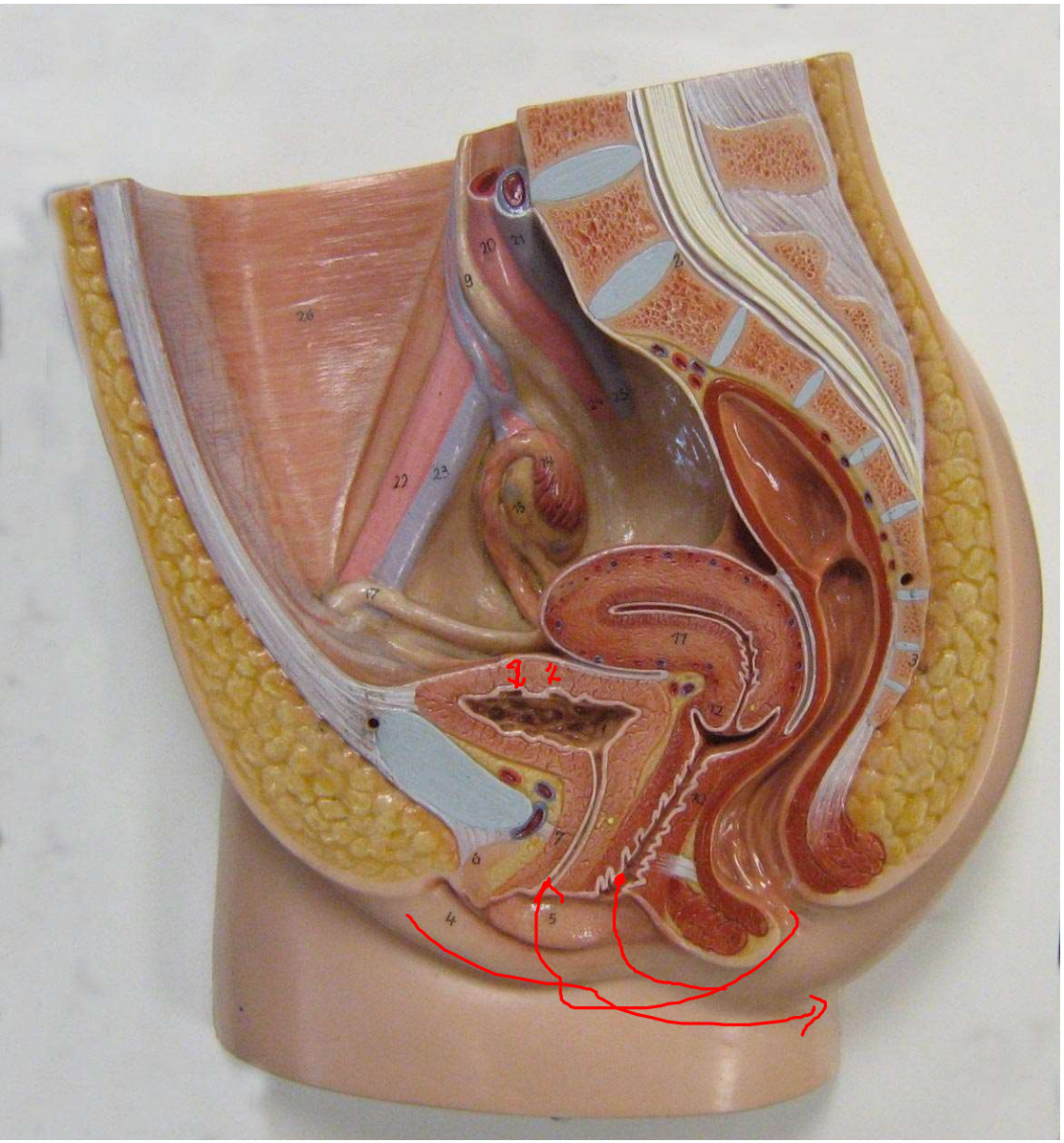
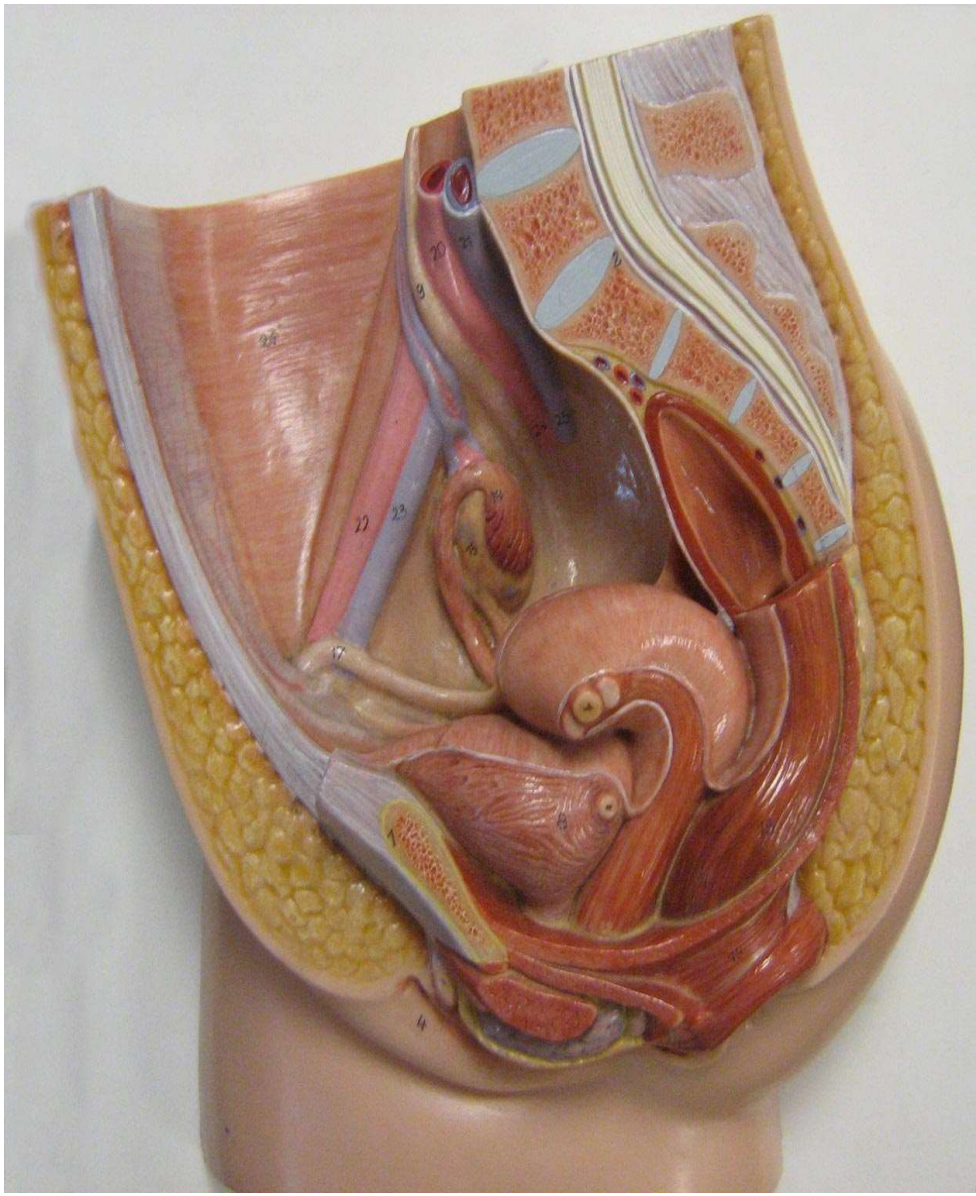
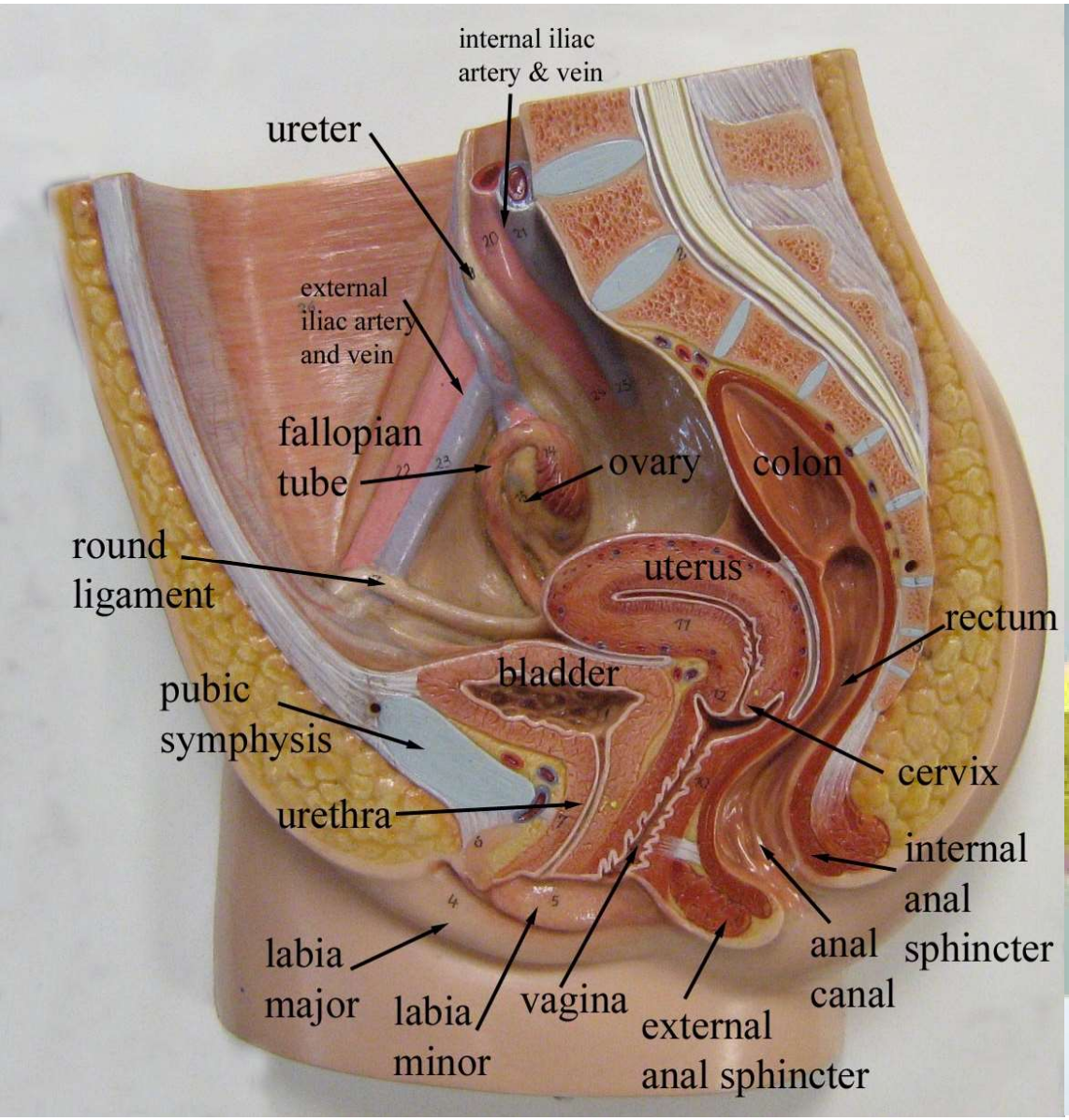
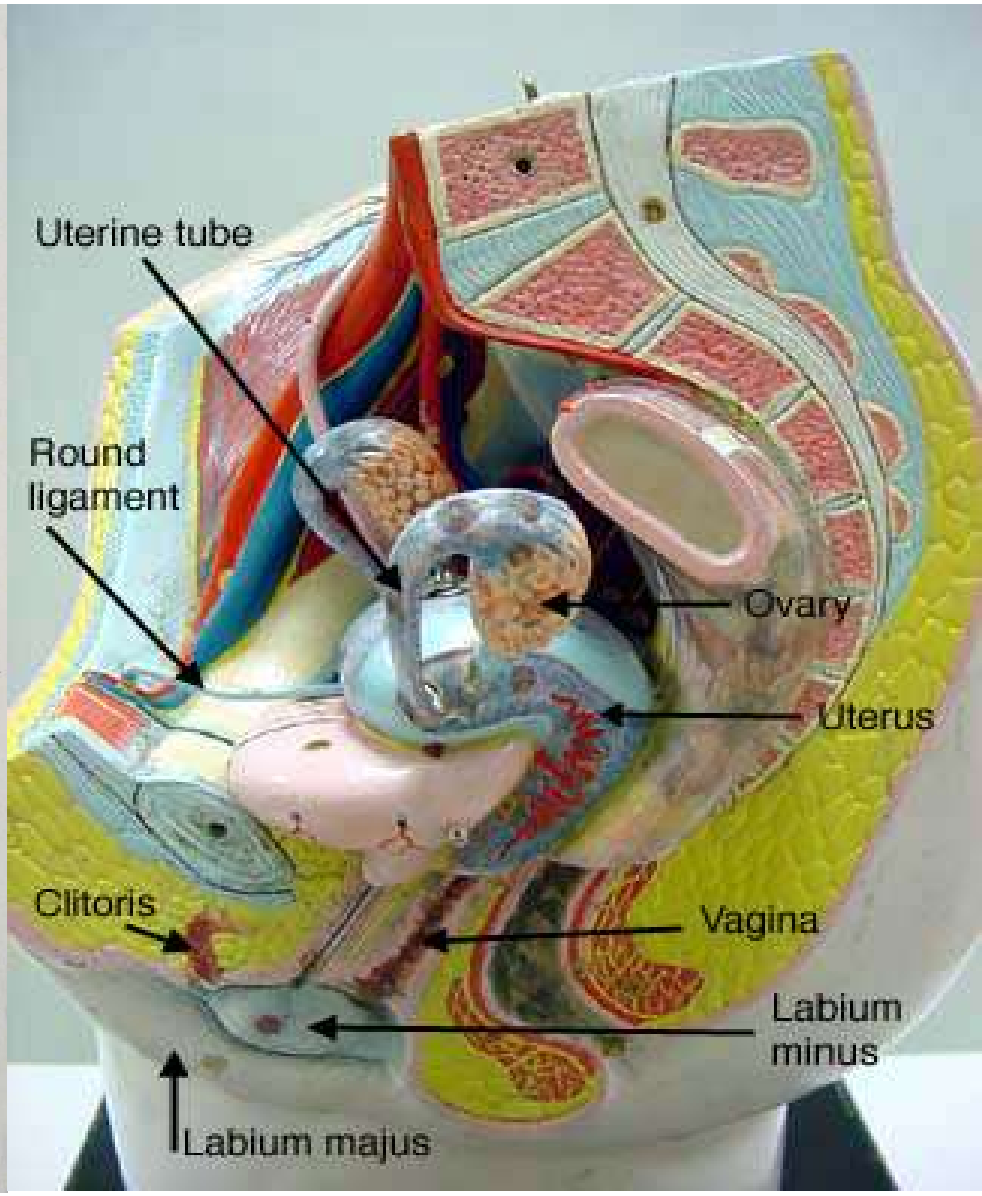
# Female/male reproductive models

Dr H


1
2

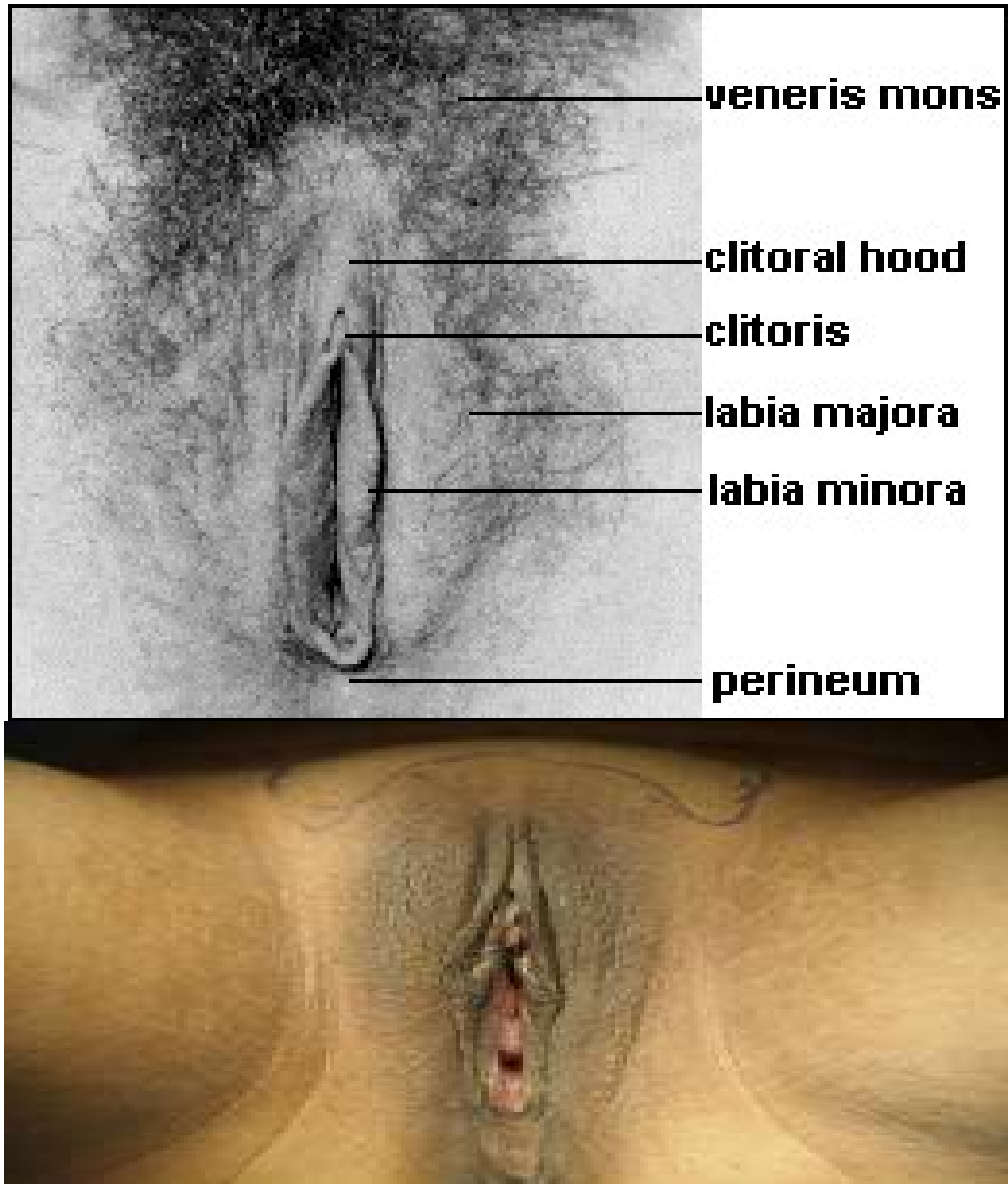


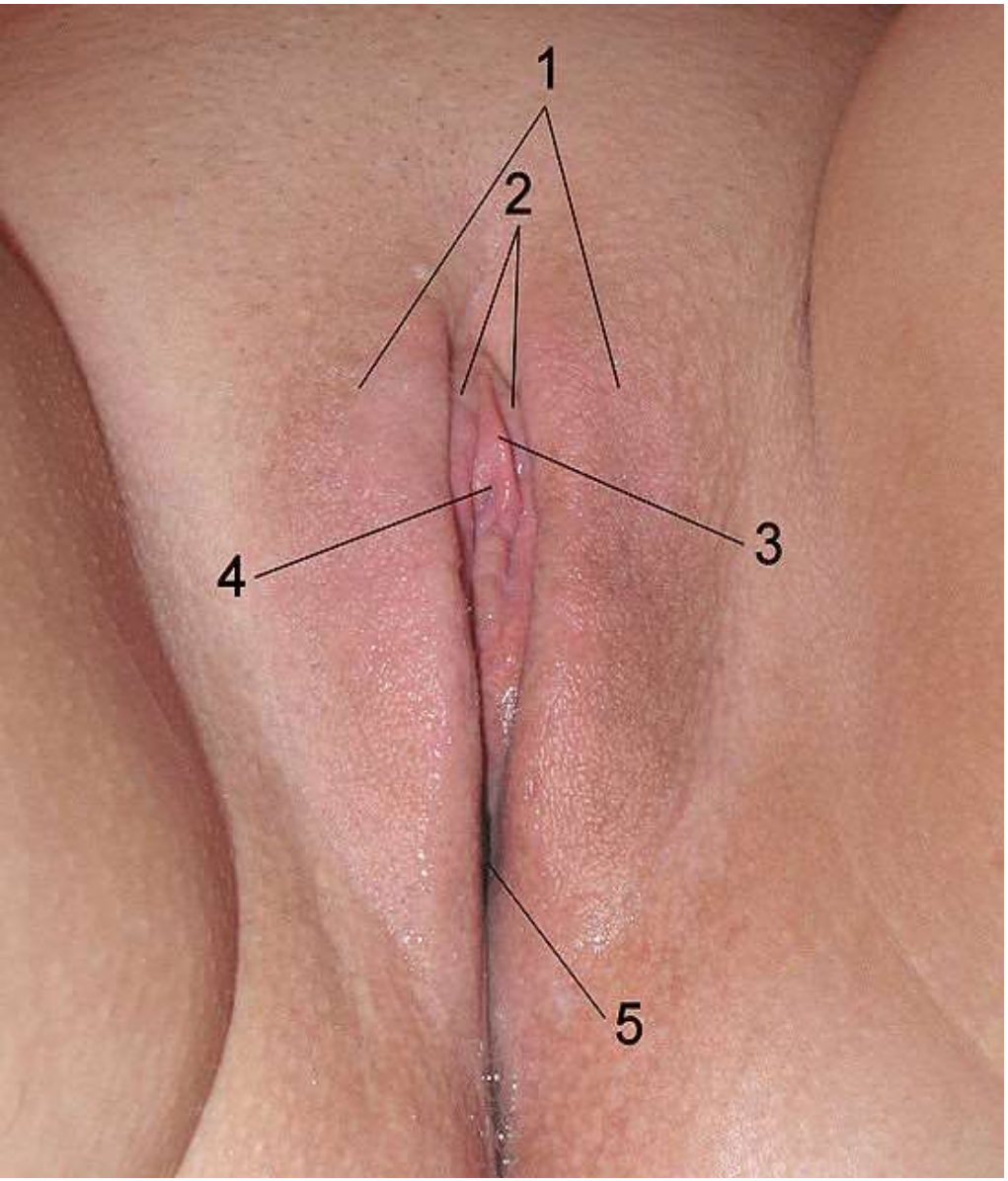

internal iliac
artery & vein
ureter
external
iliac artery
and vein
fallopian
tube
ovary
colon
round
ligament
uterus
rectum
bladder
pubic
symphysis
cervix
urethra
internal
anal
sphincter
anal
canal
labia
major
labia
minor
vagina
external
anal sphincter


Uterine tube
Round
ligament
Ovary
Uterus
Clitoris
Vagina
Labium
minus
Labium majus

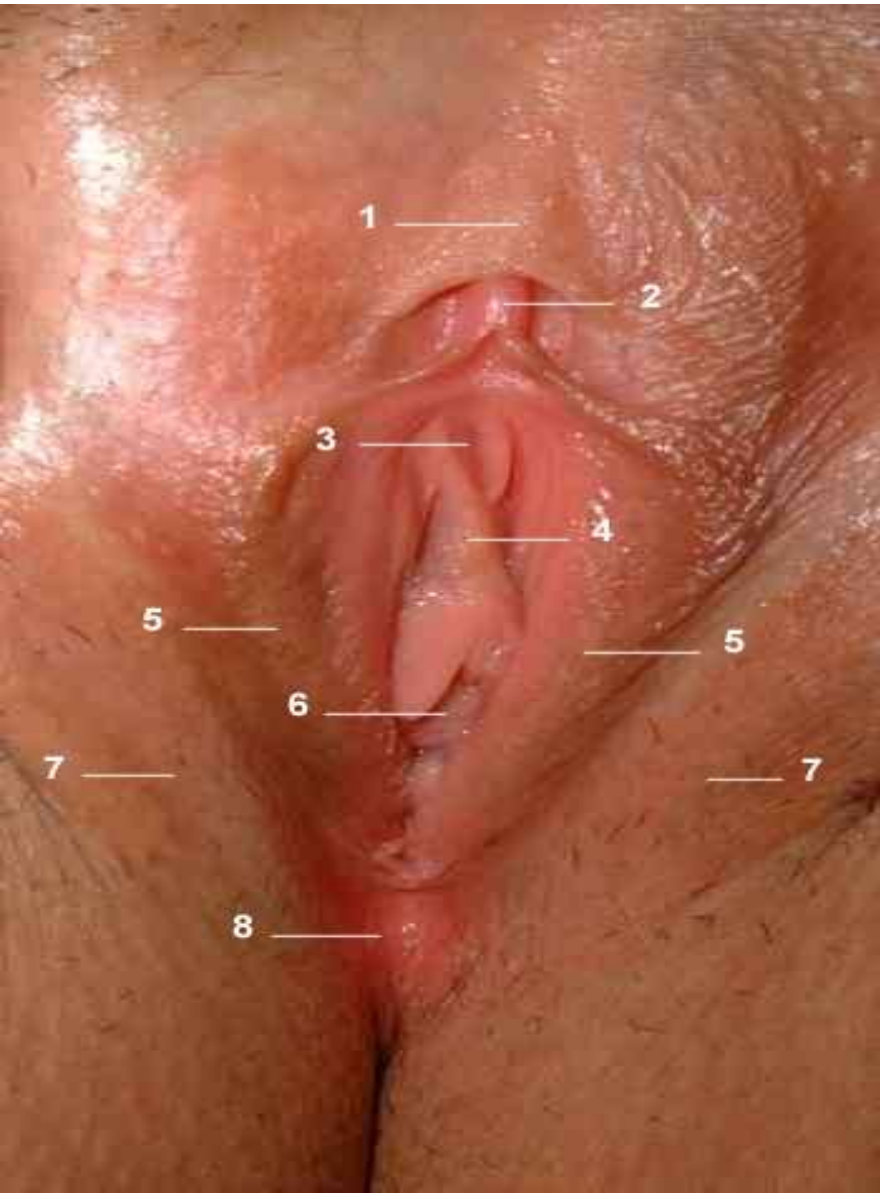
# External genitalia

- Vulva
  - Vestibule
  - Labia minora and majora
  - Paraurethral glands
  - Clitoris
  - Lesser and greater vestibular glands






1. Labia majora
2. Labia minora
3. Clitoral hood (foreskin)
4. Clitoral glans (under the clitoral hood)
5. Vagina


1
2
3
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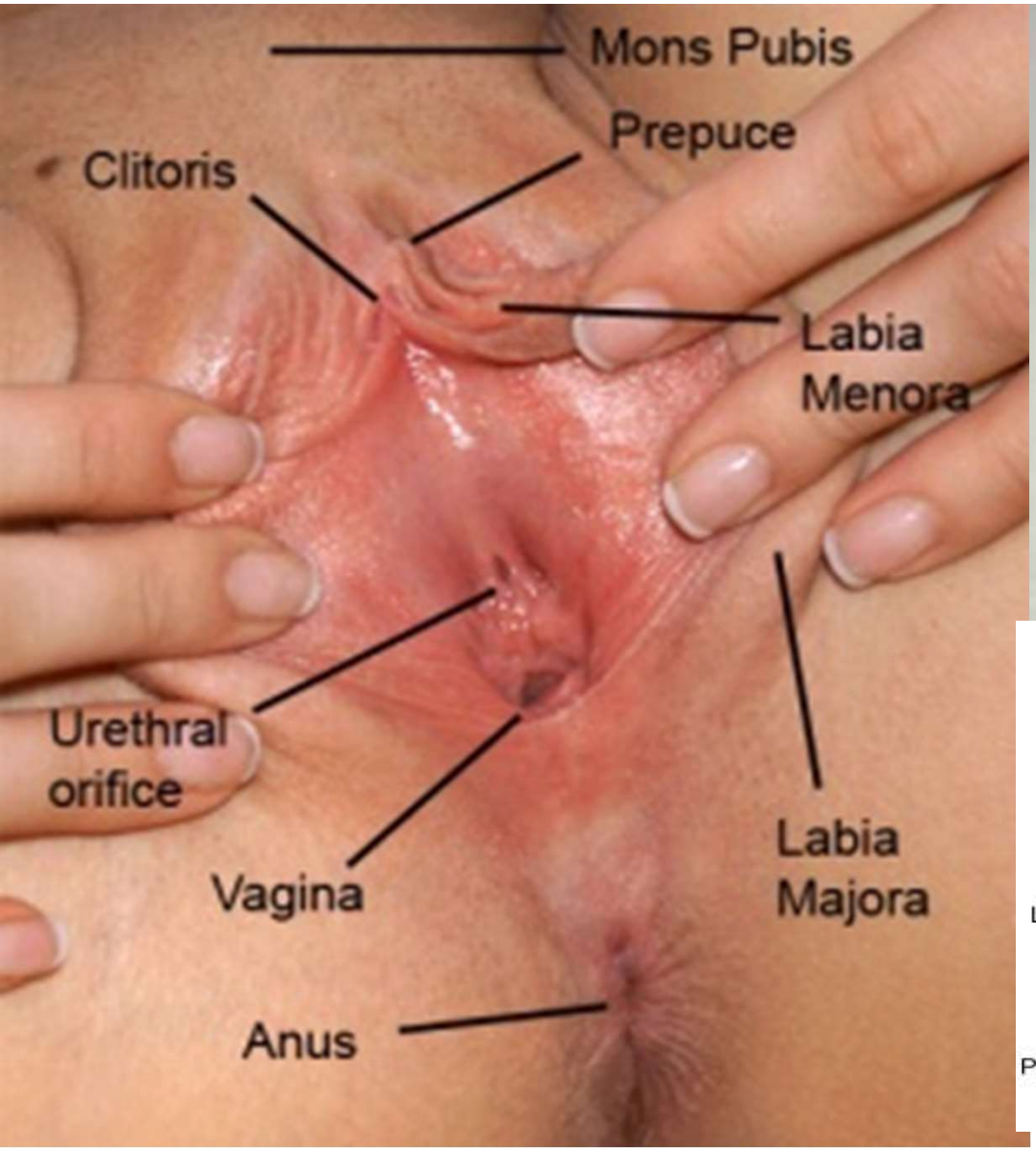
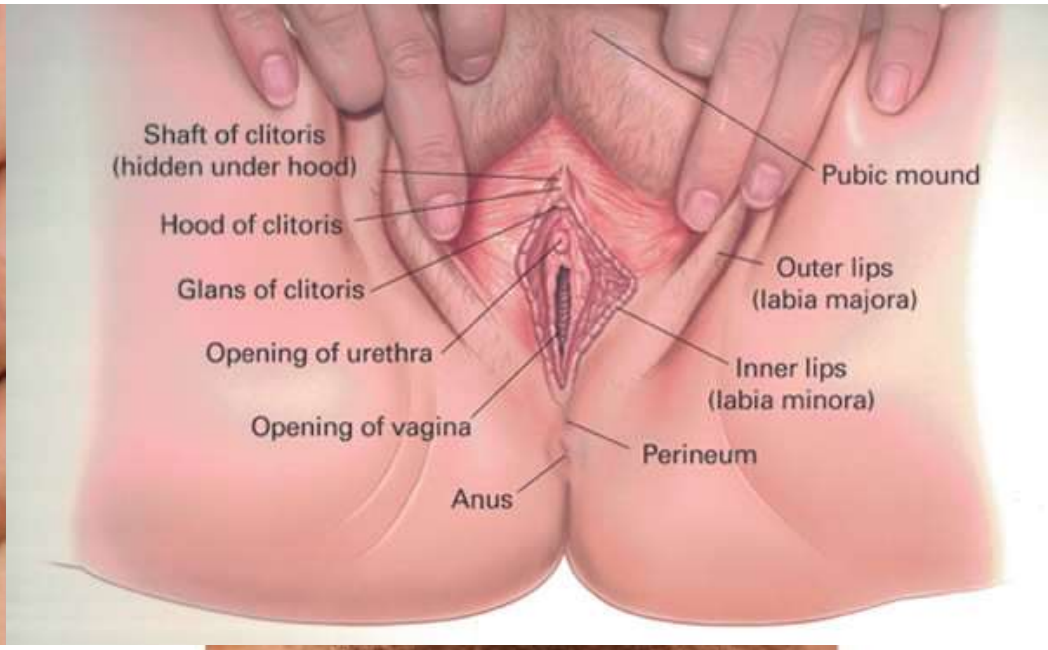
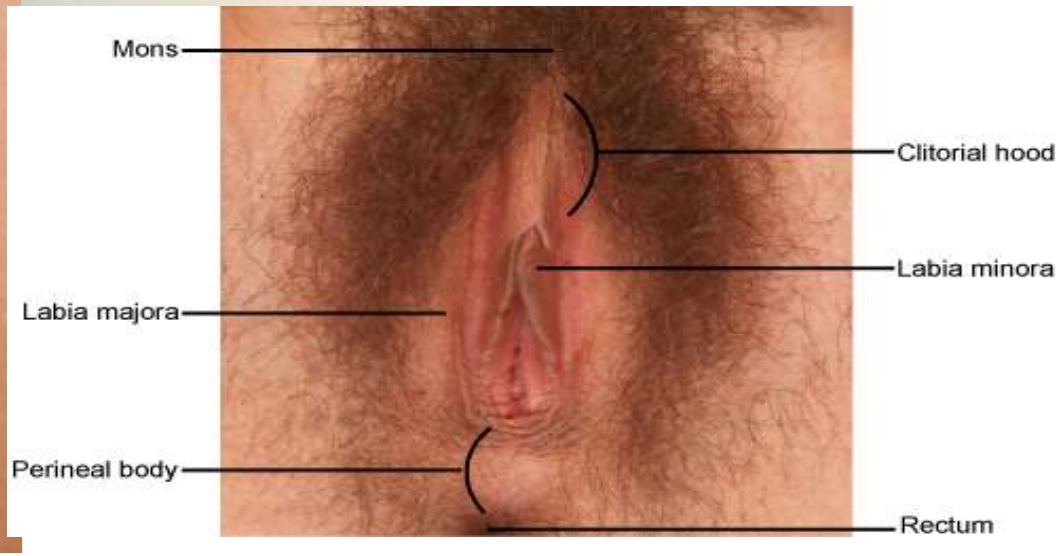
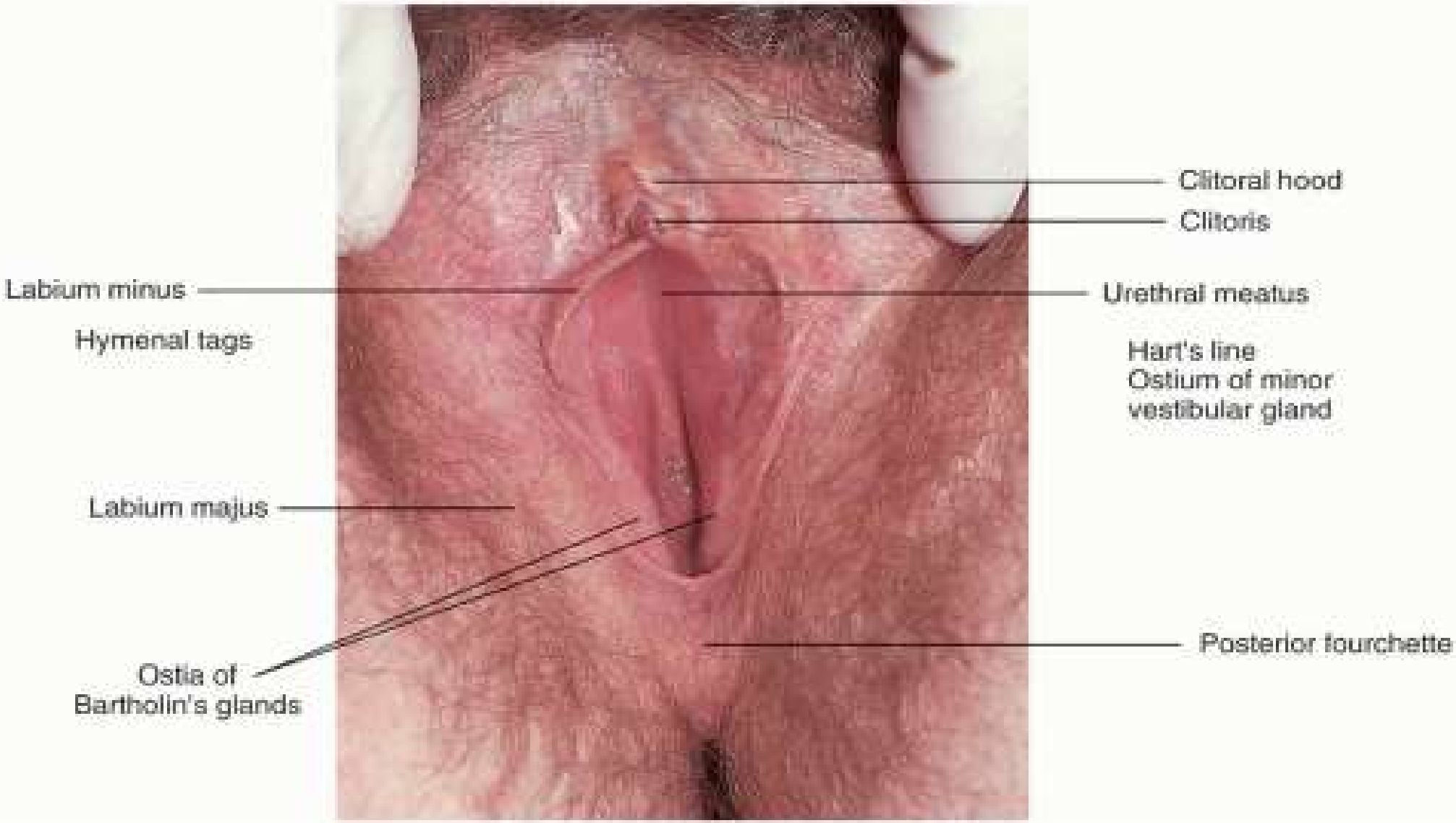
8

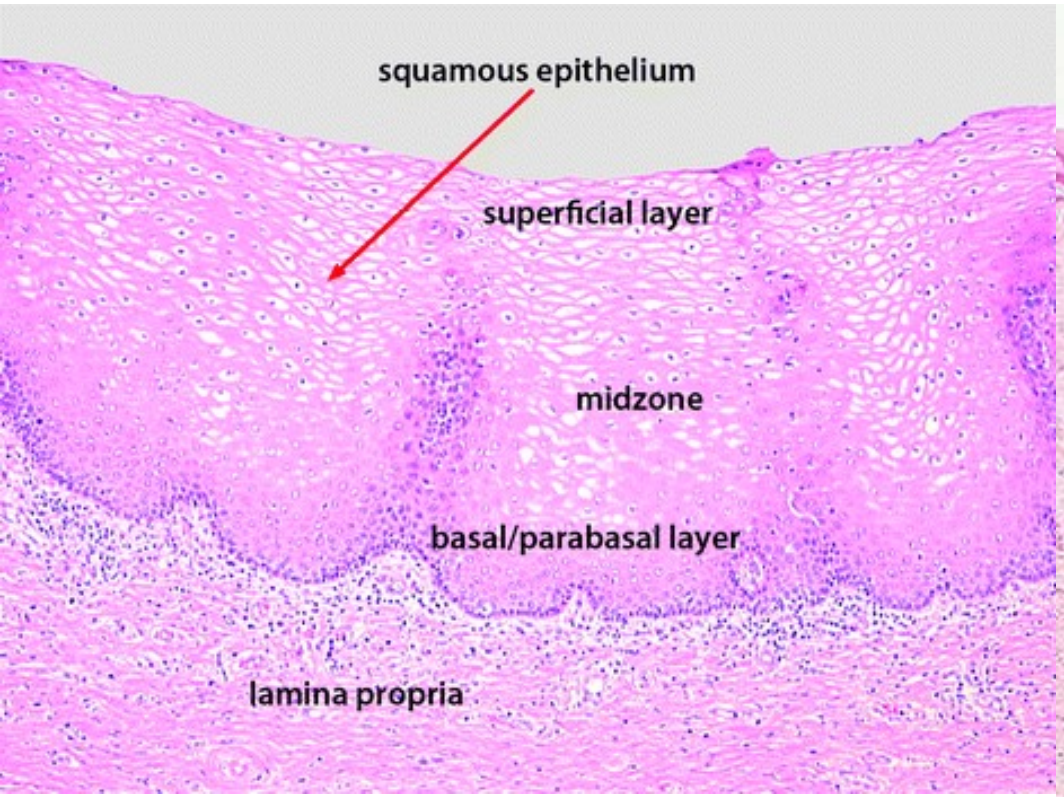

clitoral hood
clitoral glans
labia minora
vaginal opening
labia majora
perineum

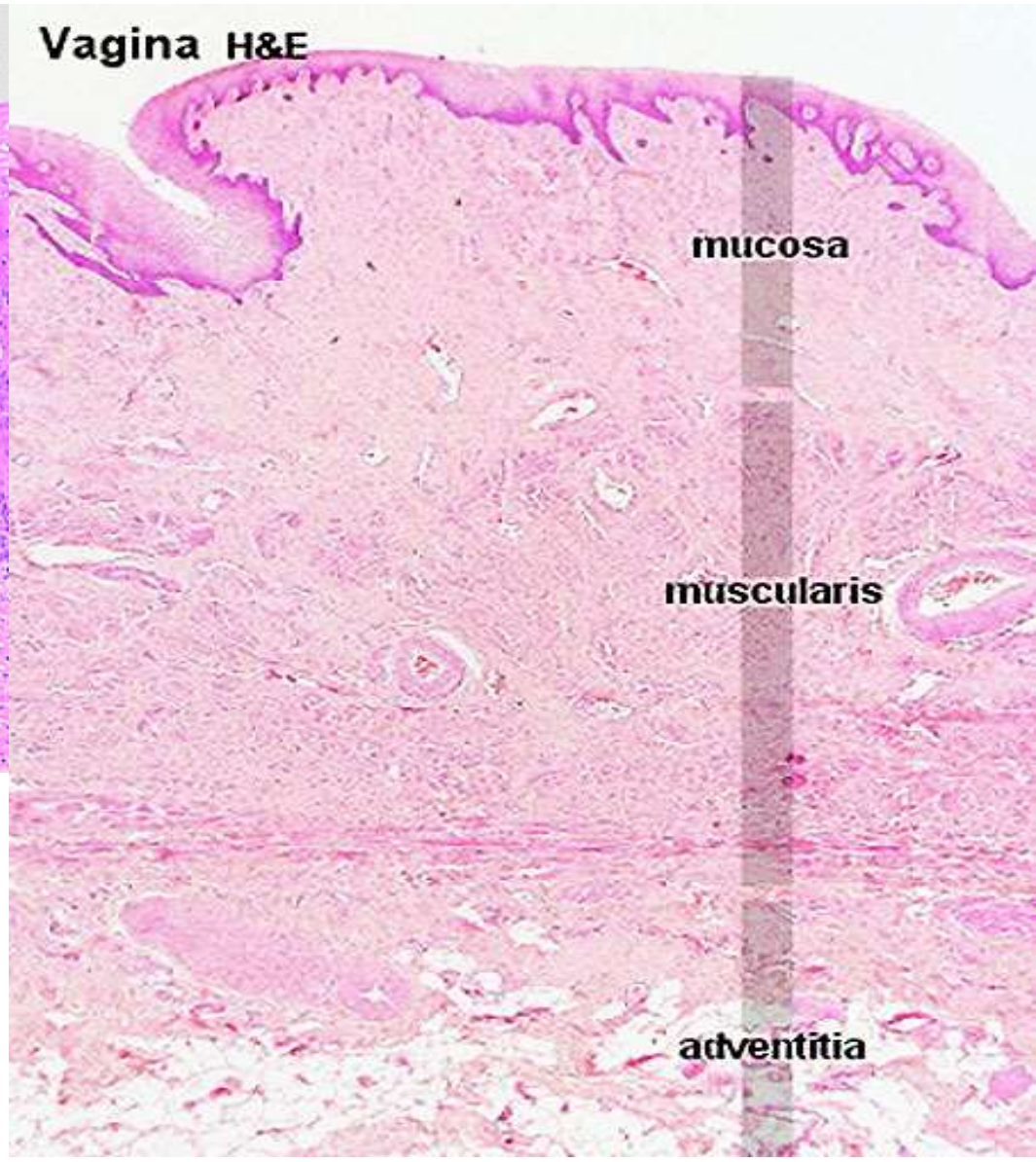

Mons Pubis
Prepuce
Clitoris
Labia Menora
Urethral orifice
Vagina
Labia Majora
Anus

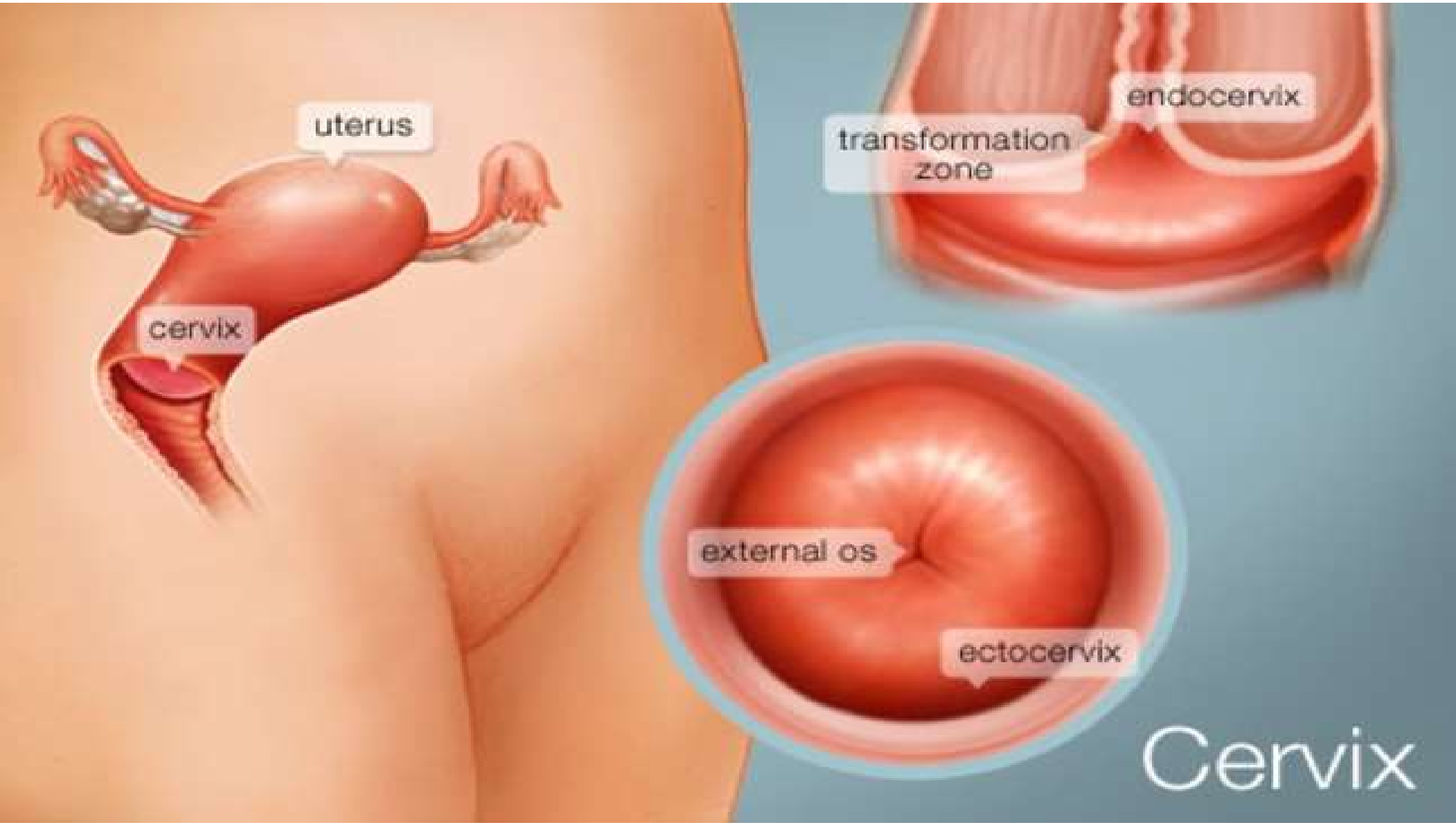

Shaft of clitoris (hidden under hood)
Hood of clitoris
Glans of clitoris
Opening of urethra
Opening of vagina
Anus
Pubic mound
Outer lips (labia majora)
Inner lips (labia minora)
Perineum


Mons
Clitorial hood
Labia minora
Labia majora
Perineal body
Rectum

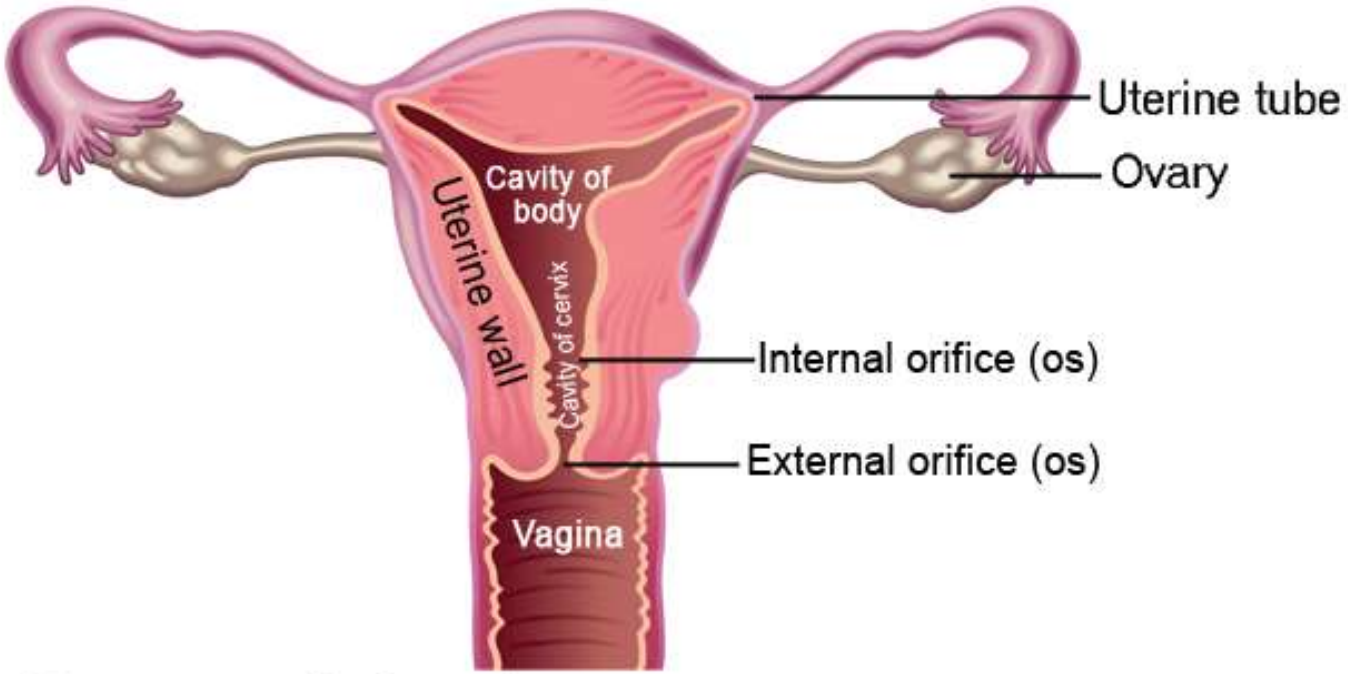

Clitoral hood
Clitoris
Labium minus
Hymenal tags
Urethral meatus
Hart's line
Ostium of minor vestibular gland
Labium majus
Posterior fourchette
Ostia of Bartholin's glands

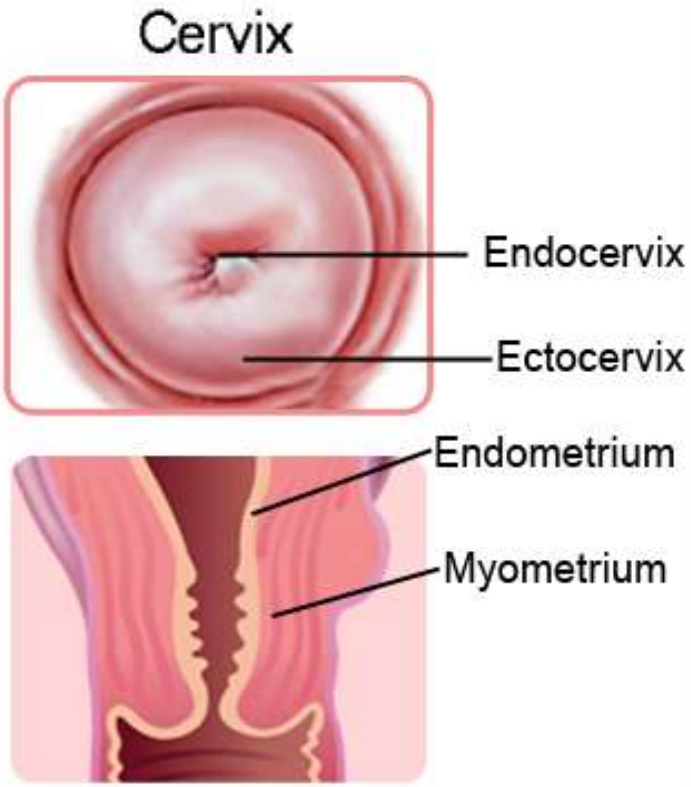

squamous epithelium
superficial layer
midzone
basal/parabasal layer
lamina propria

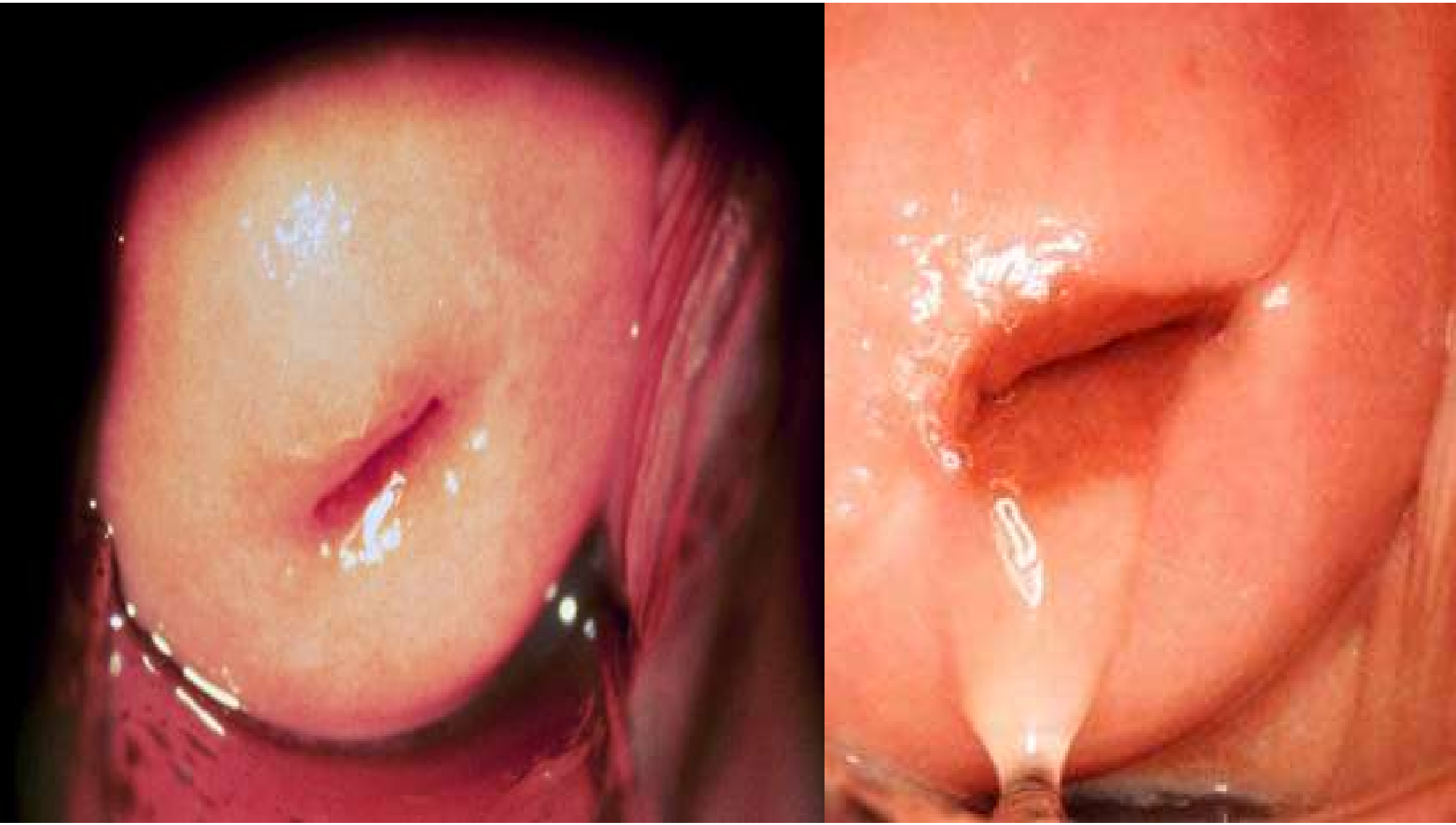

Vagina H&E
mucosa
muscularis
adventitia


uterus
cervix
endocervix
transformation zone
external os
ectocervix
Cervix

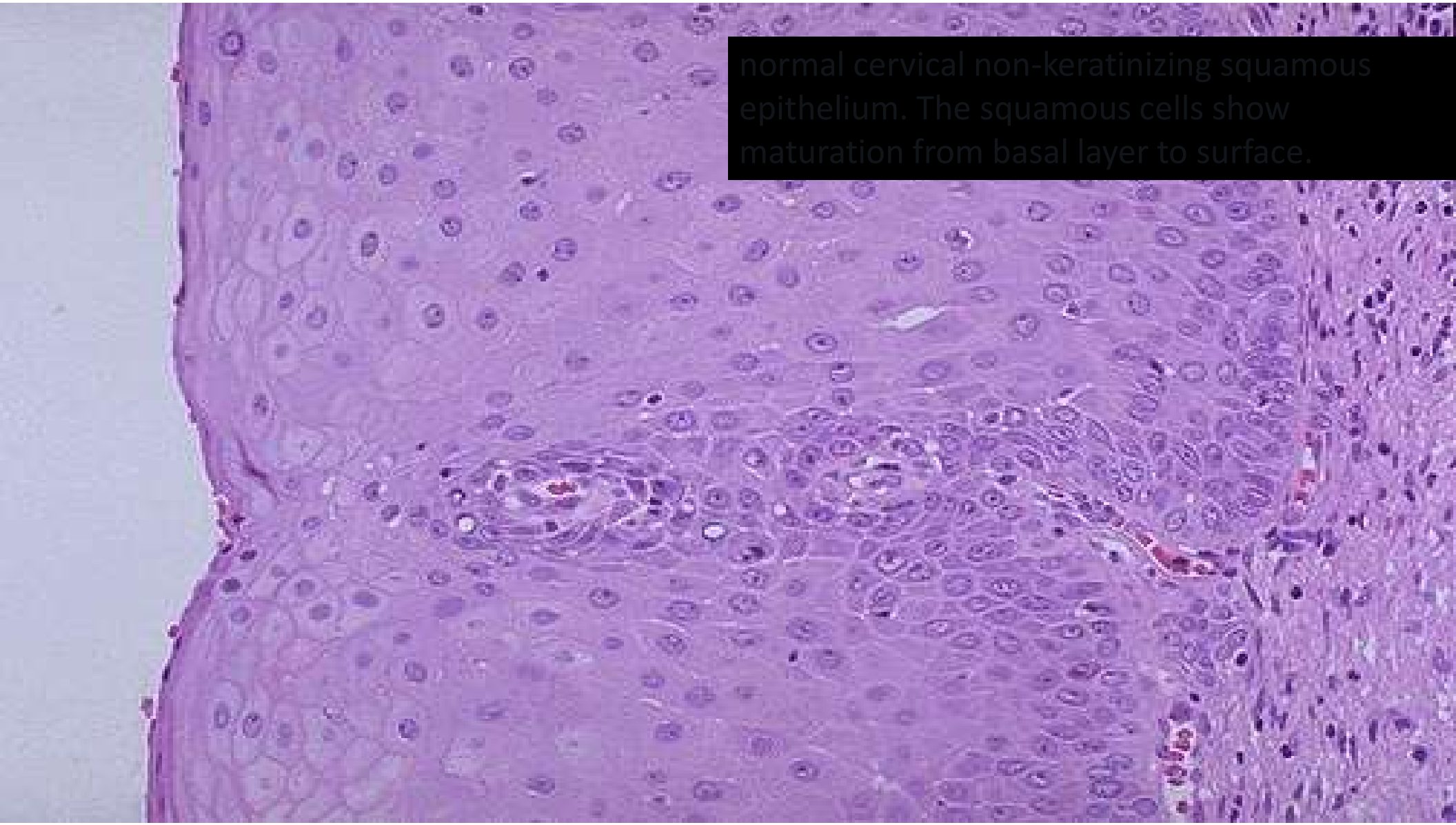
# Anatomy of the Cervix

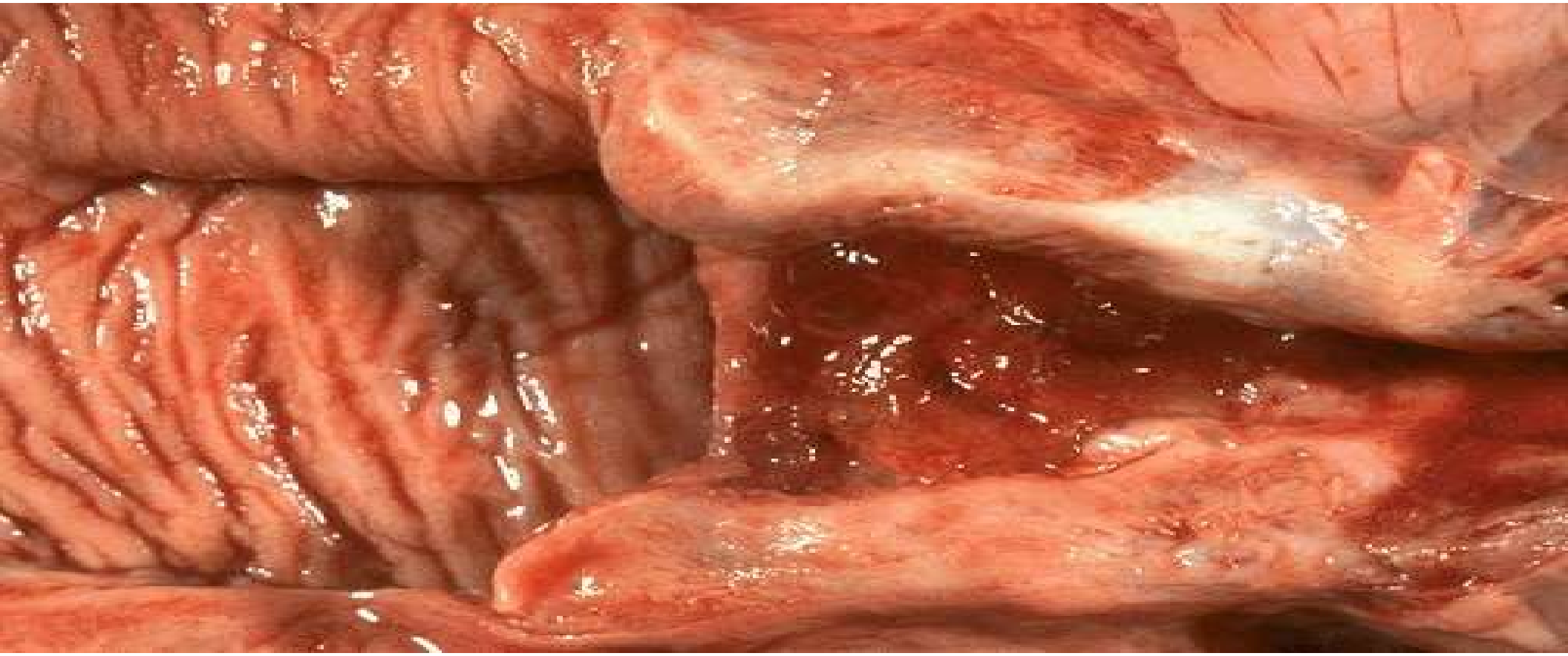





normal cervix with a smooth, glistening mucosal surface.


normal cervical non-keratinizing squamous epithelium. The squamous cells show maturation from basal layer to surface.

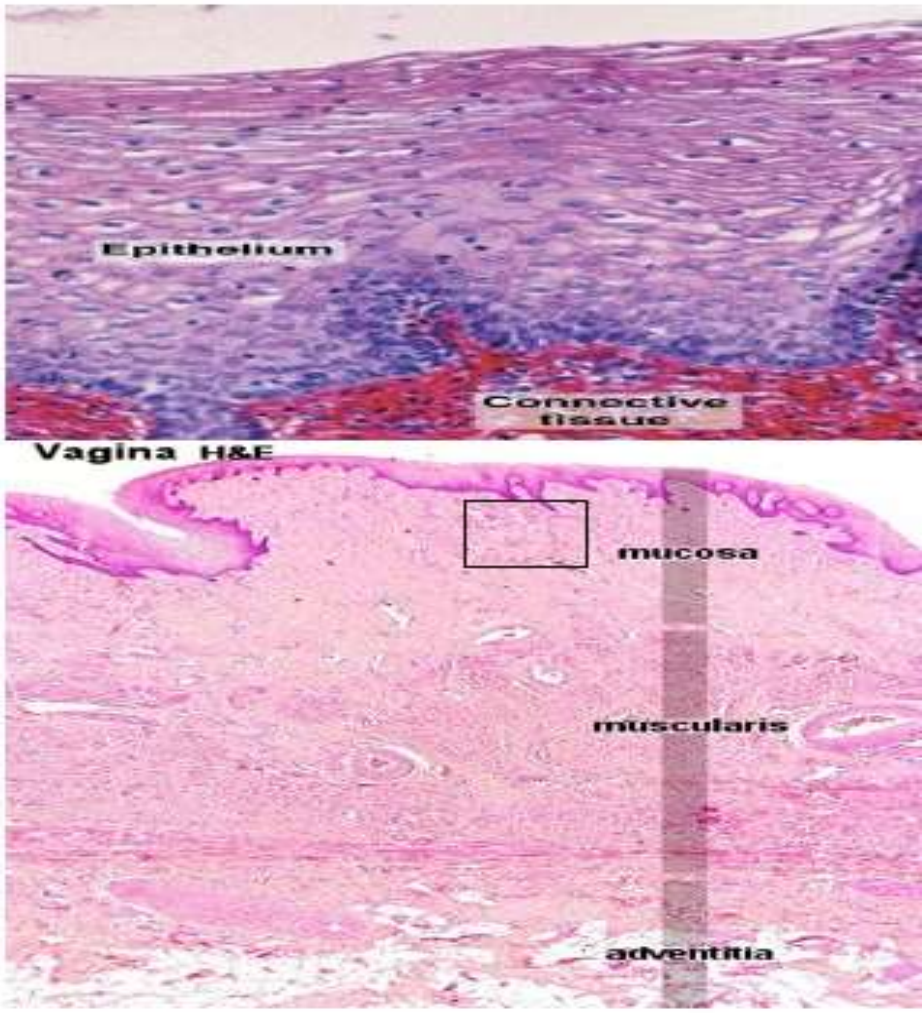


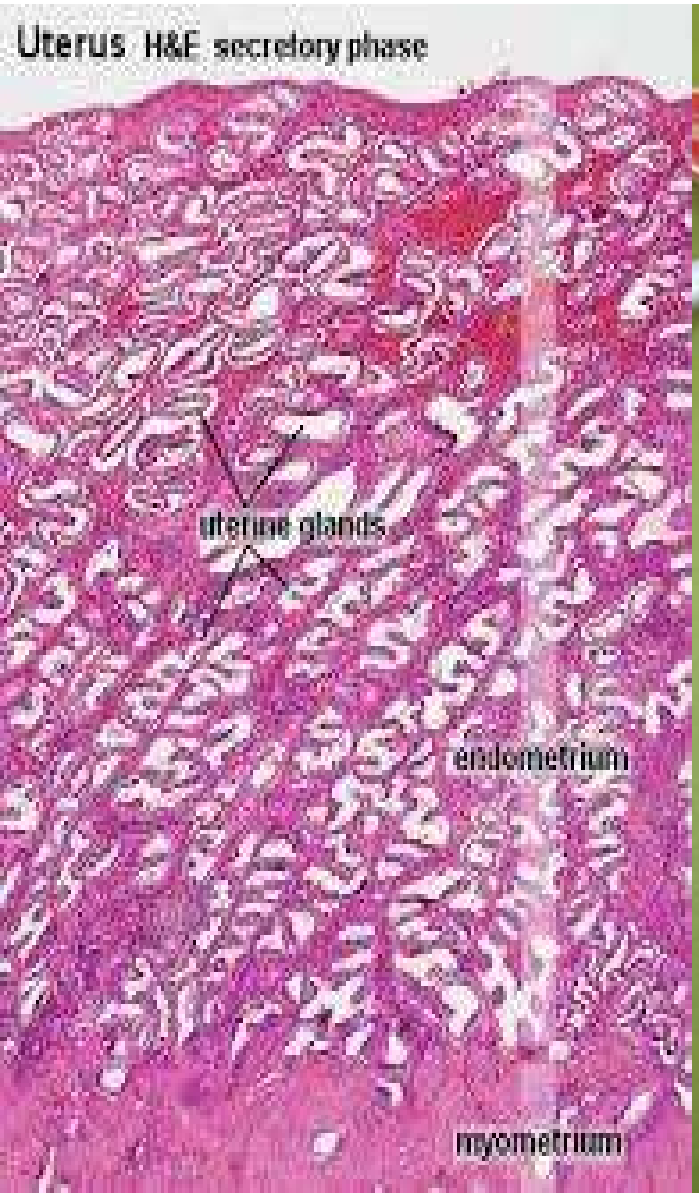
The normal adult vaginal mucosa with a wrinkled appearance that is seen in women of reproductive years appears at the left. The cervix has been opened to reveal an endocervical canal leading to the lower uterine segment at the right that has an erythematous appearance extending to the cervical os consistent with chronic inflammation.

# VAGINA

Vagina consist of three layers :

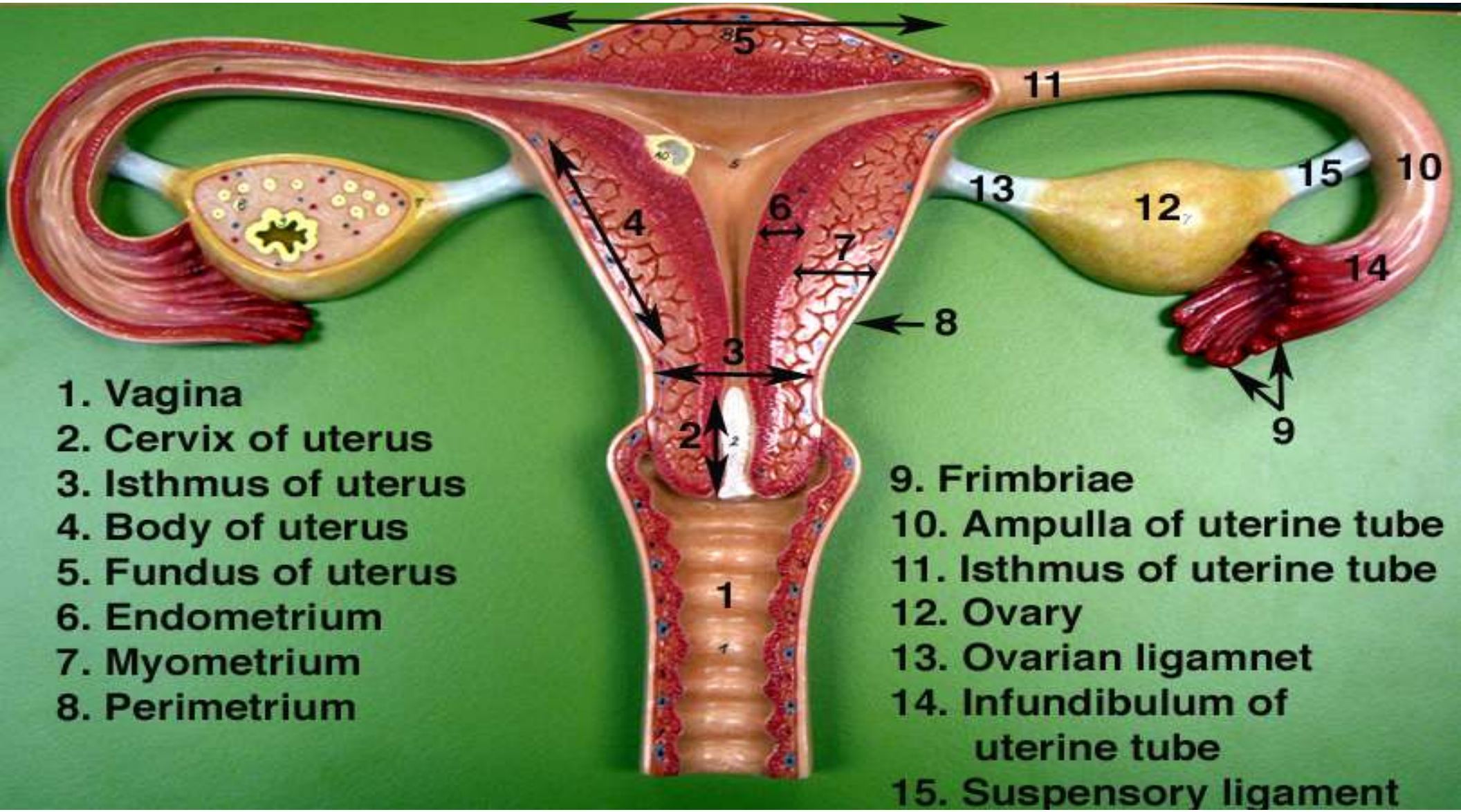
- Mucosa
  - Strat. Sq. Nonkeratinized Epit. (>> glycogen)
  - Lamina propria : loose fibroelastic C.T. , rich vascular.
  - **No glands** ; vaginal fluid comes from transudation & cervical glands
- Muscularis
  - Smooth muscle, inner circular & outer longitudinal
- Adventitia
  - Dense fibroelastic C.T

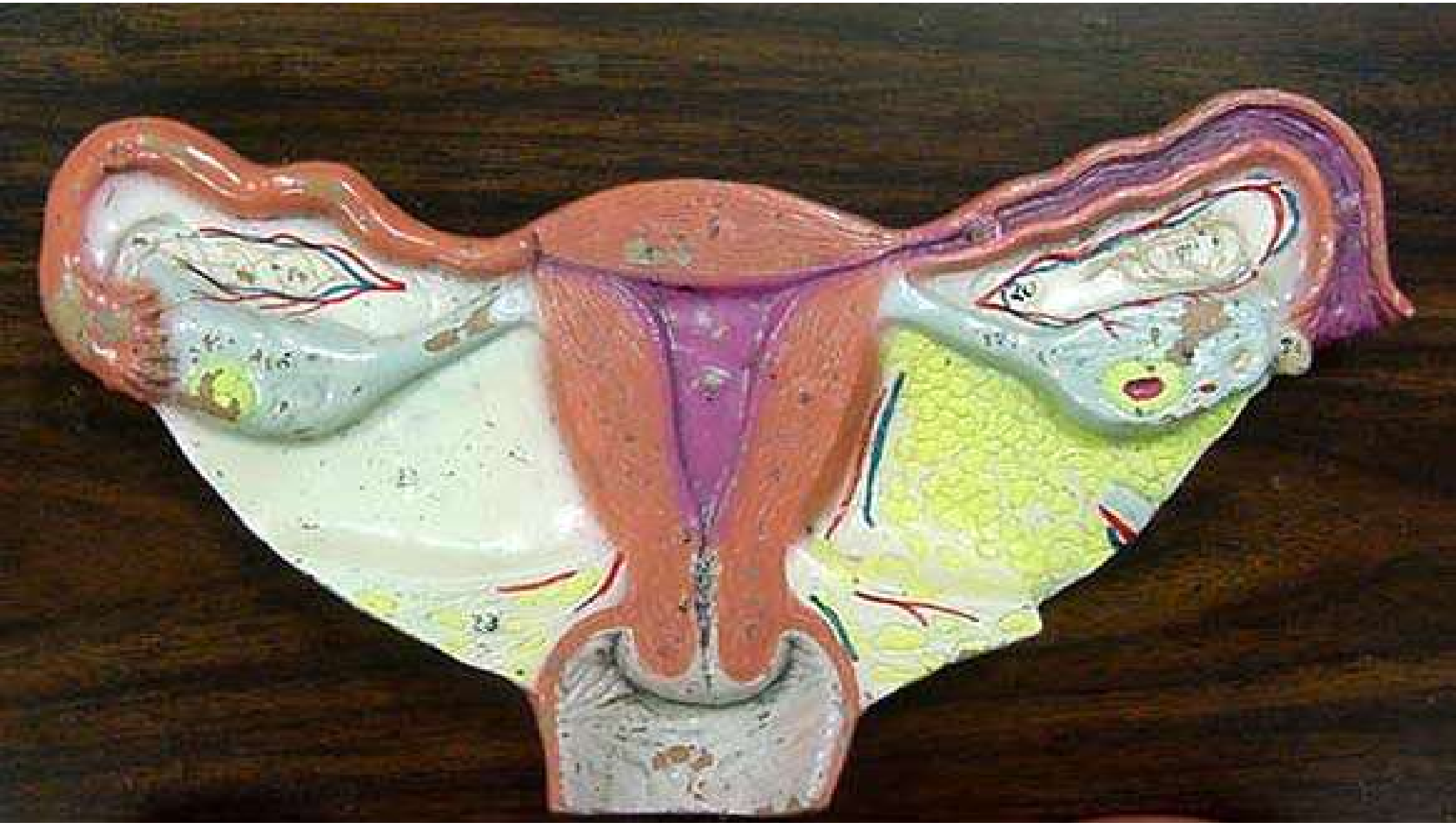


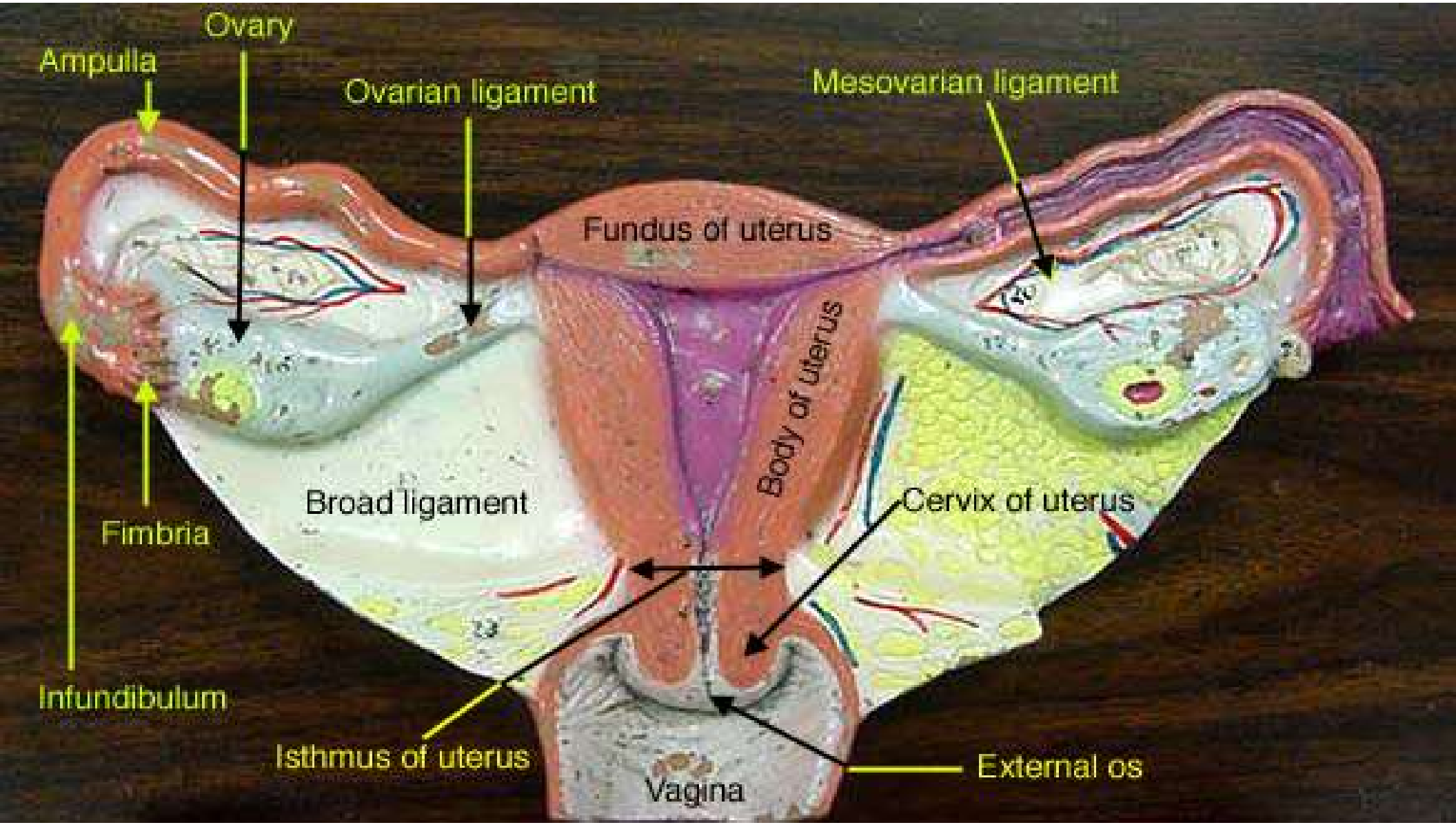

Uterus H&E secretory phase
uterine glands
endometrium
myometrium

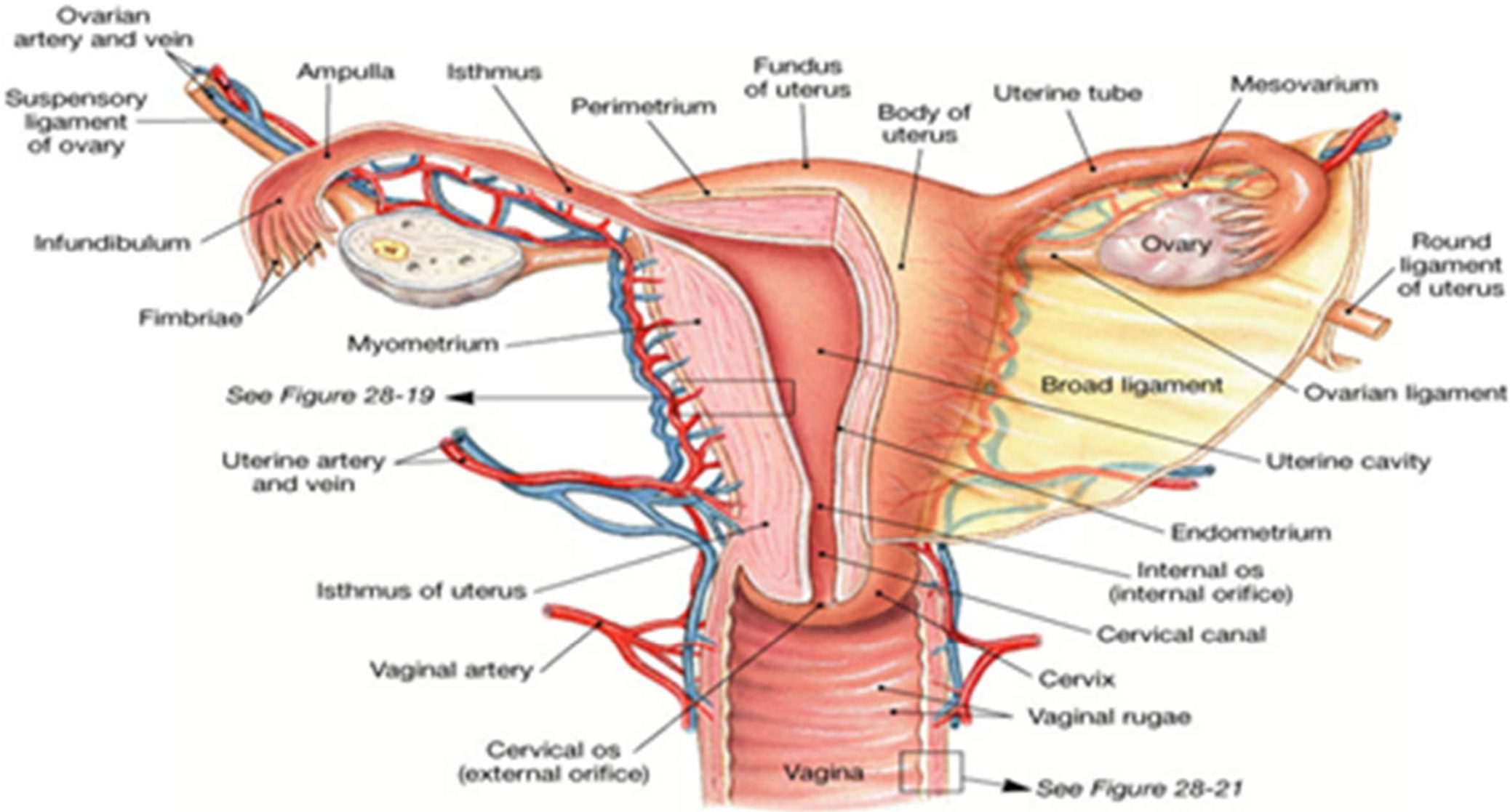

Uterus H&E proliferative phase
uterine glands
endometrium
myometrium


Stratified squamous epithelium
Inflammatory cells
Lamina propria
Veins


1. Vagina
2. Cervix of uterus
3. Isthmus of uterus
4. Body of uterus
5. Fundus of uterus
6. Endometrium
7. Myometrium
8. Perimetrium
9. Frimbriae
10. Ampulla of uterine tube
11. Isthmus of uterine tube
12. Ovary
13. Ovarian ligamnet
14. Infundibulum of uterine tube
15. Suspensory ligament



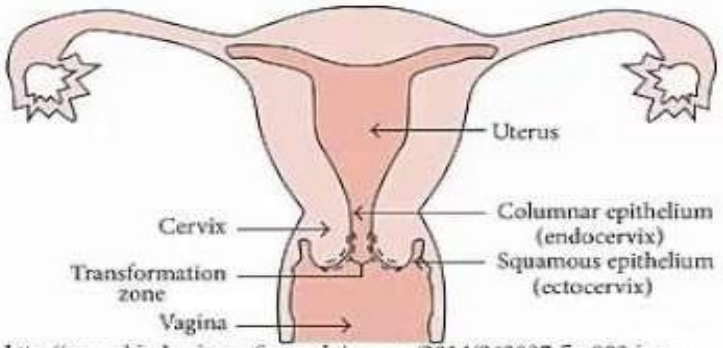

Ovary
Ampulla
Ovarian ligament
Mesovarian ligament
Fundus of uterus
Body of uterus
Broad ligament
Cervix of uterus
Fimbria
Infundibulum
Isthmus of uterus
External os
Vagina



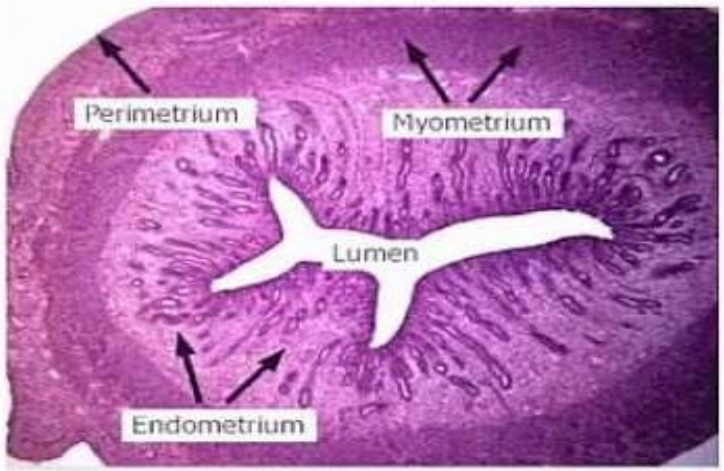

(c) Posterior view

# The Main Parts of the Uterus

- Cervix
  - Ectocervix
  - Transformation zone
  - Endocervix
- Uterus Tissue Layers
  - Endometrium
    - Functionalis
  - Myometrium
  - Serosa

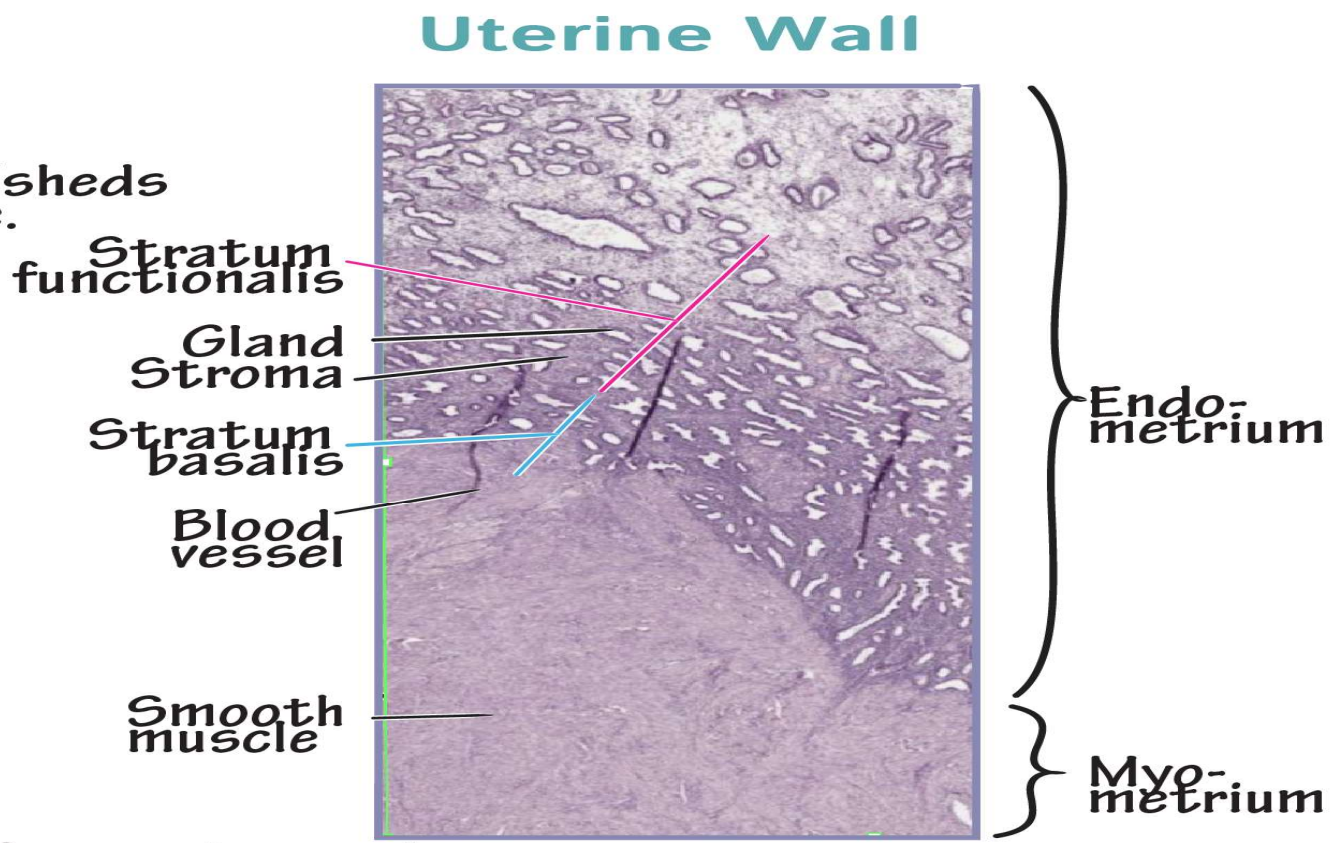


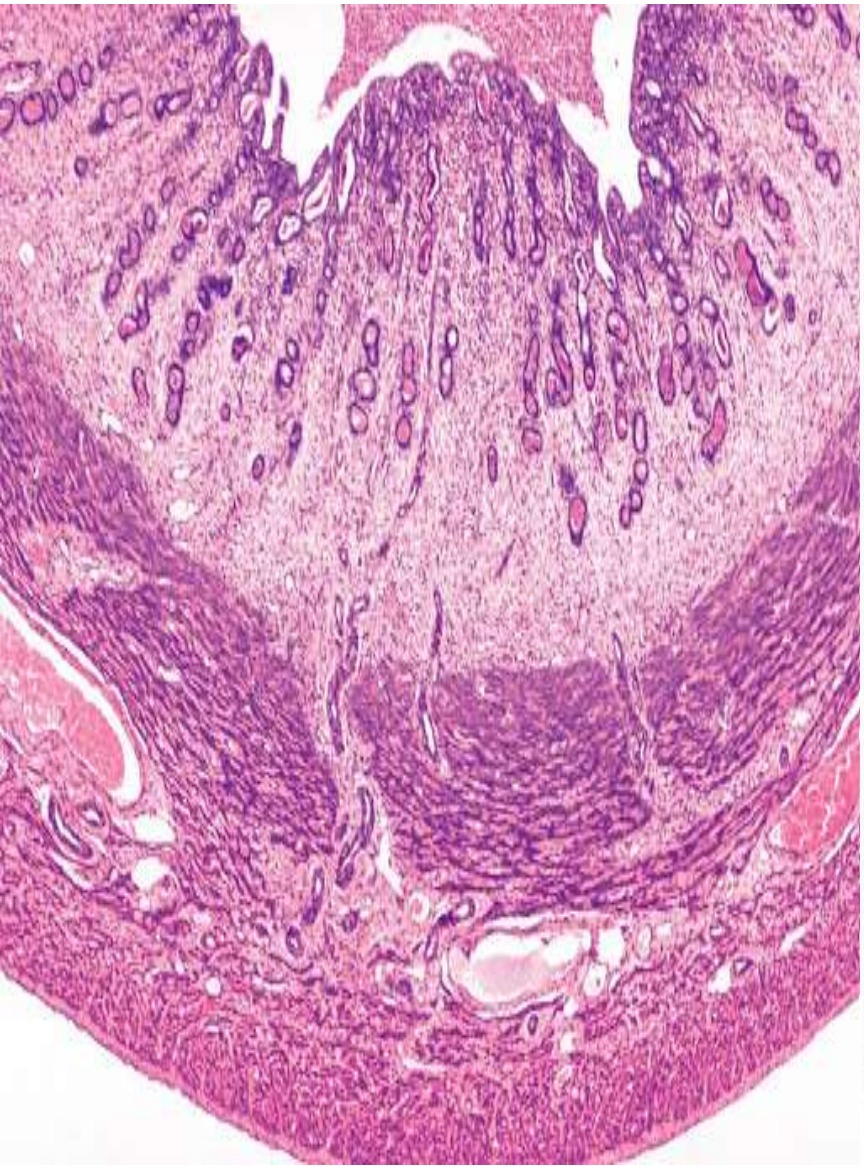
http://www.hindawi.com/journals/cmmm/2014/842037.fig.003.jpg

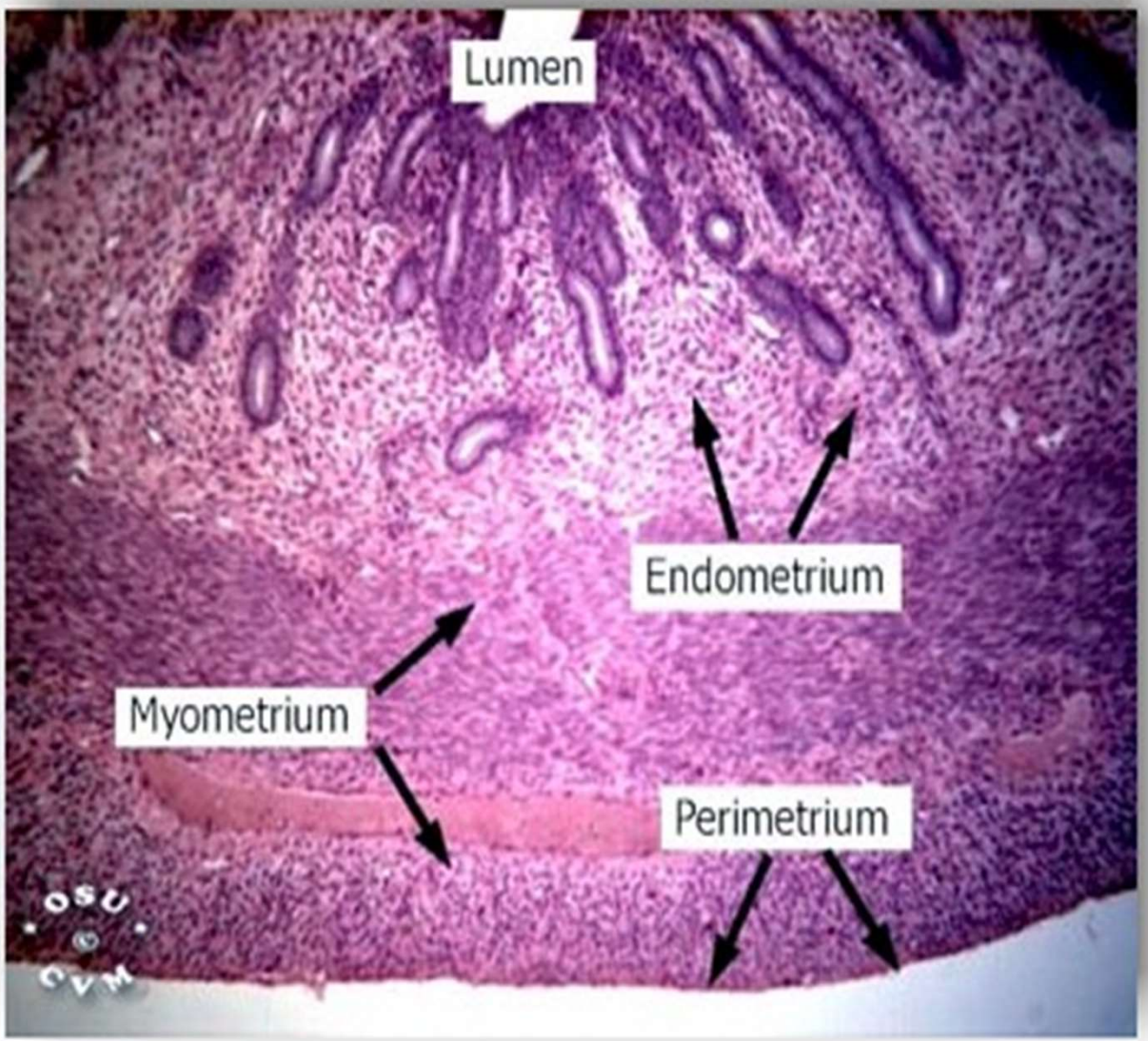


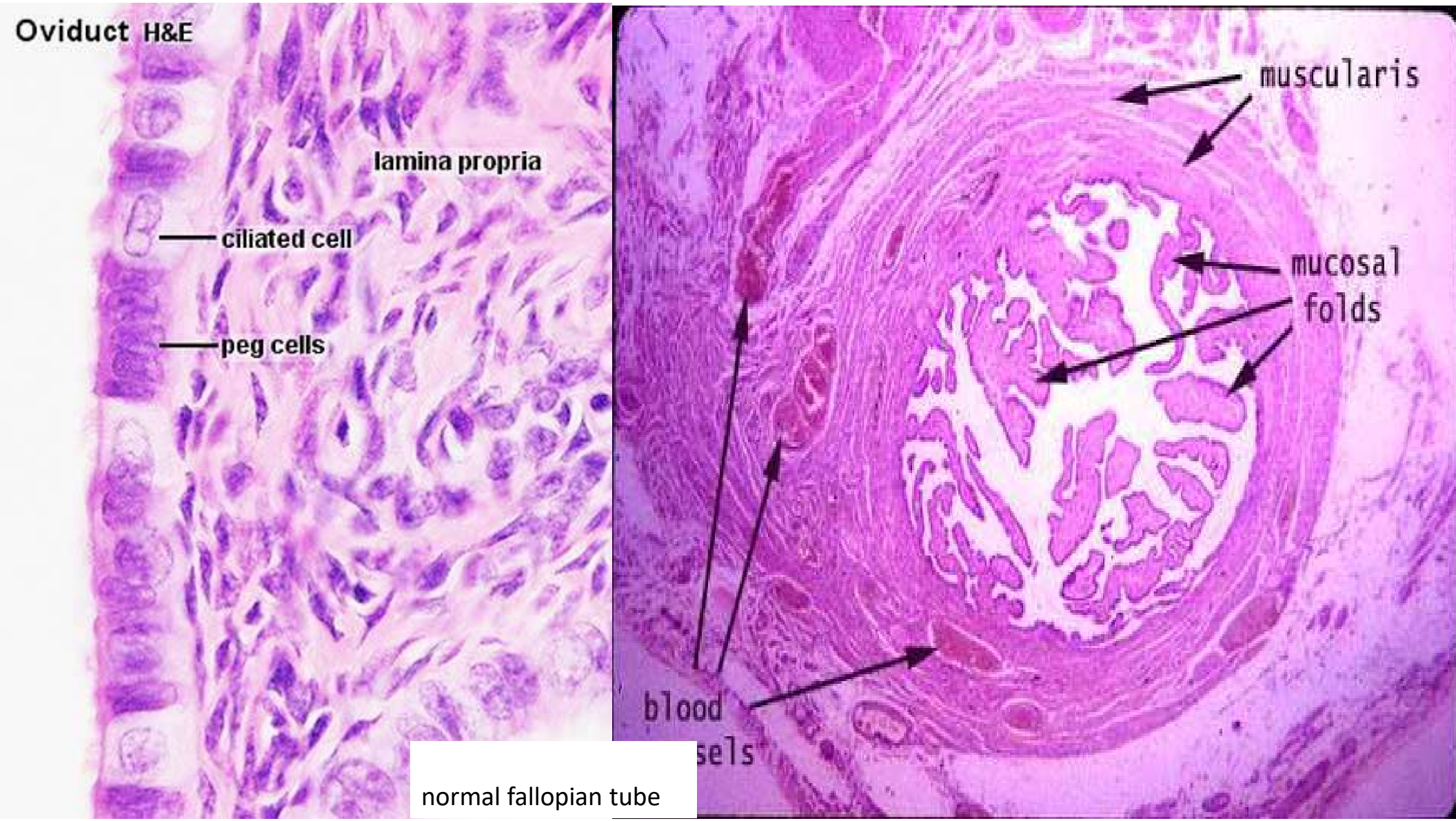
http://legacy.owensboro.kctcs.edu/gcaplan/anat2/histology/uterus1.jpg

- Stratum functionalis
  - Cyclically proliferates/sheds during mehstrual cycle.
- Endometrial gland
  - Columnar ciliated & non-ciliated secretory cells.
- Myometrium
  - Interweaving bundles of smooth muscle fibers contract to expel uterine contents.
  - Vasculature passes through to endometrium.

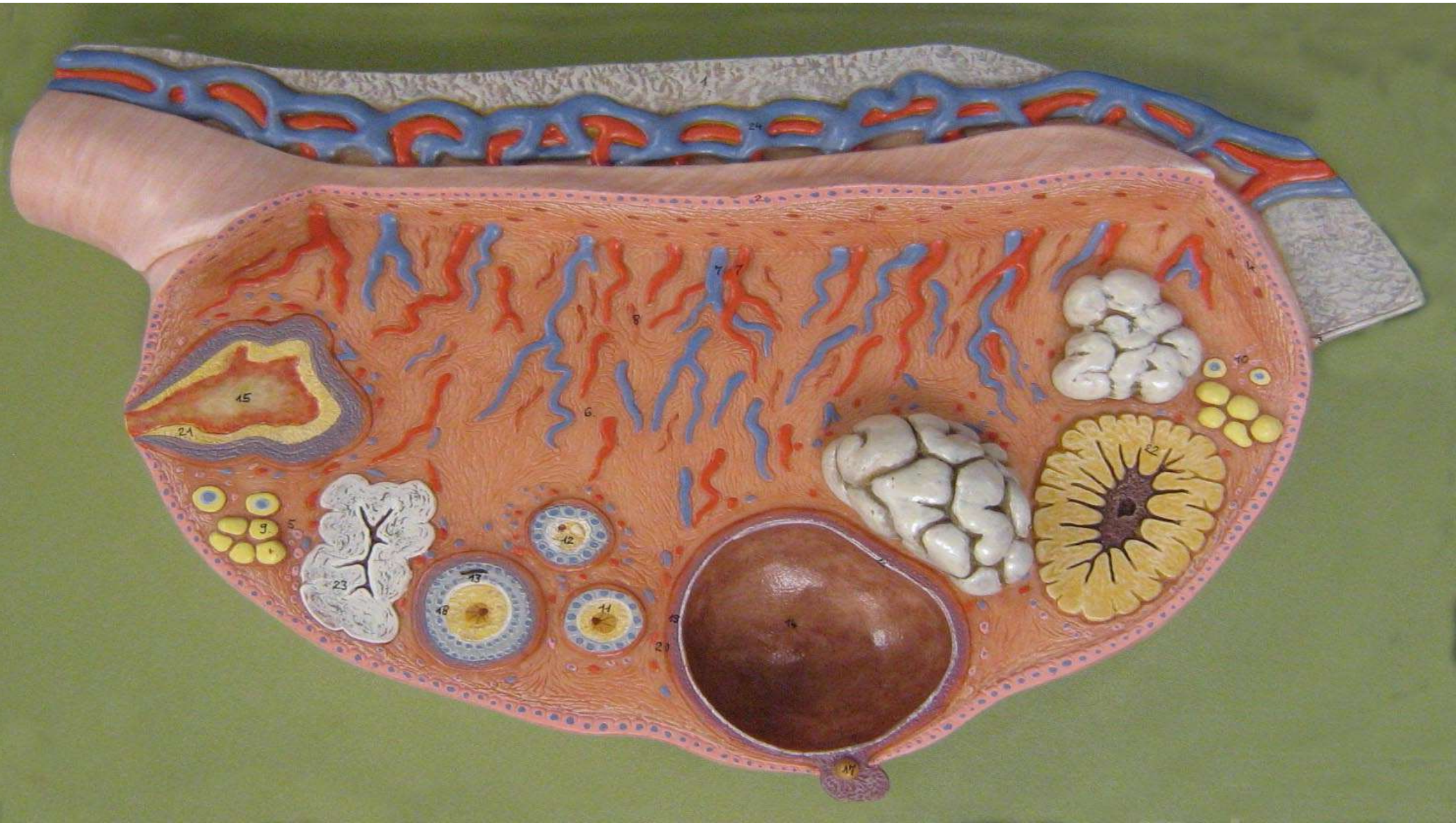





Lumen
Endometrium
Myometrium
Perimetrium
OSU
CVM




normal fallopian tube


1
24
2
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15
21
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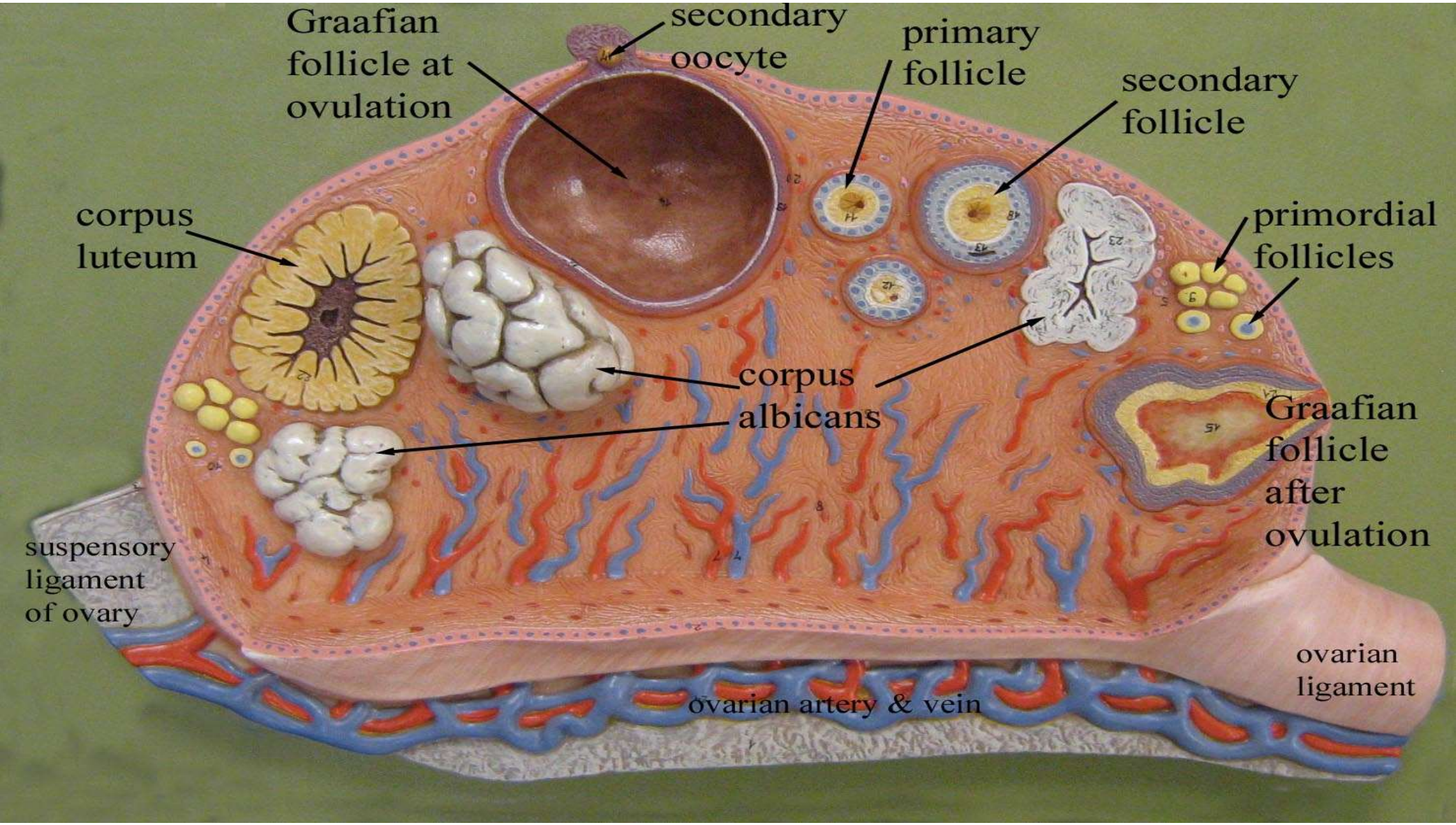
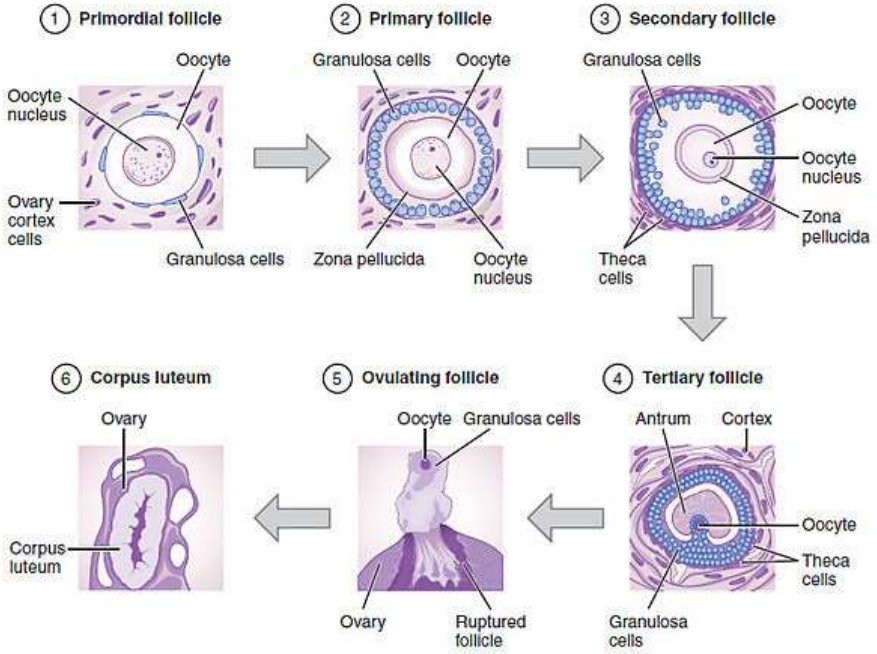
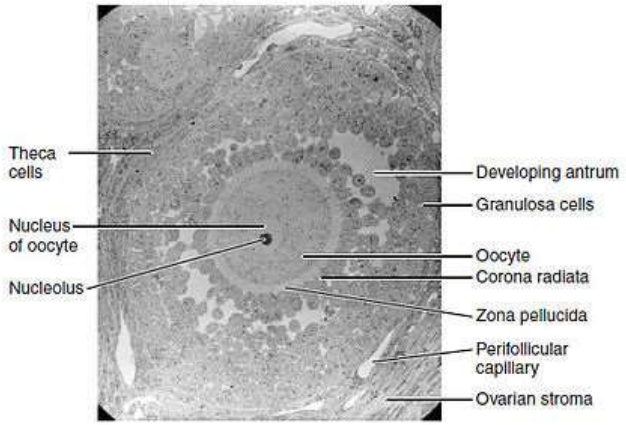
17

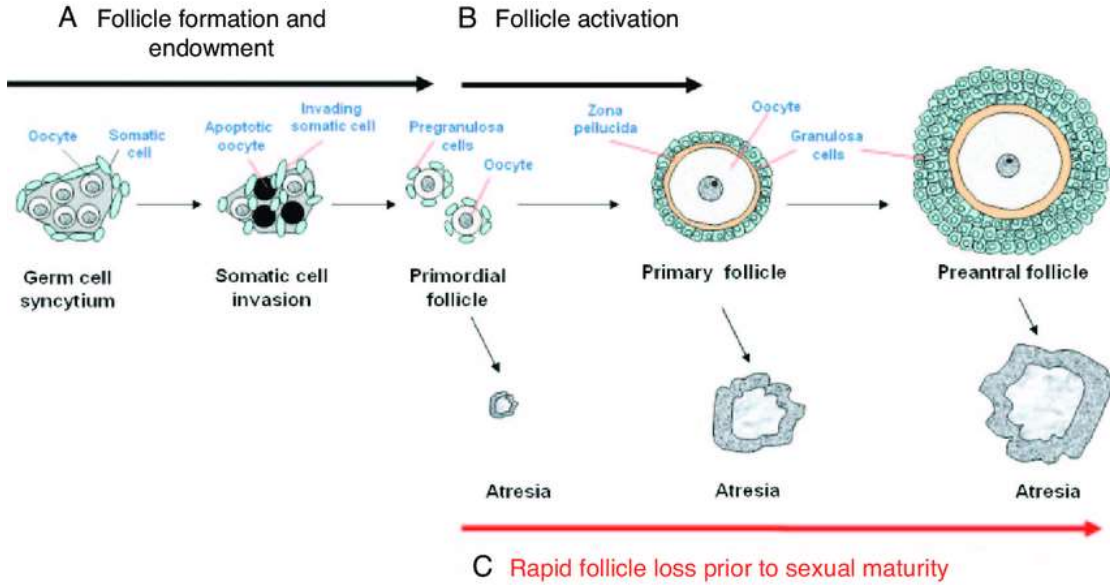

Graafian follicle at ovulation
secondary oocyte
primary follicle
secondary follicle
corpus luteum
primordial follicles
corpus albicans
Graafian follicle after ovulation
suspensory ligament of ovary
ovarian ligament
ovarian artery & vein

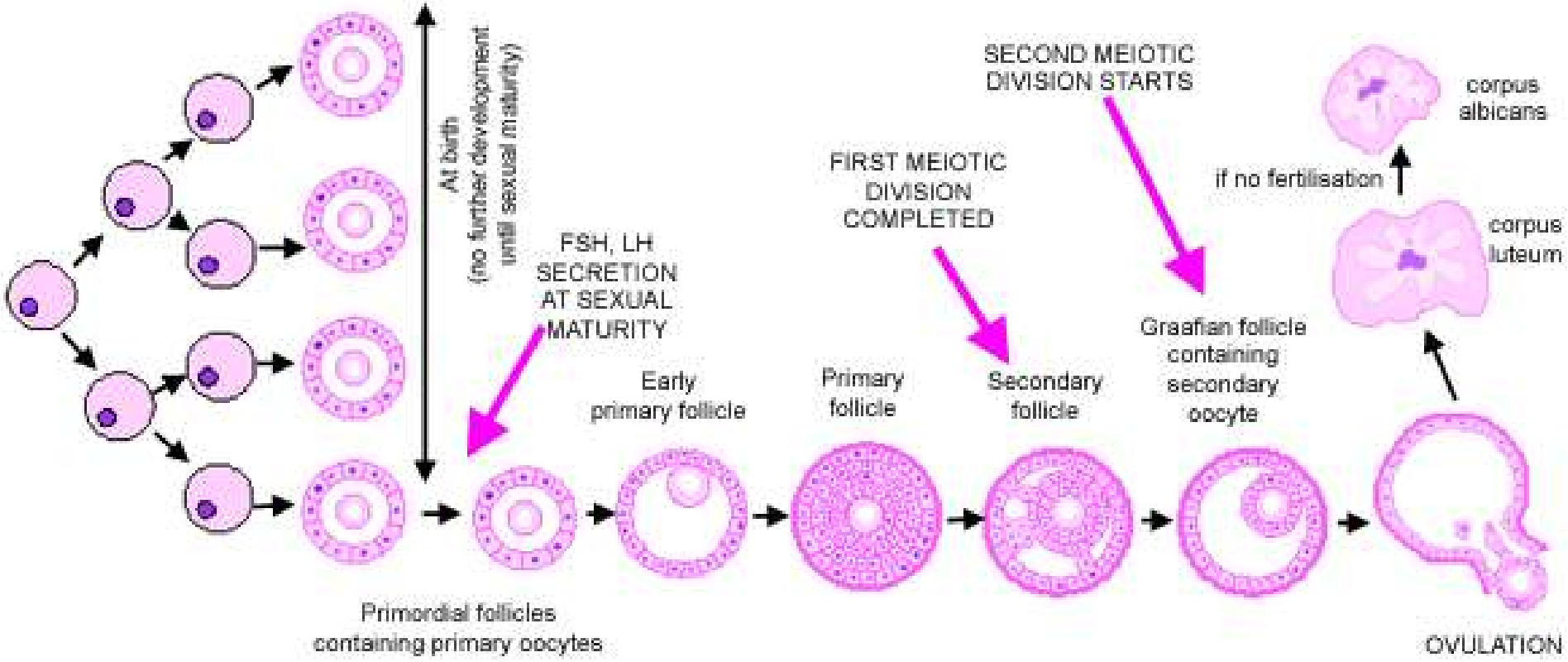
(a) Stages of Folliculogenesis

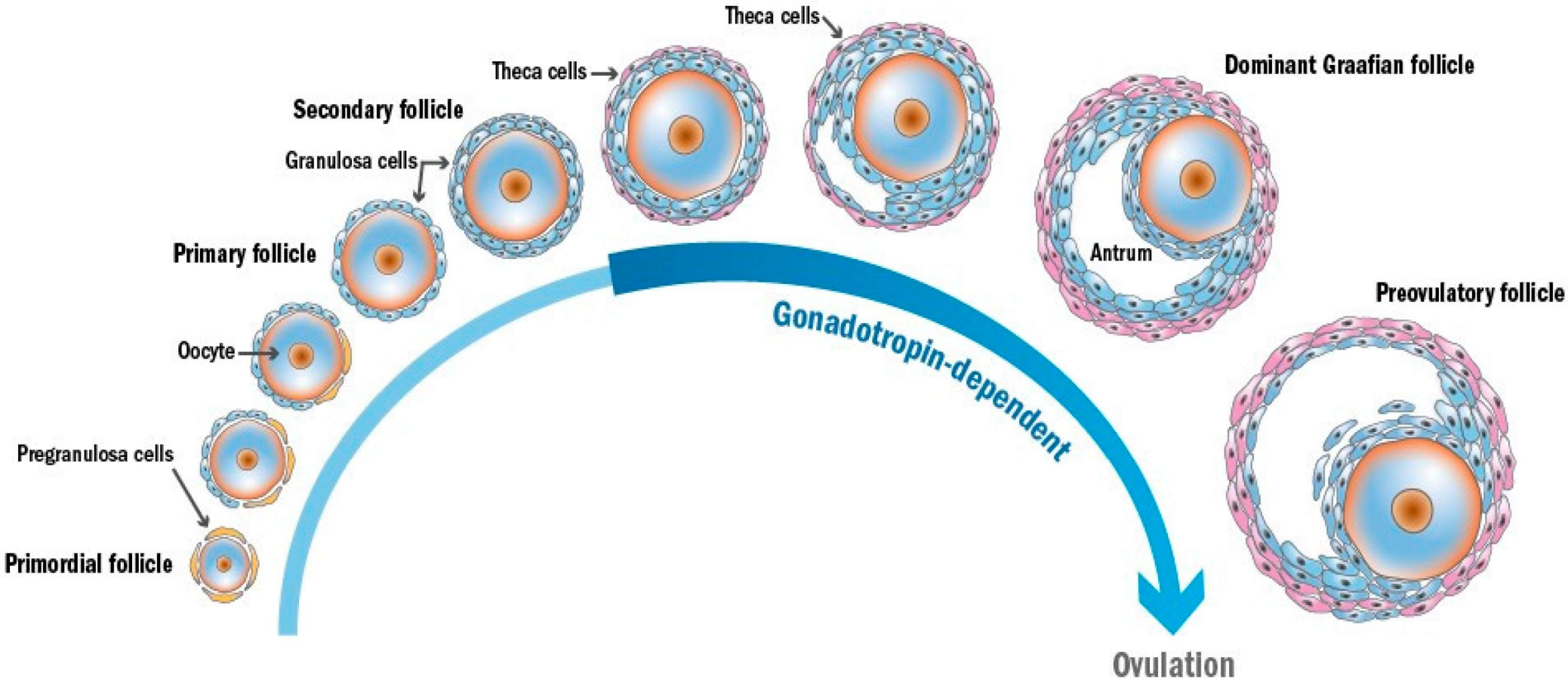



(b) A Secondary Follicle

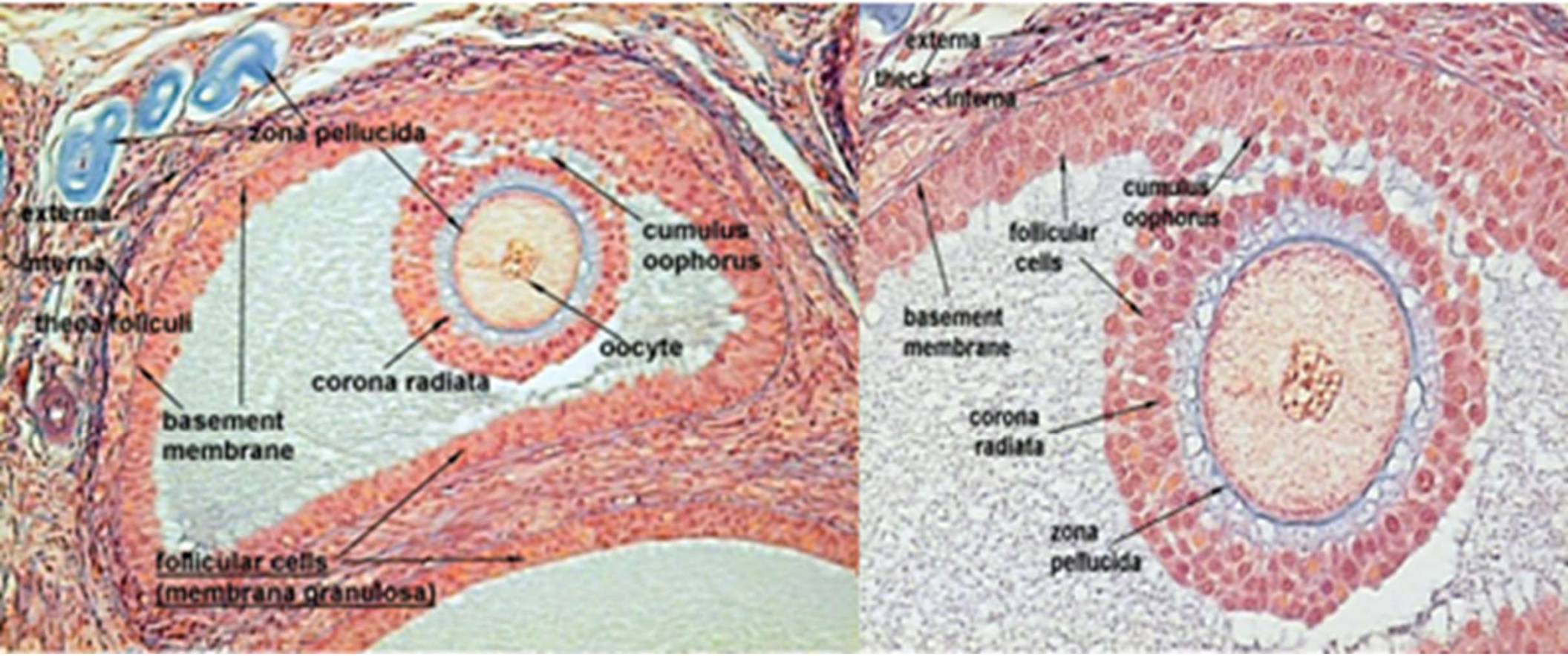


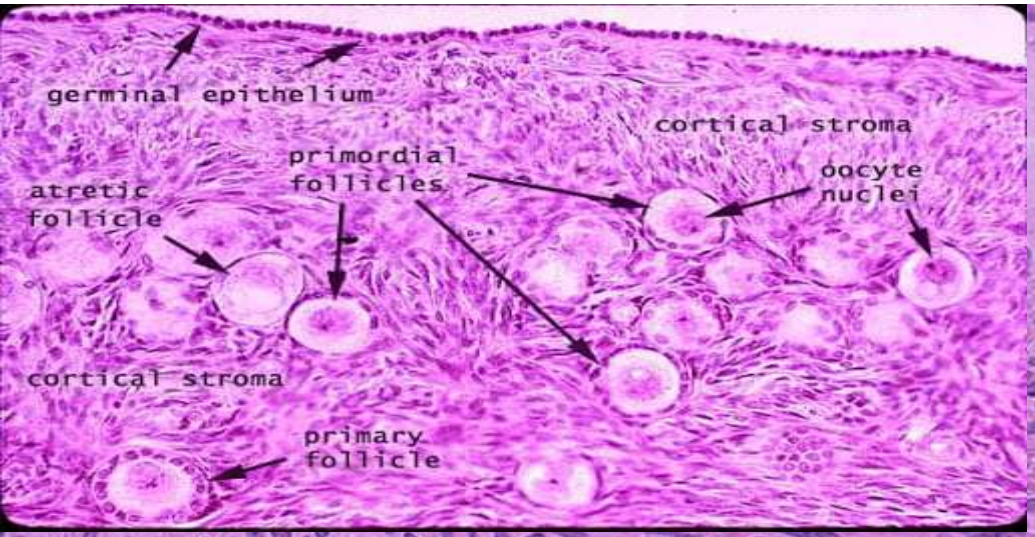



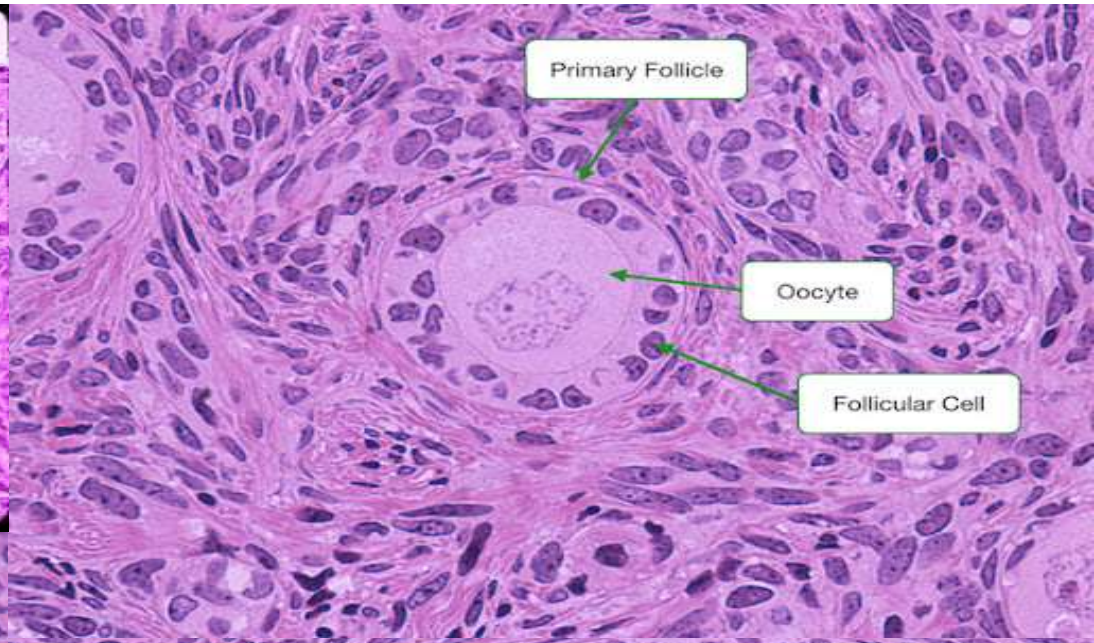

At birth
(no further development until sexual maturity)
FSH, LH SECRETION AT SEXUAL MATURITY
FIRST MEIOTIC DIVISION COMPLETED
SECOND MEIOTIC DIVISION STARTS
Early primary follicle
Primary follicle
Secondary follicle
Graafian follicle containing secondary oocyte
OVULATION
if no fertilisation
corpus albicans
corpus luteum
Primordial follicles containing primary oocytes

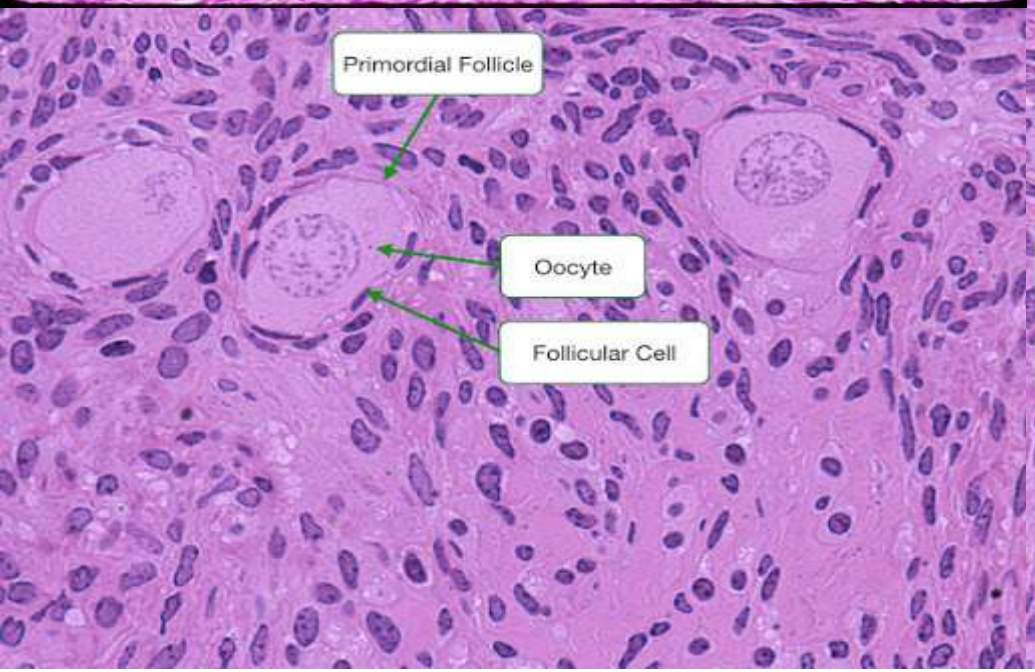

Theca cells
Theca cells
Secondary follicle
Granulosa cells
Dominant Graafian follicle
Primary follicle
Antrum
Oocyte
Preovulatory follicle
Gonadotropin-dependent
Pregranulosa cells
Primordial follicle
Ovulation

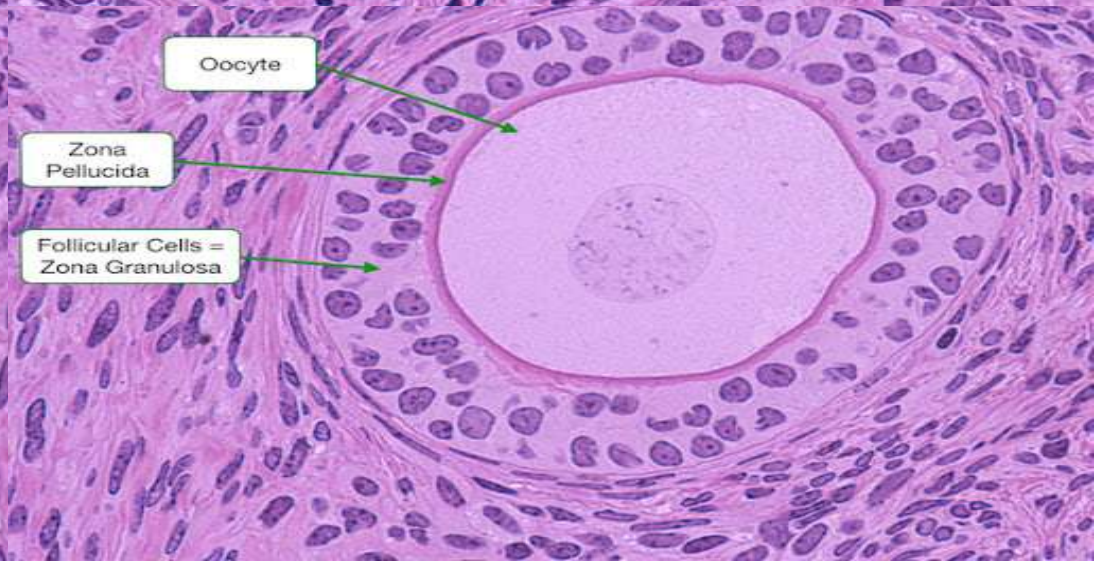
# Ovaries

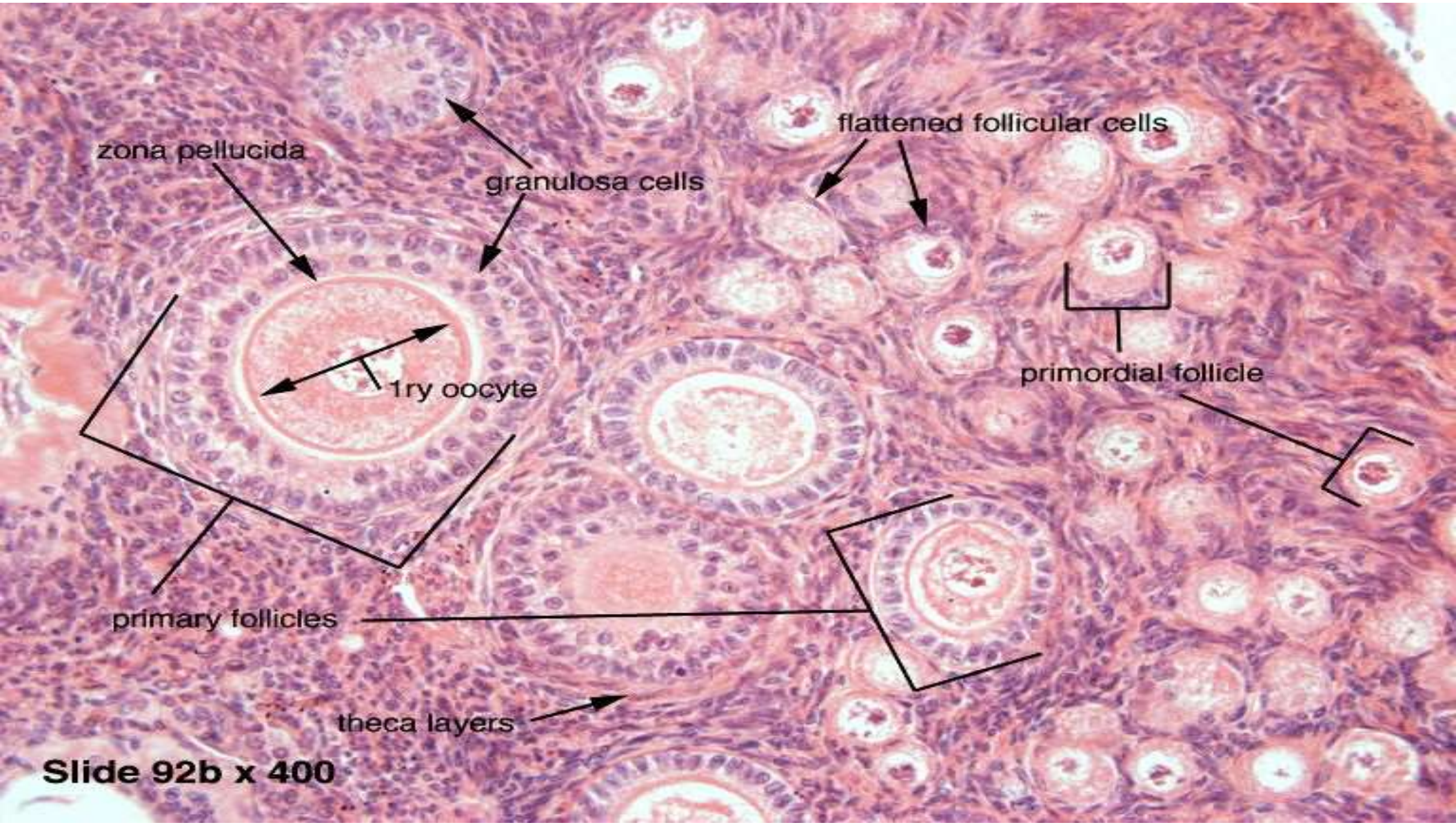

zona pellucida
externa
interna
theca folliculi
cumulus oophorus
oocyte
corona radiata
basement membrane
follicular cells (membrana granulosa)
externa
theca interna
follicular cells
cumulus oophorus
basement membrane
corona radiata
zona pellucida

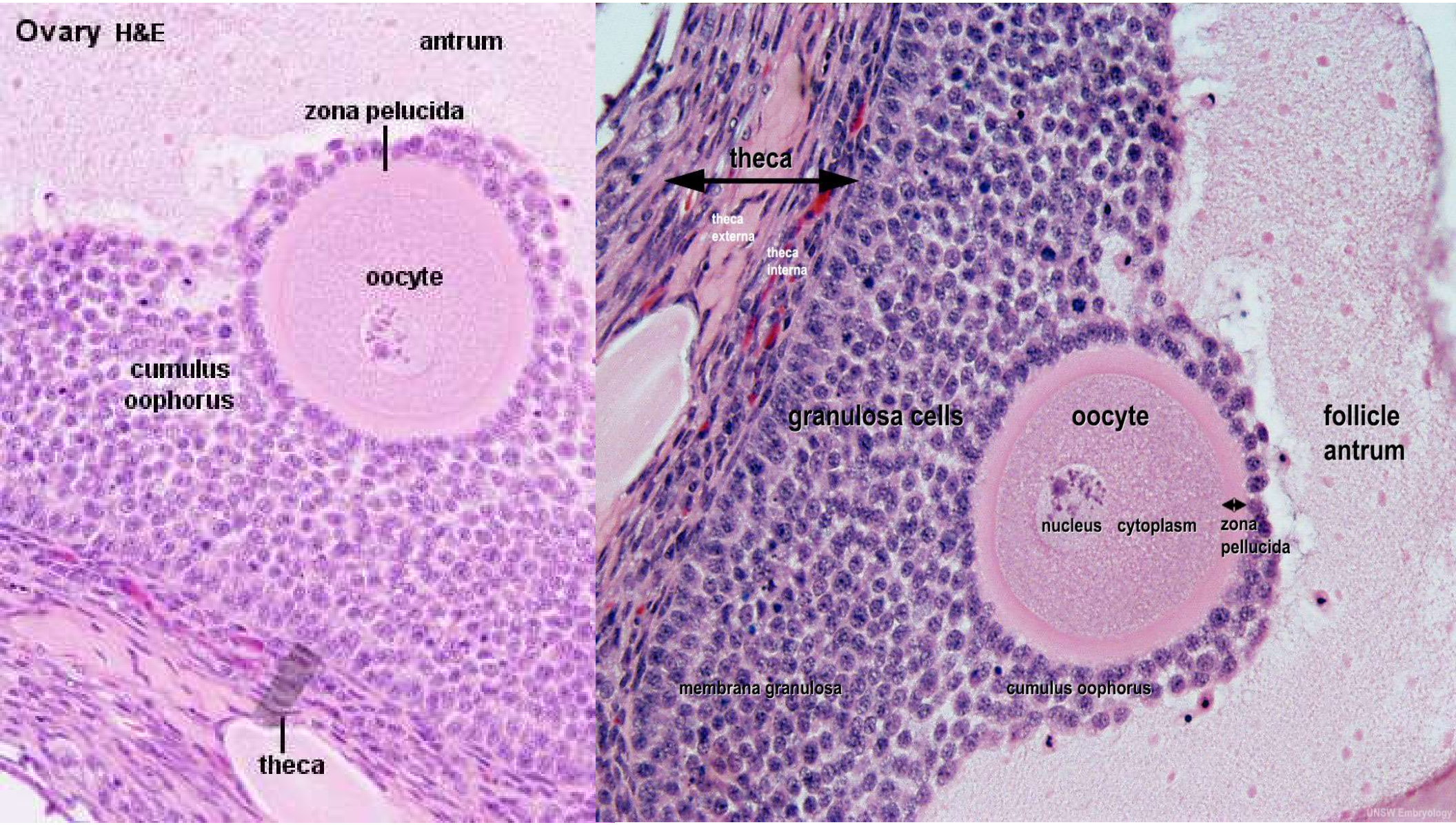

germinal epithelium
cortical stroma
primordial follicles
oocyte nuclei
atretic follicle
cortical stroma
primary follicle

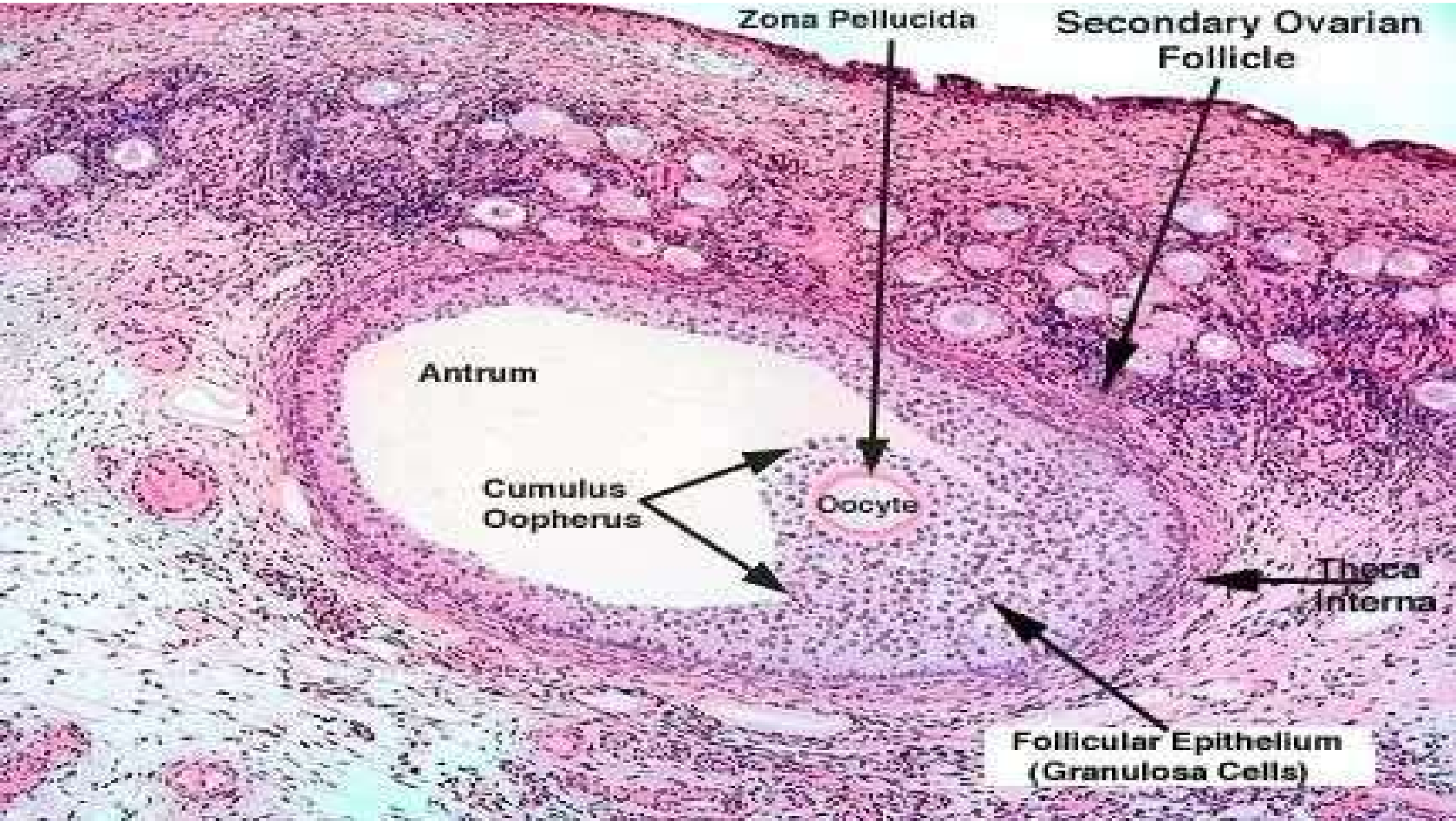

Primary Follicle
Oocyte
Follicular Cell

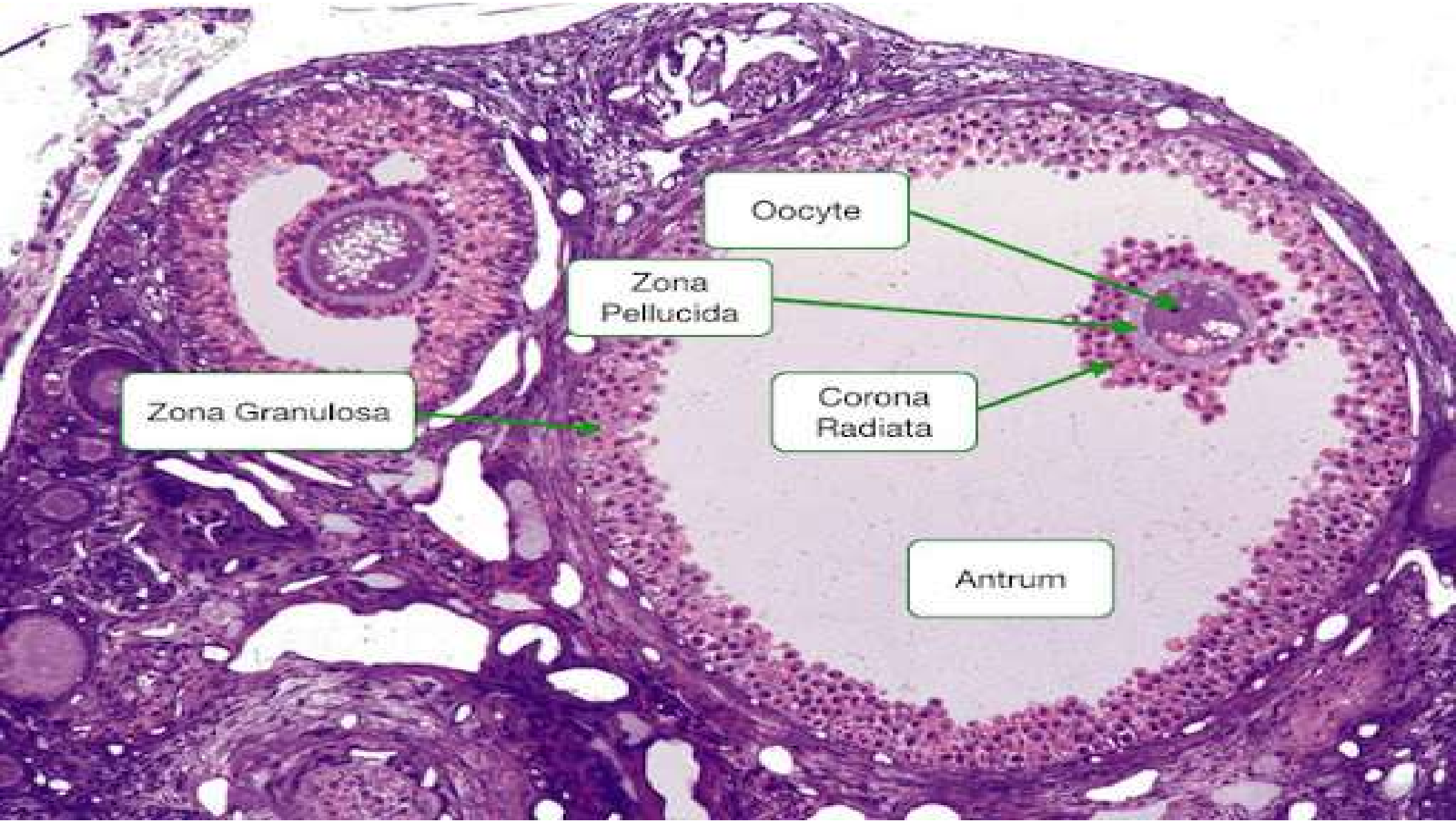

Primordial Follicle
Oocyte
Follicular Cell

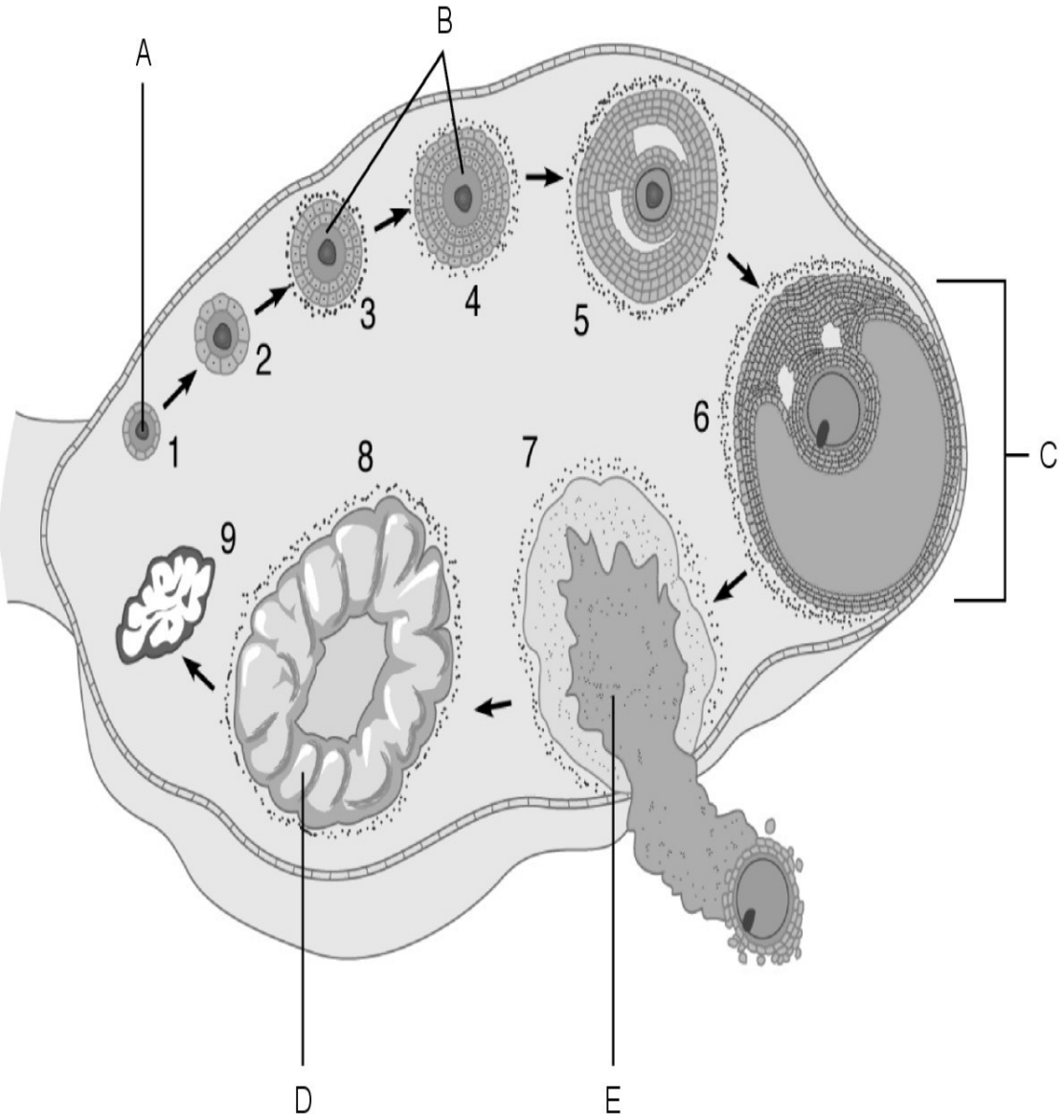

Oocyte
Zona Pellucida
Follicular Cells = Zona Granulosa


zona pellucida
granulosa cells
flattened follicular cells
1ry oocyte
primordial follicle
primary follicles
theca layers
Slide 92b x 400

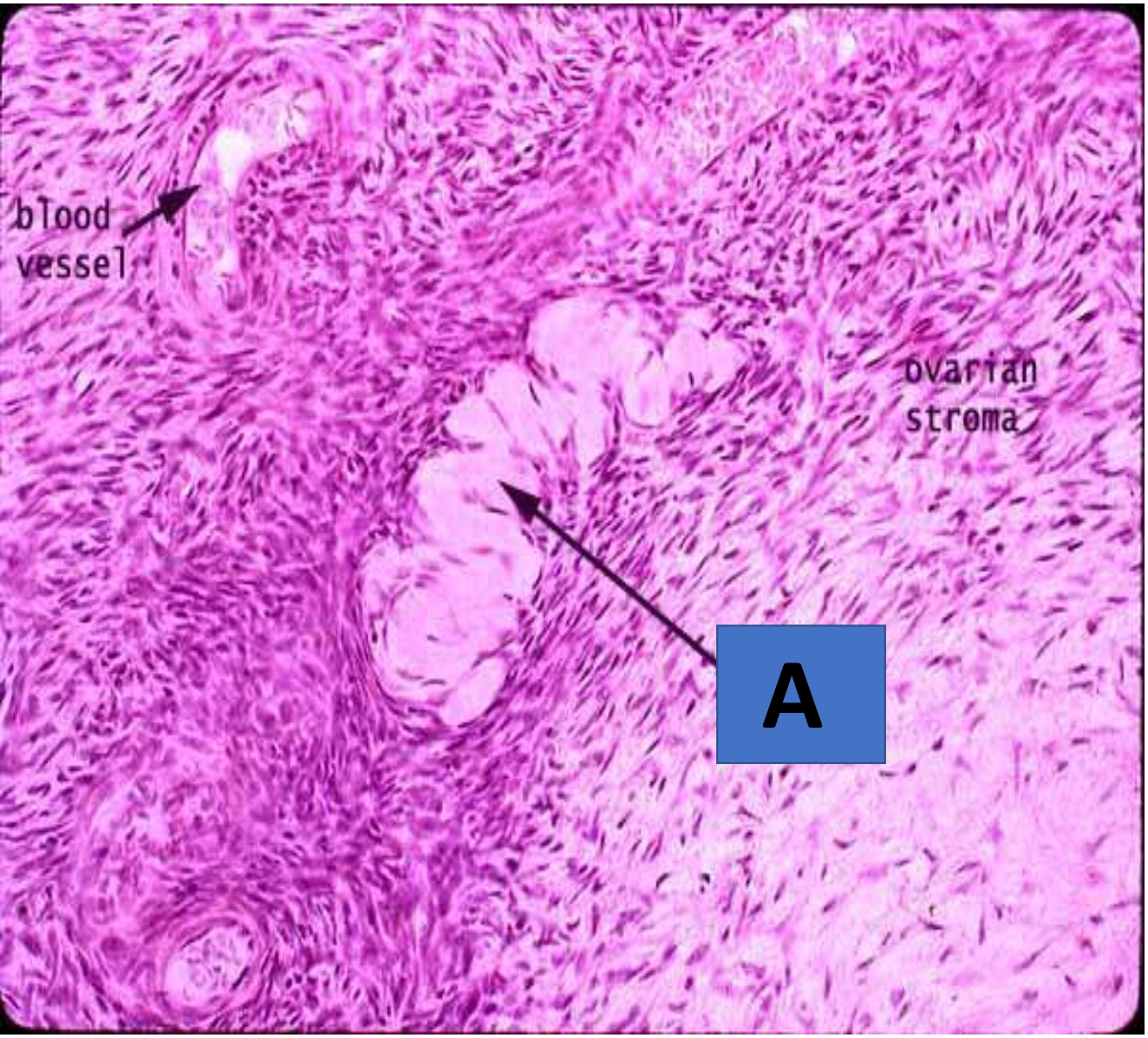

Ovary H&E
antrum
zona pelucida
oocyte
cumulus oophorus
theca
theca
theca externa
theca interna
granulosa cells
oocyte
follicle antrum
nucleus
cytoplasm
zona pellucida
membrana granulosa
cumulus oophorus
UNSW Embryology


Zona Pellucida
Secondary Ovarian Follicle
Antrum
Cumulus Oophorus
Oocyte
Theca Interna
Follicular Epithelium (Granulosa Cells)


Oocyte
Zona Pellucida
Zona Granulosa
Corona Radiata
Antrum




63) The stage called ovulation.
Answer: E
64) Vesicular (Graafian) follicle.
Answer: C
65/Primary follicles.
Answer: B
66) Primordial follicle.
Answer: A




67/IdentifY structure A

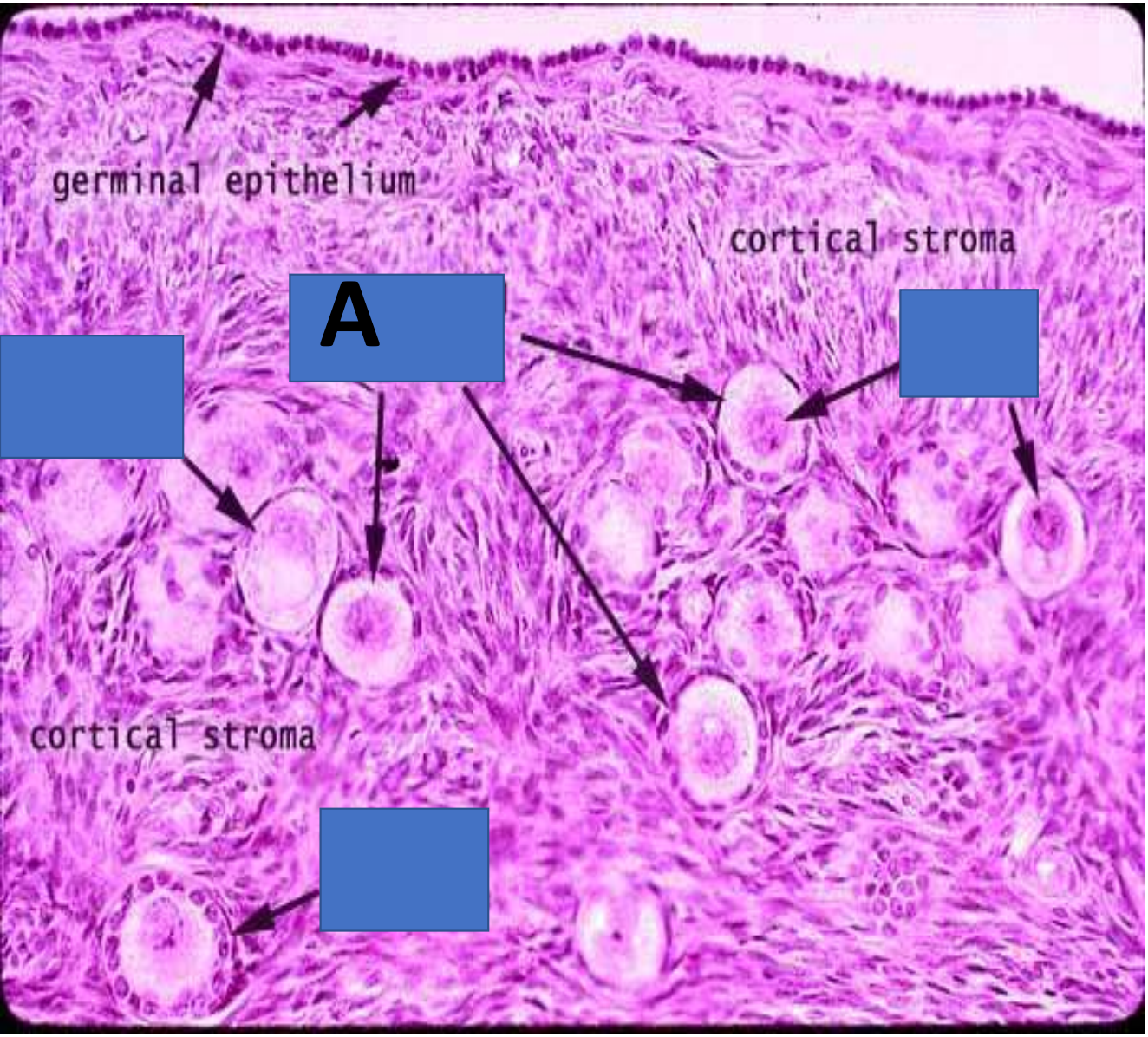
A/CORPUS ALBICANS

B/CORPUS LUTEUM

C/CORPUS MAGELUM

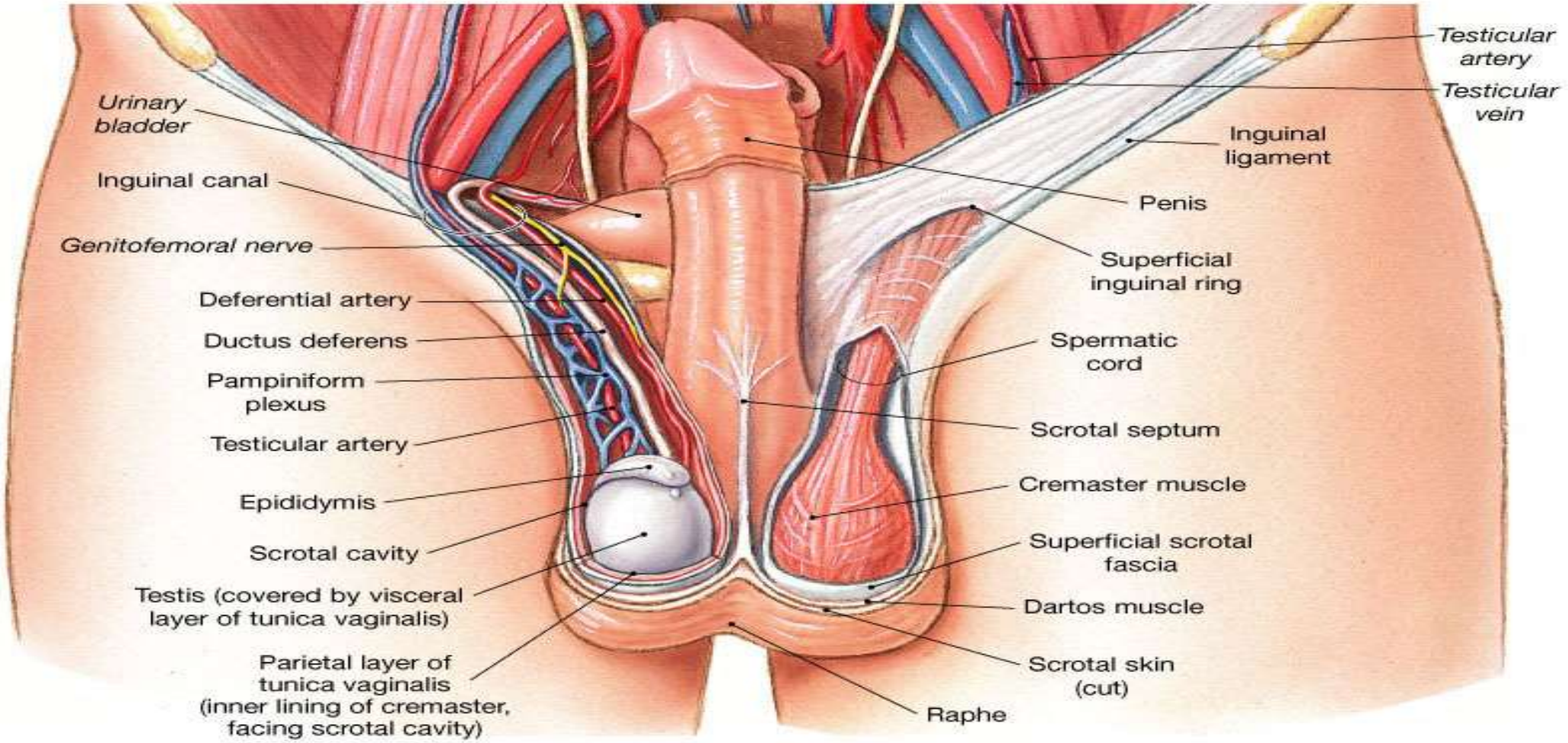
D/GRAFIAN VESICLE

E/PRIMARY FOLLICLE

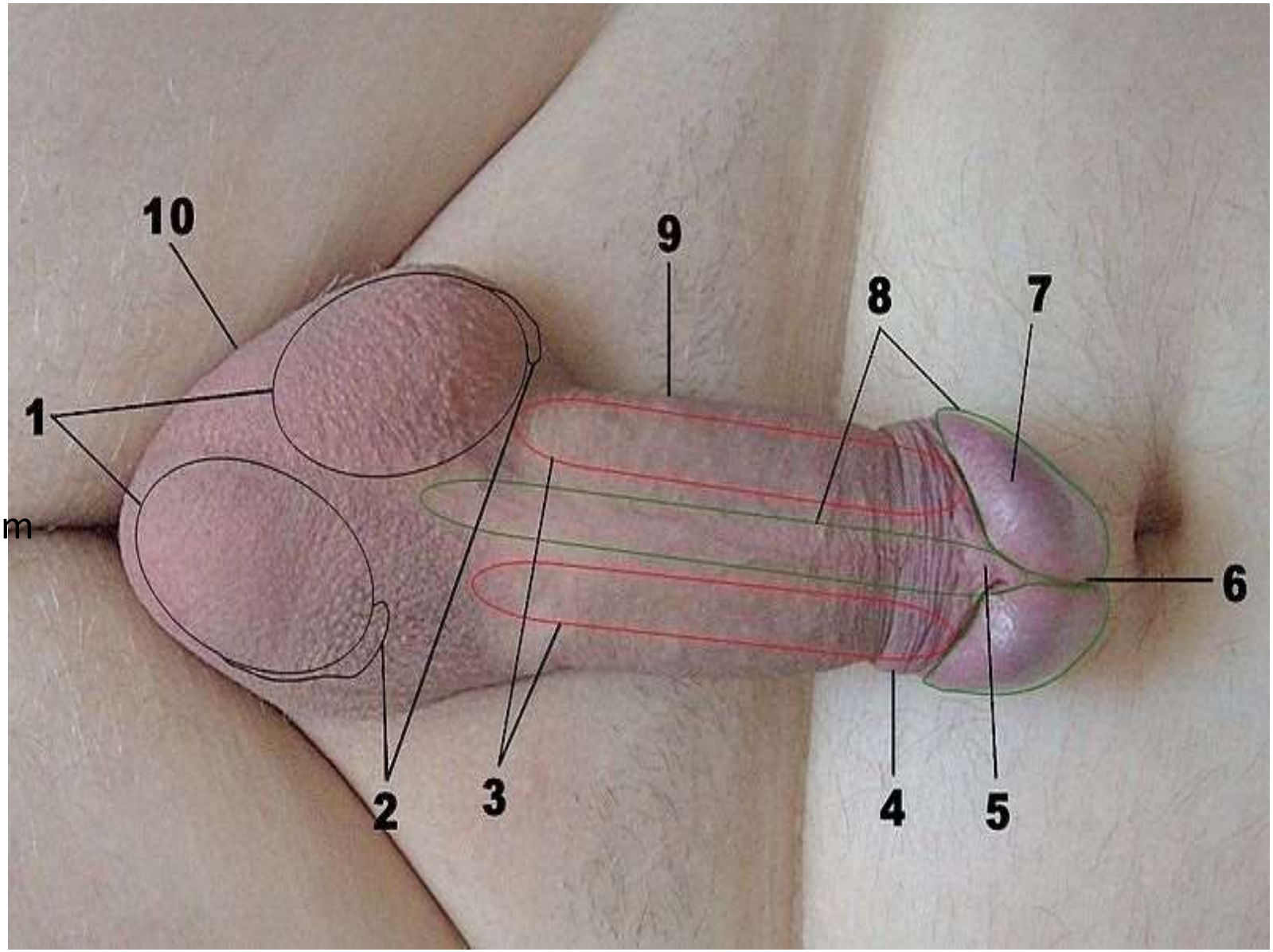



68/IDENTIFY A
A/SECONDARY FOLLICLES
B/PRIMARY FOLLICLE
C/TERTIARY FOLLICLES
D/ATRETIC FOLLICLE

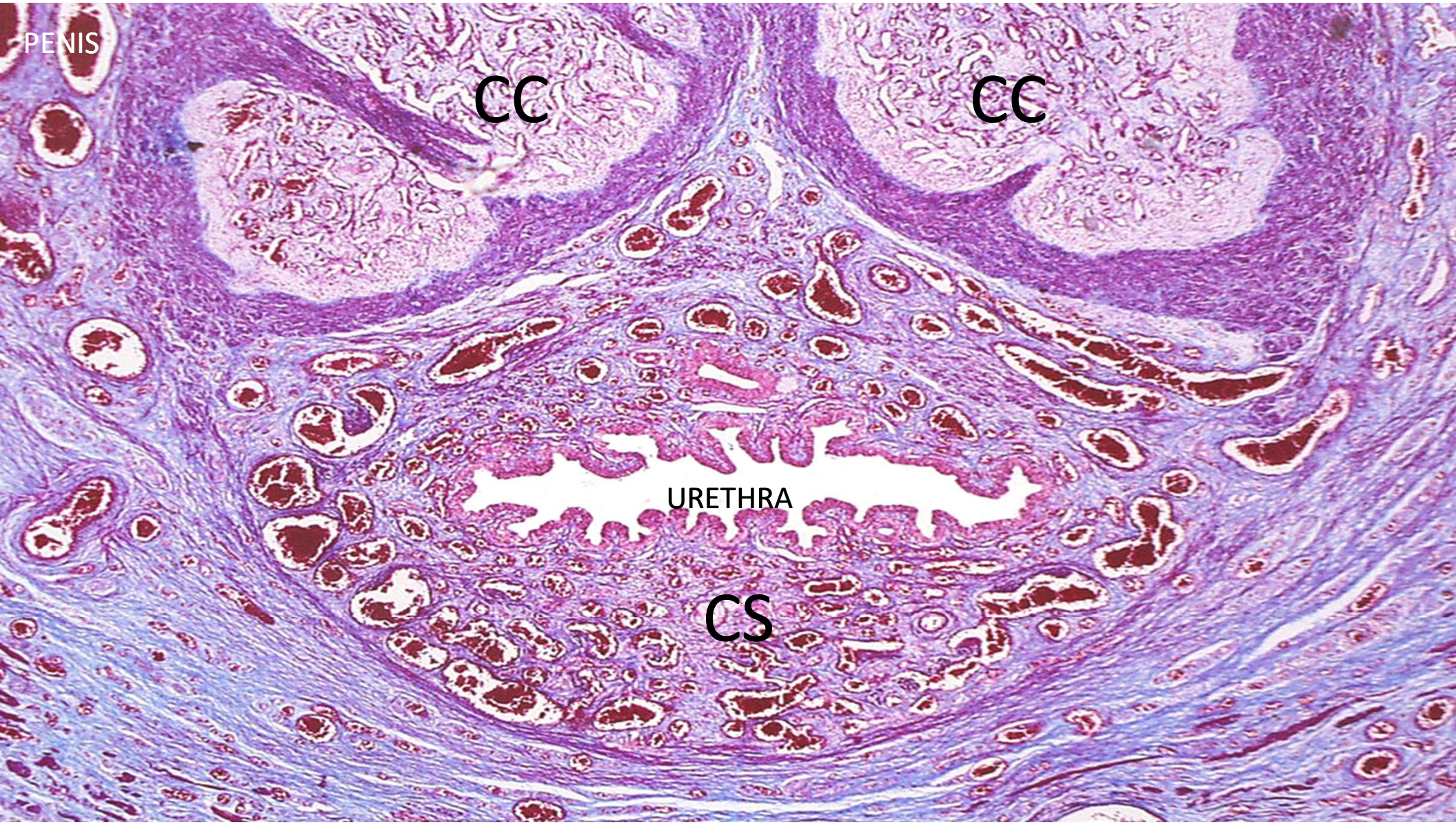
# The Male Reproductive System in Anterior View



1. Testicles
2. Epididymis
3. Corpus cavernosa
4. Foreskin
5. Frenulum
6. Urethral opening
7. Glans penis
8. Corpus spongiosum
9. Penis
10. Scrotum

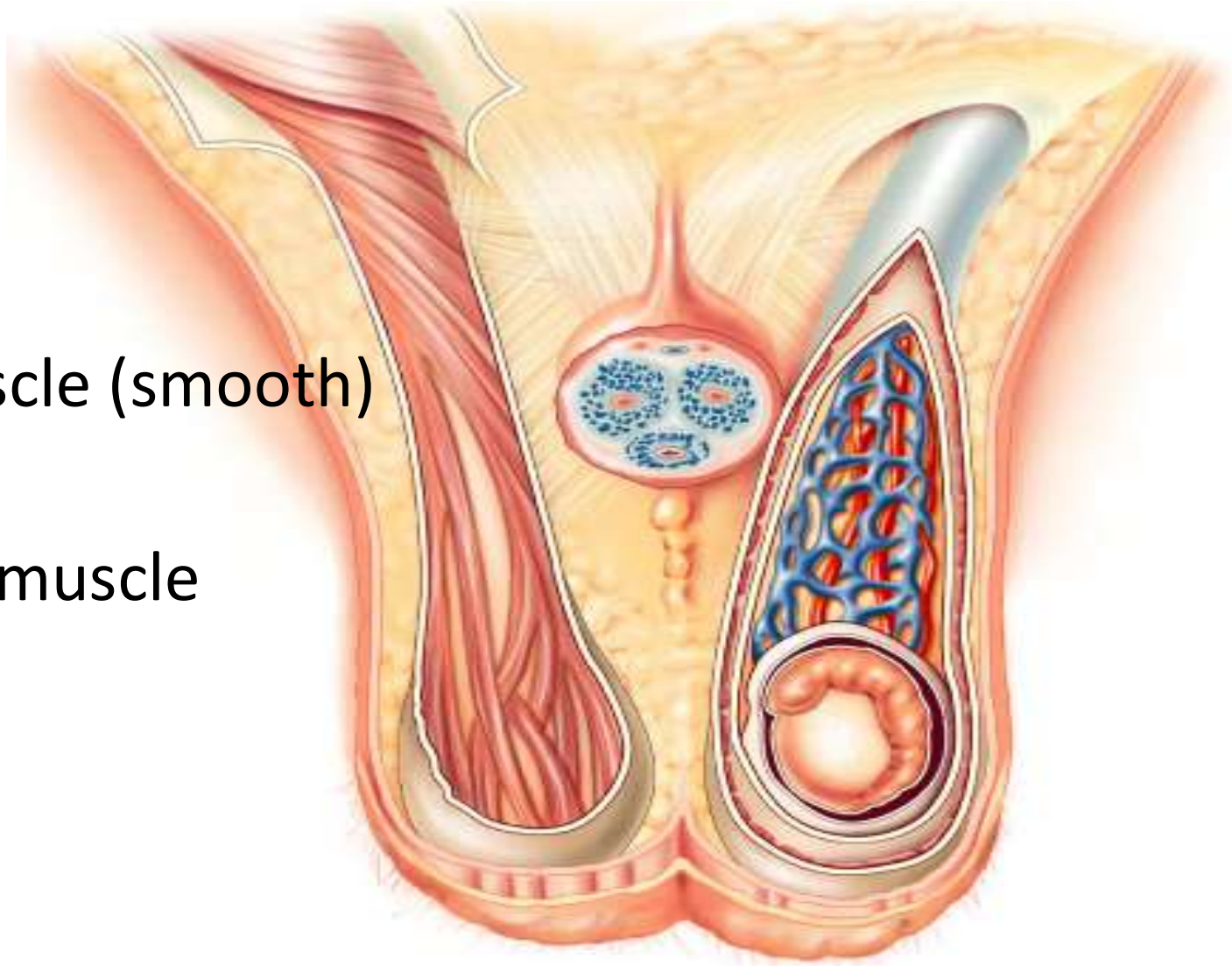


**A view of the frenulum, foreskin retracted**


PENIS
CC
CC
URETHRA
CS

# Scrotum

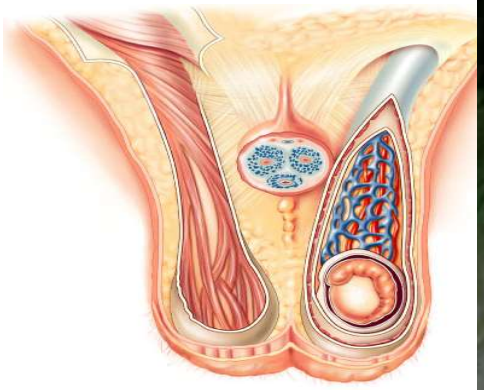
- Skin
- Dartos muscle (smooth)
- Septum
- Cremaster muscle (skeletal)



24.2

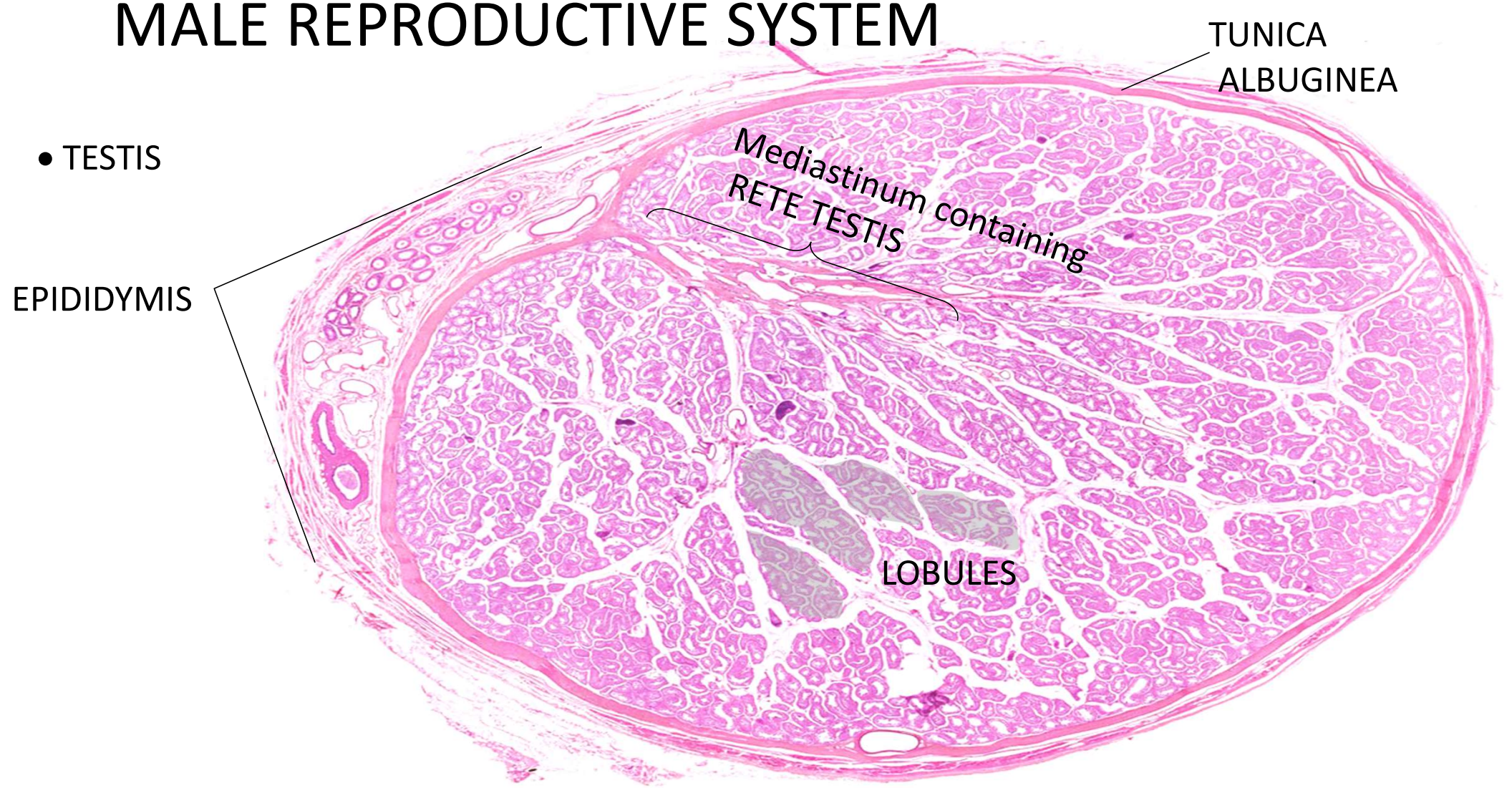
# Scrotum

- Temperature
  - Optimal for sperm development is 3°C below body temp (~91 F)
  - Controlled by muscles
- Spermatic cord
  - Testicular artery
  - Plexus of veins
  - Nerves
  - vas deferens



24.2

# MALE REPRODUCTIVE SYSTEM

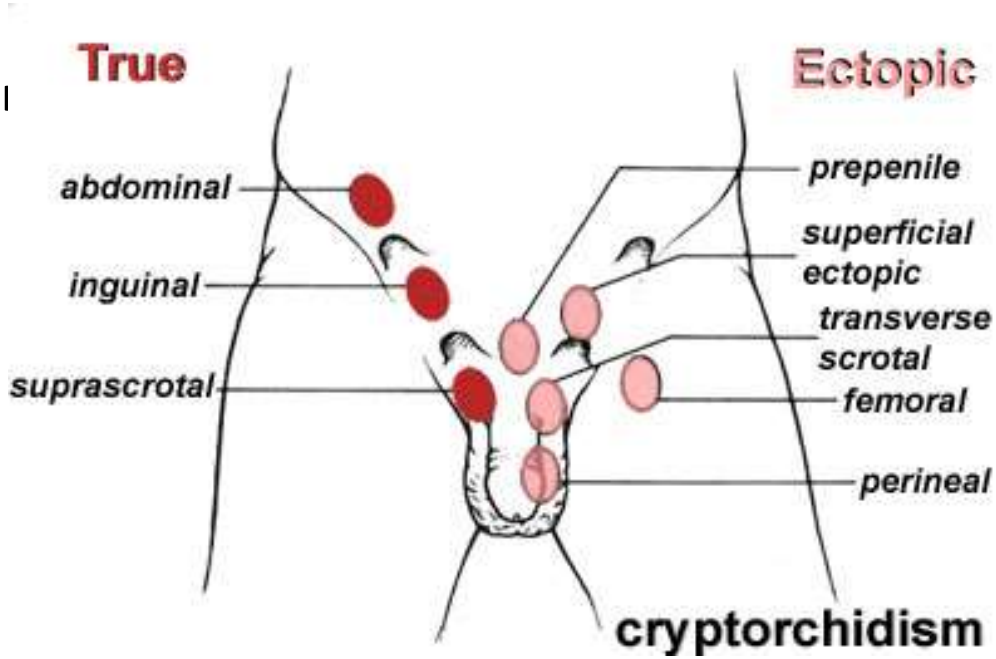


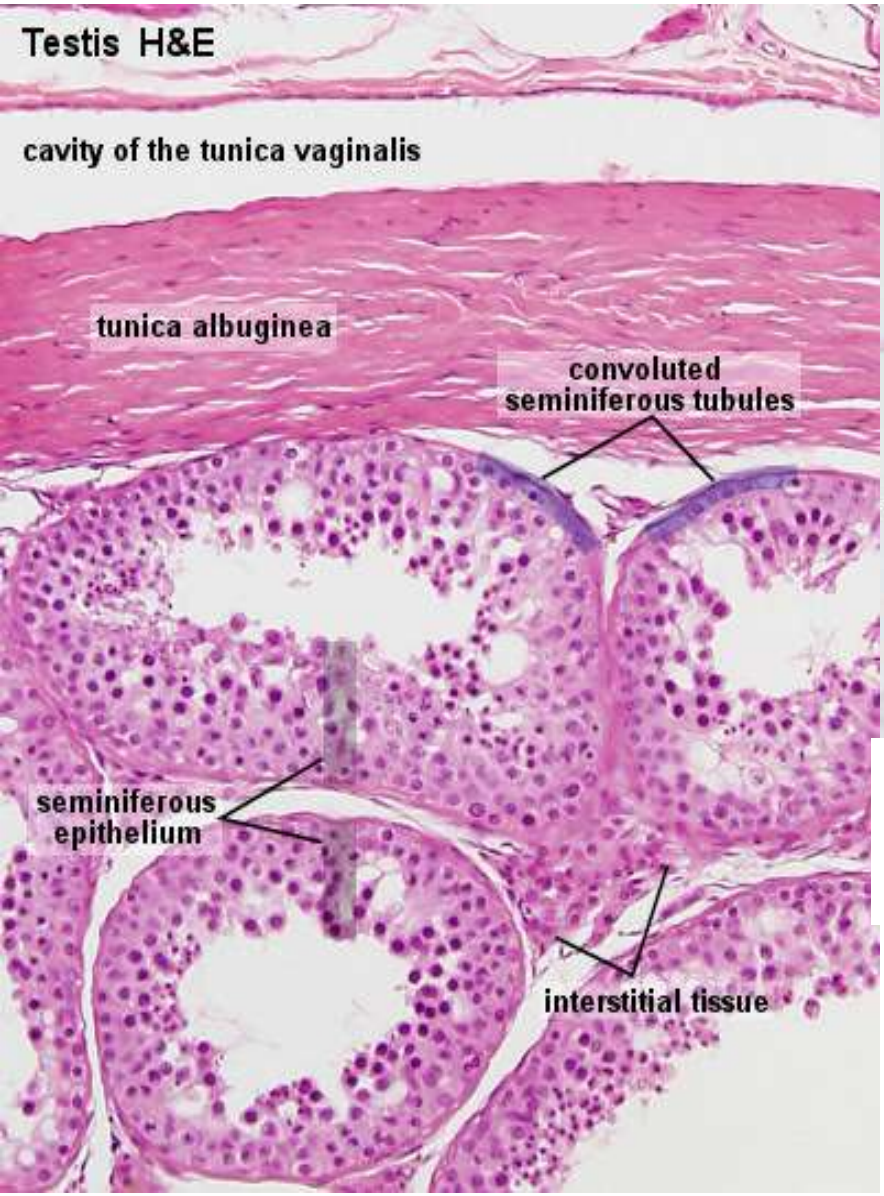
- Testes are formed in abdomen and descend into scrotum at 7th month of development

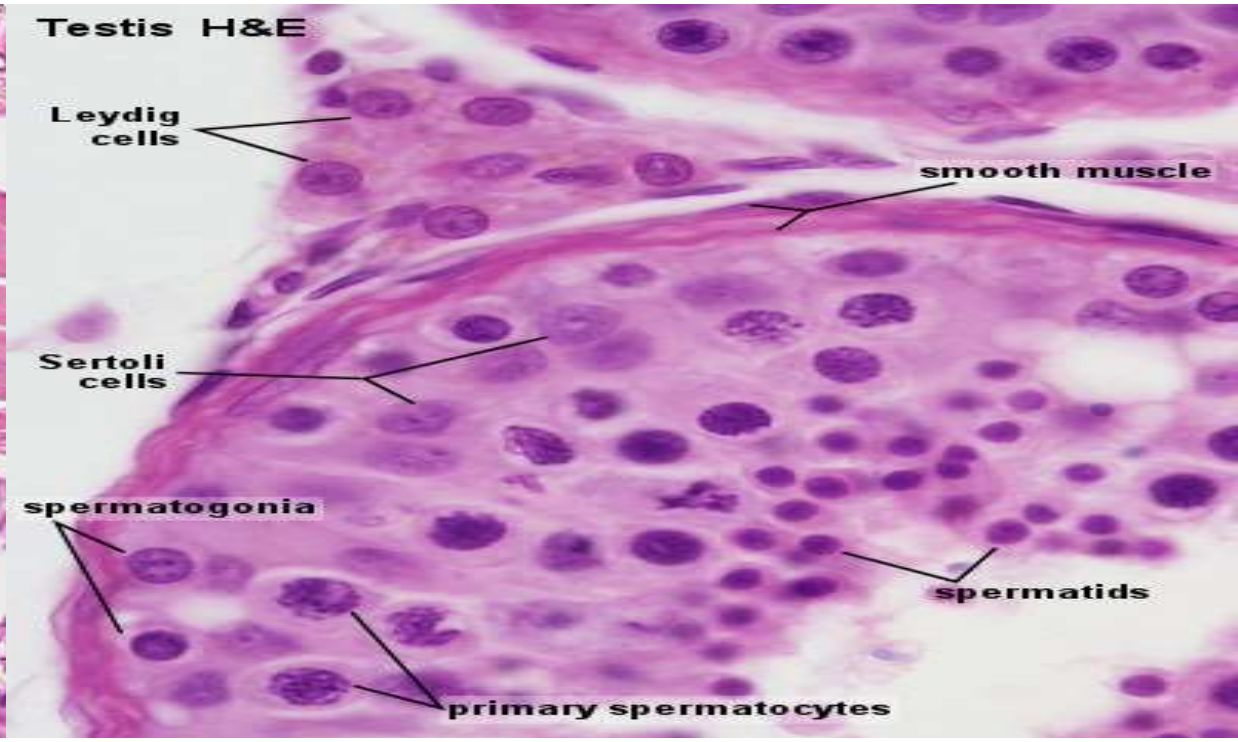
- Temperature in scrotum is slightly lower than in body

- Spermatogenesis (formation of sperm)
  - sperm-forming cells
  - Sertoli cells
  - interstitial cells-produce testoste

- Process takes about 9 weeks

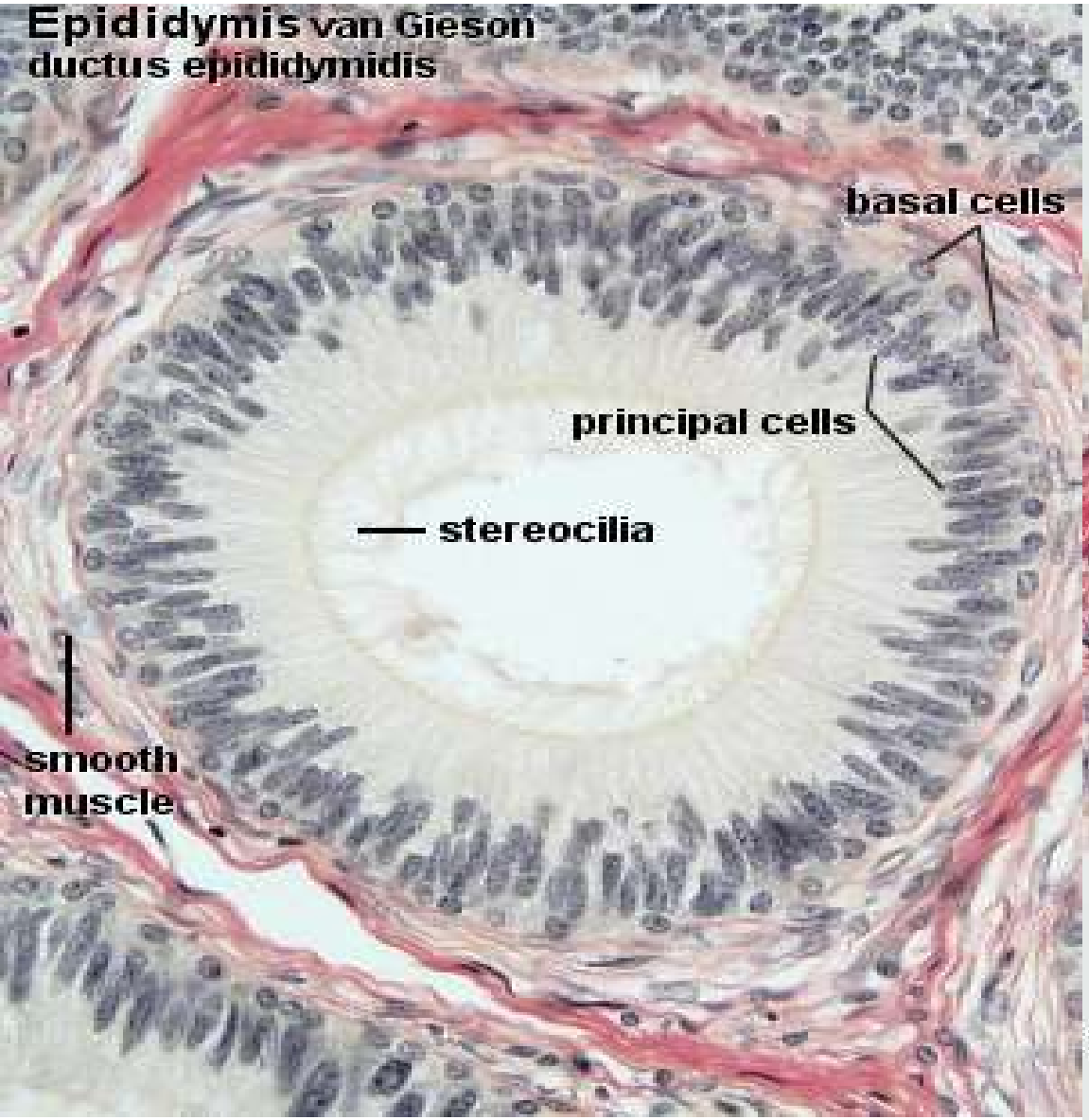


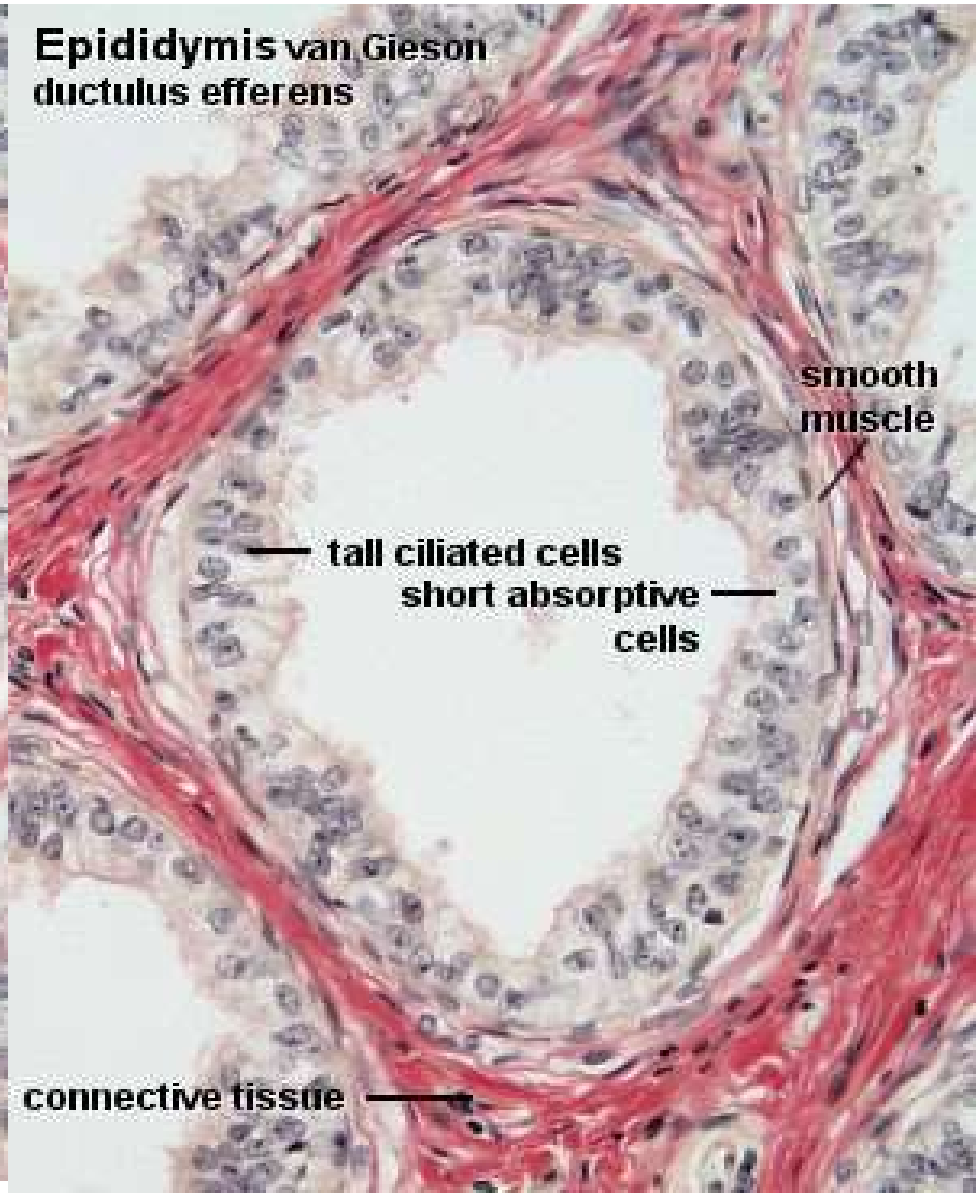


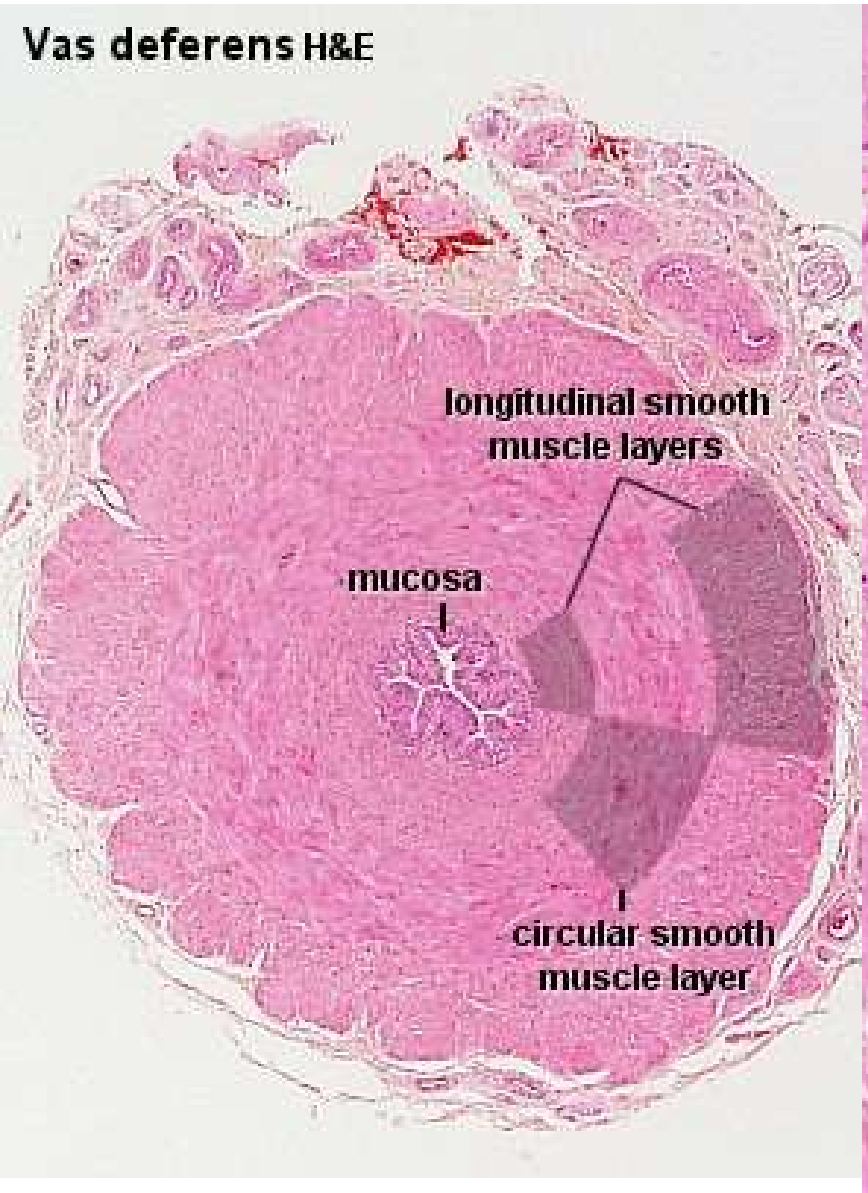



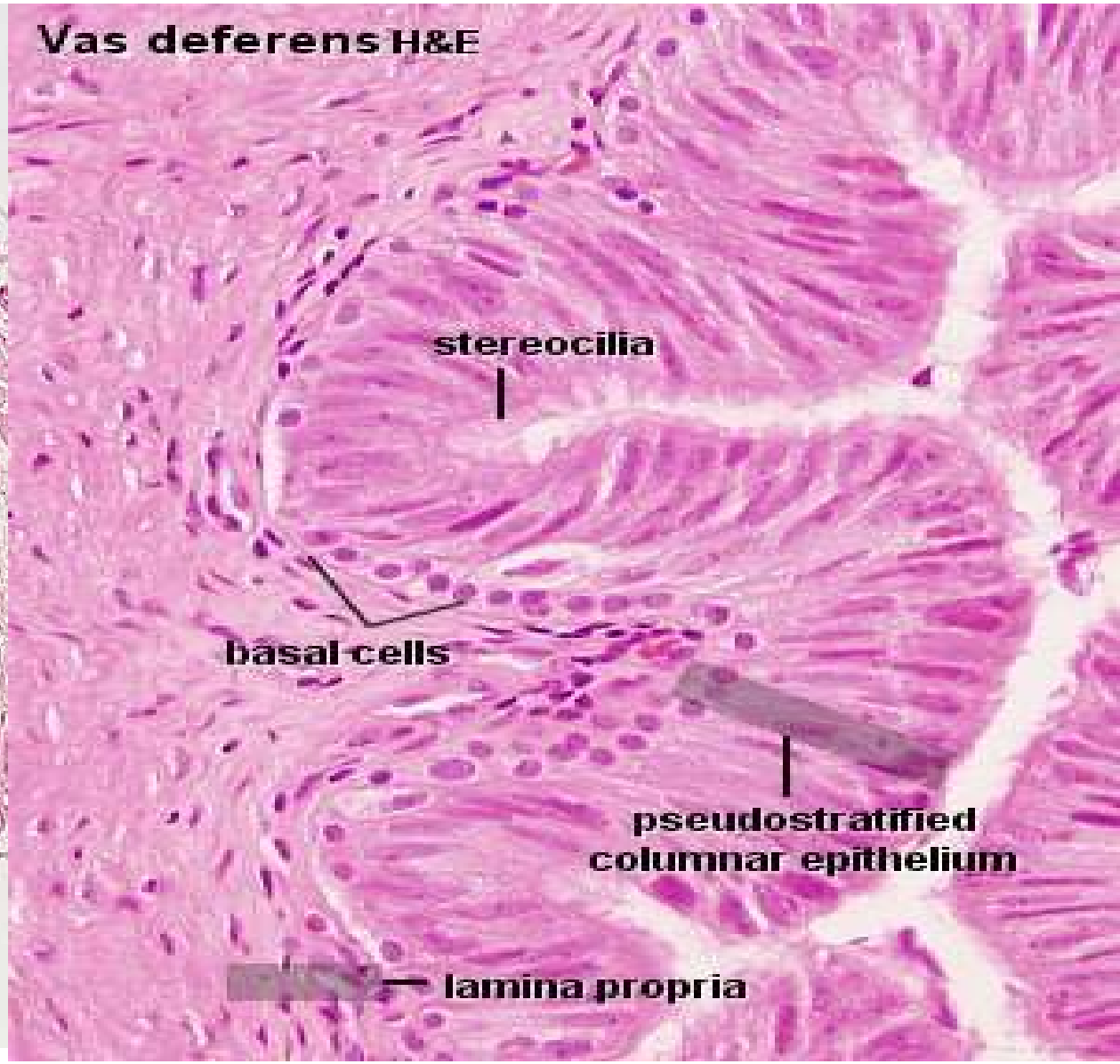

Sertoli cells facilitate the progression of germ cells to spermatozoa via direct contact and by controlling the environment milieu within the seminiferous tubules. The regulation of spermatogenesis by FSH and testosterone occurs by the action of these hormones on the Sertoli cells.

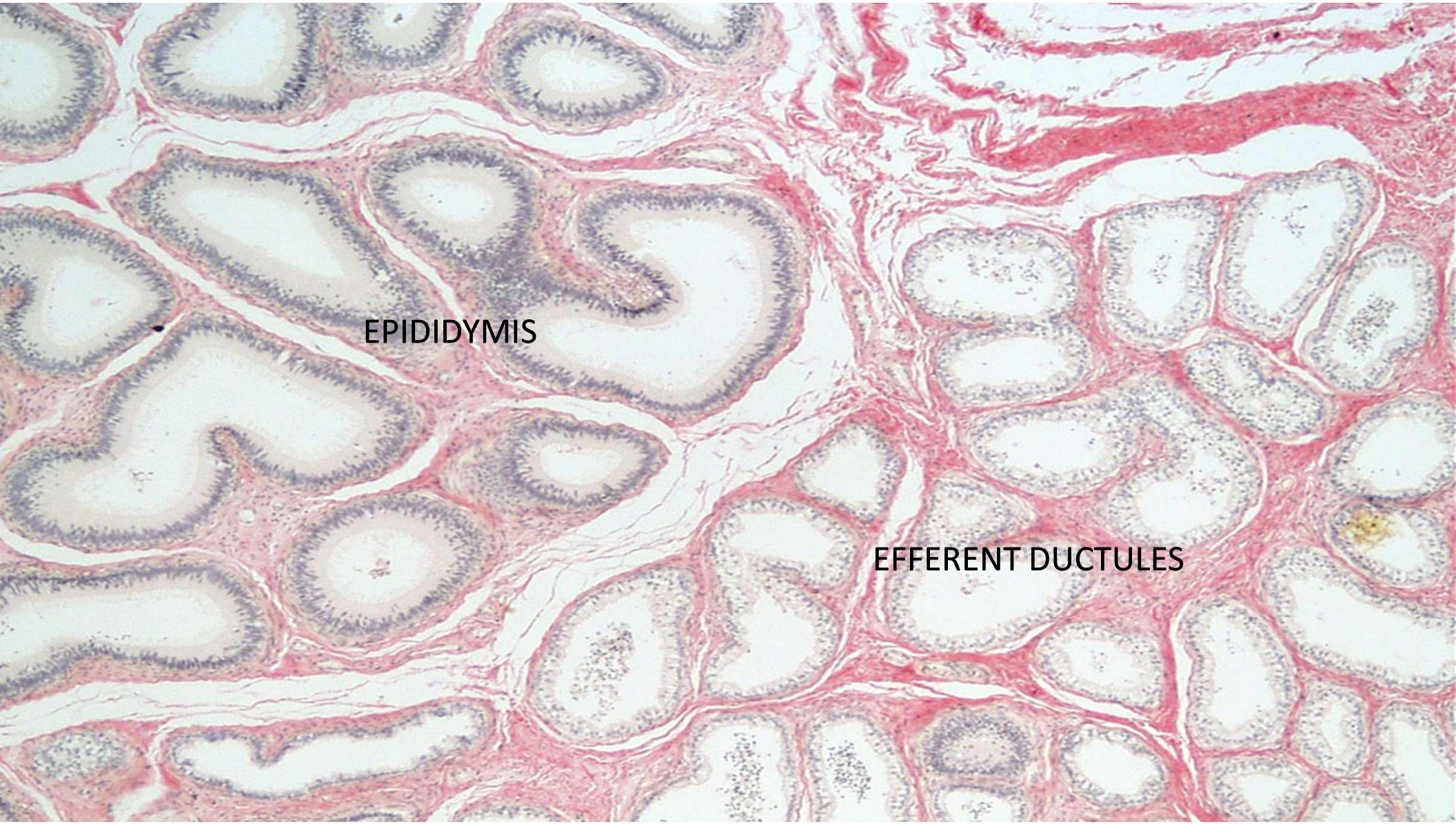
Interstitial or Leydig cells are located in the connective tissue surrounding the seminiferous tubules. They produce testosterone, the male sex hormone responsible for the growth and maintenance of the cells of the germinal epithelium and the development of secondary sex characteristics.

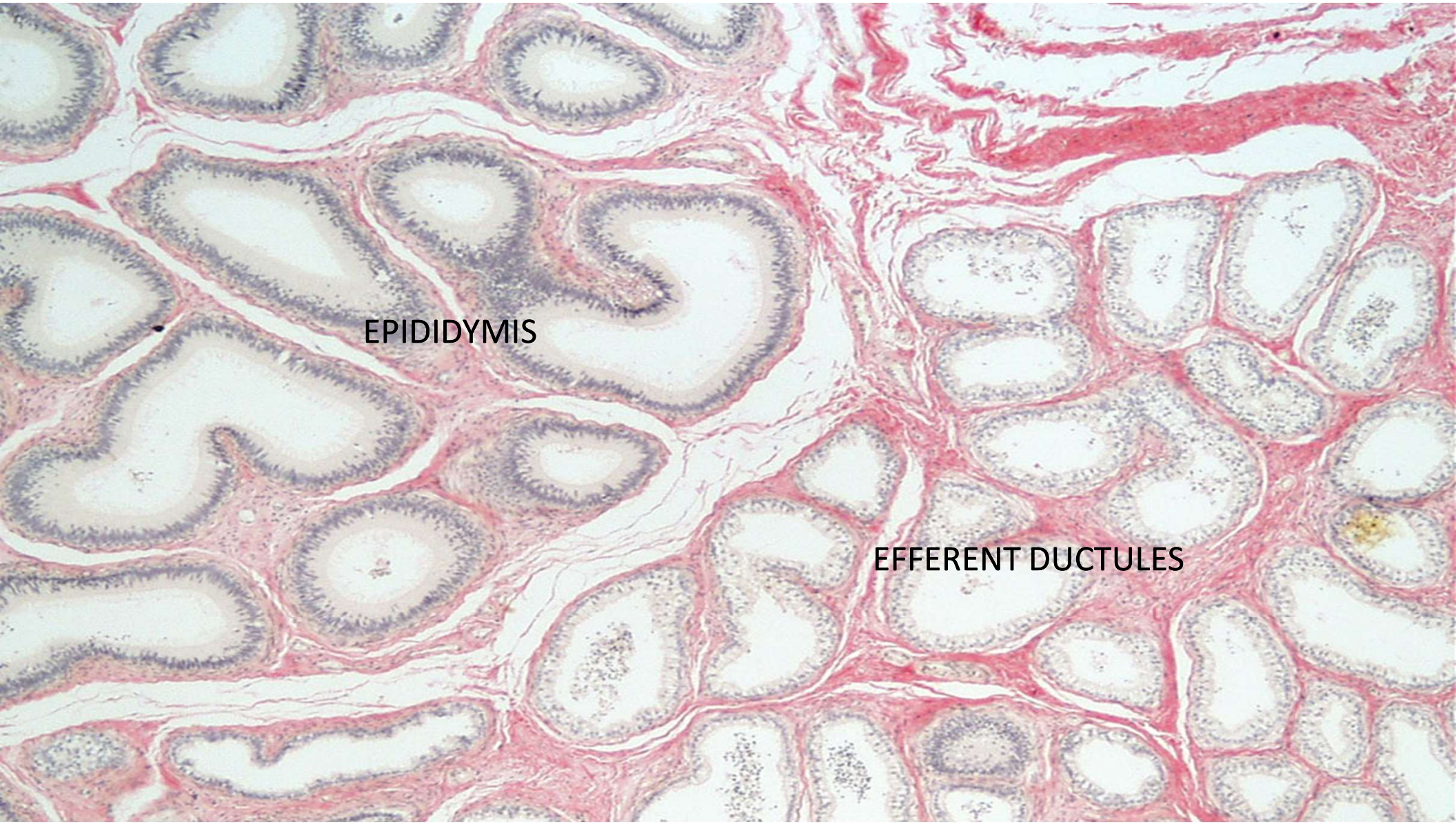

Epididymis van Gieson
ductus epididymidis
basal cells
principal cells
stereocilia
smooth muscle


Epididymis van Gieson
ductulus efferens
smooth muscle
tall ciliated cells
short absorptive cells
connective tissue

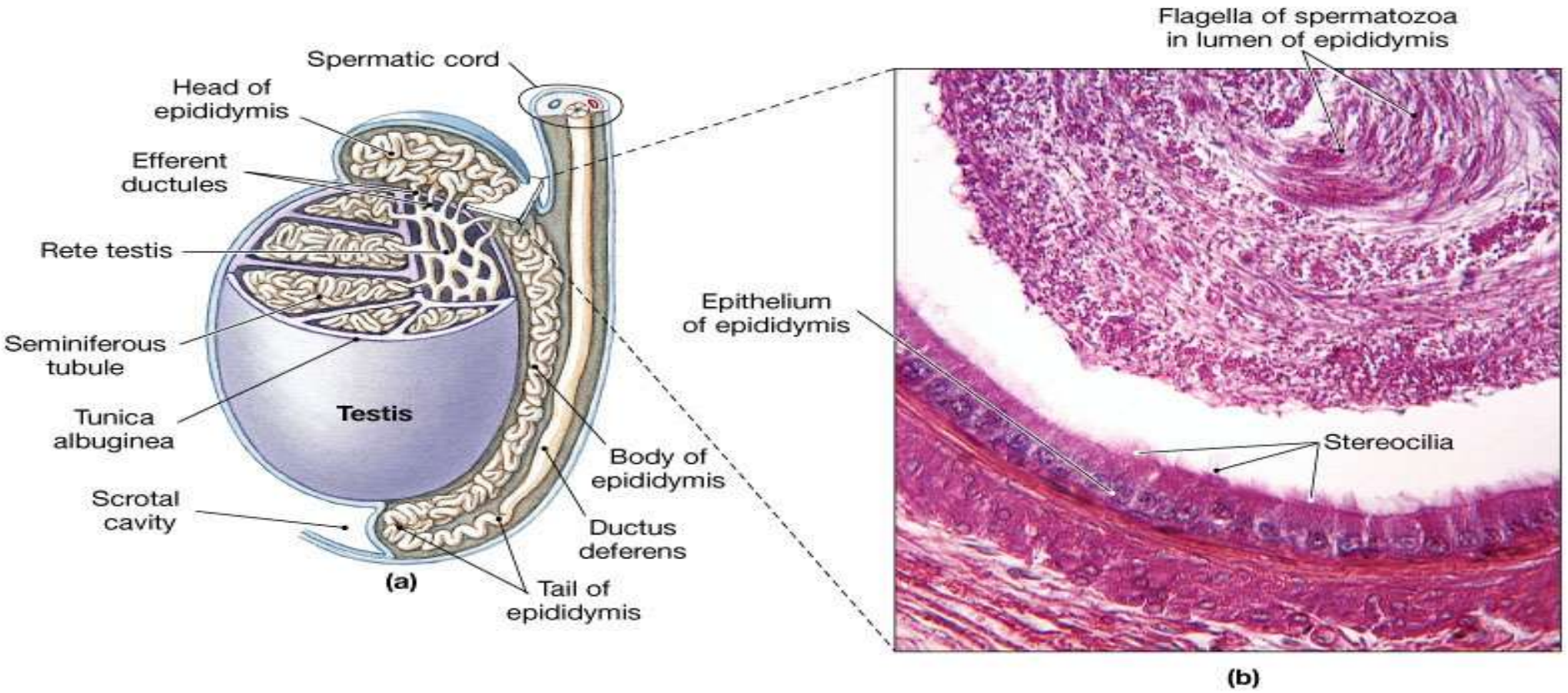

Vas deferens H&E
longitudinal smooth muscle layers
mucosa
circular smooth muscle layer


Vas deferens H&E
stereocilia
basal cells
pseudostratified columnar epithelium
lamina propria


EPIDIDYMIS
EFFERENT DUCTULES


EPIDIDYMIS
EFFERENT DUCTULES

# The Epididymus



# BulbourethralGlands (Cowper's Glands)

- Pea-sized glands inferior to the prostate
- Produce thick, clear, alkaline mucus prior to

ejaculation that neutralizes traces of acidic urine in the urethra

# Contents of Semen

- Typical ejaculate = 2-5 ml fluid
  - Contains between 20 – 100 million spermatozoa per ml
- Seminal fluid
  - A distinct ionic and nutritive glandular secretion

# MALE REPRODUCTIVE SYSTEM

- TESTIS

  TUNICA VAGINALIS

  TUNICA ALBUGINEA

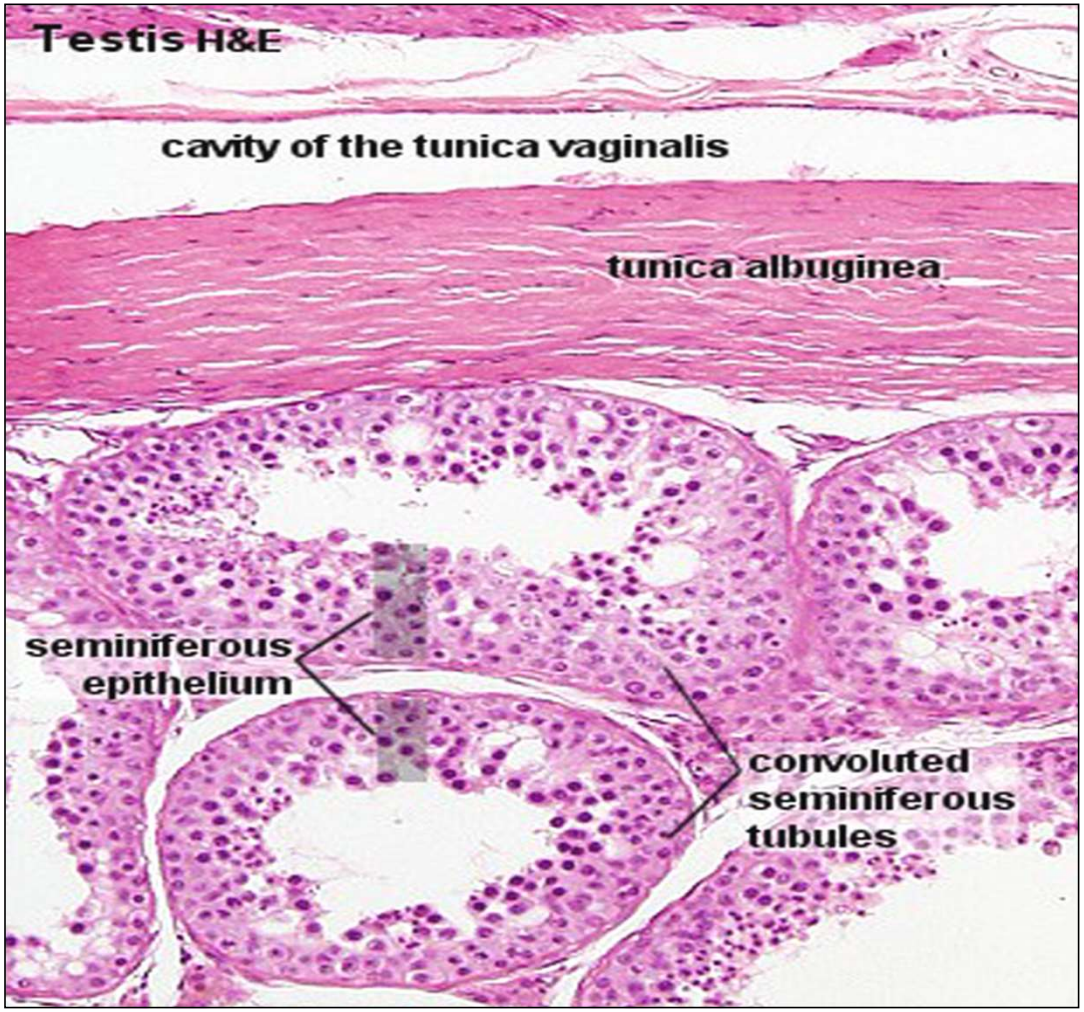
  SEMINIFEROUS TUBULES

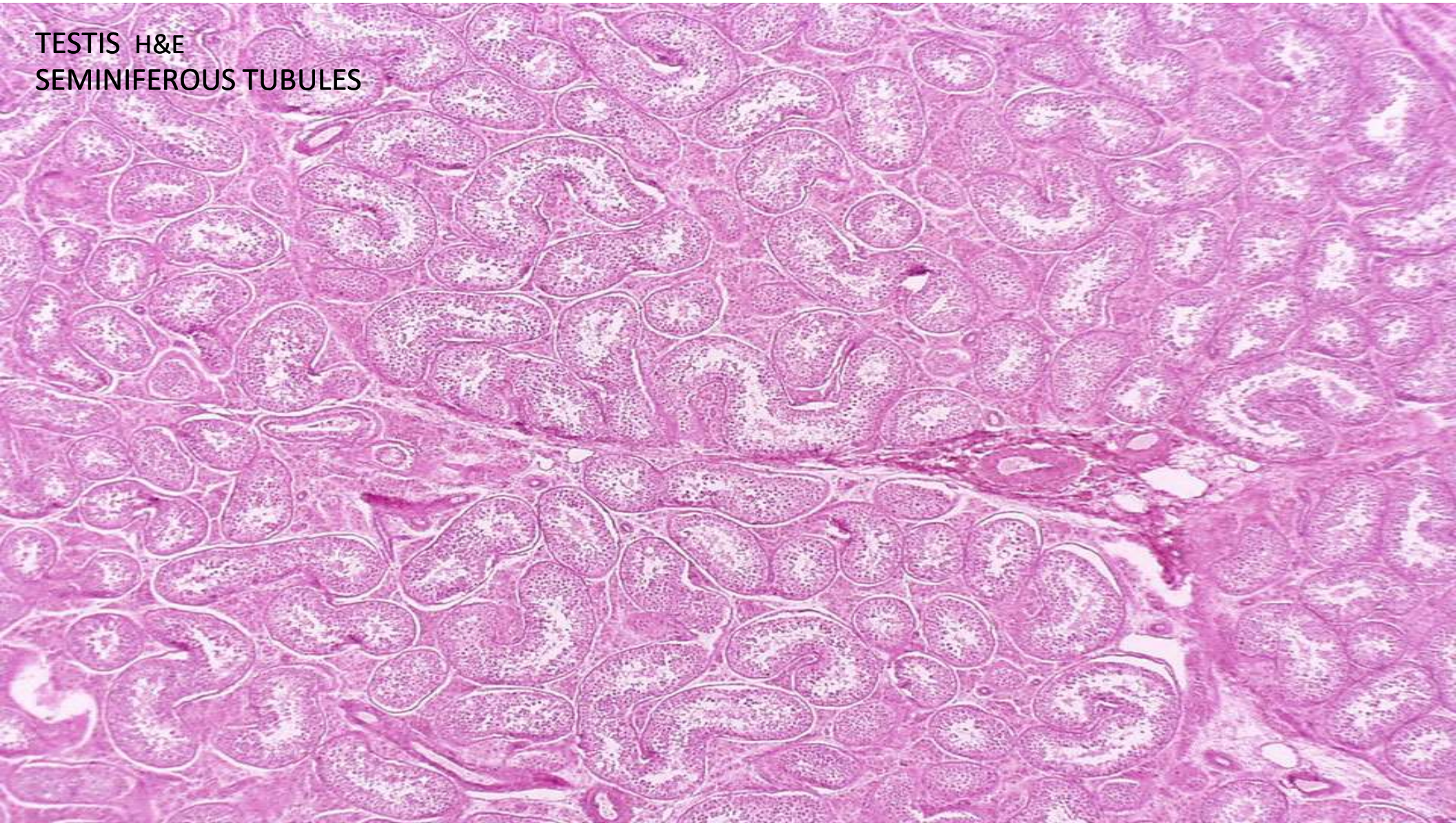
  SEMINIFEROUS EPITHELIUM

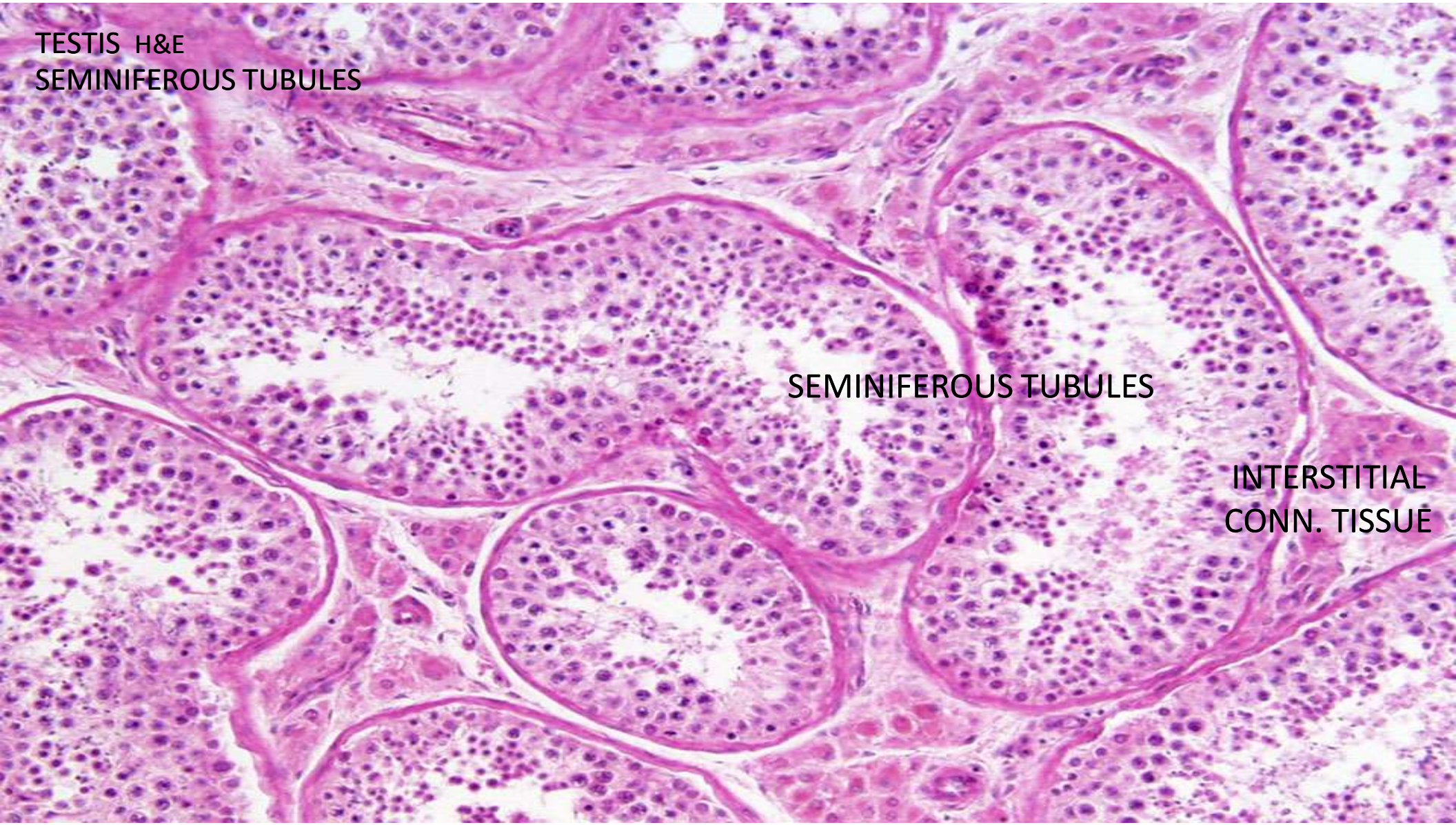
  - complex stratified epithelium containing two basic cell populations:

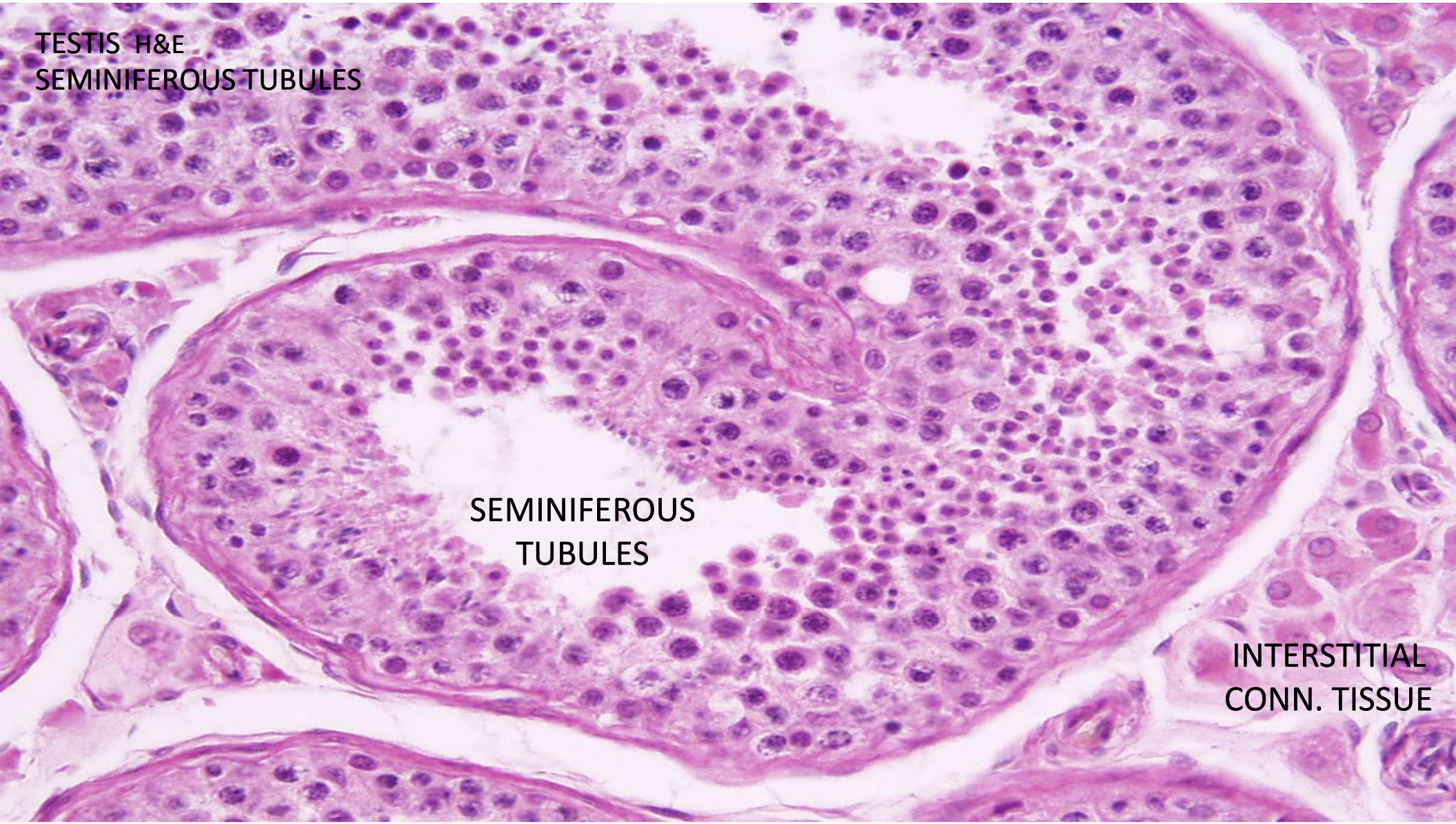
  (1) SPERMATOGENIC CELLS

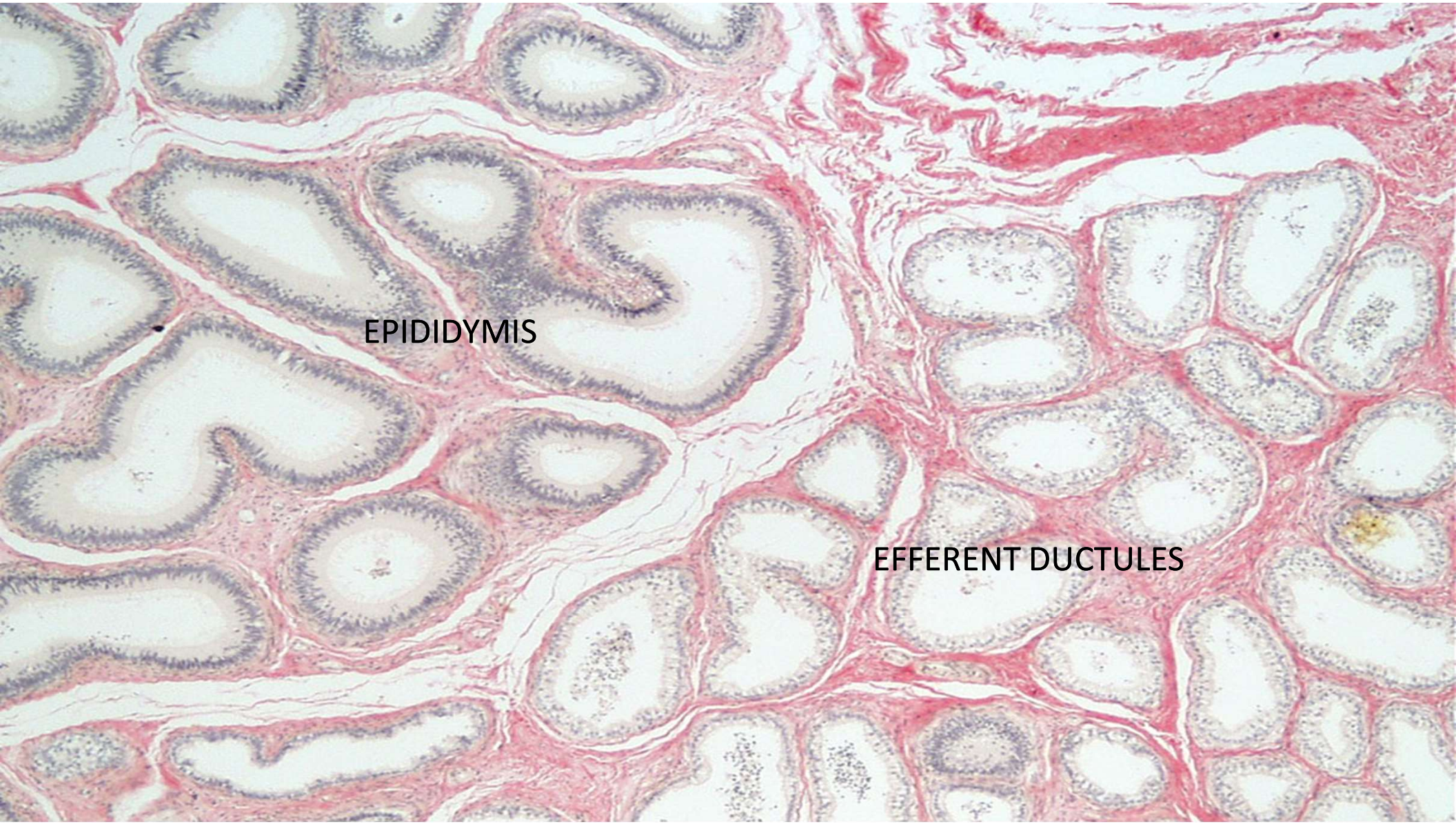
  (2) SERTOLI CELLS



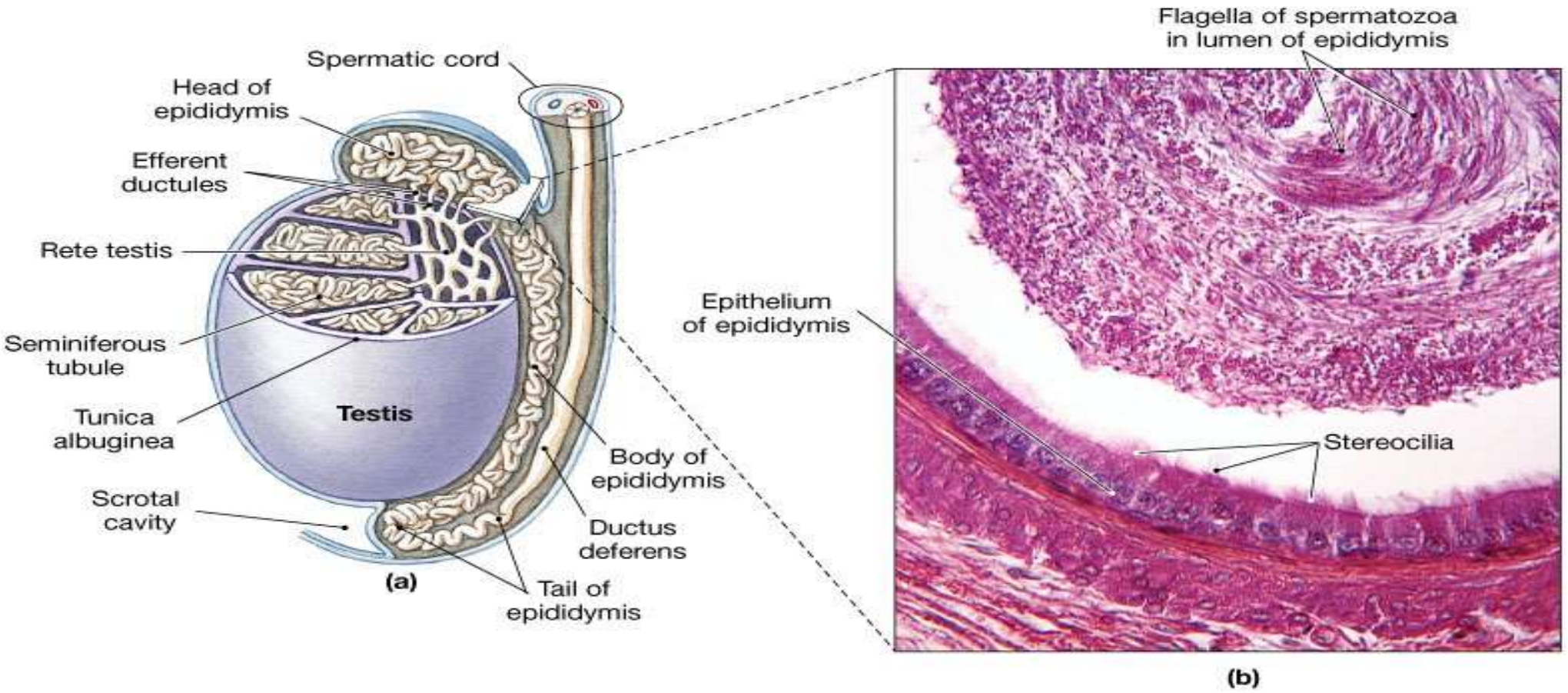

TESTIS H&E
SEMINIFEROUS TUBULES


TESTIS H&E
SEMINIFEROUS TUBULES
SEMINIFEROUS TUBULES
INTERSTITIAL
CONN. TISSUE


TESTIS H&E
SEMINIFEROUS TUBULES
SEMINIFEROUS
TUBULES
INTERSTITIAL
CONN. TISSUE


EPIDIDYMIS
EFFERENT DUCTULES

# The Epididymus



# MALE REPRODUCTIVE SYSTEM

- TESTIS

  TUNICA VAGINALIS

  TUNICA ALBUGINEA

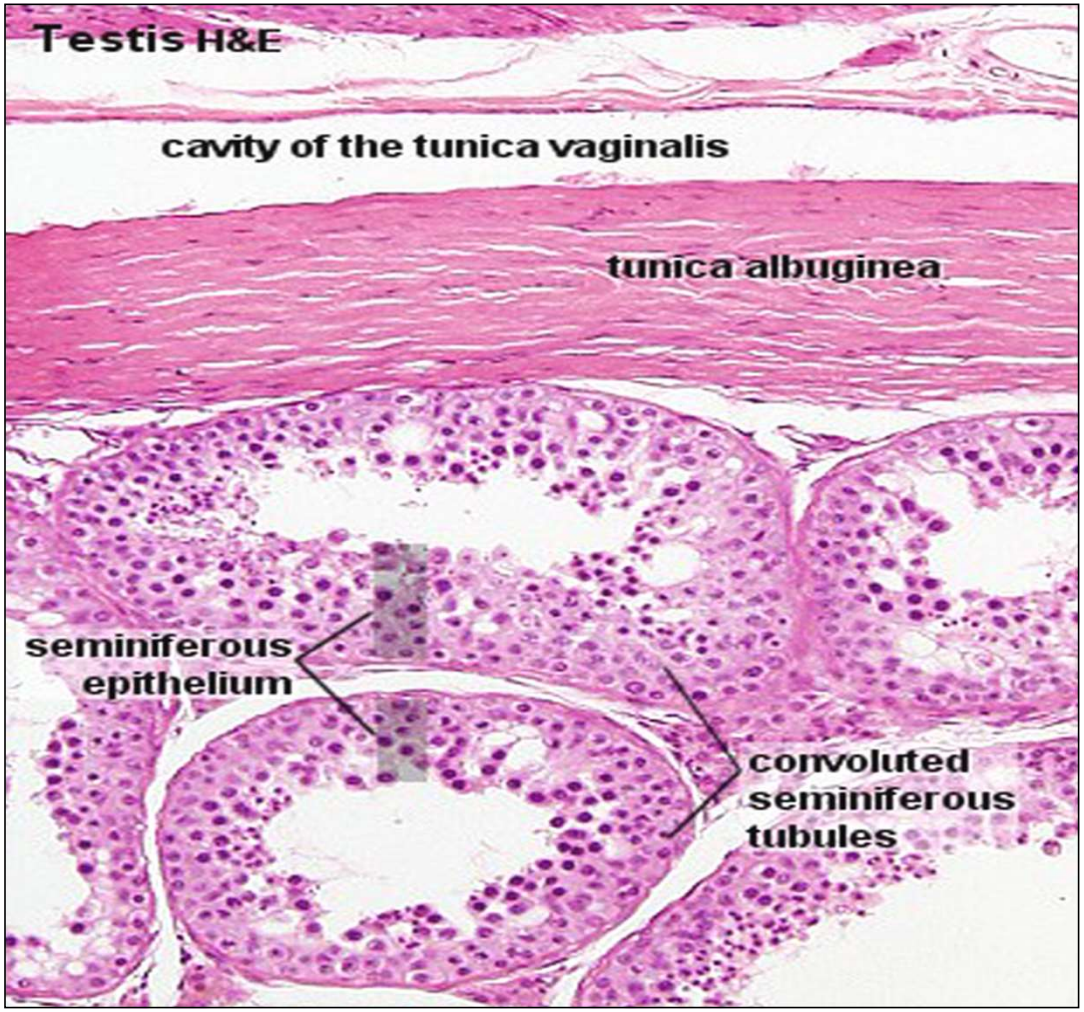
  SEMINIFEROUS TUBULES

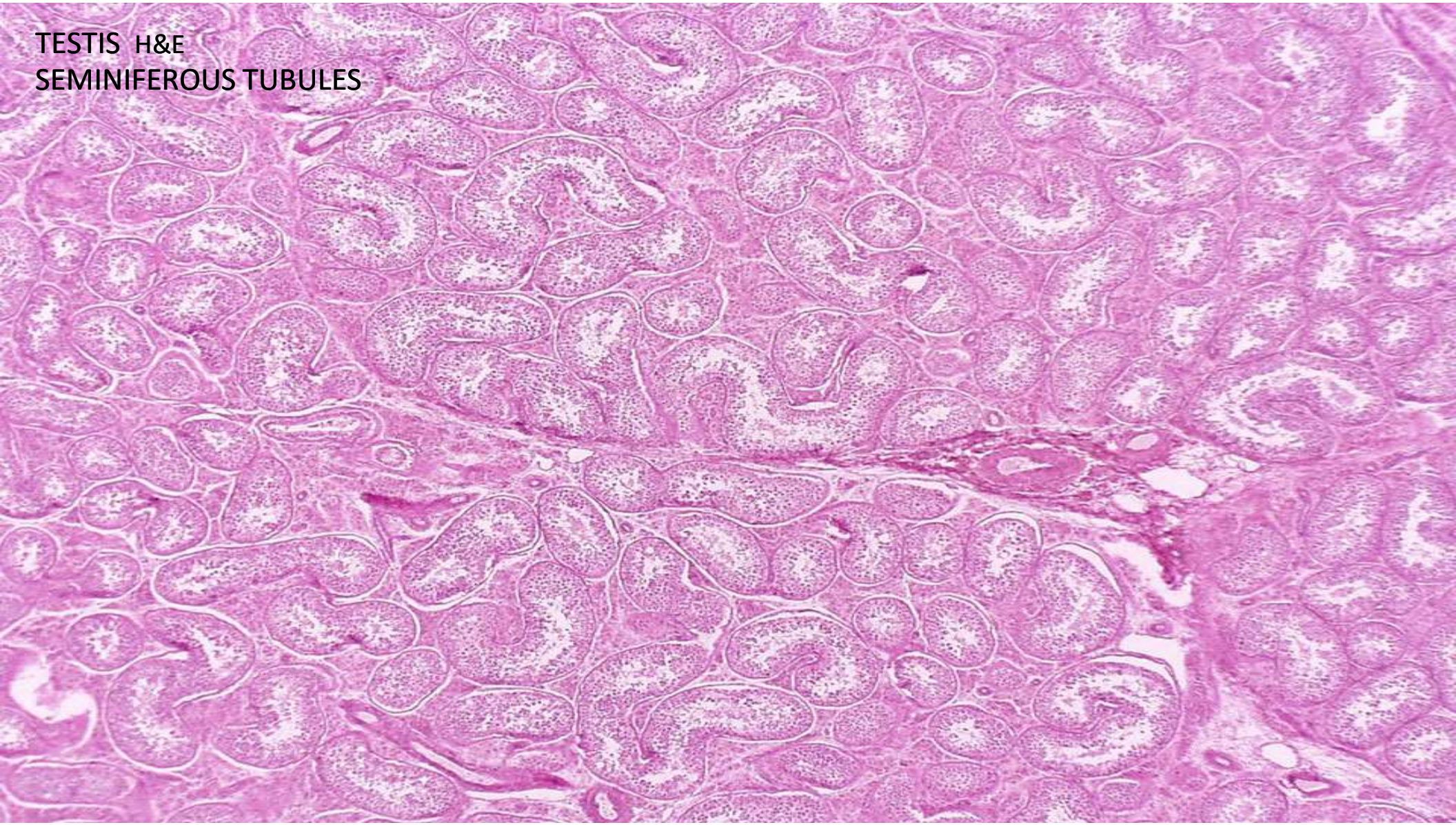
  SEMINIFEROUS EPITHELIUM

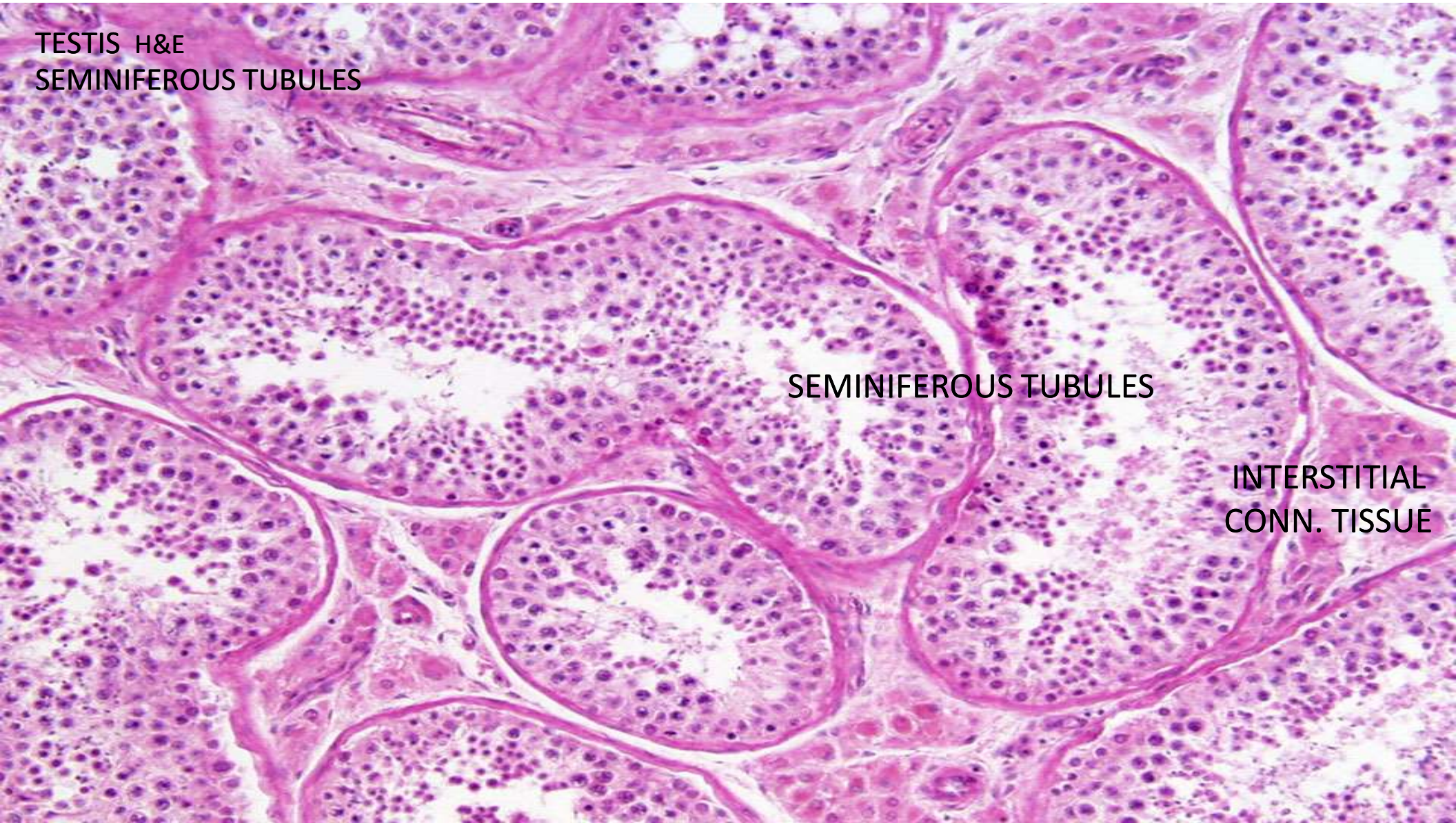
  - complex stratified epithelium containing two basic cell populations:

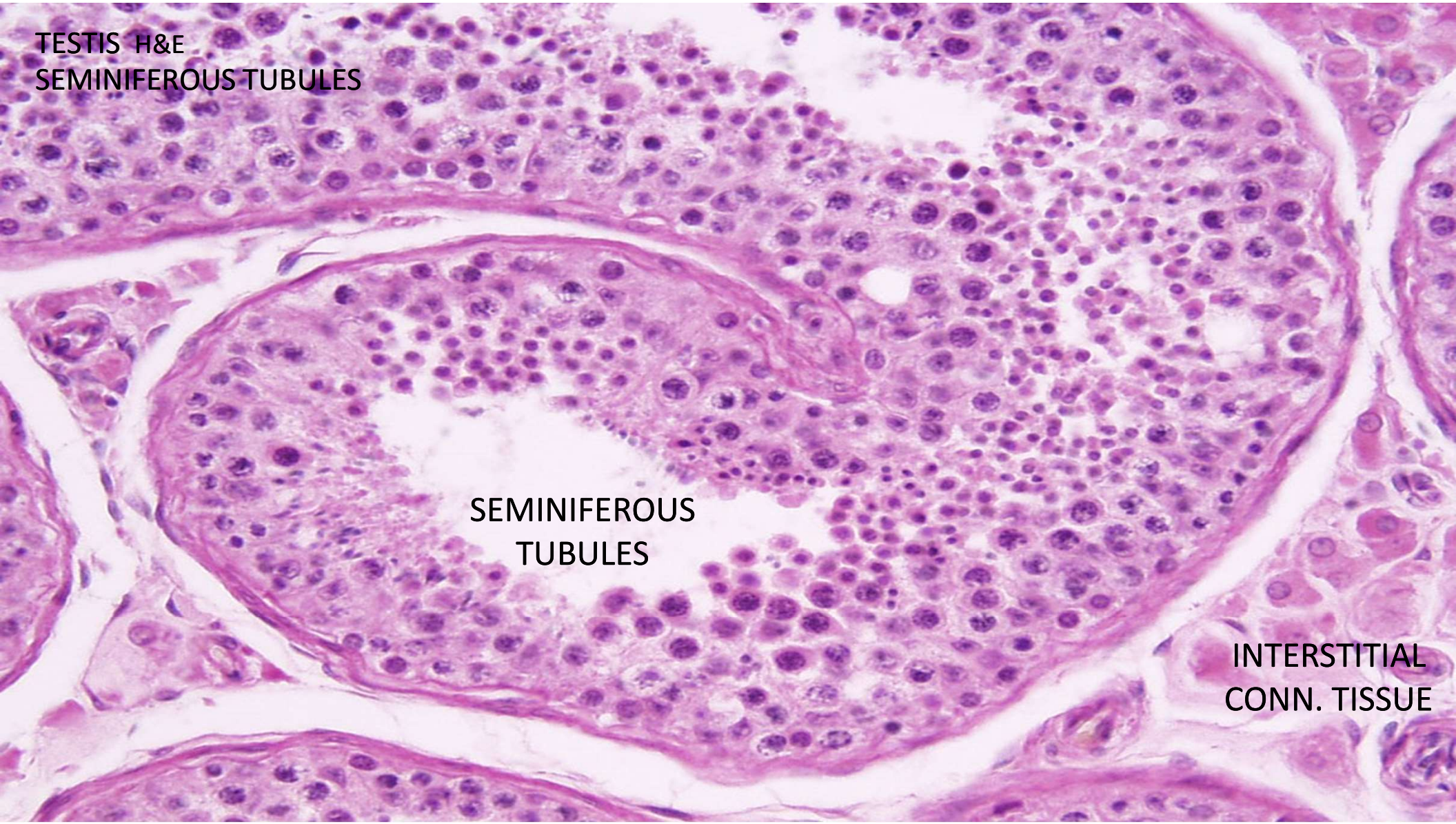
  (1) SPERMATOGENIC CELLS

  (2) SERTOLI CELLS

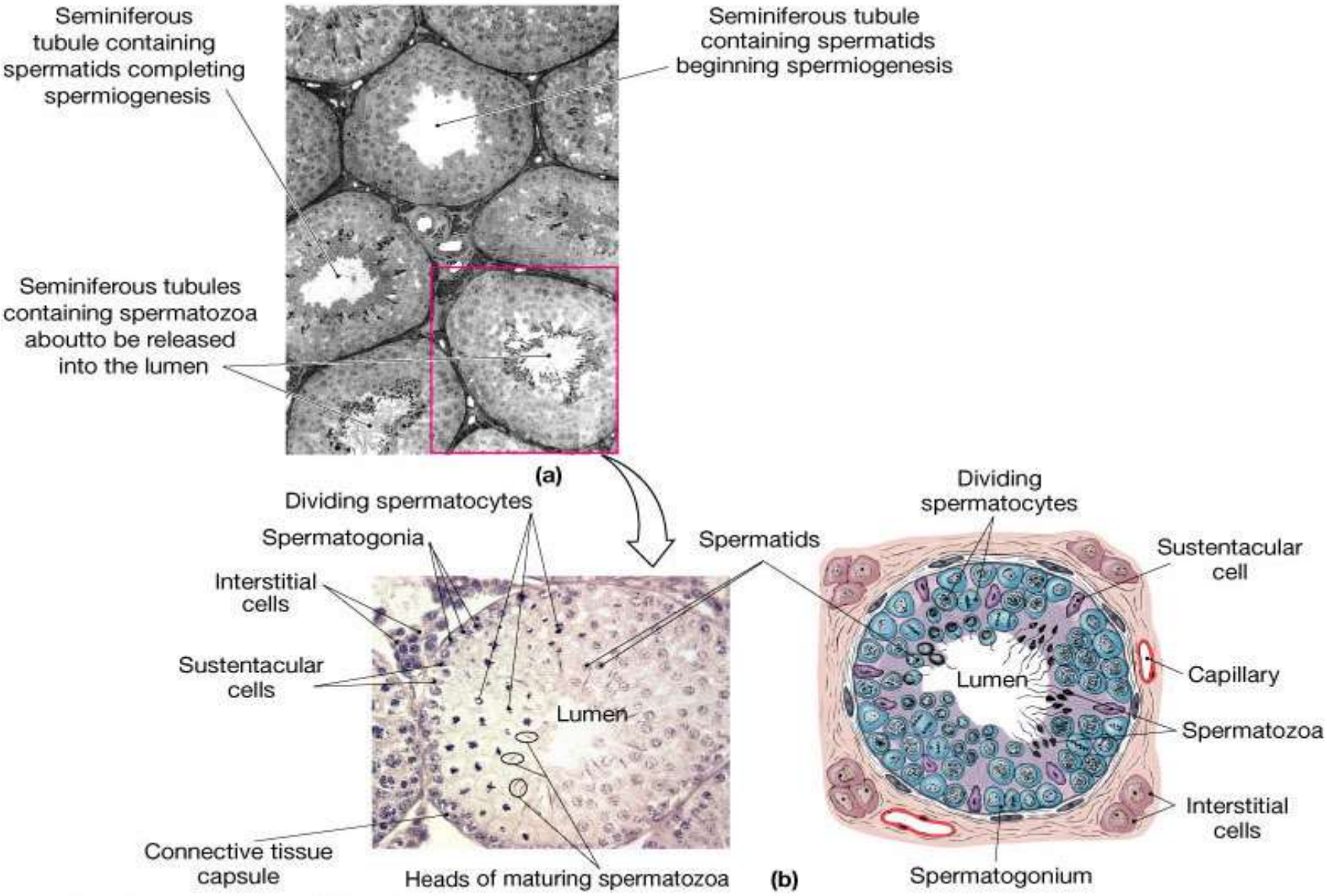



TESTIS H&E
SEMINIFEROUS TUBULES


TESTIS H&E
SEMINIFEROUS TUBULES
SEMINIFEROUS TUBULES
INTERSTITIAL
CONN. TISSUE


TESTIS H&E
SEMINIFEROUS TUBULES
SEMINIFEROUS
TUBULES
INTERSTITIAL
CONN. TISSUE

The Seminiferous Tubules



# MALE REPRODUCTIVE SYSTEM

- TESTIS

SEMINIFEROUS TUBULES

SEMINIFEROUS EPITHELIUM

- complex stratified epithelium containing two basic cell populations:

(1) SPERMATOGENIC CELLS

*stem cells which regularly replicate and differentiate into mature sperm as they migrate toward the lumen*

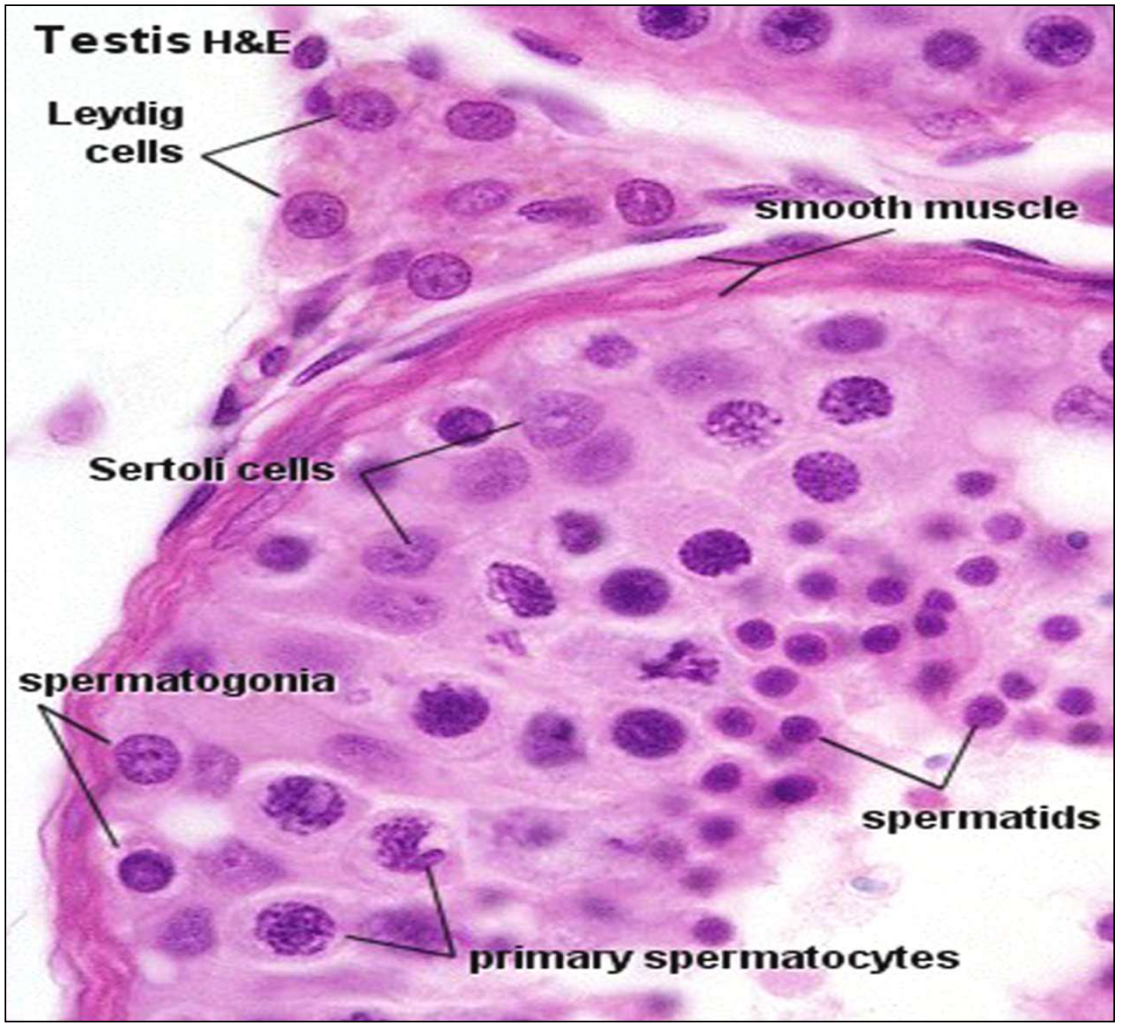
(2) SERTOLI CELLS

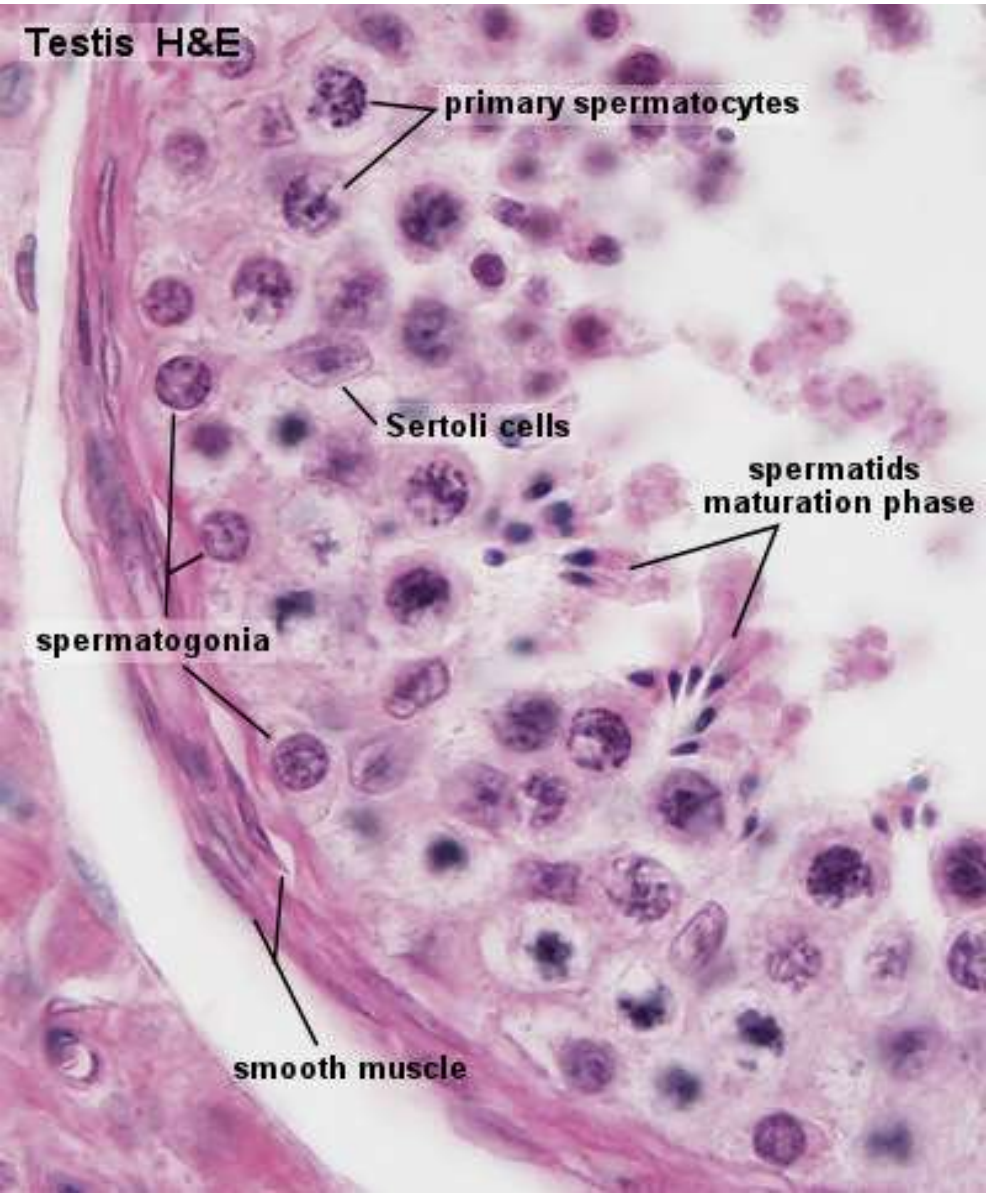
*nonreplicating physical support cells*

INTERSTITIAL CONNECTIVE TISSUE

(1) LEYDIG CELLS

*produce and release testosterone*




Testis H&E
primary spermatocytes
Sertoli cells
spermatids
maturation phase
spermatogonia
smooth muscle

# MALE REPRODUCTIVE SYSTEM

- SPERMATOGENESIS

THREE PHASES:

(1) Spermatogonial Phase (Mitosis)

- spermatogonia proliferate by mitotic divisions to provide *stem cells* and cells which will proceed through spermatogenesis *(1º spermatocytes)*

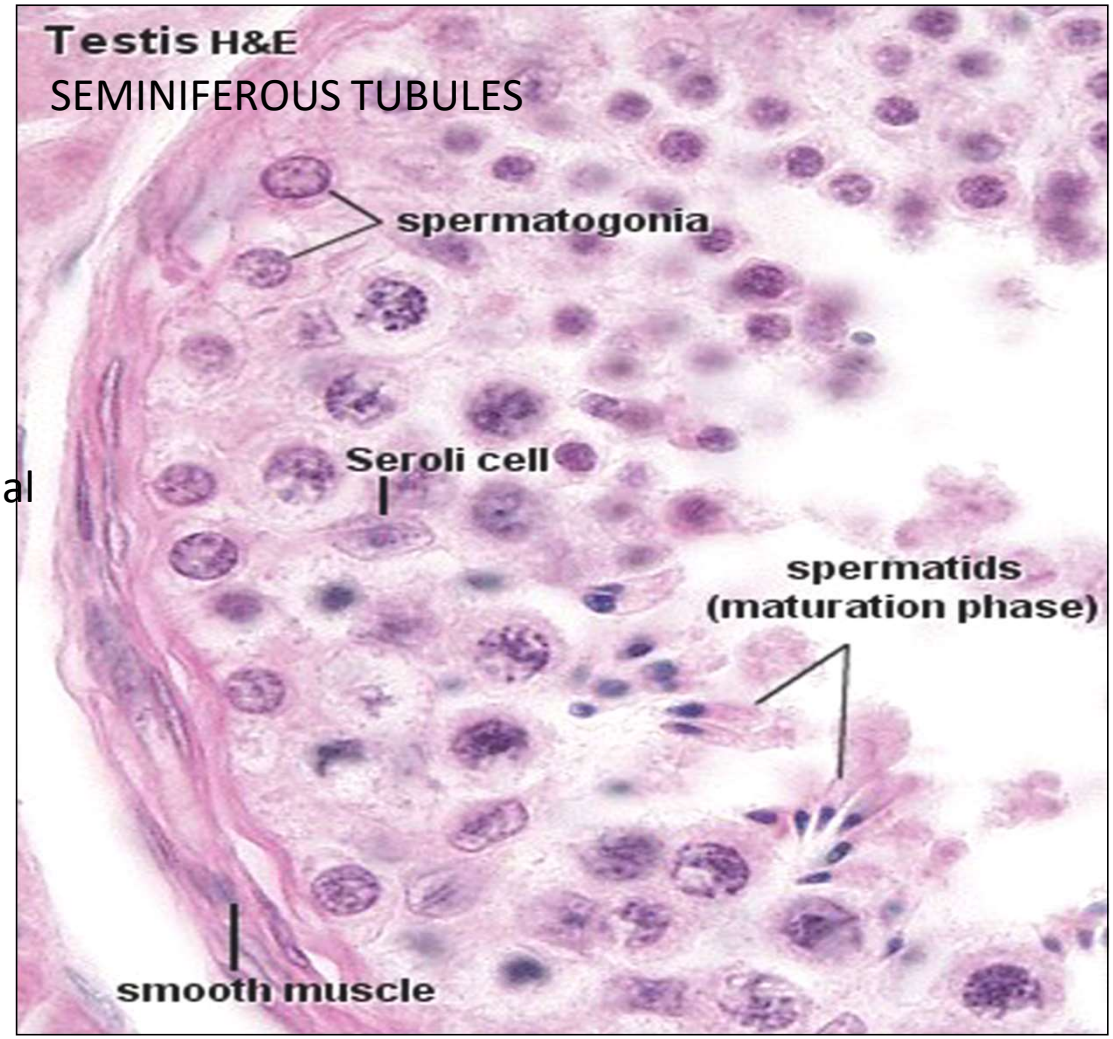
(2) Spermatocyte Phase (Meiosis)

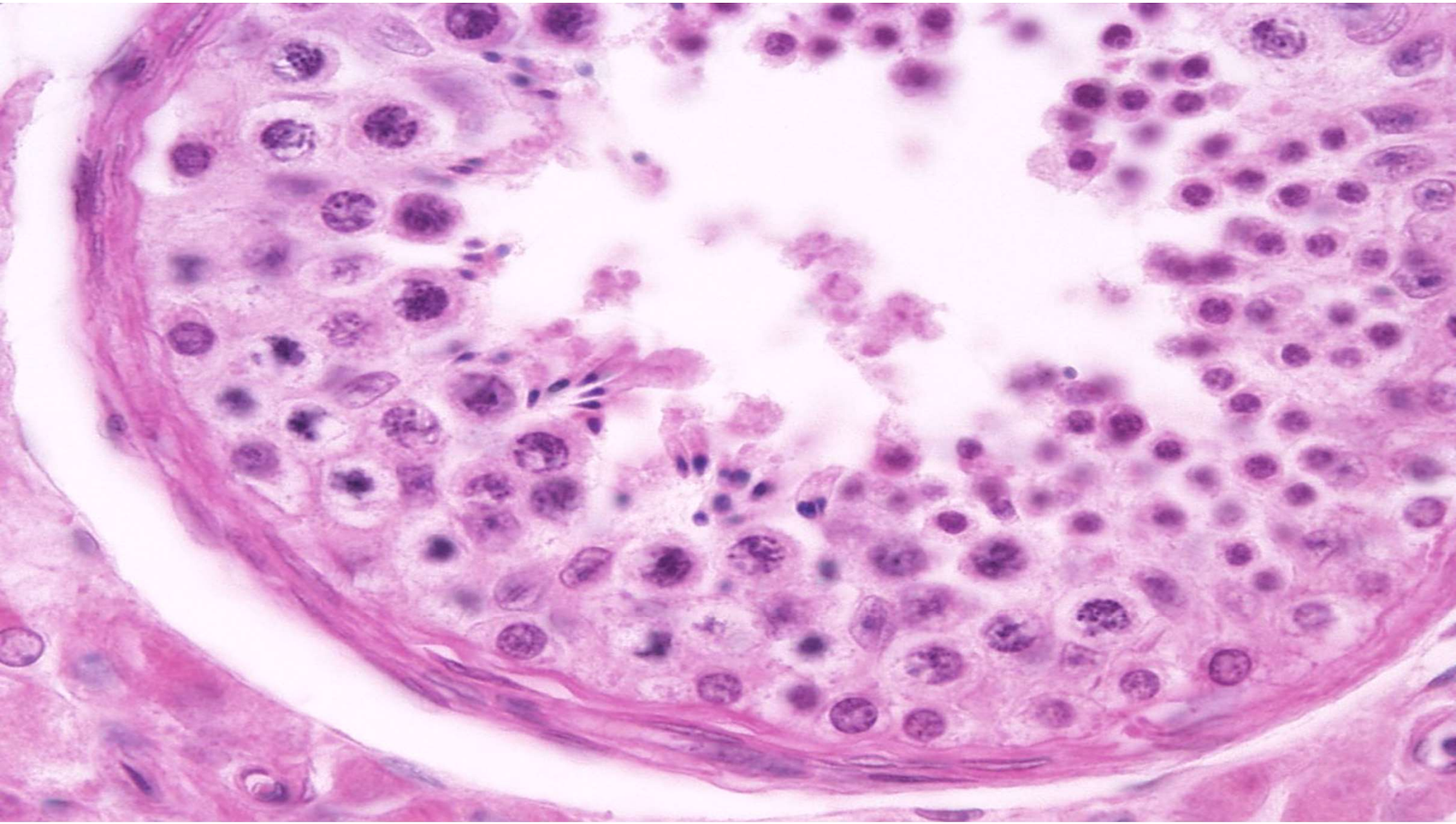
- diploid cells (2n) created in spermatogonial phase give rise to haploid cells (1n)

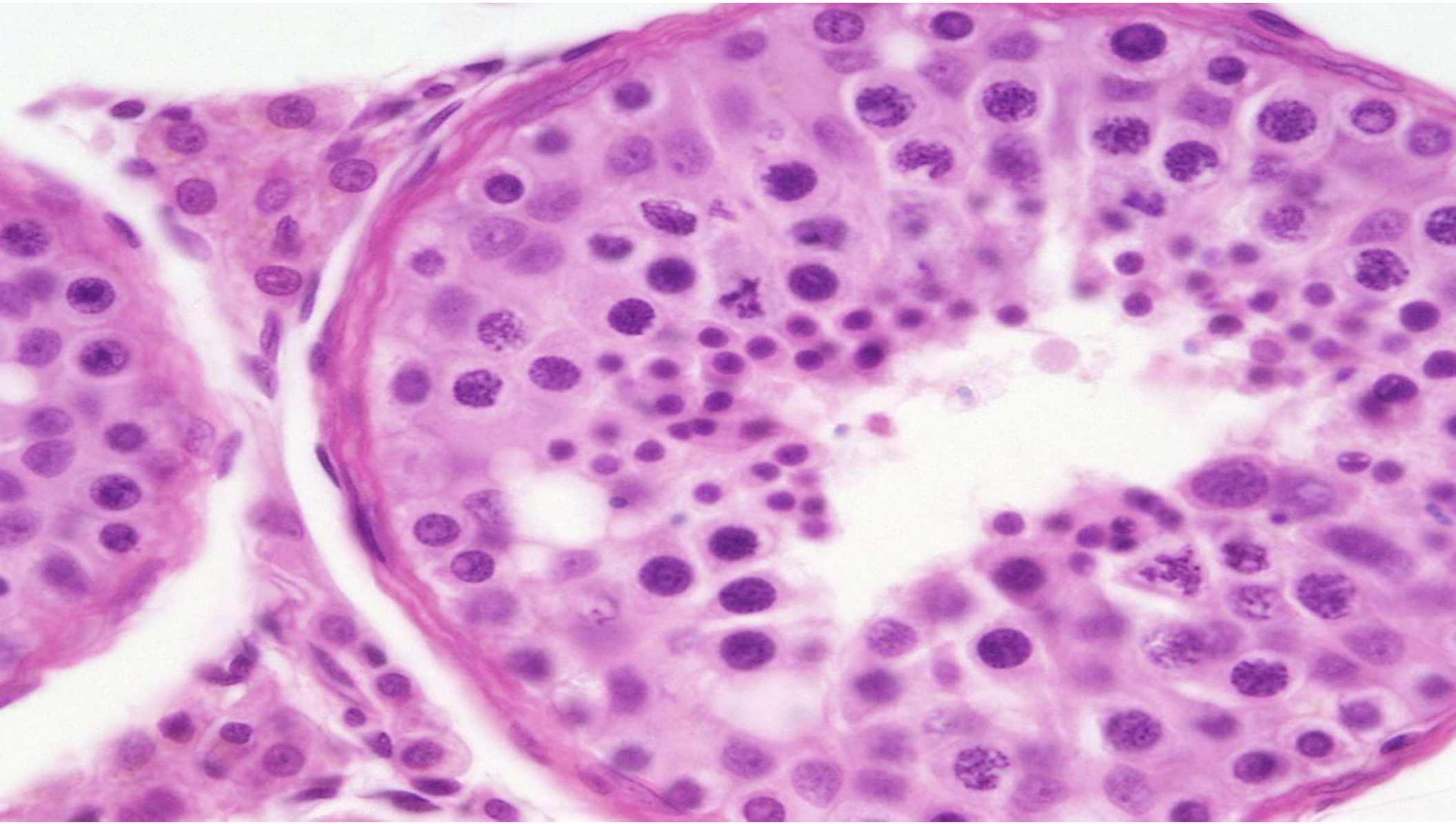
- Meiosis I (reduction division) & Meiosis II (equatorial division)
- 1º spermatocytes enter Meiosis I to form 2º spermatocytes which then enter Meiosis II and result in spermatids

(3) Spermatid Phase (Spermiogenesis)

- spermatid differentiation into spermatazoa





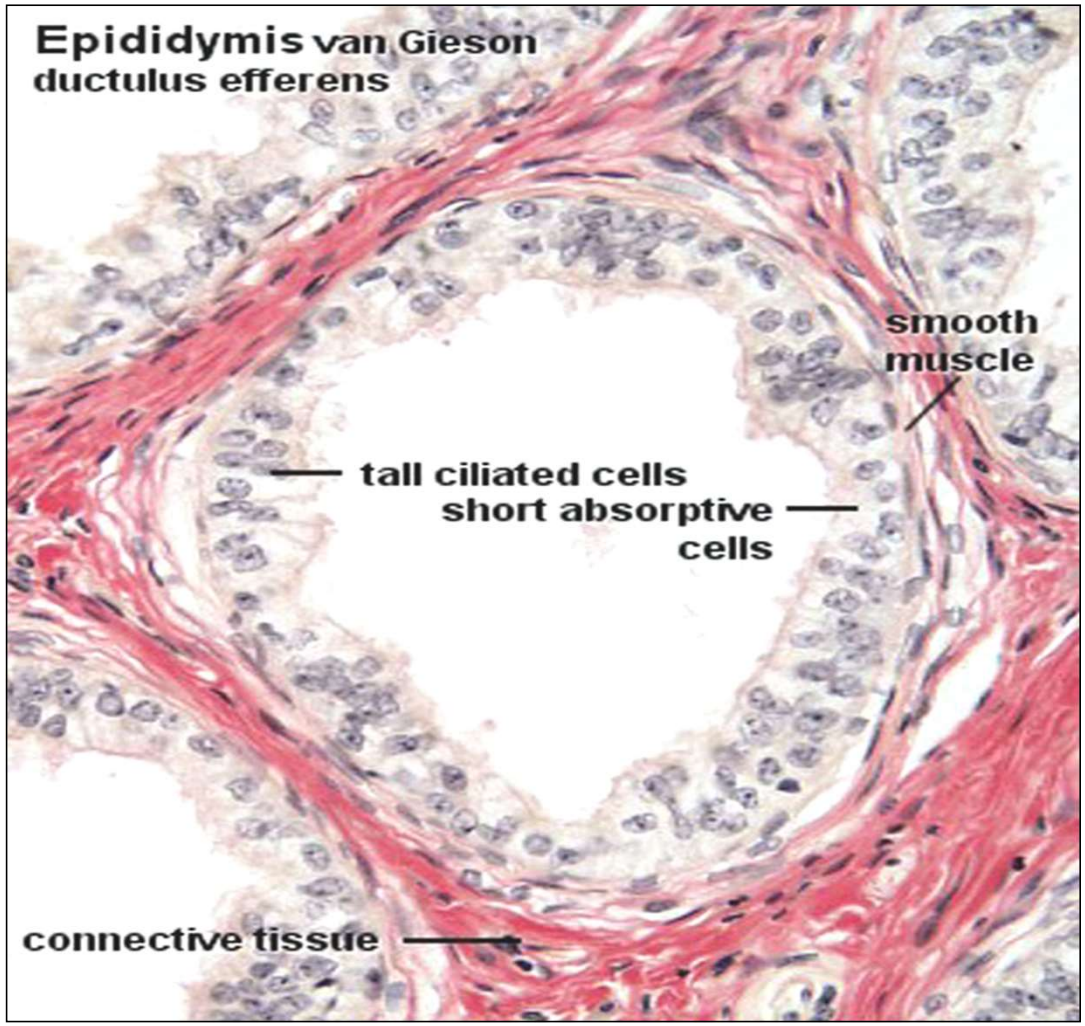


# MALE REPRODUCTIVE SYSTEM

- EFFERENT DUCTULES

CONNECT RETE TESTIS WITH EPIDIDYMIS

IRREGULAR LUMINAL APPEARANCE DUE TO TALL CILIATED CELLS AND SHORT NON-CILIATED CELLS
CILIATED CELLS BEAT TOWARD EPIDIDYMIS; THIN LAYER OF SMOOTH MUSCLE ALSO AIDS MOVEMENT INTO EPIDIDYMIS



# MALE REPRODUCTIVE SYSTEM

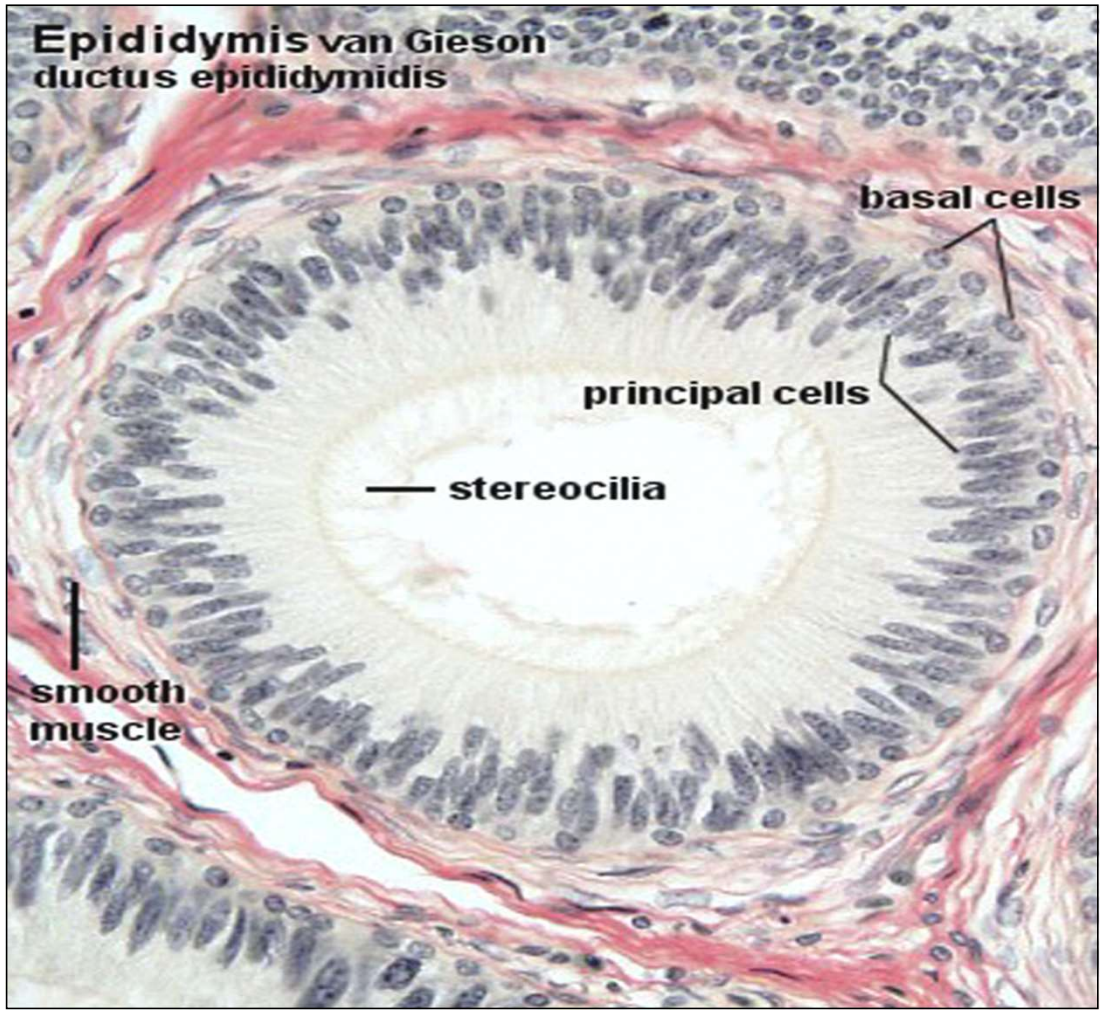
- EPIDIDYMIS

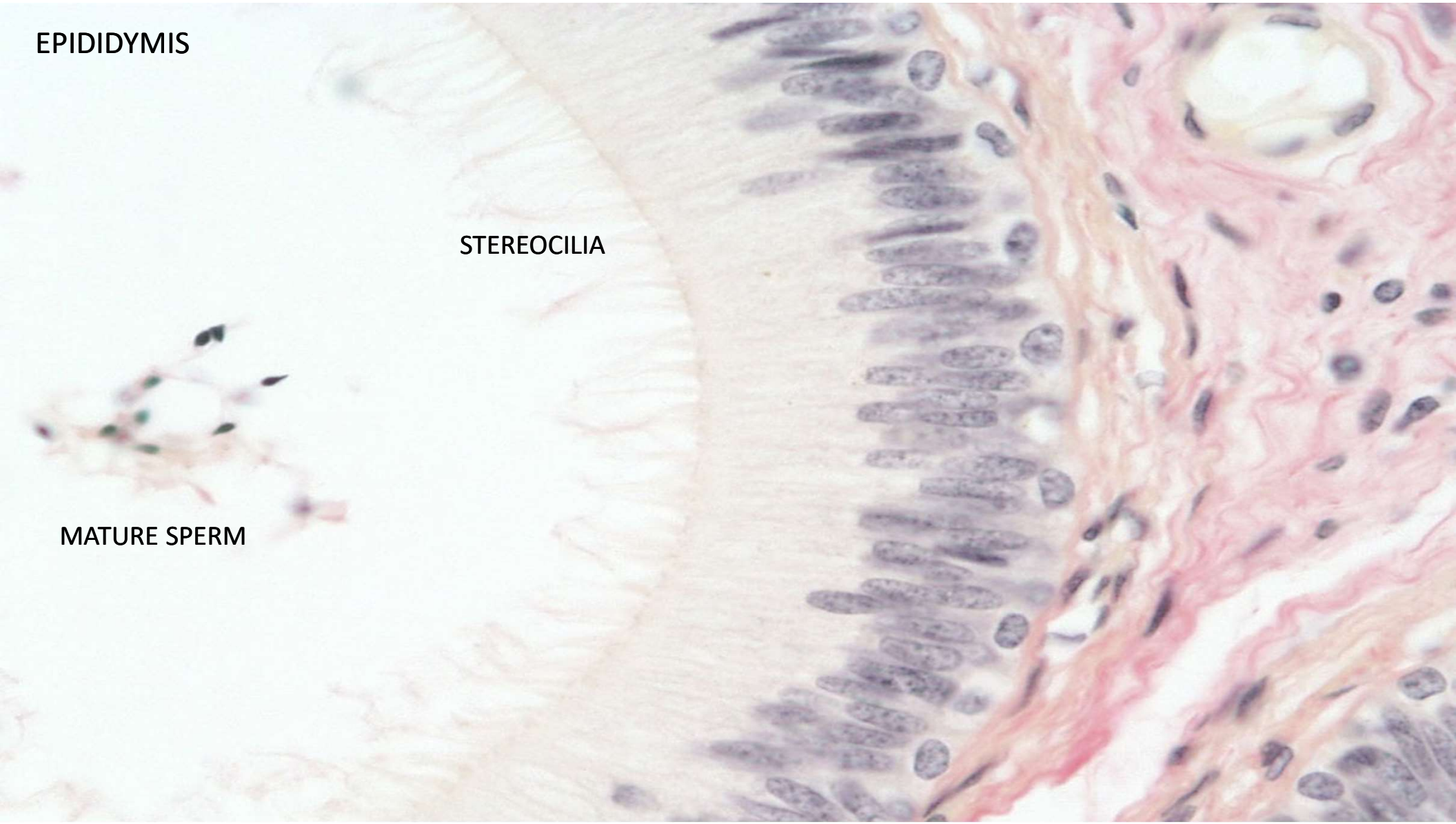
RECEIVES EFFERENT DUCTULES

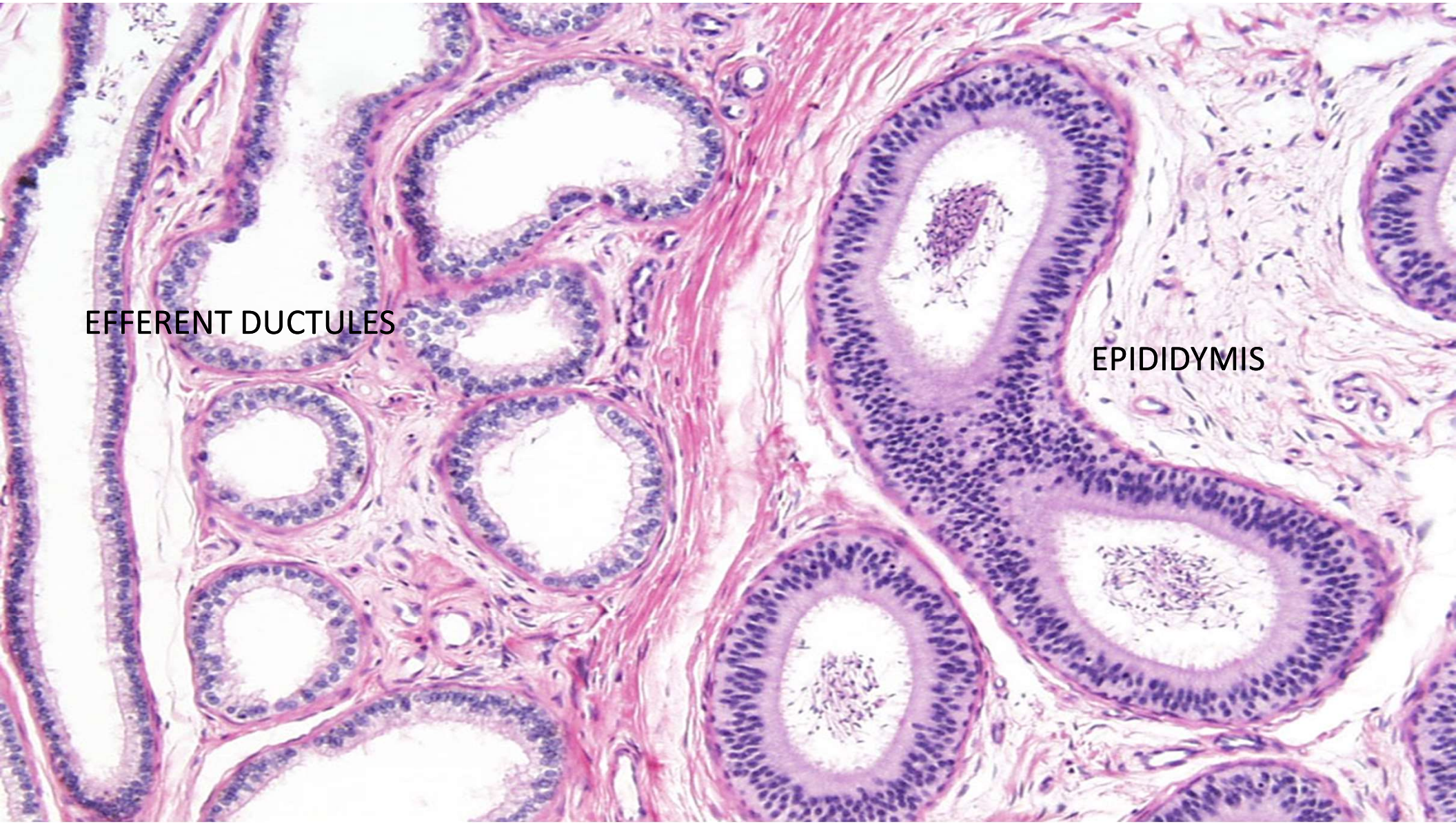
DIVIDED INTO HEAD, BODY, AND TAIL

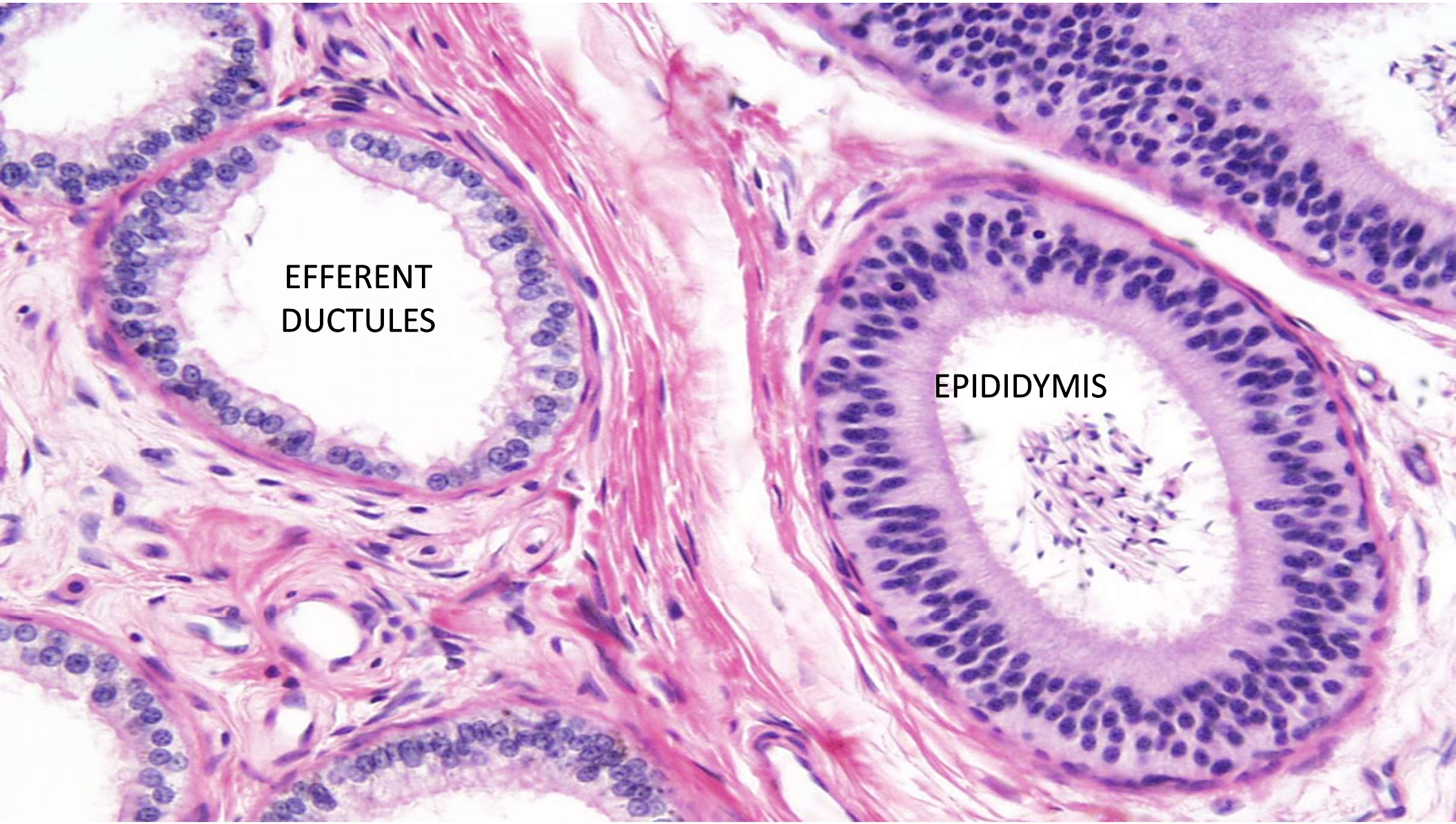
PSEUDOSTRATIFIED EPITHELIUM CONSISTING OF PRINCIPAL AND BASAL CELLS

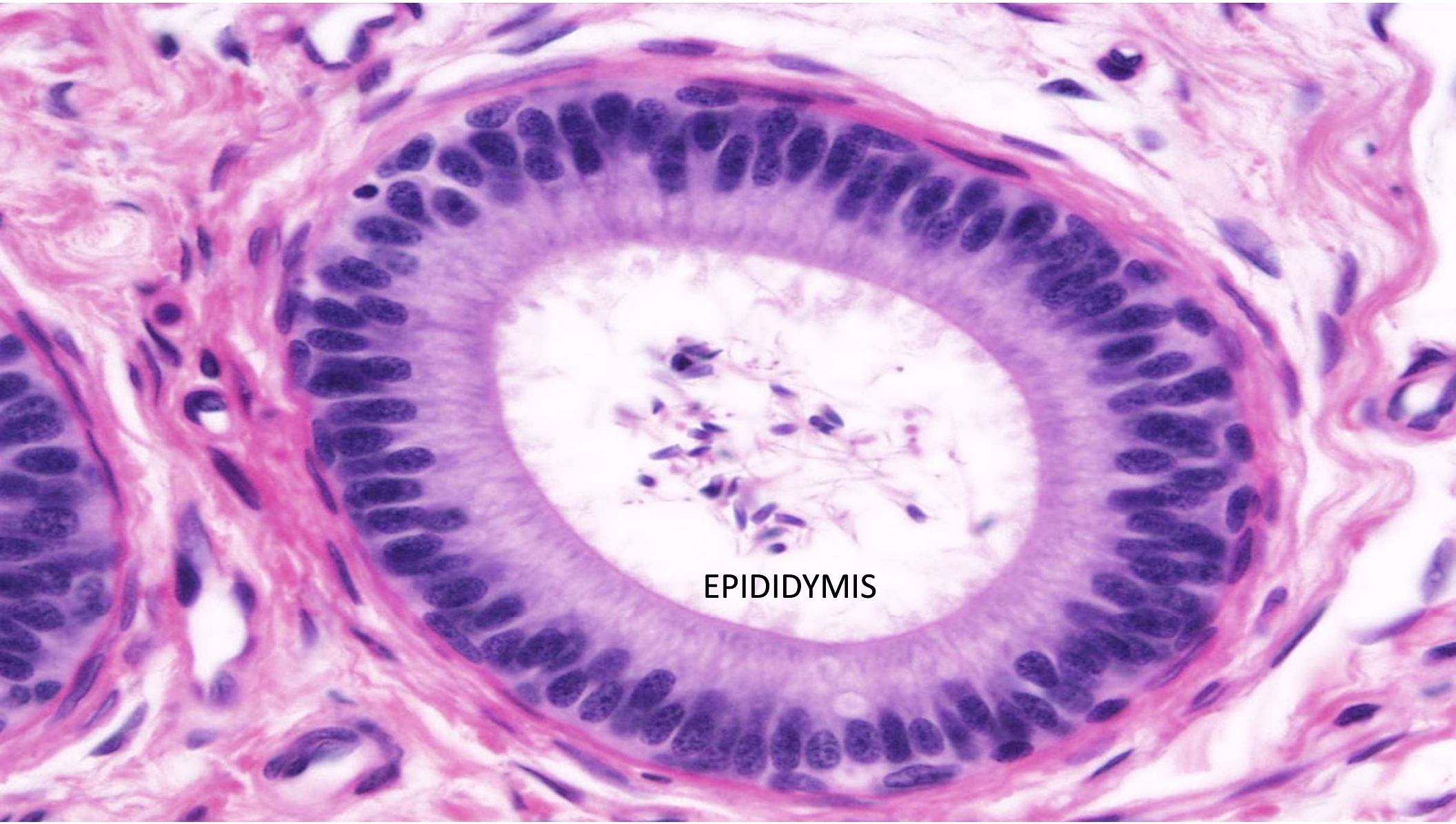
SMOOTH MUSCLE IN HEAD AND TAIL CONTRACT SPONTANEOUSLY; SMOOTH MUSCLE IN TAIL REQUIRES SYMPATHETIC INNERVATION FOR CONTRACTION




EPIDIDYMIS
STEREOCILIA
MATURE SPERM


EFFERENT DUCTULES
EPIDIDYMIS


EFFERENT
DUCTULES
EPIDIDYMIS


EPIDIDYMIS

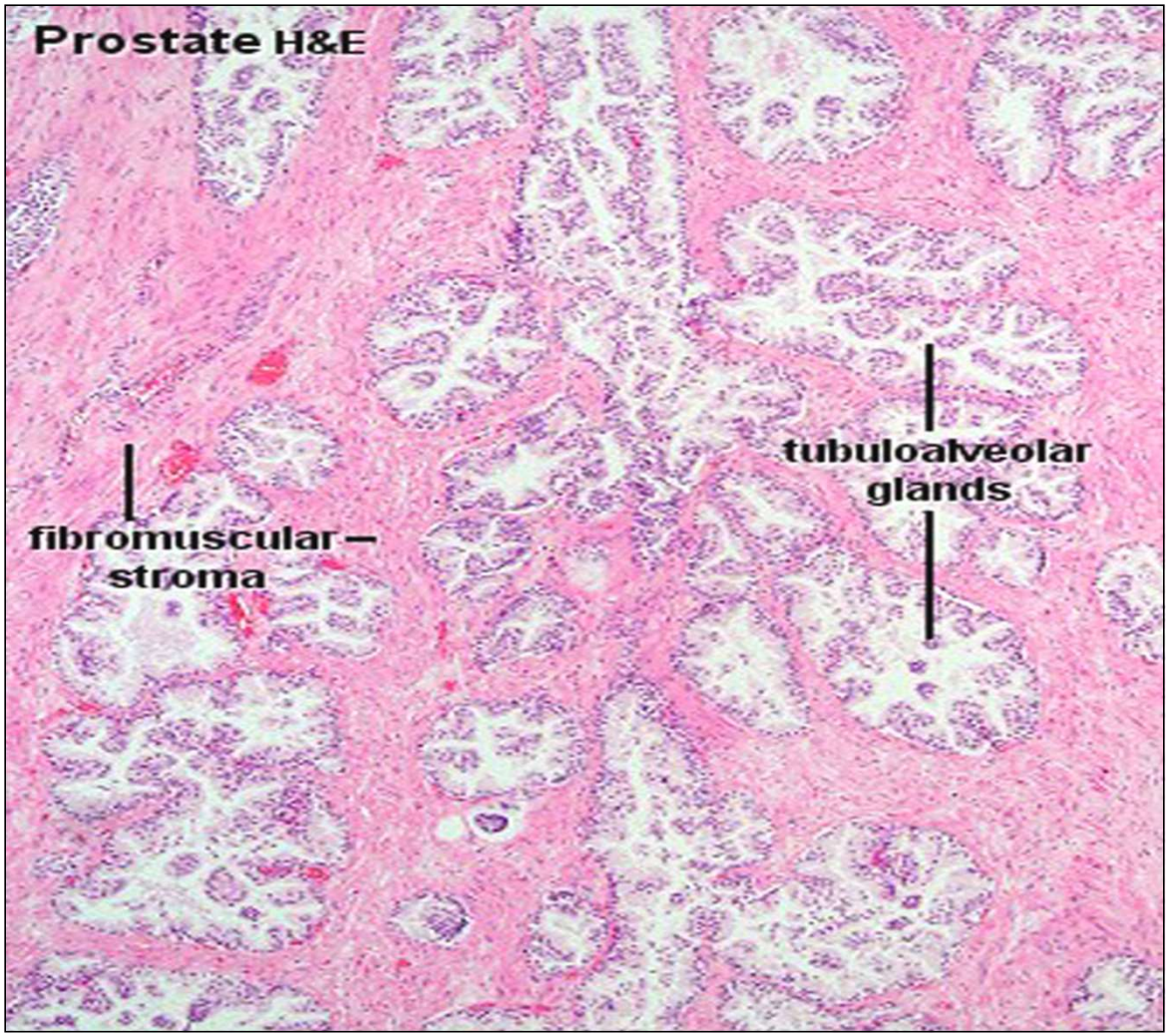
# MALE REPRODUCTIVE SYSTEM

- PROSTATE

  SIMPLE OR PSEUDOSTRATIFIED COLUMNAR EPITHELIUM

  30-50 TUBULOALVEOLAR GLANDS WHICH EMPTY INTO URETHRA

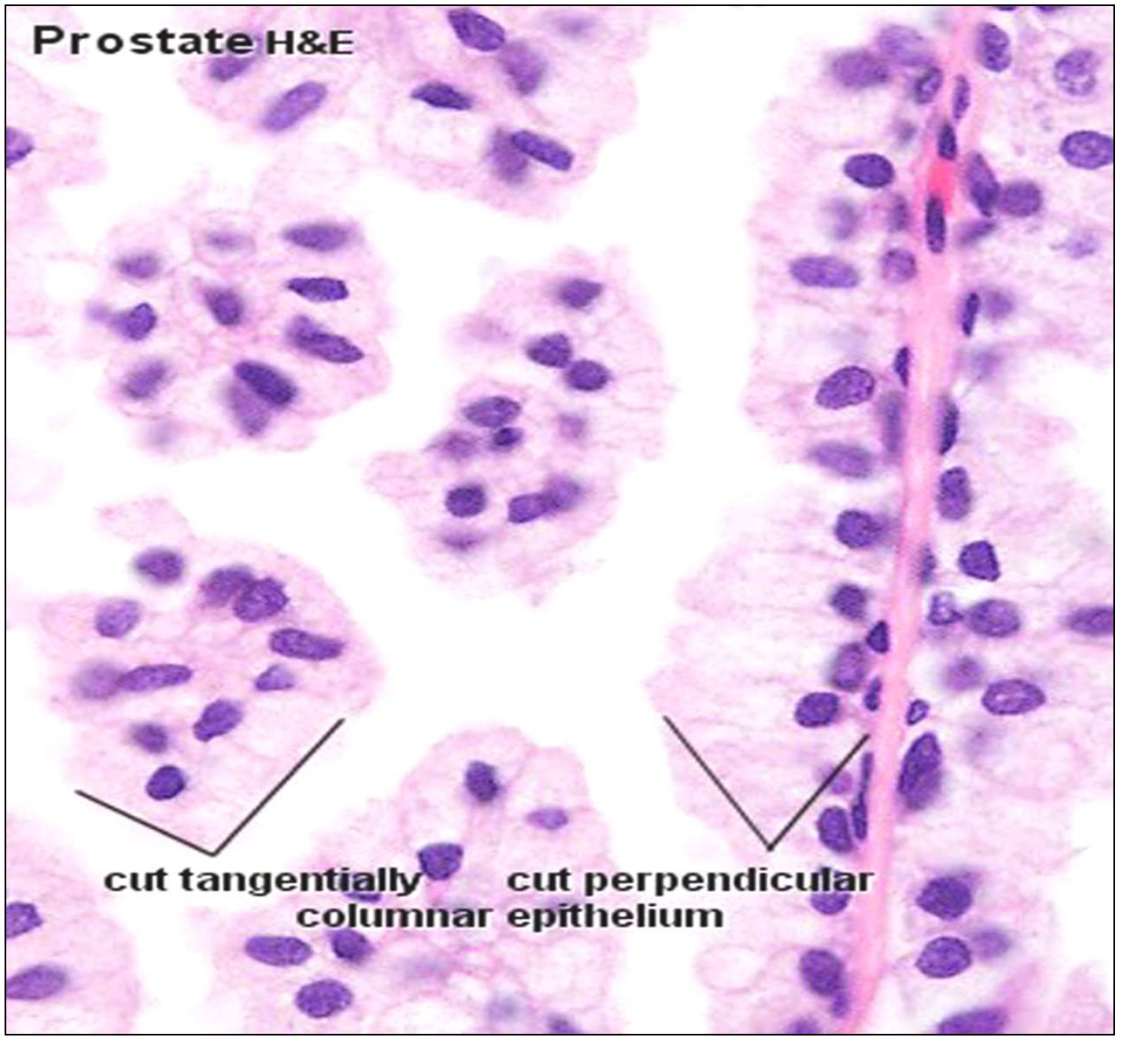
  PROSTATIC SECRETIONS RICH IN CITRIC ACID, ACID PHOSPHATASE, AND PROTEOLYTIC ENZYMES



# MALE REPRODUCTIVE SYSTEM

- PROSTATE

SIMPLE OR PSEUDOSTRATIFIED COLUMNAR EPITHELIUM



# MALE REPRODUCTIVE SYSTEM

- PROSTATE

PROSTATIC CONCRETIONS
- *precipitation of secretory product*