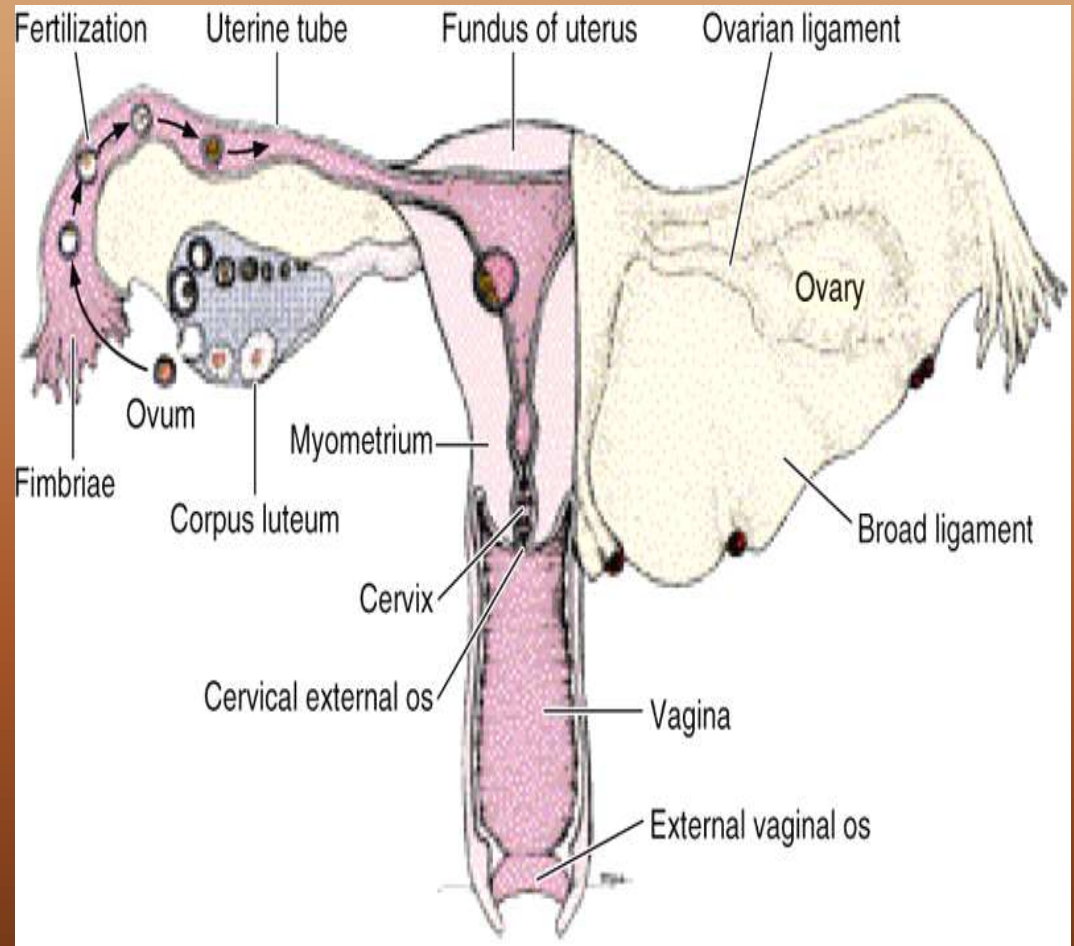


Female Reproductive System

- I. Overview
- II. Ovaries
- III. Oogenesis
- IV. Follicle Development
- V. Oviducts
- VI. Uterus
- VII. Menstrual Cycle
- VIII. Placenta

I. Overview

- A. Ovaries (23.1)
- B. Oviducts
- C. Uterus
- D. (vagina & external genitalia)
- E. (mammary glands)



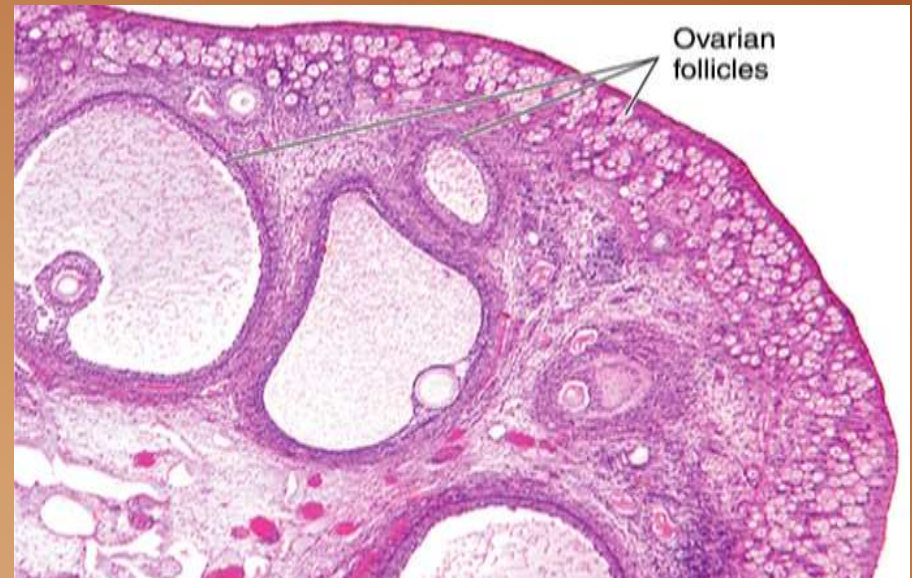
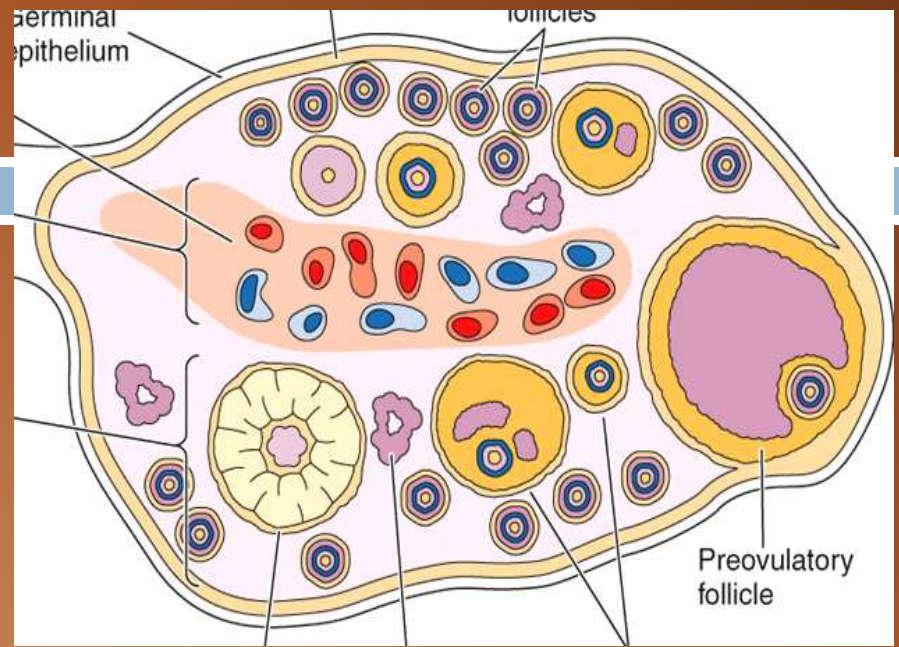
II. Ovaries

A. medulla (23.2,23.3)

1. CT
2. vascular

B. cortex

1. follicles
2. germinal epithelium
3. tunica albuginea



III. Oogenesis

A. Oogonia 23.4

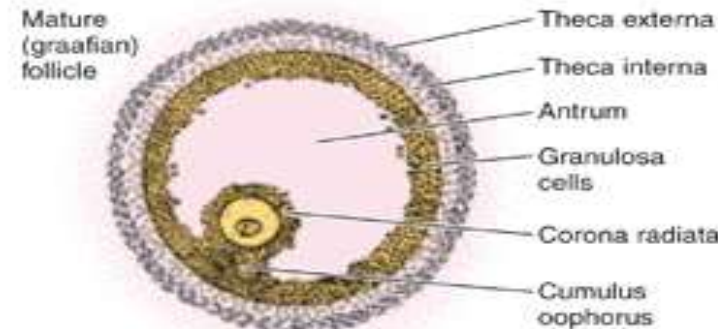
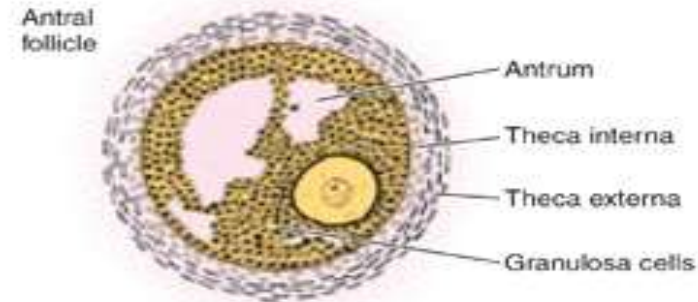
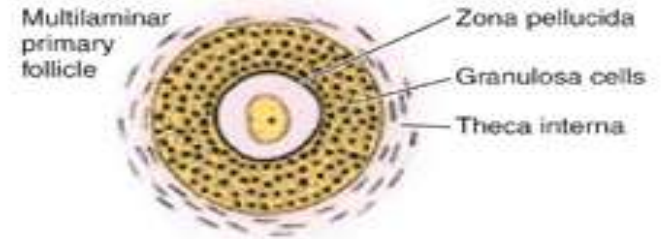
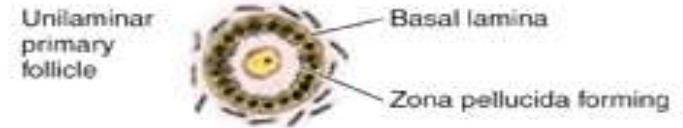
1. migrate to ovary from yolk sac
2. mitosis until 5 mo.

B. Primary oocytes

1. prophase of 1st meiotic div.
2. 3rd-7th mo.

C. Secondary oocyte

1. just before ovulation
2. first meiotic div.
3. first polar body + 2° oocyte
4. ovum viable for 24 hrs.



III. Oogenesis

D. Second meiotic division 23.4

1. complete only after fertilization
2. second polar body + ♀ pronucleus
3. zygote = ♂ + ♀ pronuclei fuse
4. mitotic div.

IV. Follicle Development

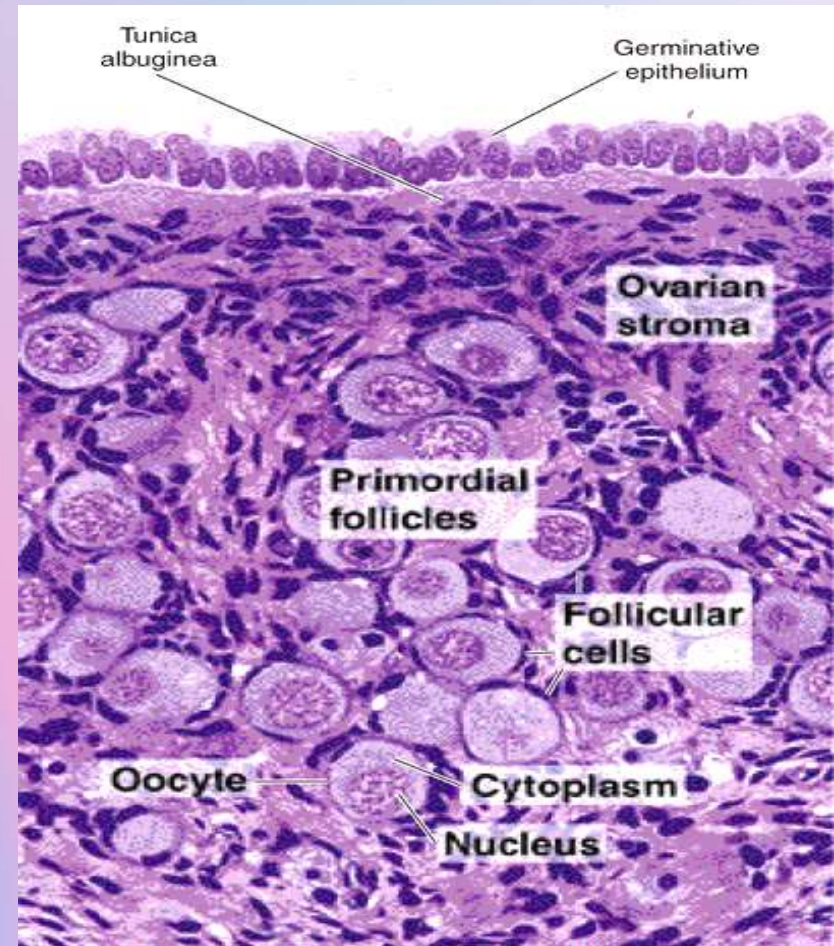
A. Primordial follicle (23.5)

1. primary oocyte

a. $\sim 25 \mu\text{m}$ diameter

2. single layer of flat follicular (granulosa) cells

a. desmosomes



IV. Follicle Development

B. Primary follicle (23.6)

1. primary oocyte

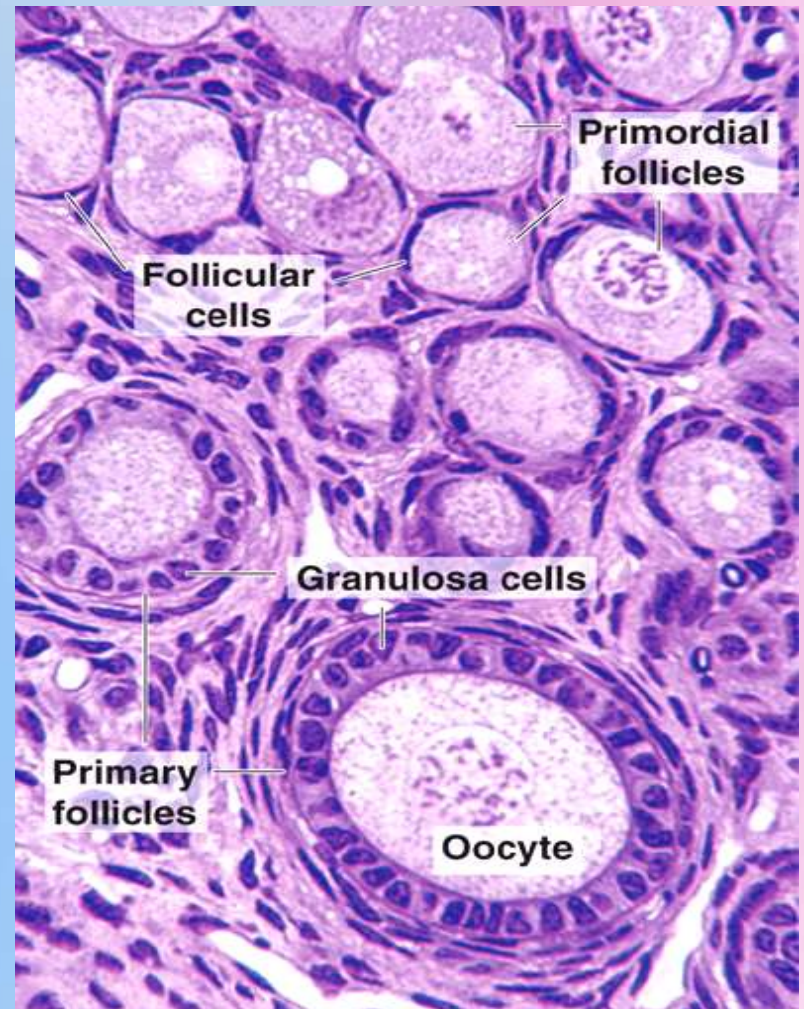
a. growth to 125-150 μm diam.

2. follicular cells

a. cuboidal cells

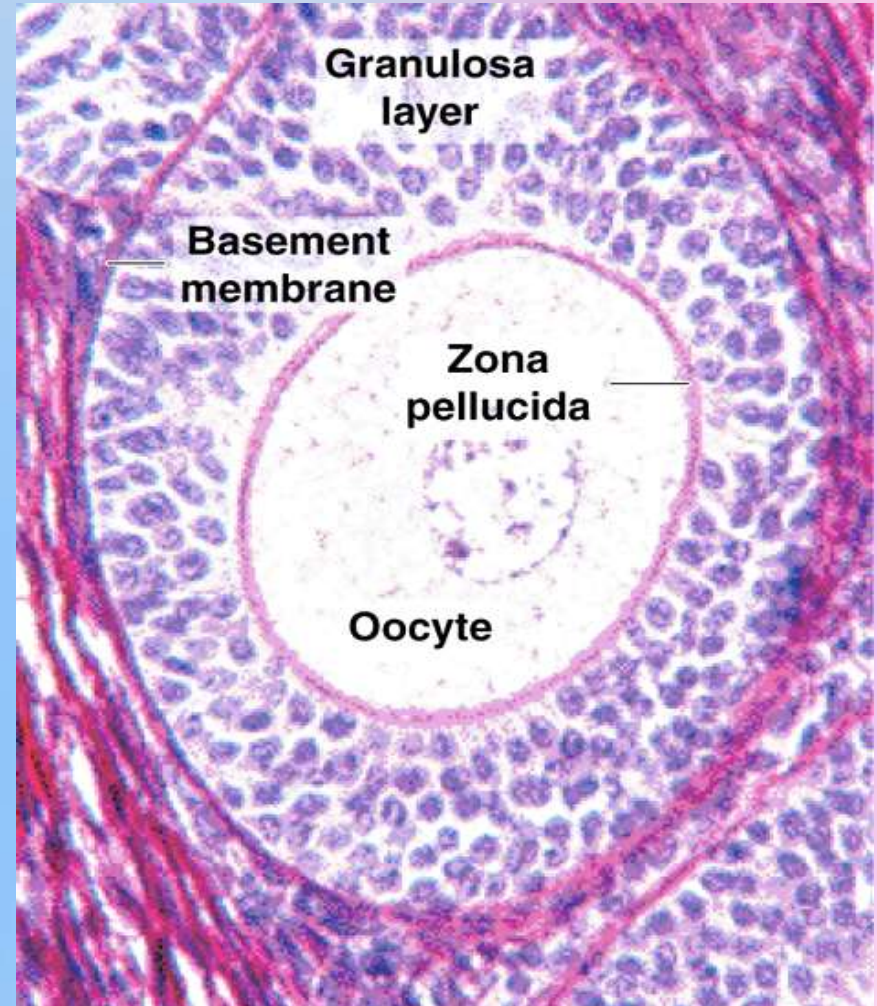
b. 1 to many layers

c. gap junctions



IV. Follicle Development

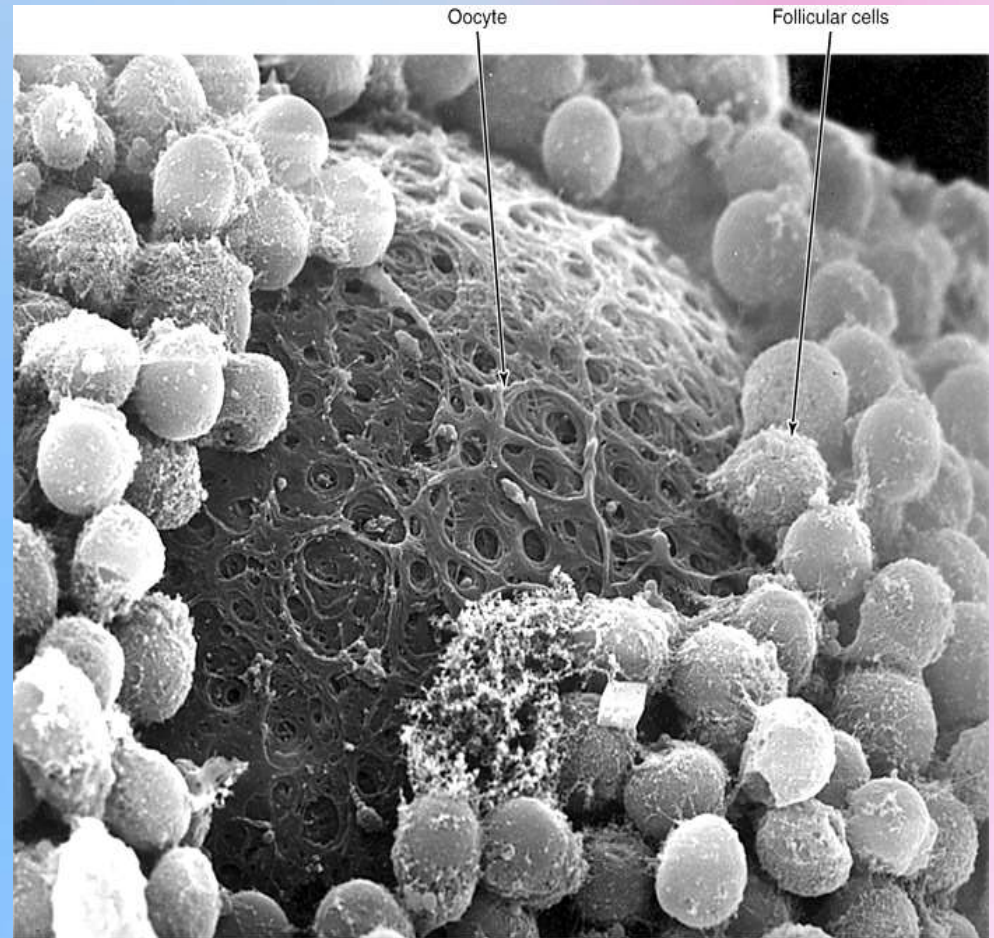
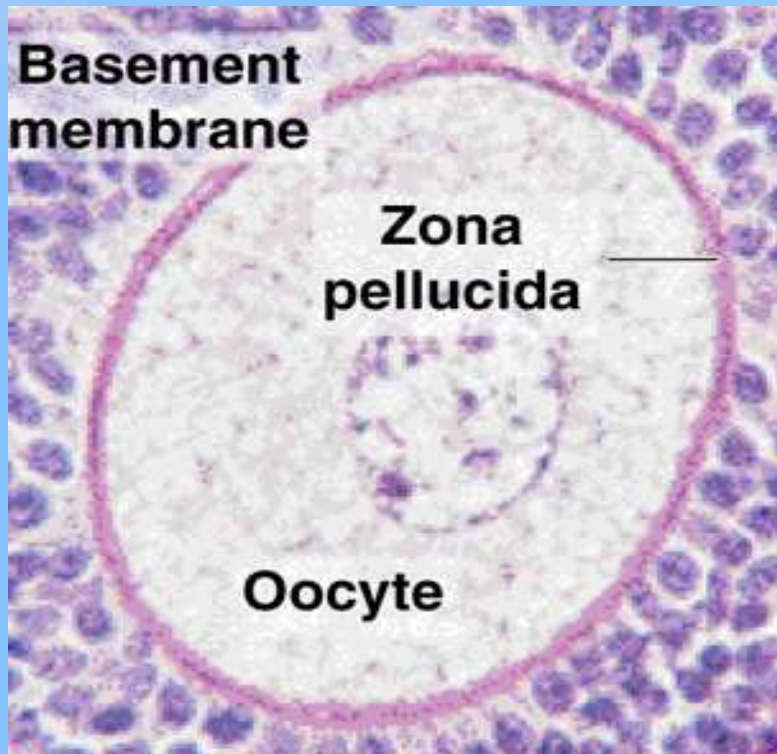
B. Primary follicle 23-7



IV. Follicle Development

B. Primary follicle

3. zona pellucida (23.8,23.7)



IV. Follicle Development

B. Primary follicle

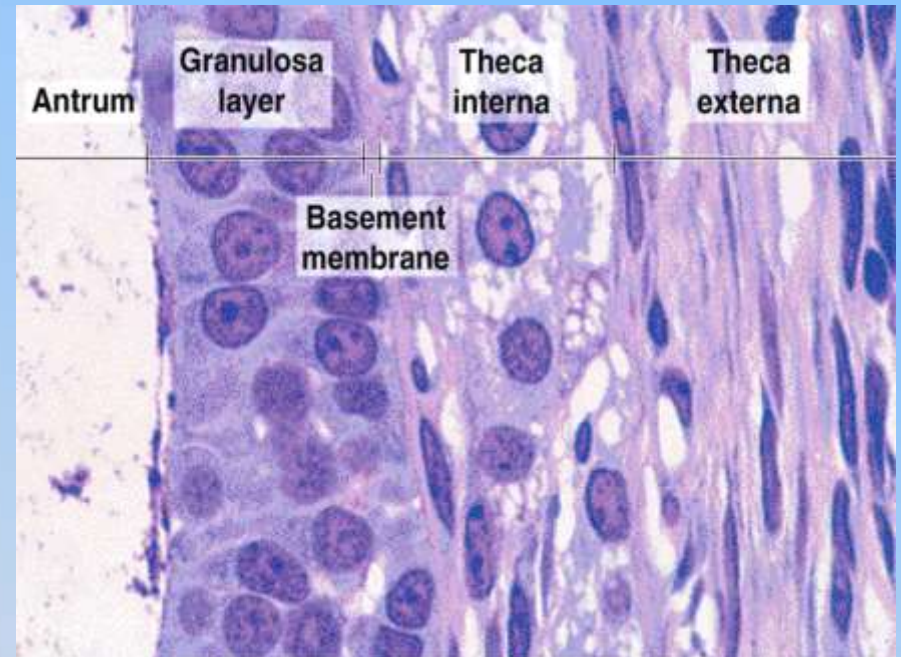
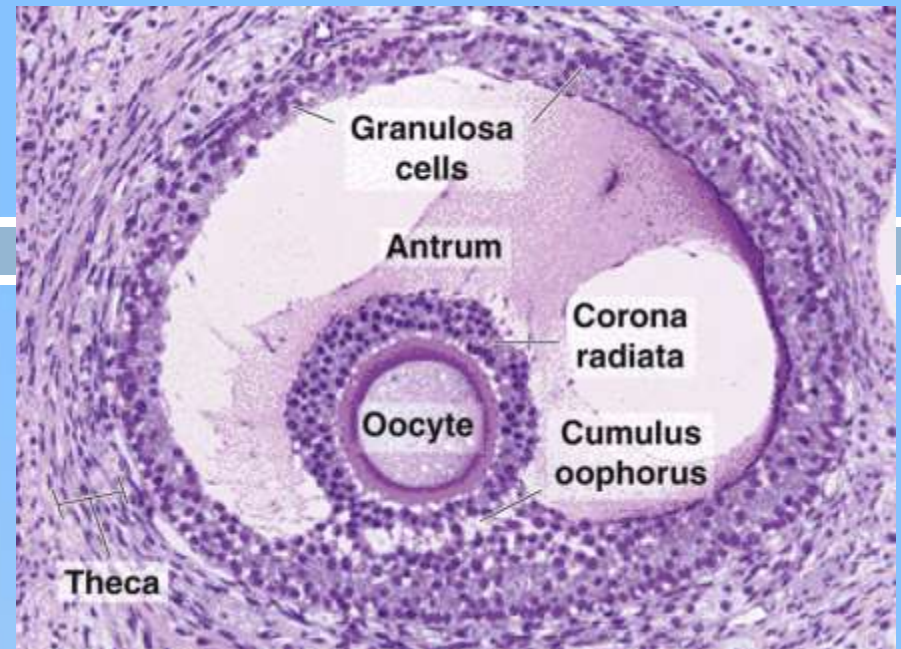
4. theca folliculi (23.10,23.11)

a. theca interna

1) source of
estrodiol precursor

b. theca externa

1) CT



IV. Follicle Development

C. Secondary (vesicular) follicle (23.9,23.10)

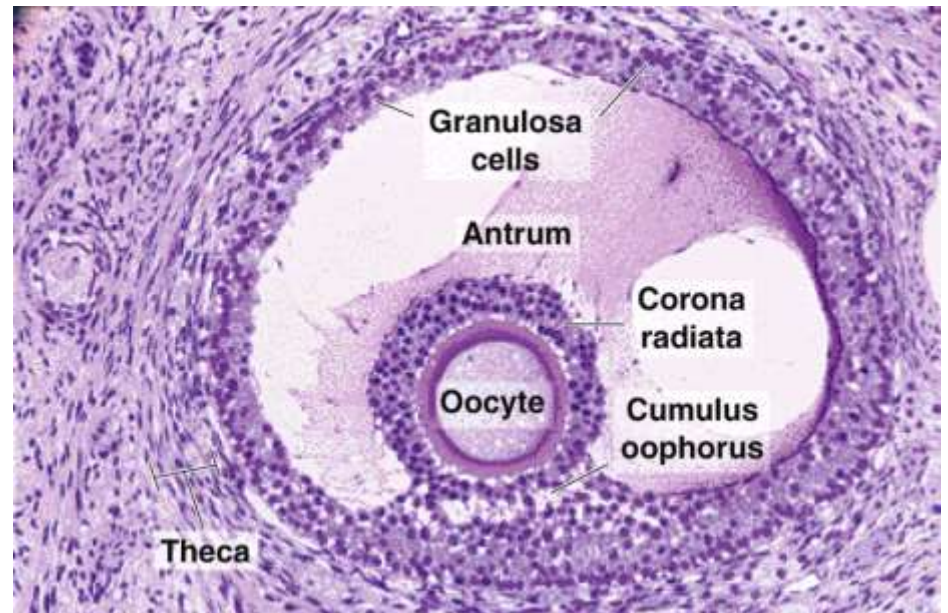
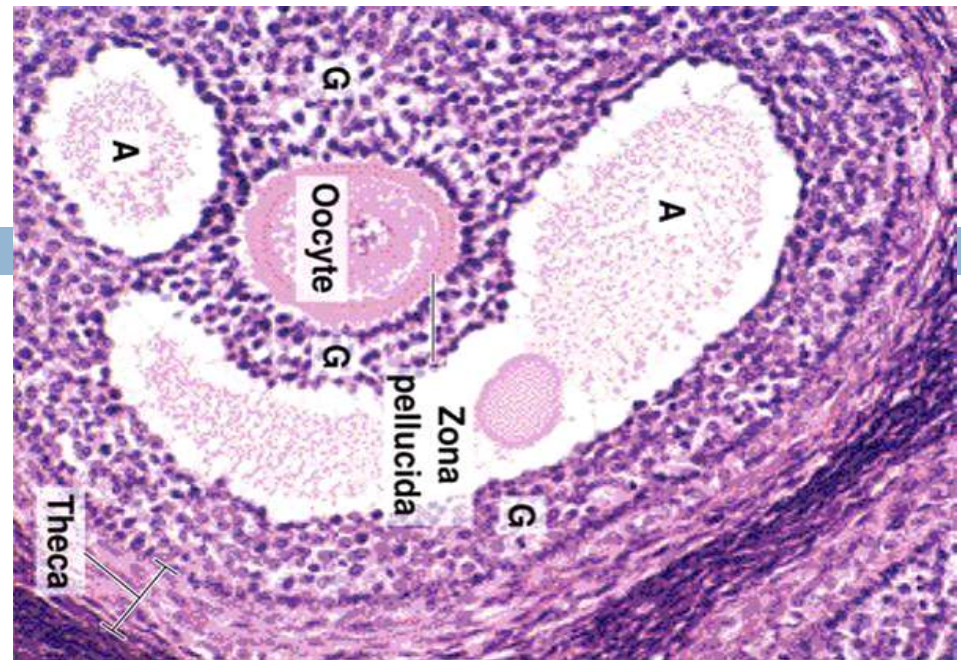
1. antrum

a. liquor folliculi

2. cumulus oophorus

3. oocyte at maximal diameter

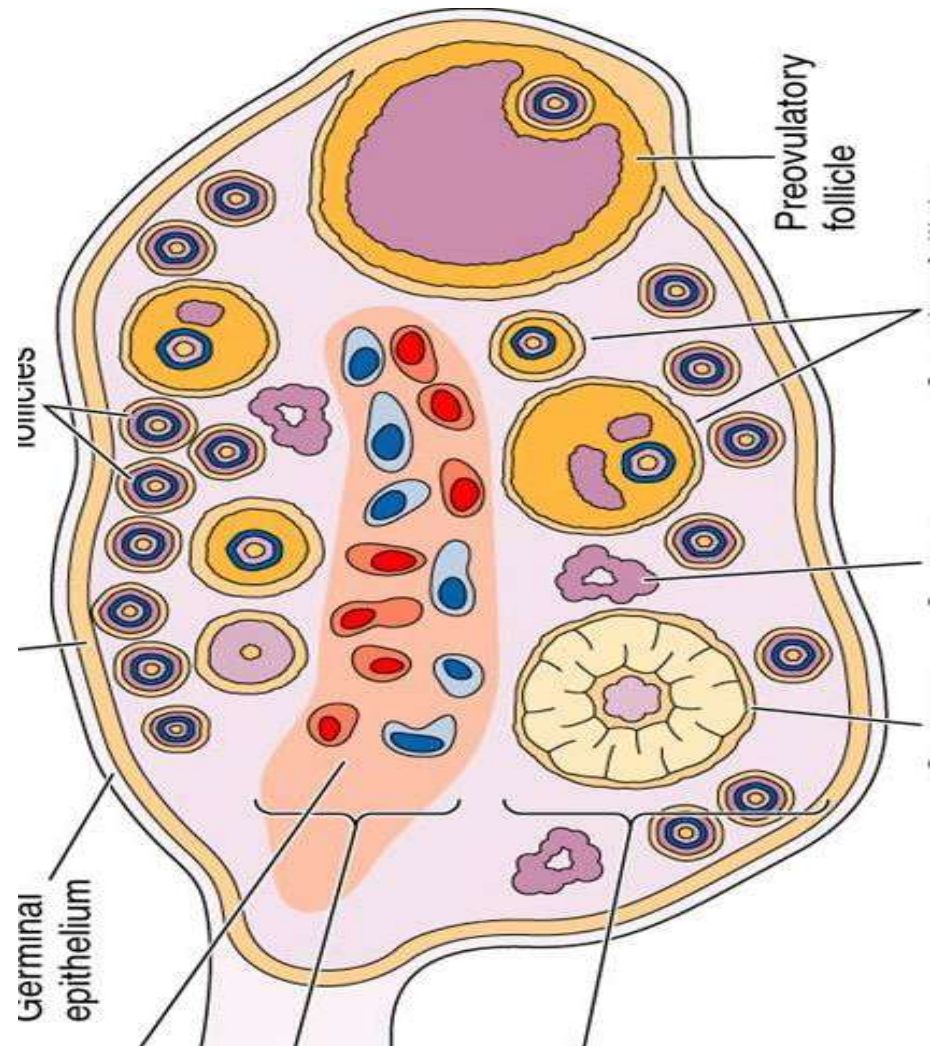
4. 1st meiotic division: secondary oocyte & 1st polar body (not visible)



IV. Follicle Development

D. Mature (graafian) follicle (23.2)

1. ~2.5 cm diameter
2. located near ovary surface
3. corona radiata
4. secondary oocyte

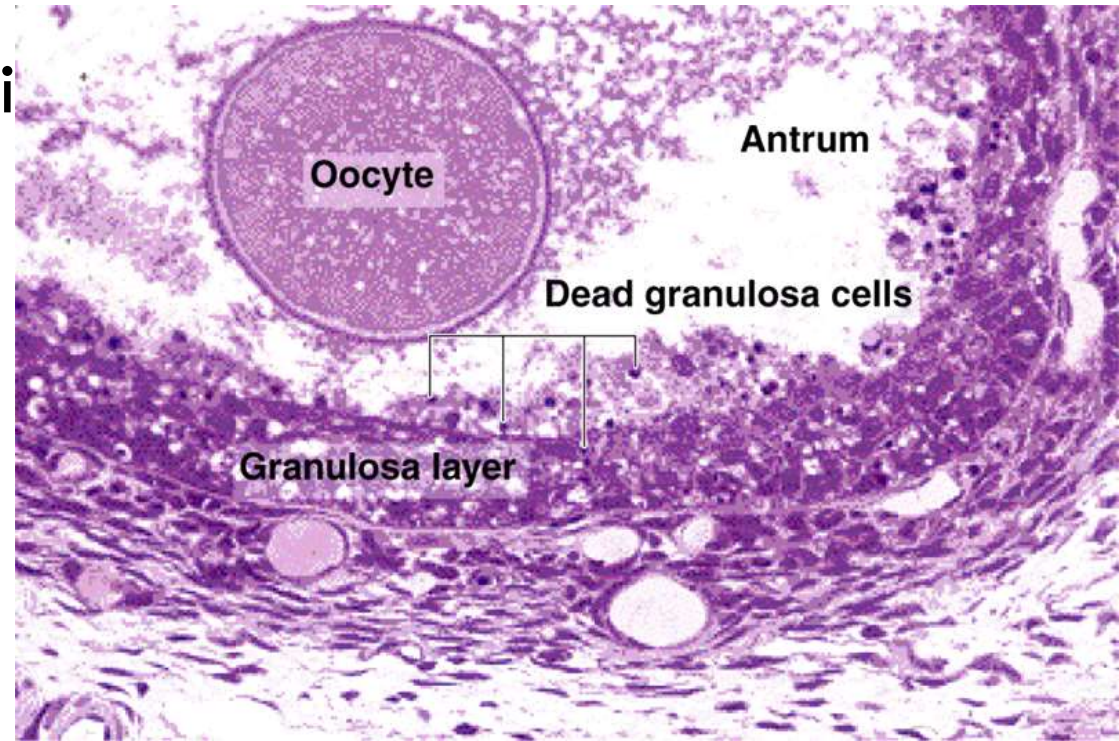
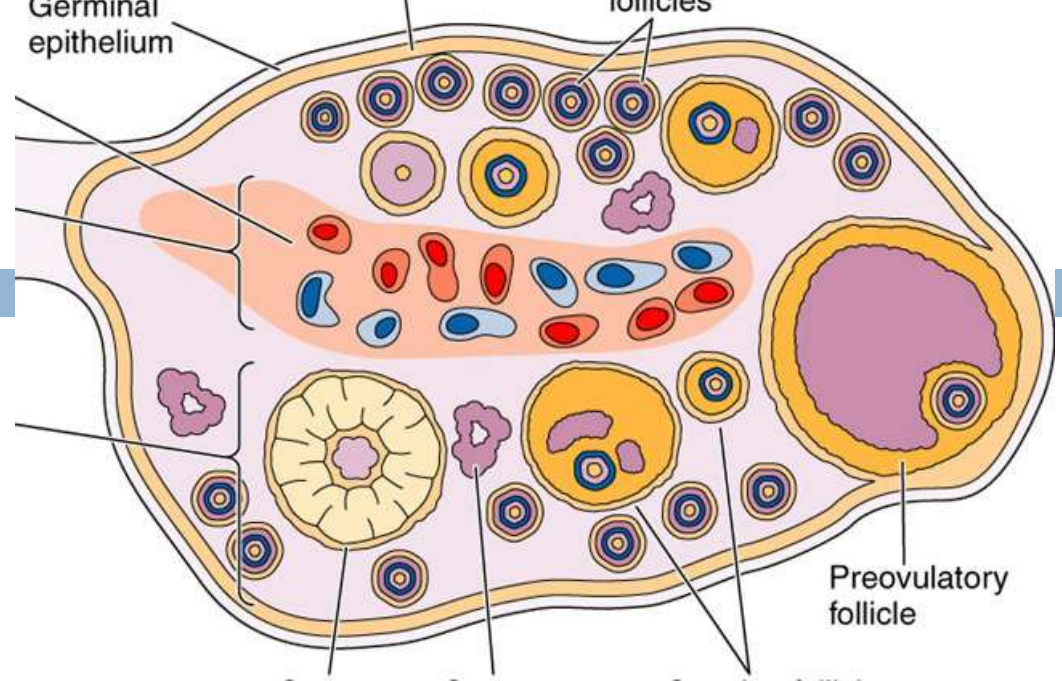


IV. Follicle

Development

E. Follicular atresia (23.2,23.12)

1. degeneration of follicle
2. phagocytosis of follicle
3. may occur at any stage of follicular development

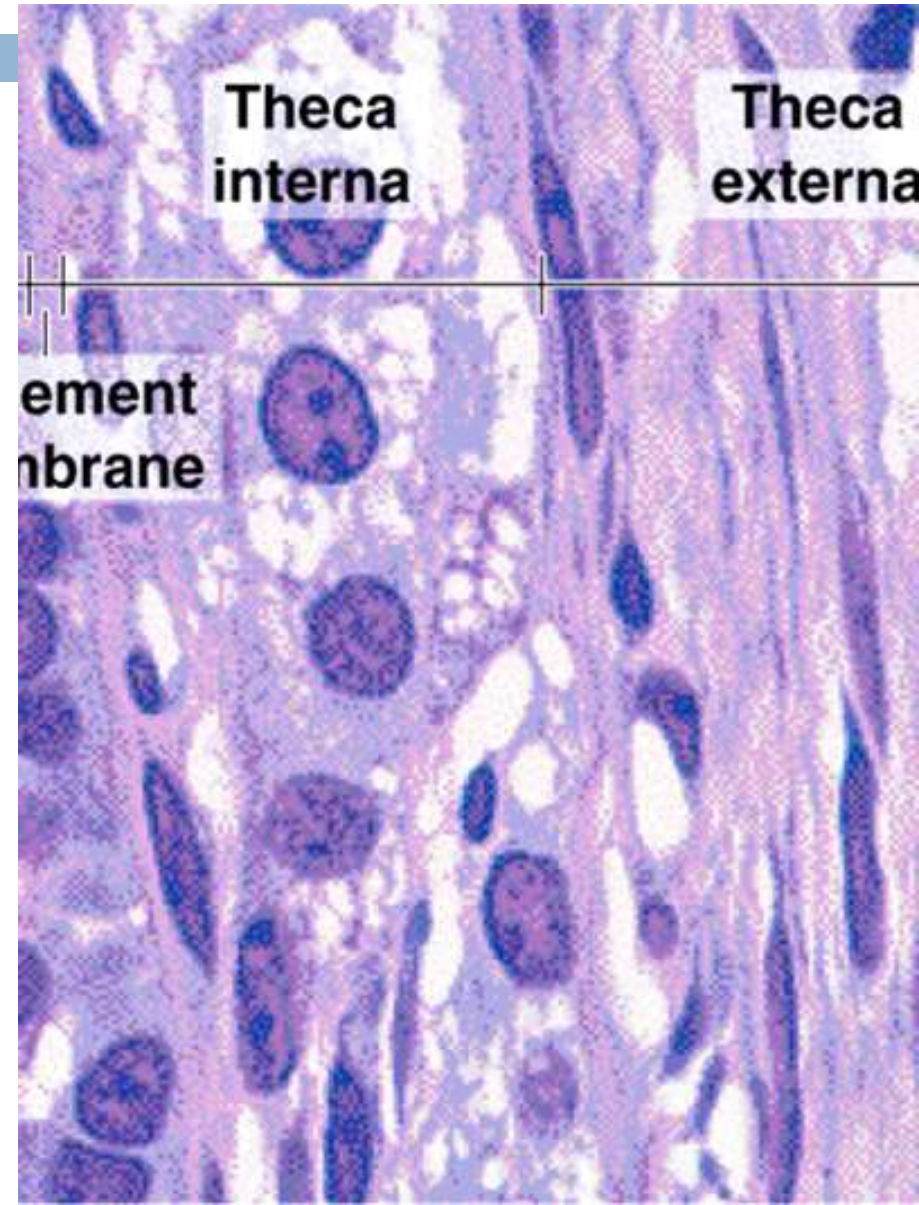


IV. Follicle Development

E. Follicular atresia

4. interstitial cells (23.11)

- a. persistent theca interna cells
- b. secrete androgens



IV. Follicle Development

F. Ovulation (23.1)

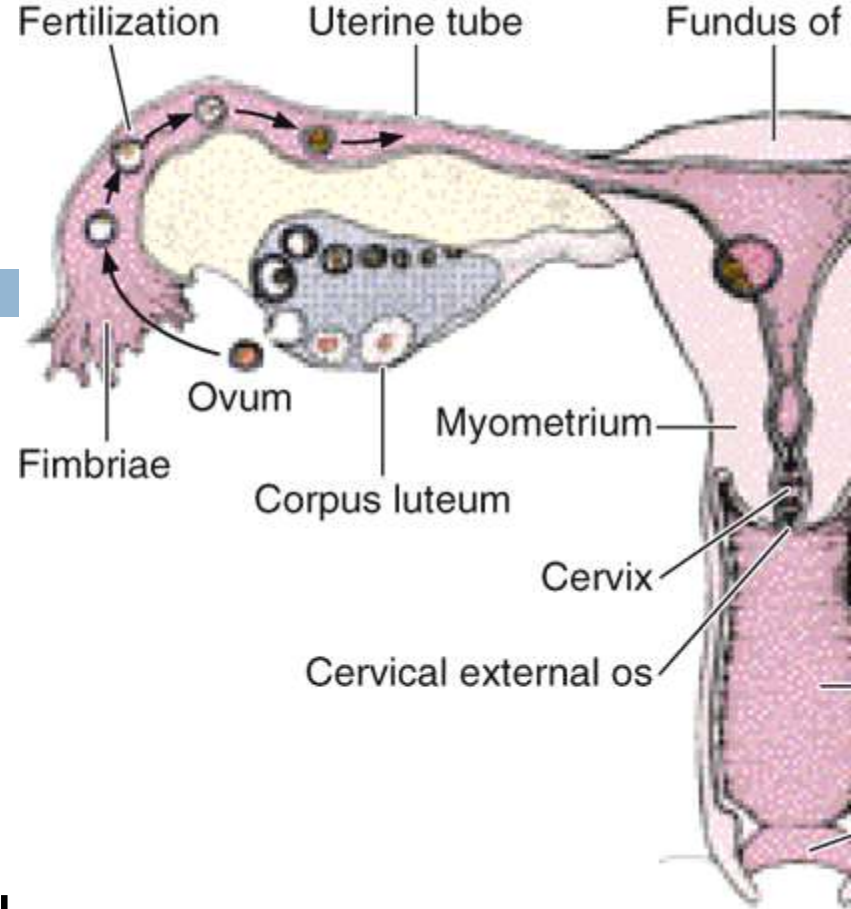
1. ~ day 14 of menstrual cycle

2. release of ovum with corona radiata

3. received by fimbriae of oviduct

4. fertilization usually in oviduct (triggers 2nd meiotic division with second polar body)

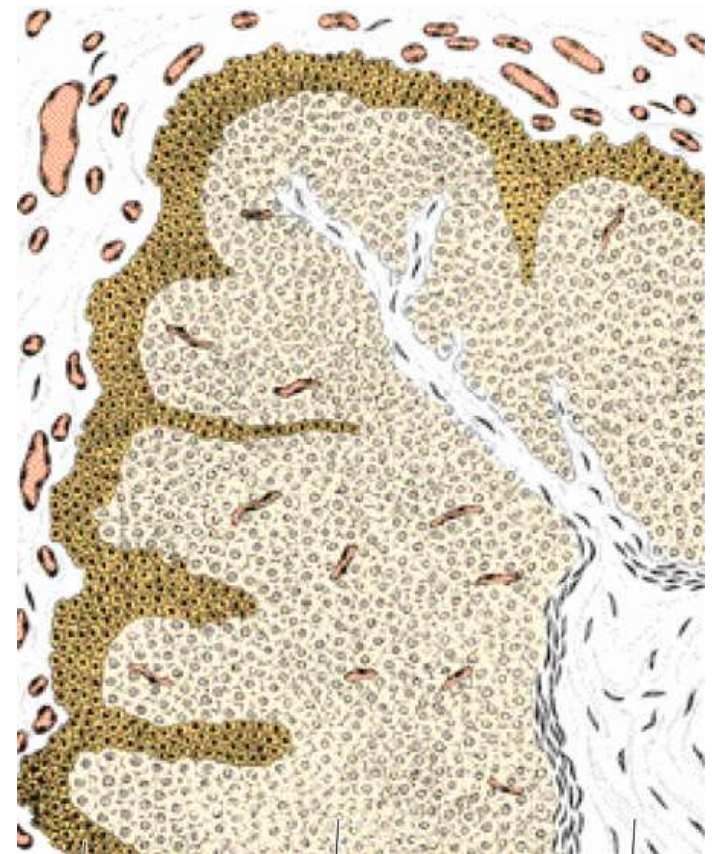
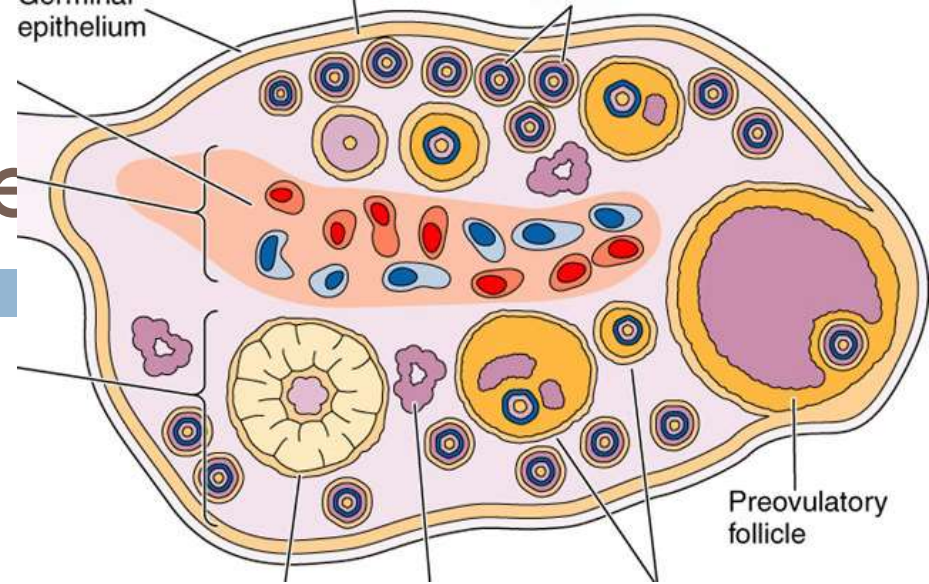
5. male & female pronuclei fuse = zygote



IV. Follicle Development

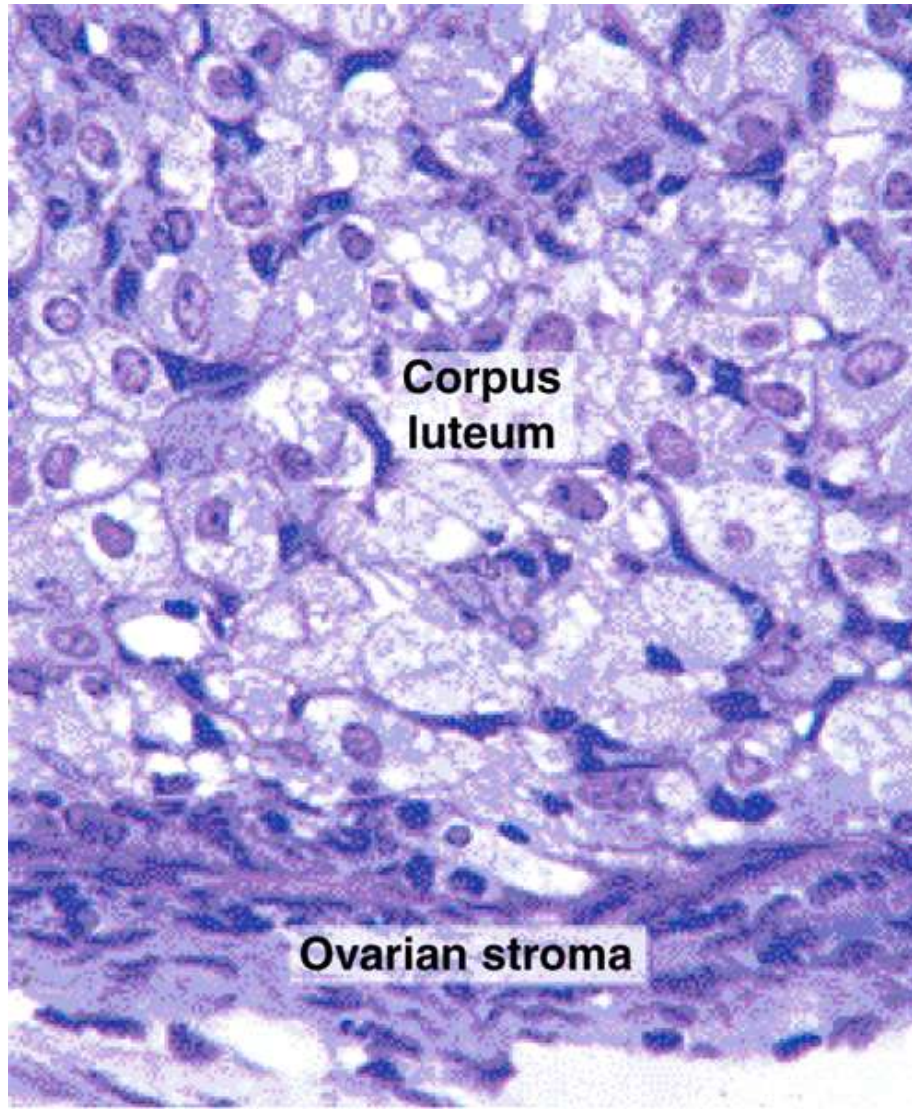
G. Corpus Luteum

1. remains after ovulation (23.2,23.13)
2. granulosa & theca interna cells
 - a. steroid secreting
 - b. granulosa lutein cells
 - c. theca lutein cells
3. progesterone & estrogens



IV. Follicle Development

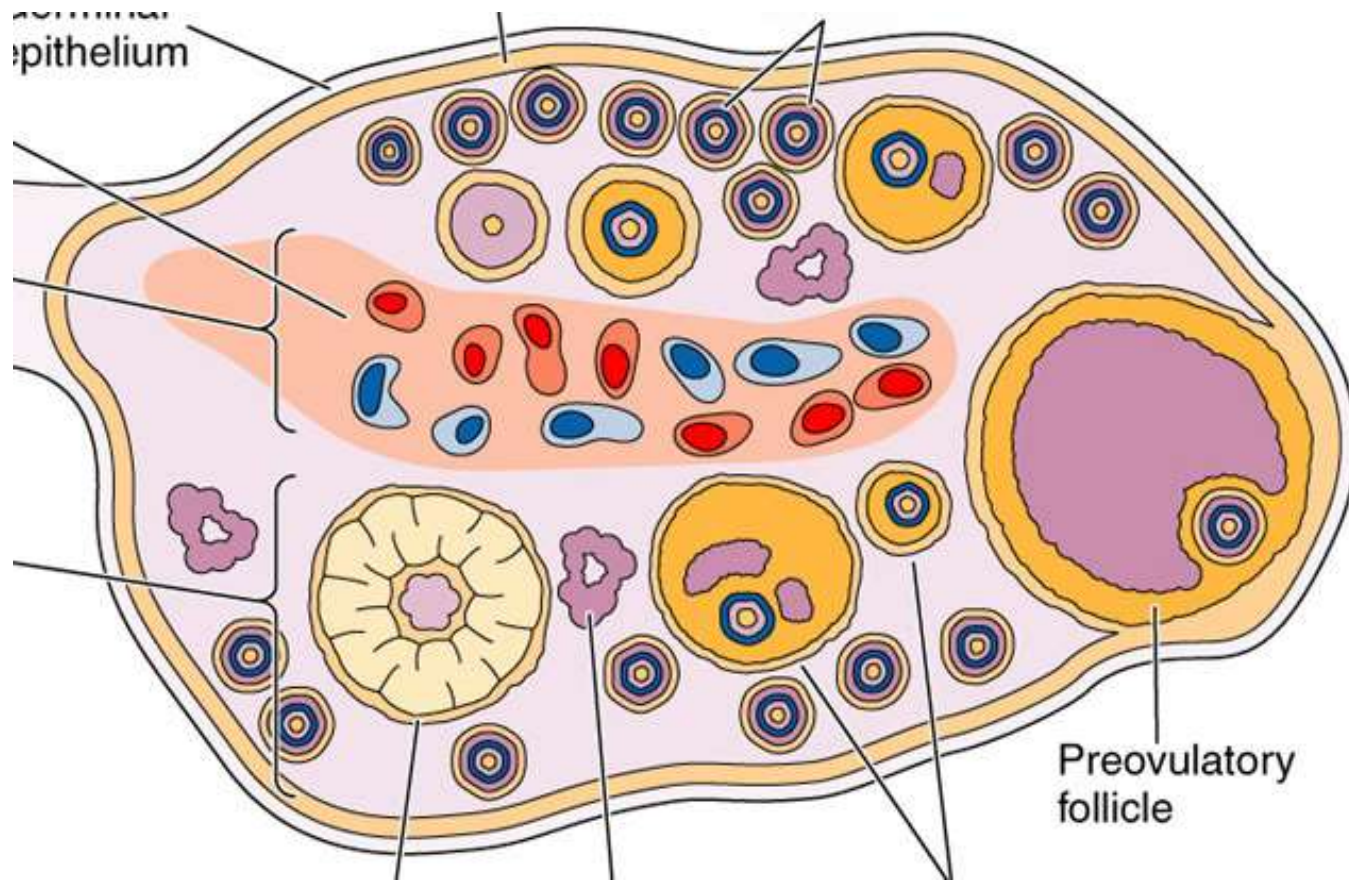
Corpus luteum – granulosa lutein cells 23-14



IV. Follicle Development

G. Corpus luteum of menstruation (23.2)

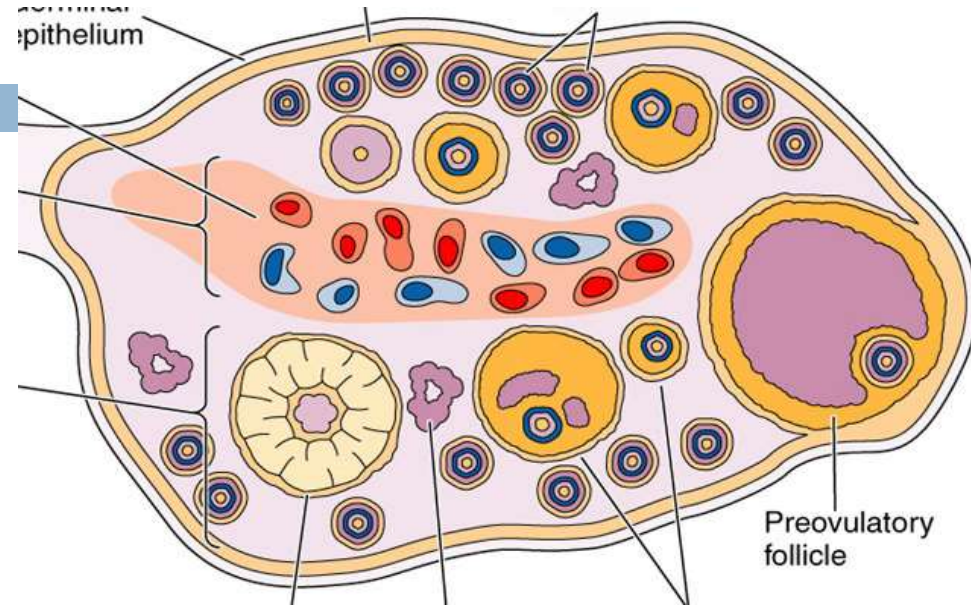
1. no fertilization
2. after 10-14 days corpus luteum degenerates



IV. Follicle Development

H. corpus luteum of pregnancy (23.2)

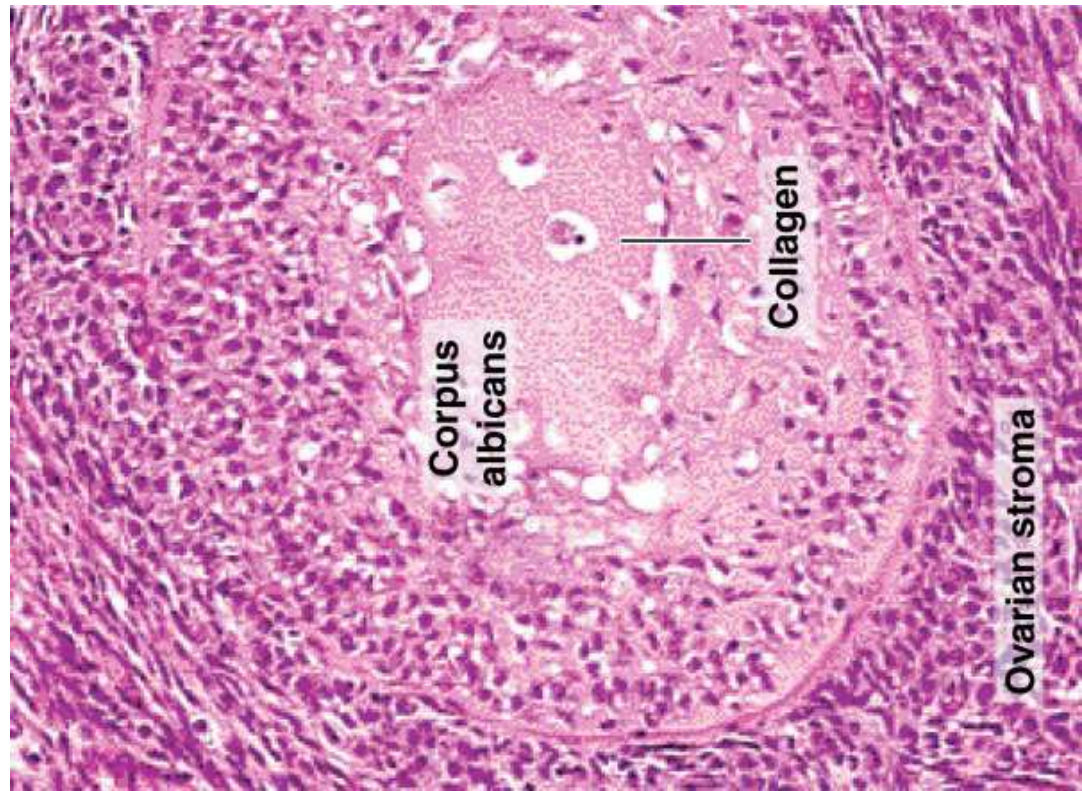
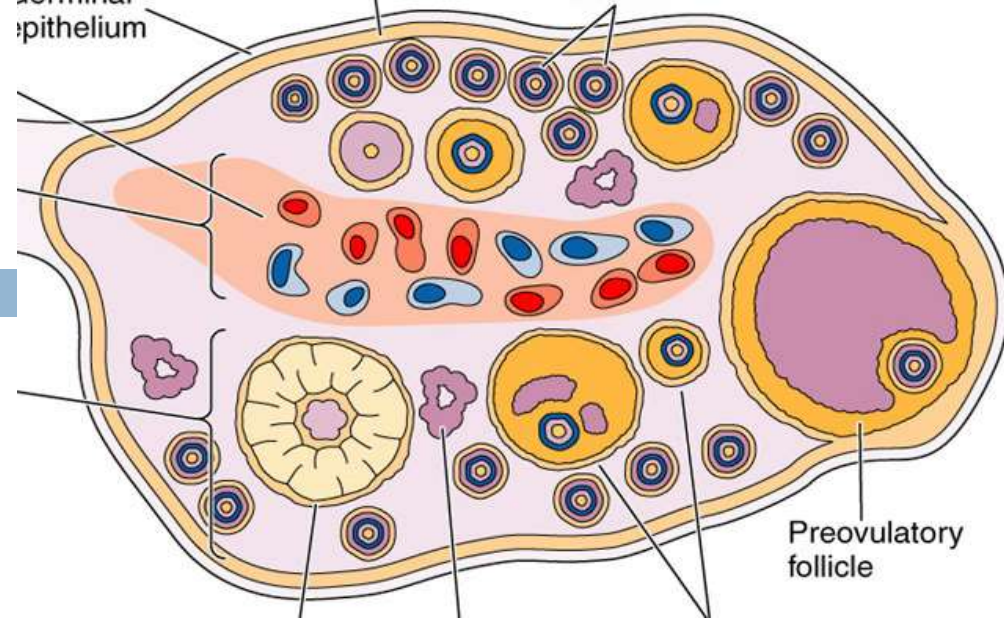
1. maintained by human chorionic gonadotropin (HCG)
 - a. from placenta
2. secretes steroids during pregnancy
3. secretes relaxin
 - a. softens pubic symphysis



IV. Follicle Development

I. Corpus albicans (23.2, 23.16)

1. replaces corpus luteum
2. CT scar tissue



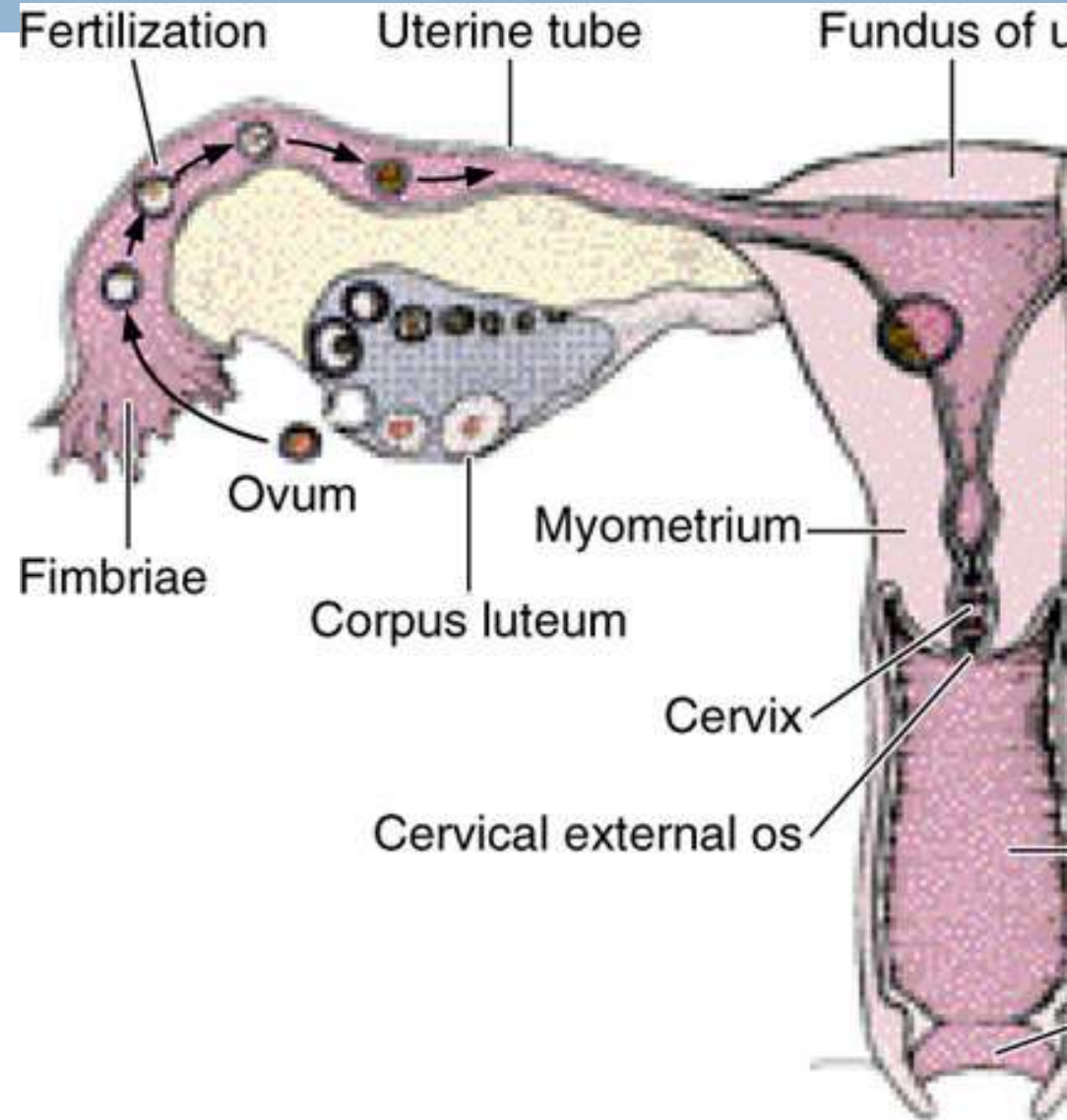
V. Oviducts

A. Between uterus and ovaries

(23.1)

1. ~ 12 cm long

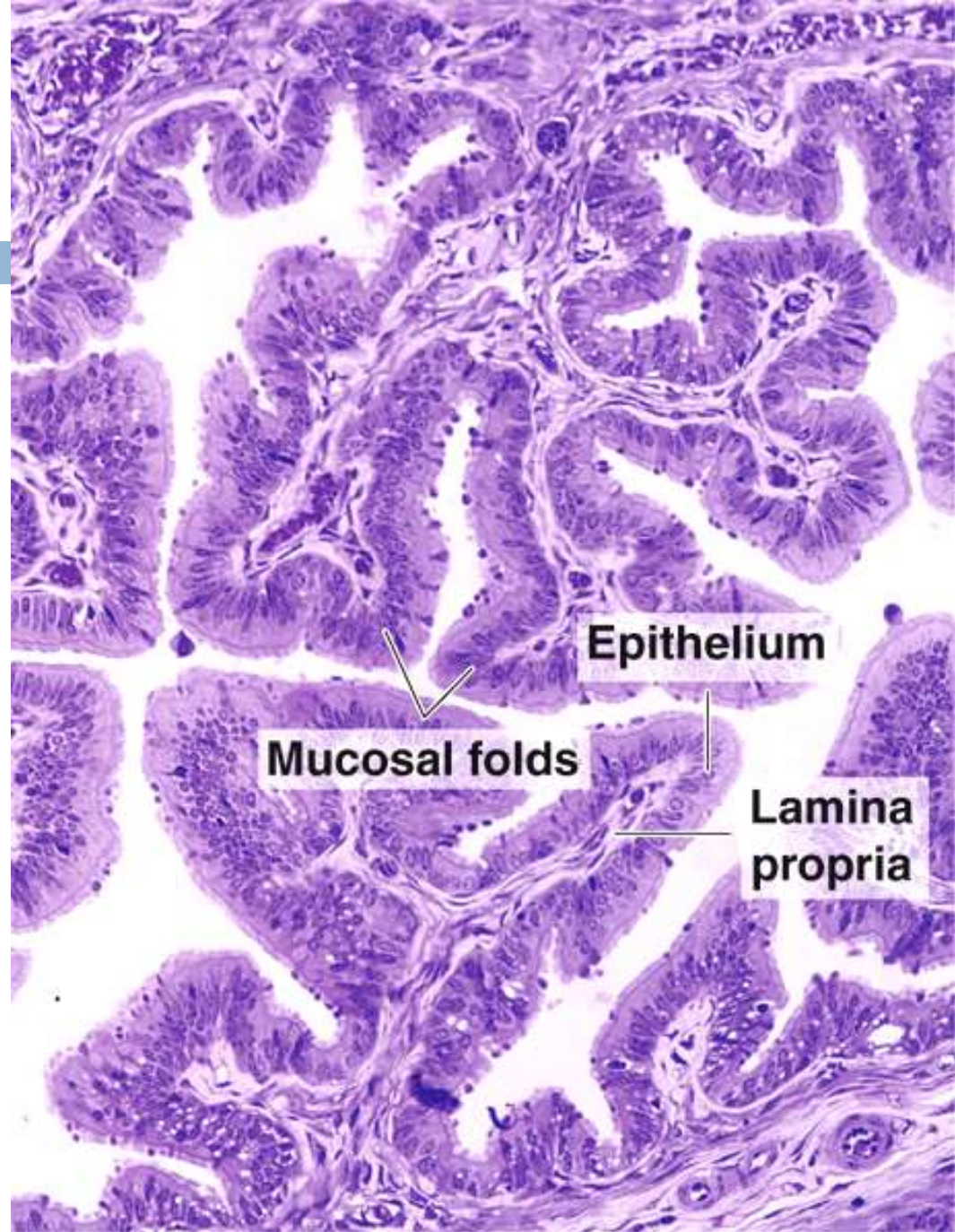
2. fimbriae



V. Oviducts

B. Mucosa

1. longitudinal folds (23.17)



V. Oviducts

B. Mucosa

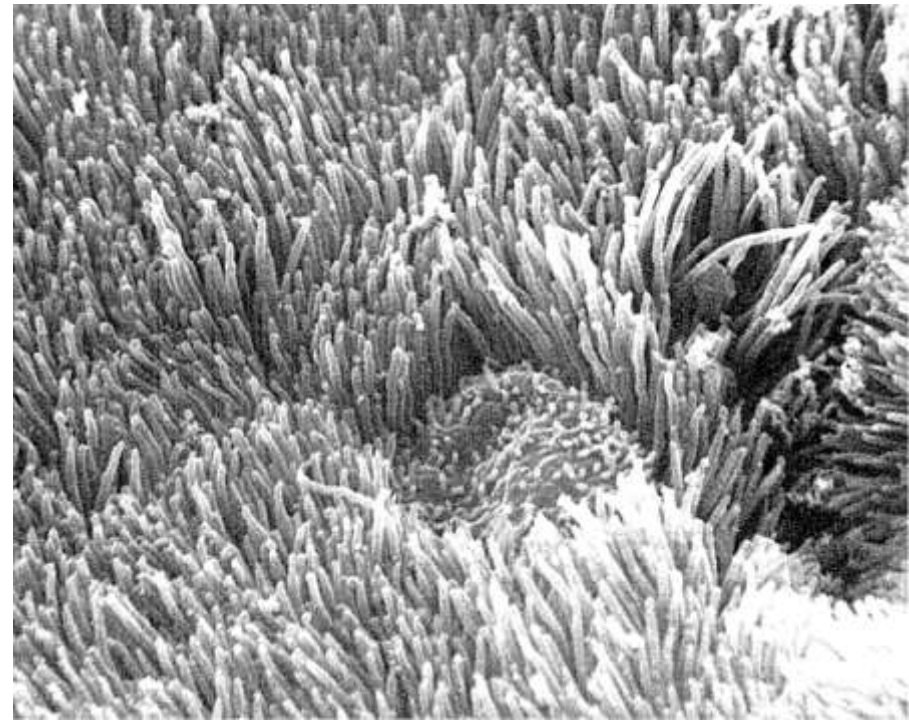
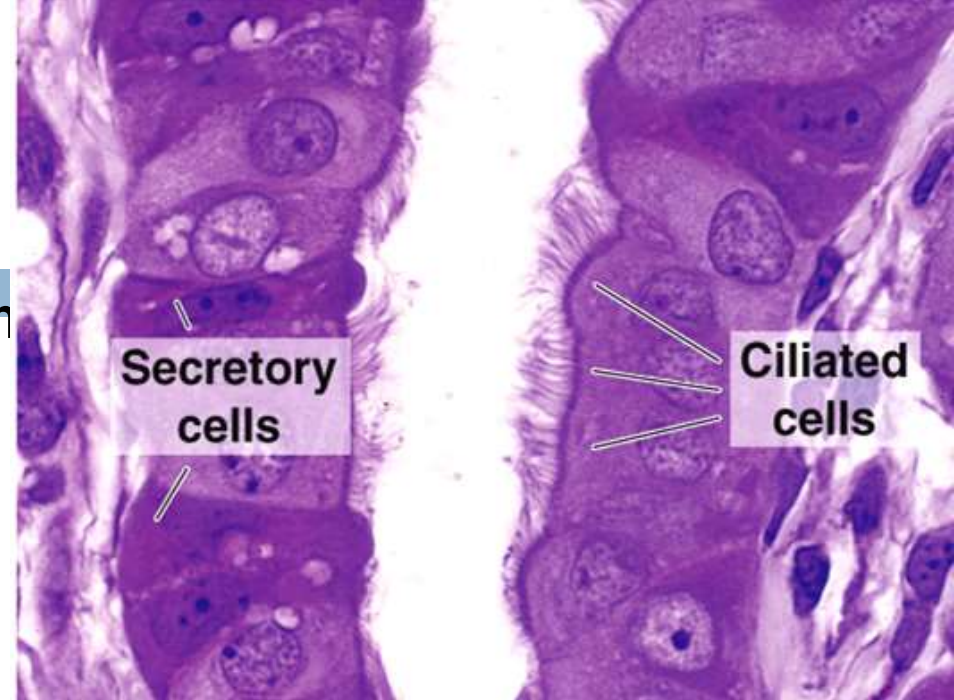
2. simple columnar epithelium
(23.18,23.19)

a. ciliated cells

b. secretory cells

1) supports / transports
ovum

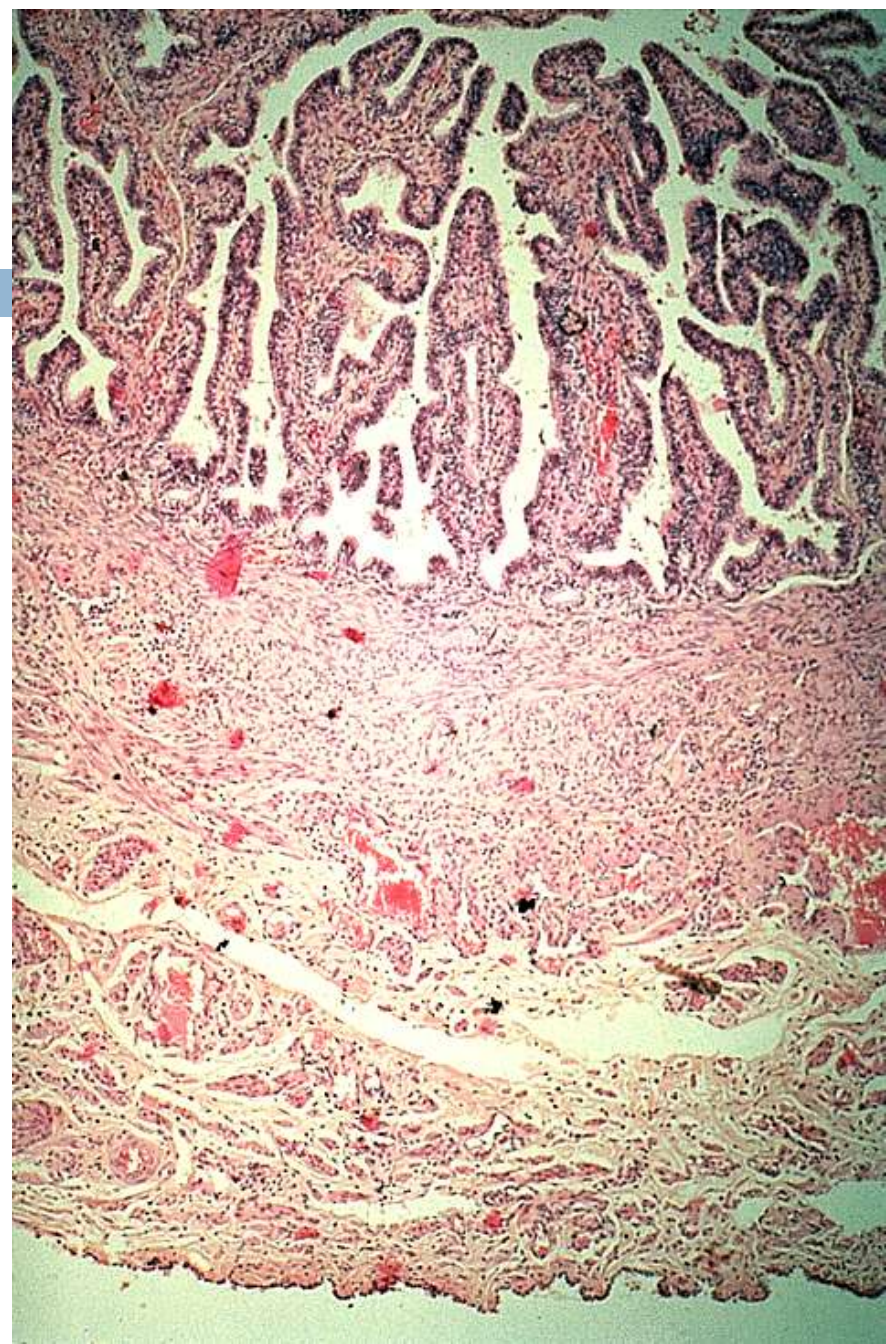
2) capacitation



V. Oviducts

C. Muscularis

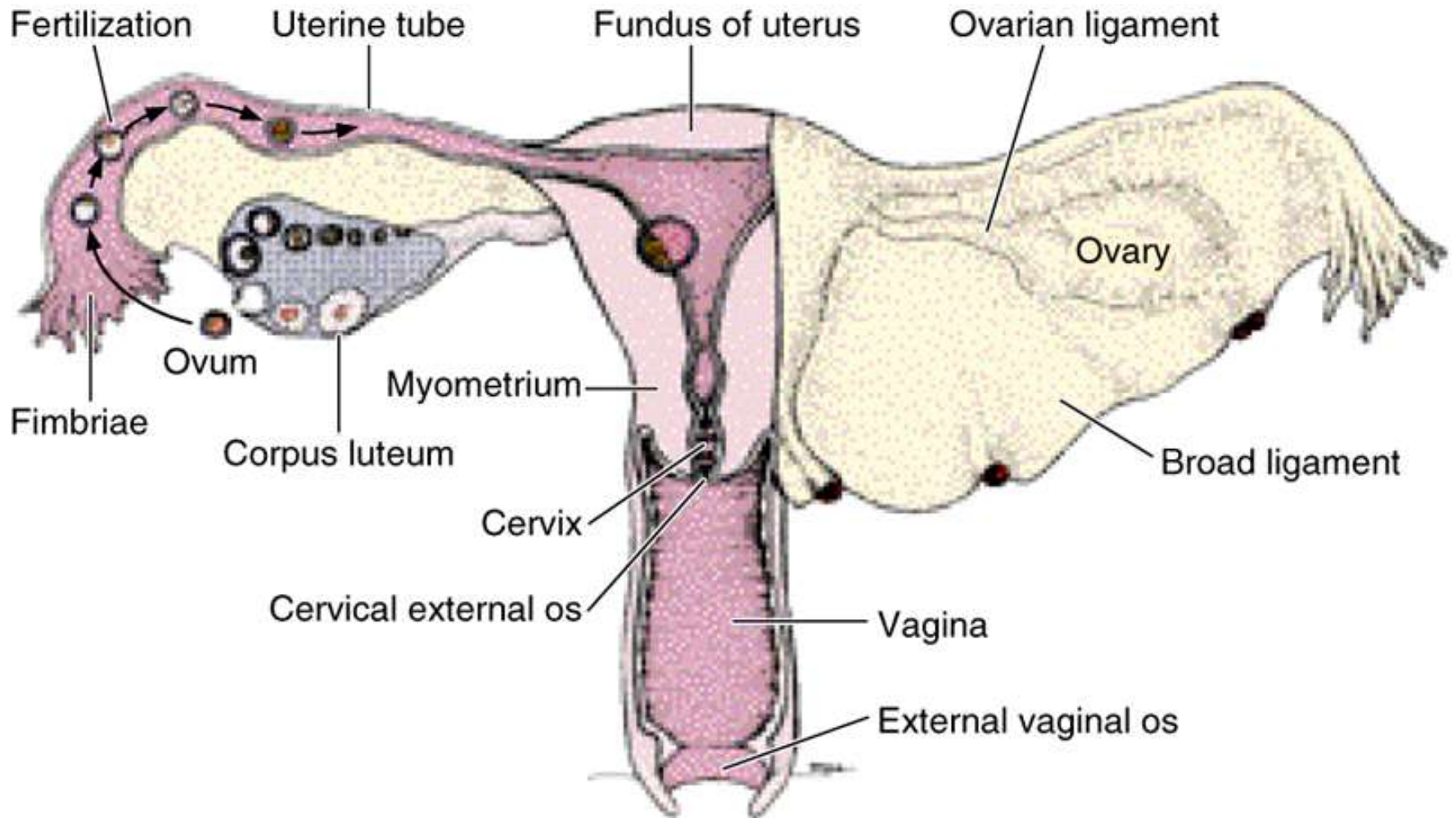
1. inner circular layer
2. outer longitudinal layer



V. Oviducts

D. Serosa (23.1)

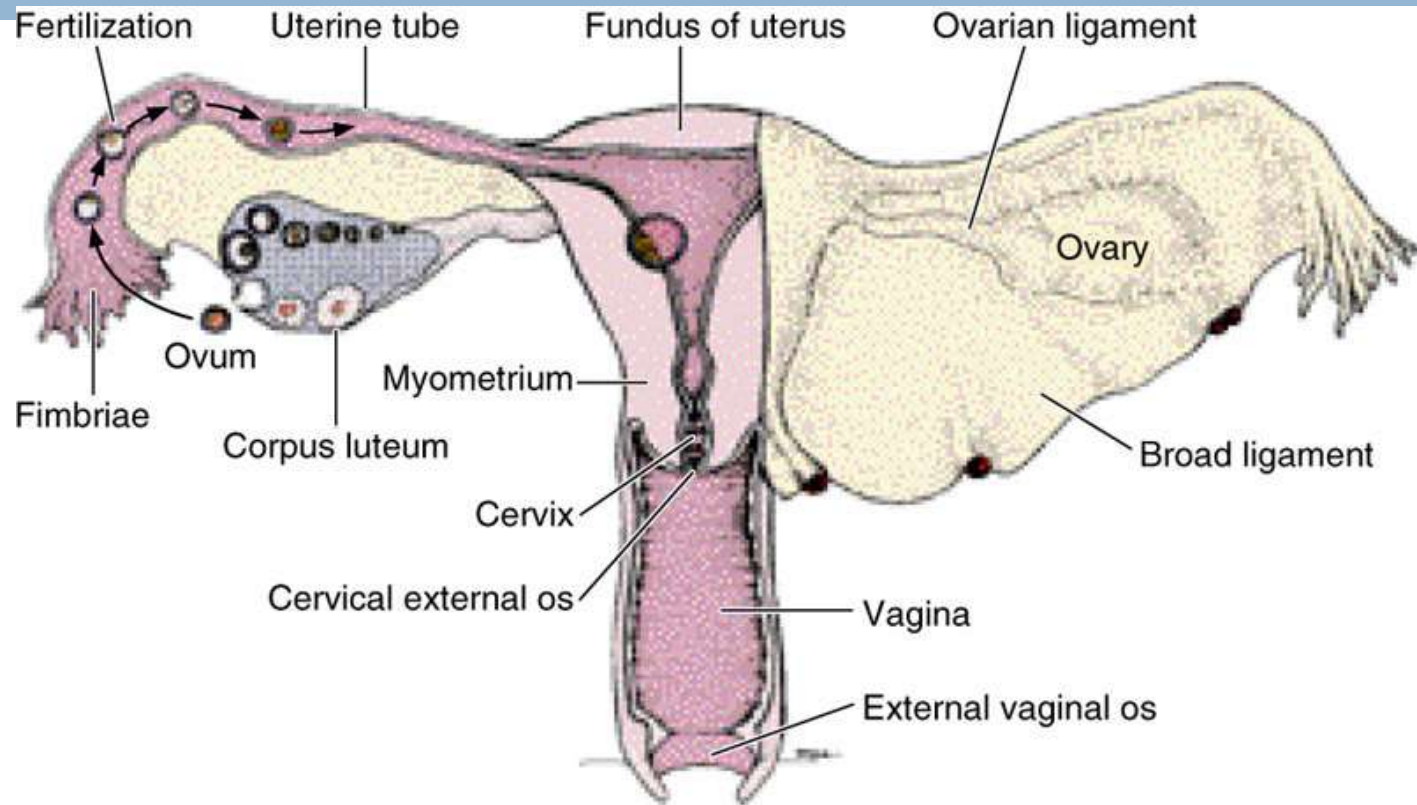
1. visceral peritoneum



VI. Uterus

A. Gross anatomy (23.1)

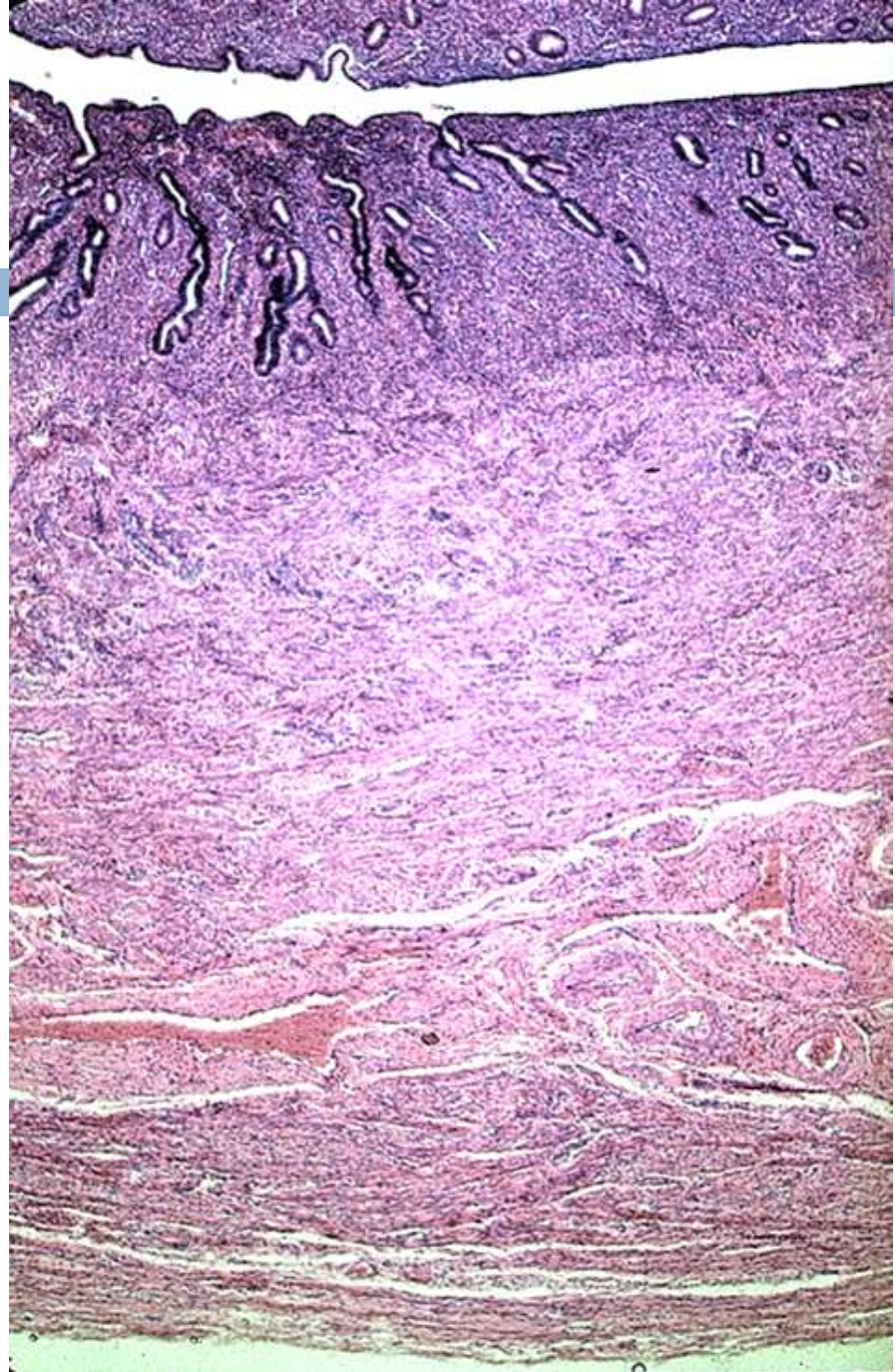
1. fundus
2. body
3. cervix



VI. Uterus

B. Layers

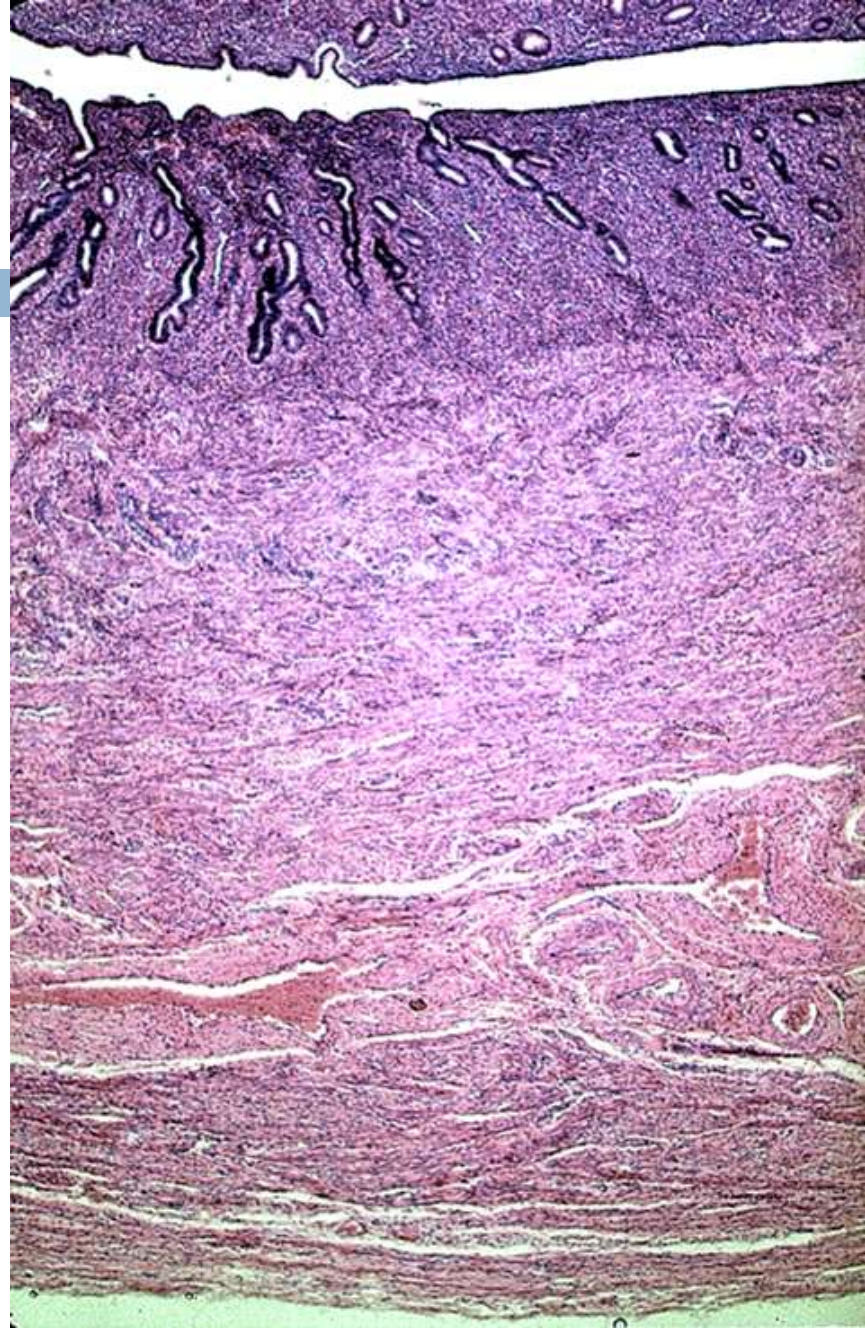
1. serosa / adventitia
2. myometrium
3. endometrium



VI. Uterus

C. Myometrium

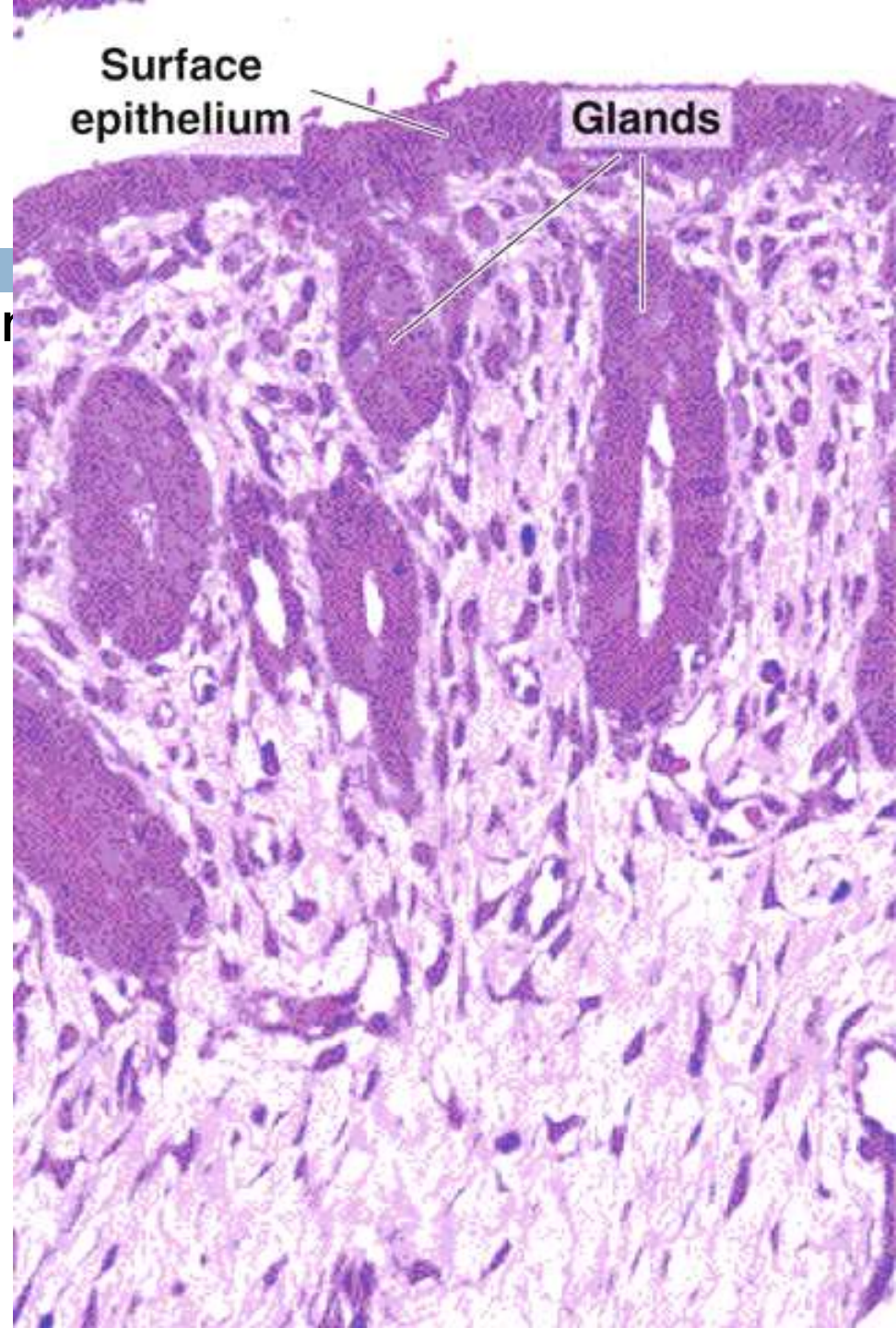
1. poorly organized layers
2. smooth muscle fibers



VI. Uterus

D. Endometrium 23-21

1. simple columnar epithelium
 - a. ciliated cells
 - b. secretory cells
2. lamina propria
 - a. loose CT
 - b. uterine glands



VI. Uterus

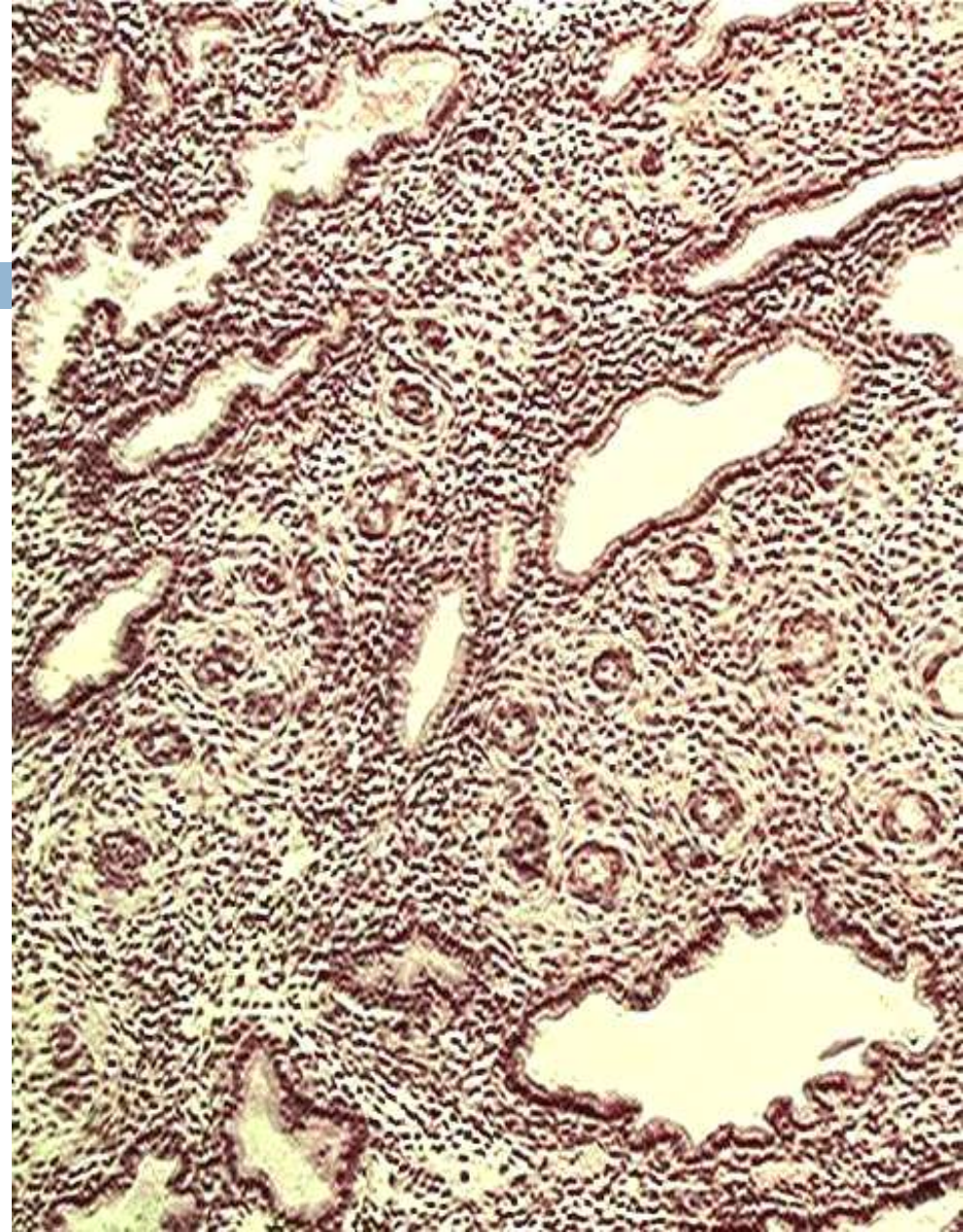
D. Endometrium

3. functionalis

a. coiled arteries

4. basalis

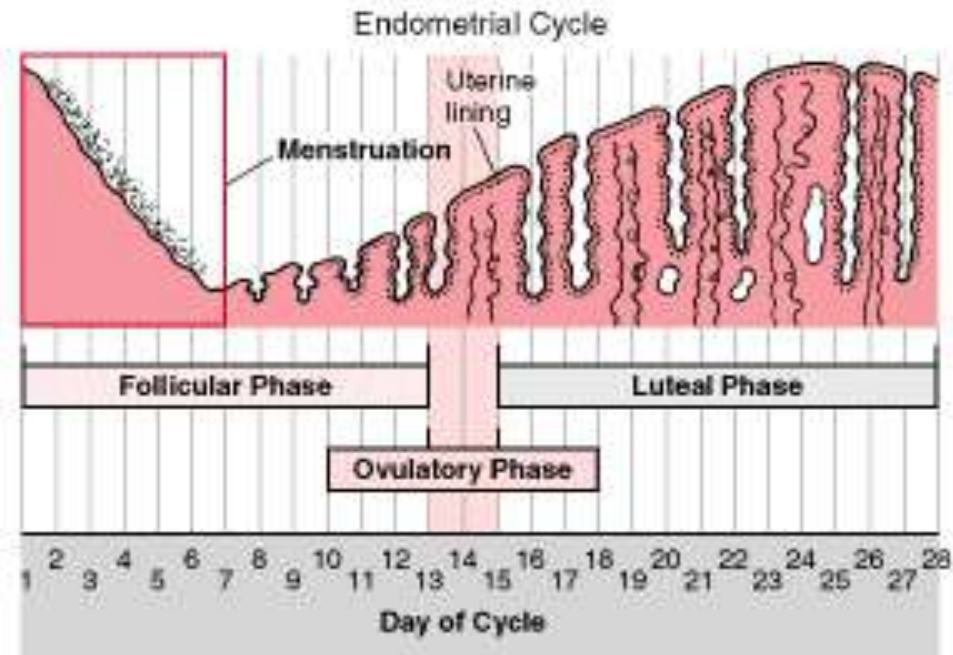
a. straight arteries



VII. Menstrual Cycle

A. Menstrual phase

1. days 1-4
2. begins with menstrual flow
3. no fertilization
4. corpus luteum degenerates
 - a. drop in progesterone and estrogens
5. coiled arteries constrict
6. ischemia & necrosis of functionalis
7. shedding of functionalis



VII. Menstrual Cycle

B. Proliferative phase

(23.21)

1. days 5-14

2. coincides with development of ovarian follicles

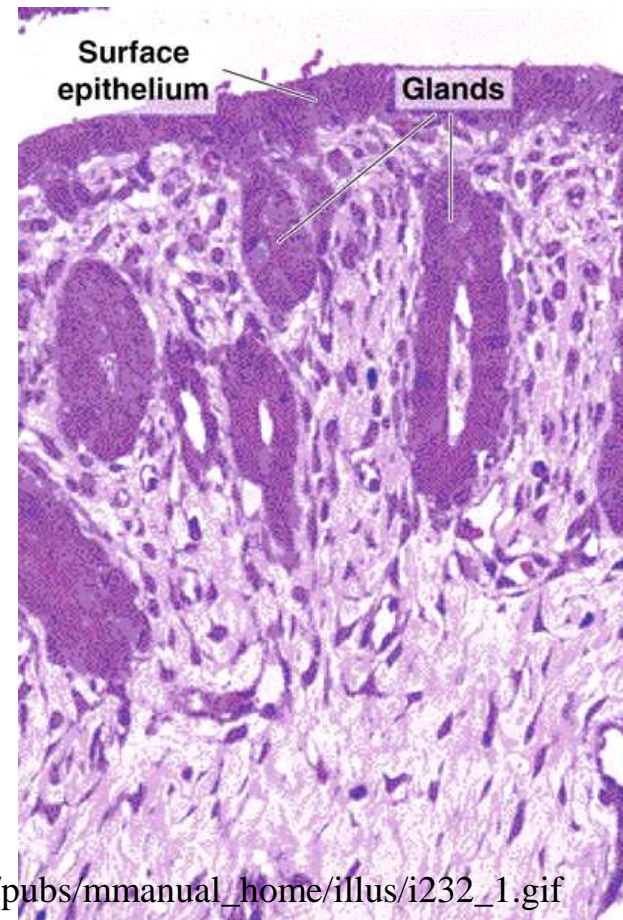
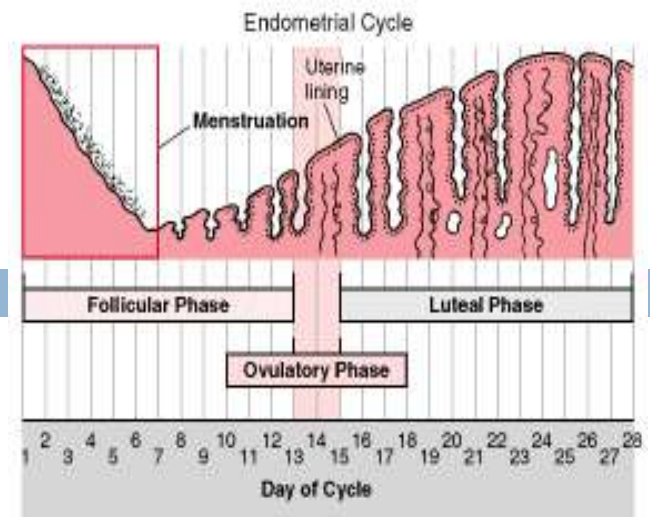
3. regeneration

a. surface epithelium

b. lamina propria

c. uterine glands

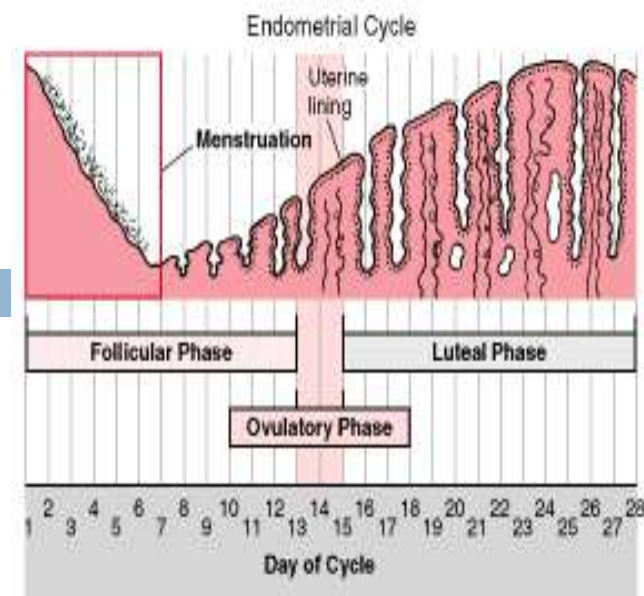
d. coiled arteries



VII. Menstrual Cycle

C. Secretory phase (23.23)

1. days 15-28
2. begins after ovulation
3. depends on corpus luteum secretions
4. uterine glands become coiled and distended
5. prepared to receive zygote



VIII. Placenta

A. Development of blastocyst

1. mitosis of zygote

a. morula (cluster of cells)

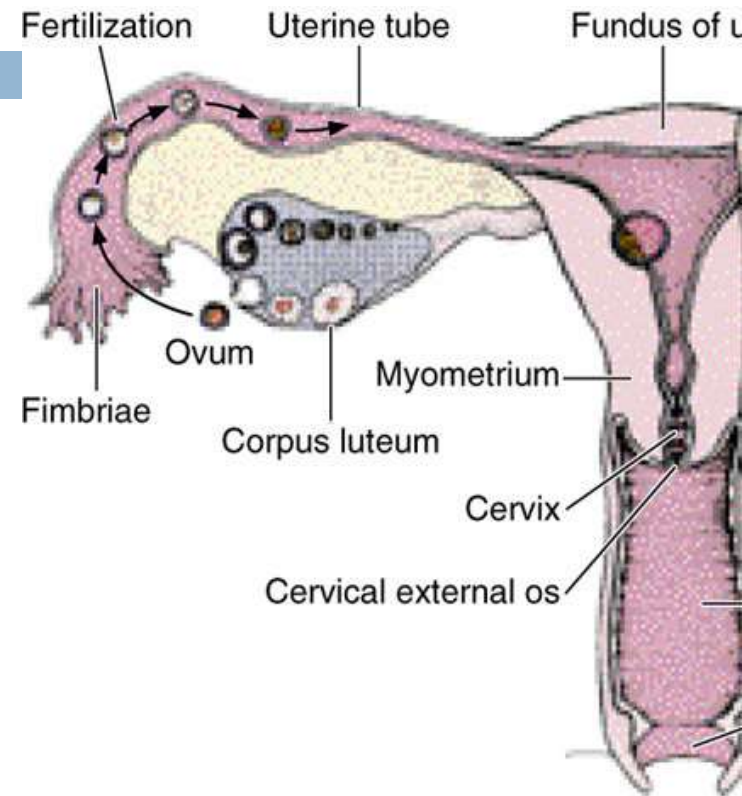
b. blastomere (sphere of cells)

2. blastocyst (fluid filled sphere)

a. outer trophoblast

b. inner cell mass (future embryo)

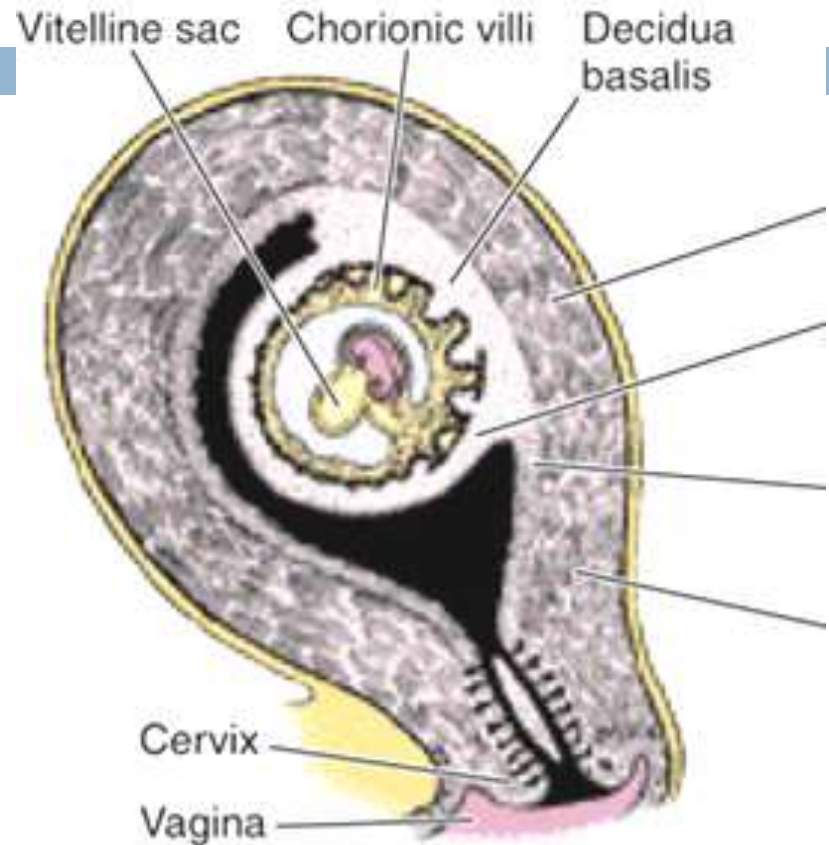
c. zona pellucida digested



VIII. Placenta

B. Implantation

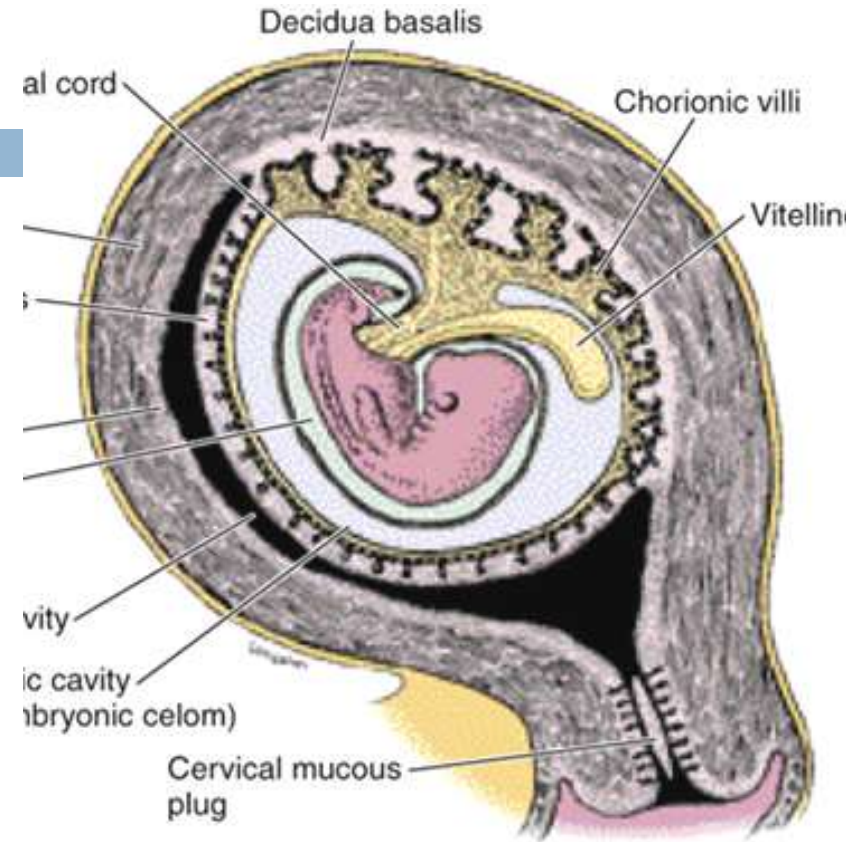
1. day 7-9 (23.25)
2. blastocyst embedded in endometrium
 - a. secretory phase
3. trophoblast forms
 - a. cytotrophoblast
 - b. syncytiotrophoblast



VIII. Placenta

B. Structure

1. chorionic villi (23.25)
 - a. trophoblast layers
 - b. mesenchyme
 - c. fetal blood vessels

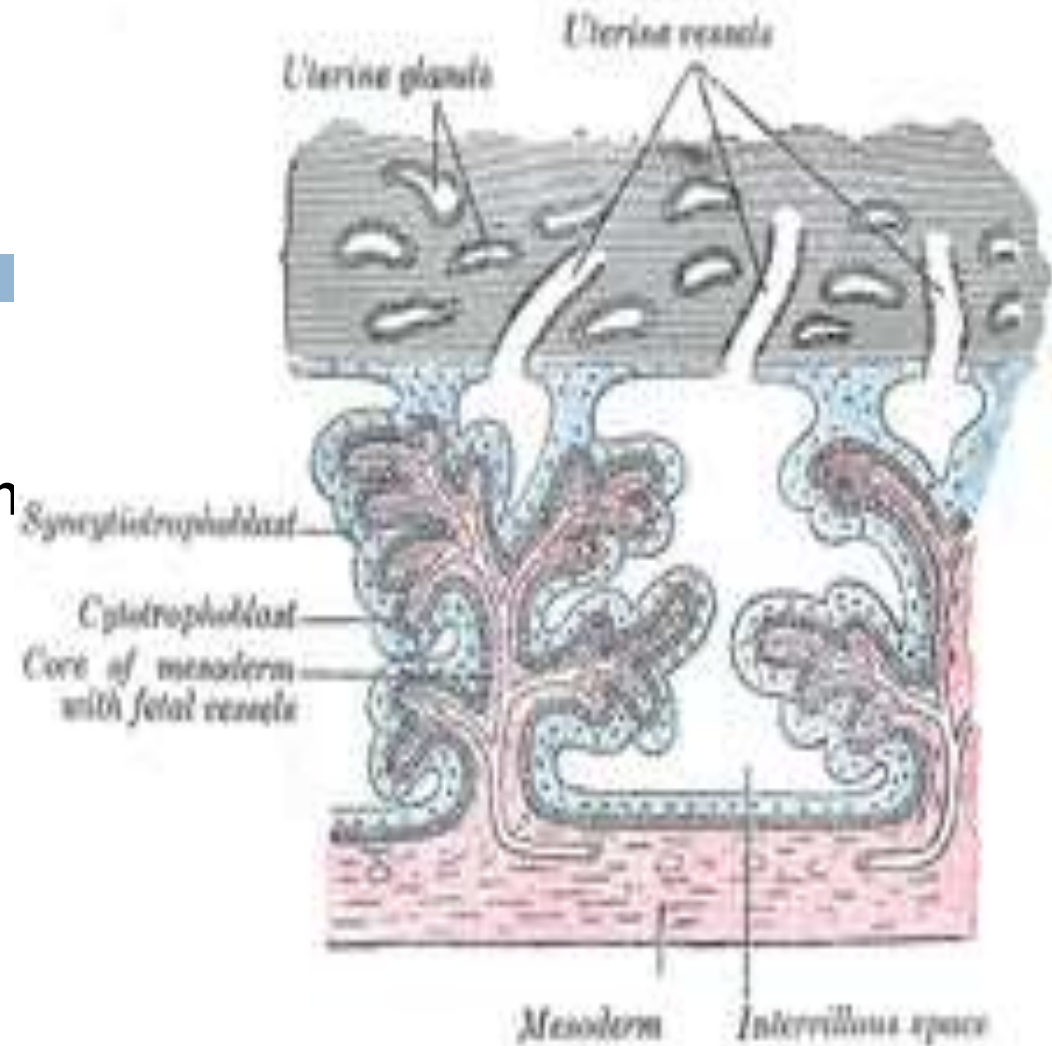


VIII. Placenta

B. Structure

2. intervillous space

a. maternal circulation

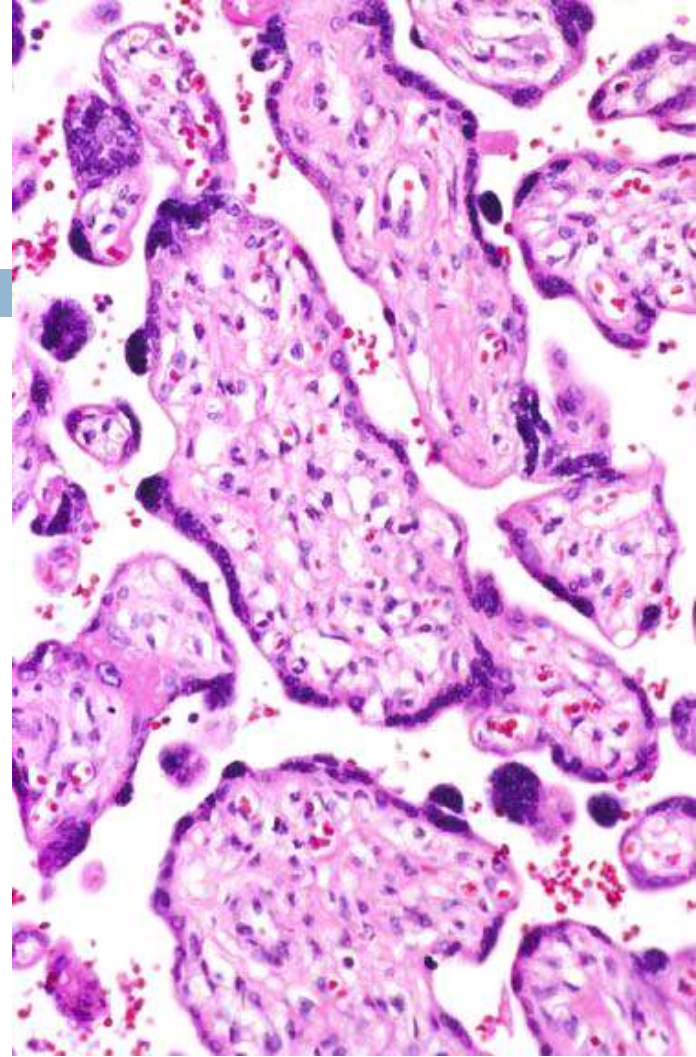


<http://www.bartleby.com/107/Images/small/image37.jpg>

VIII. Placenta

C. Function: placental barrier

- a. trophoblast layers
- b. basal lamina of trophoblast
- c. mesenchyme
- d. basal lamina of capillaries
- e. endothelium of fetal capillary



VIII. Placenta

Maternal to fetal transport:

Oxygen	Hormones
H ₂ O	Some antibodies
Electrolytes	Some drugs
Carbohydrates	CO ₂
Lipids	H ₂ O
Proteins	Hormones
Vitamins	Metabolic wastes