

Female Reproductive System

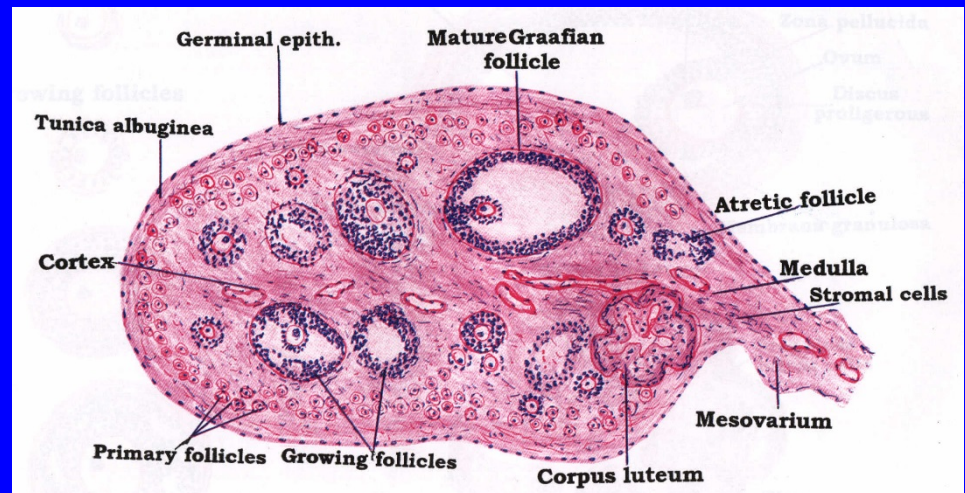
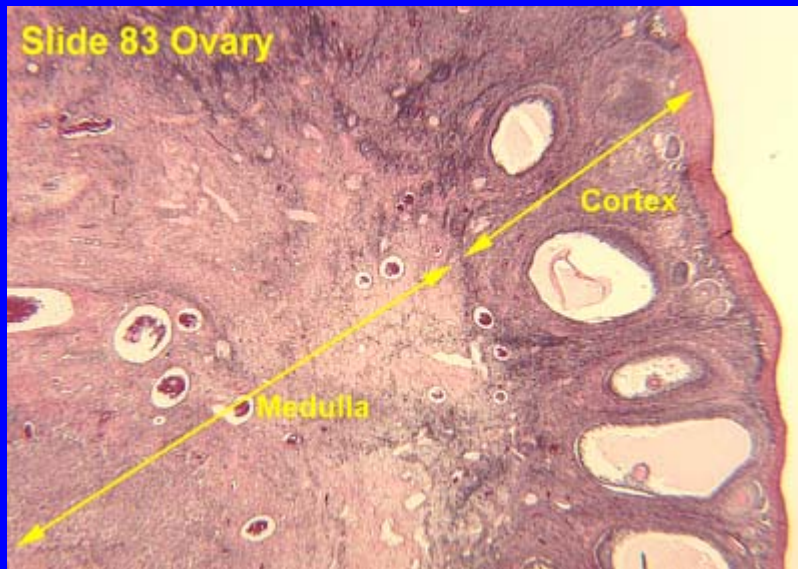
Objectives:

By the end of the lecture you should be able to:

- Describe the histological structure and fate of ovarian follicles.
- Describe the histological structure of:
 - Ovary.
 - Oviducts (Fallopian tubes).
 - Uterus.
 - Vagina.
 - Resting and lactating mammary gland.

ADULT OVARY

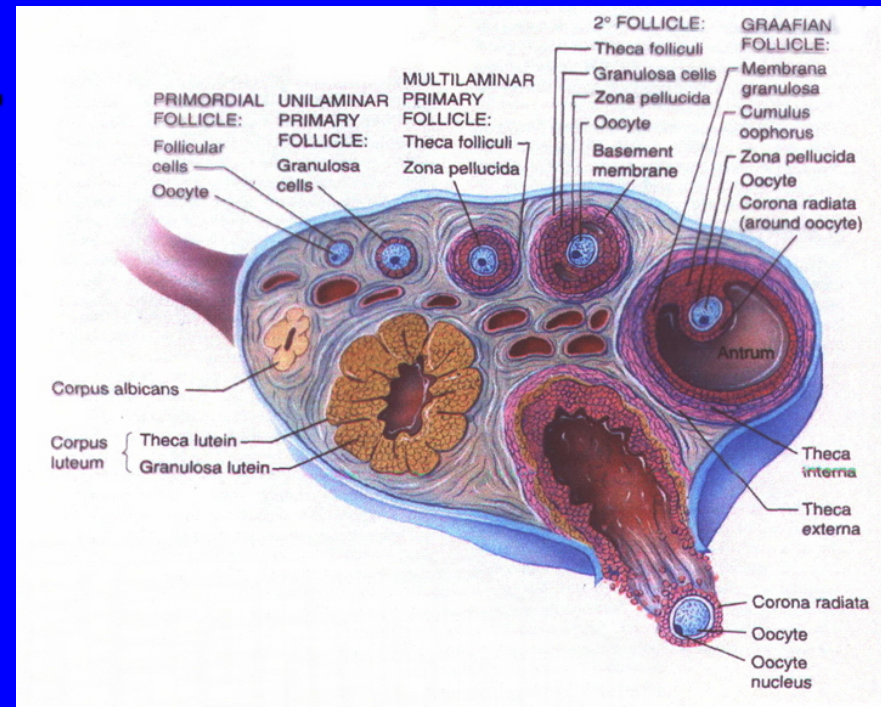
- 1- **Germinal epithelium:** outer layer of flat cells.
- 2- **Tunica albuginea:** dense C.T layer.
- 3- **Outer cortex:** ovarian follicles and interstitial cells.
- 4- **Inner medulla:** highly vascular loose C.T.



Ovarian Follicles

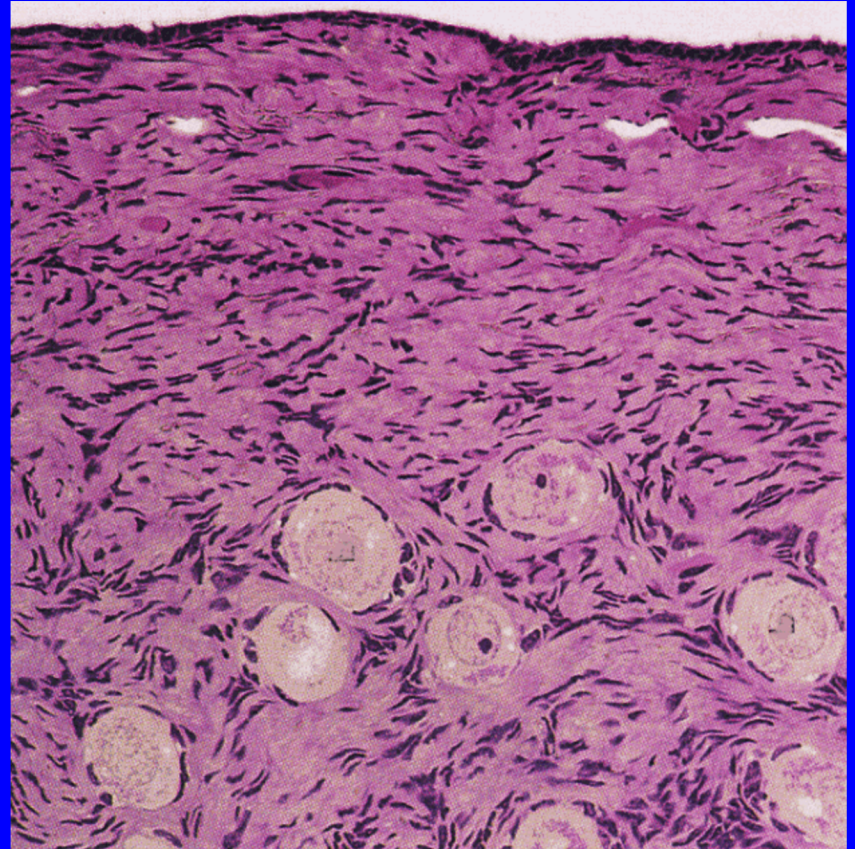
The cortex of the ovary in adults contains the following types (stages) of follicles:

1. **PRIMORDIAL** follicles.
2. **PRIMARY** follicles:
 - a) Unilaminar
 - b) Multilaminar
3. **SECONDARY (ANTRAL)** follicles.
4. **MATURE Graafian** follicles.



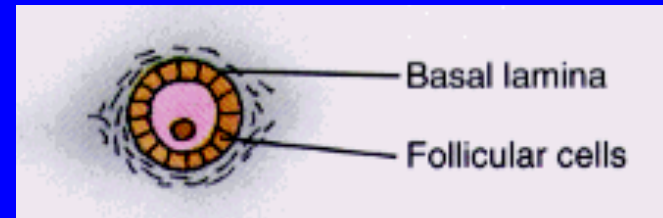
1. Primordial Follicles

- The only follicles present before puberty.
- The earliest and most numerous stage.
- Located superficially under the tunica albuginea.
- Each is formed of a primary oocyte (25 μm), surrounded by a single layer of flat follicular cells.



2. Primary Follicles

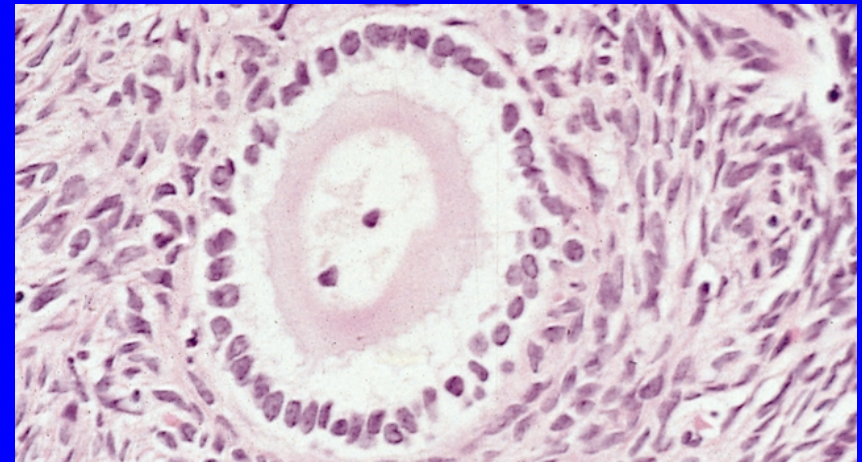
They develop from the primordial follicles, at puberty under the effect of FSH.



a) Unilaminar primary follicles:

are similar to primordial follicles, but:

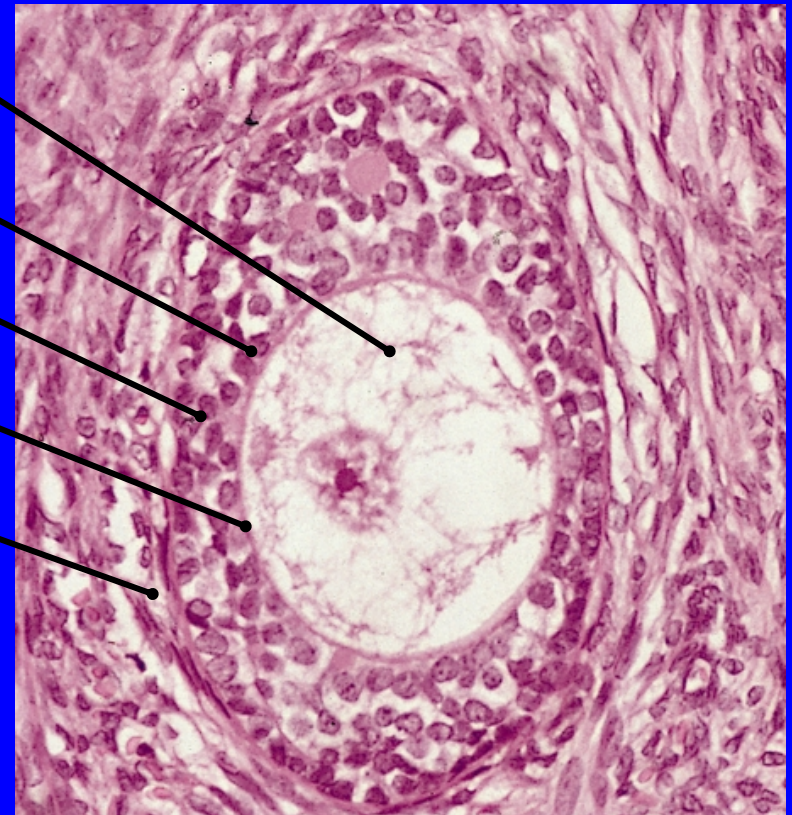
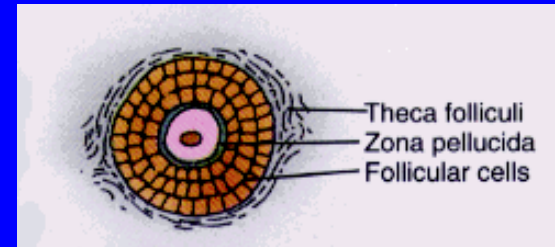
- the primary oocyte is larger ($40\ \mu\text{m}$).
- the follicular cells are cuboidal in shape.



2. Primary Follicles

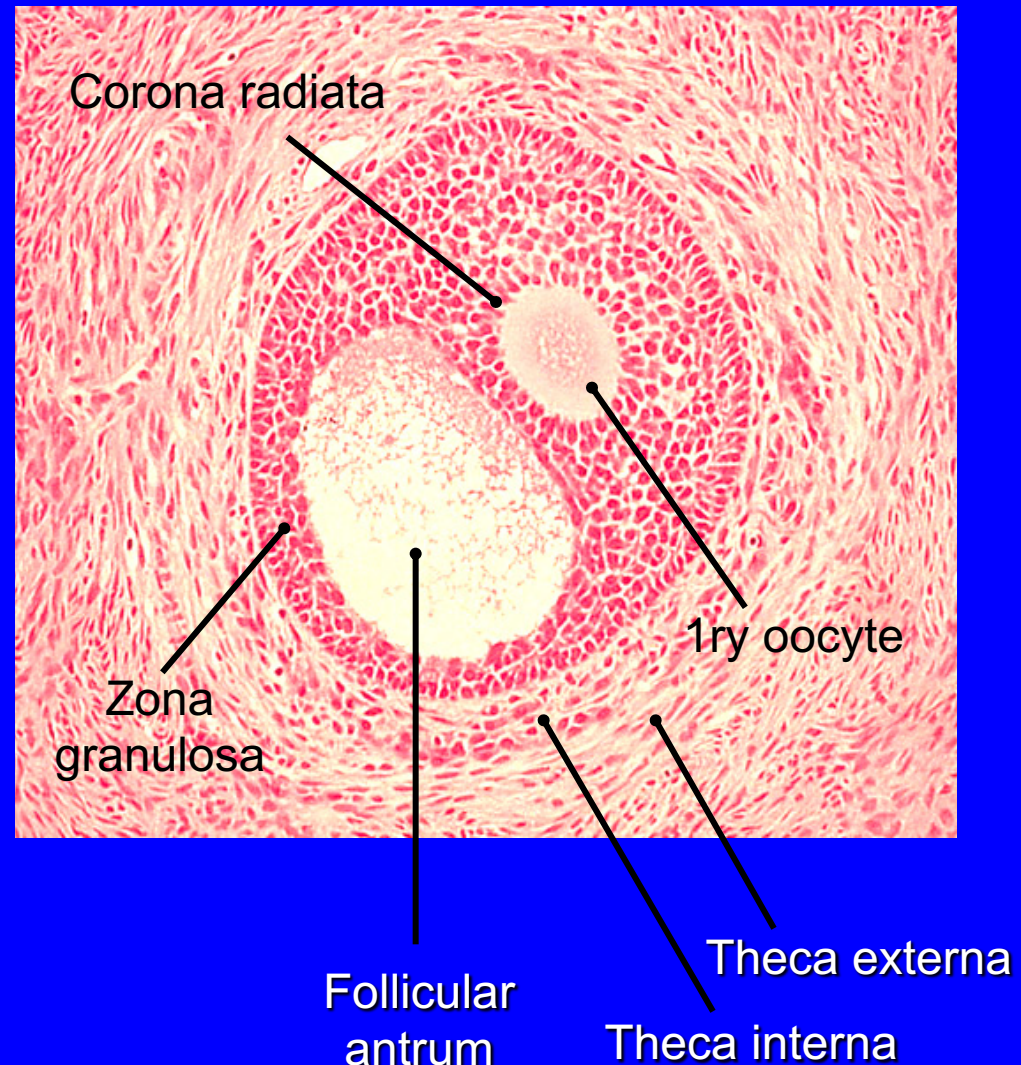
b) Multilaminar primary follicles:

- 1ry oocyte larger
- corona radiata
- granulosa cells
- zona pellucida
- theca folliculi
- follicular fluid (liquor folliculi)



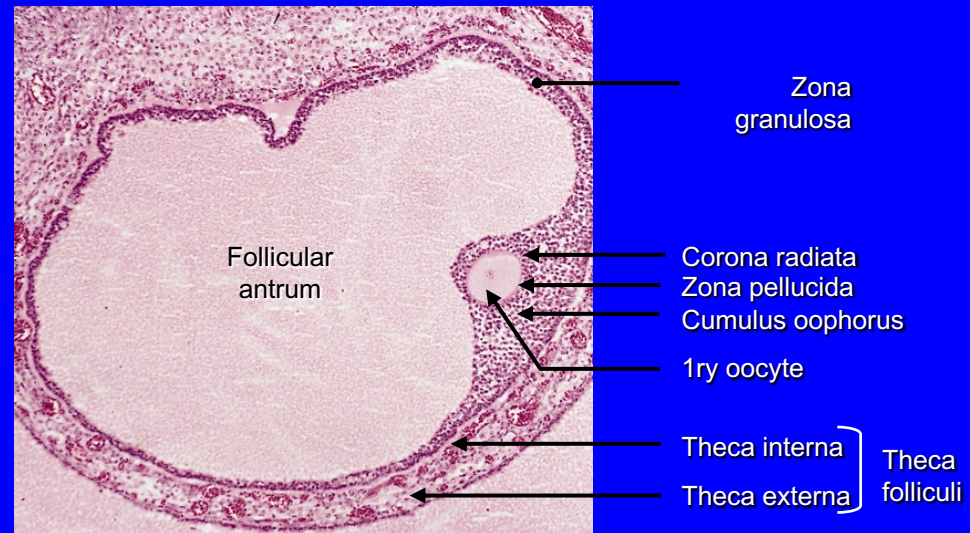
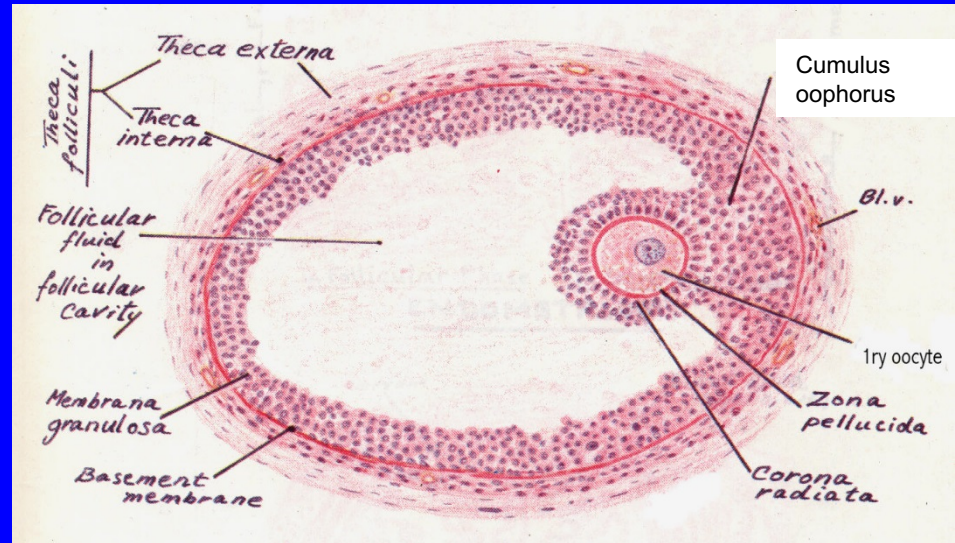
3. Secondary (Antral) Follicles

- Multilaminar primary follicles become secondary follicles when a complete antrum filled with liquor folliculi is formed.
- 1ry oocyte is larger & pushed to one side.
- Theca folliculi differentiates into theca interna and theca externa.



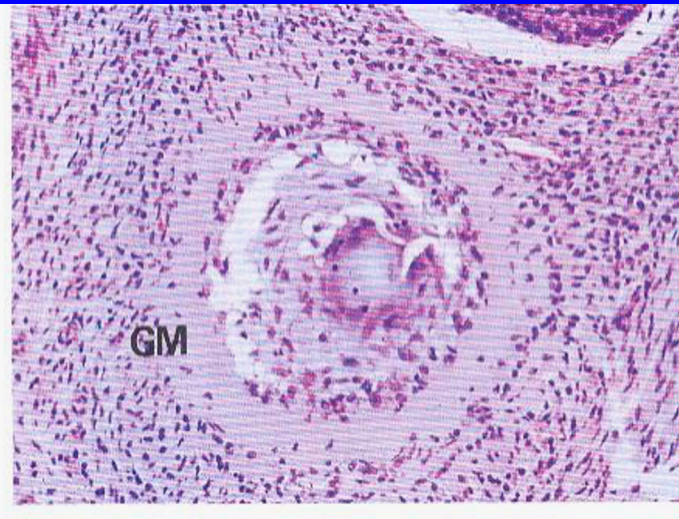
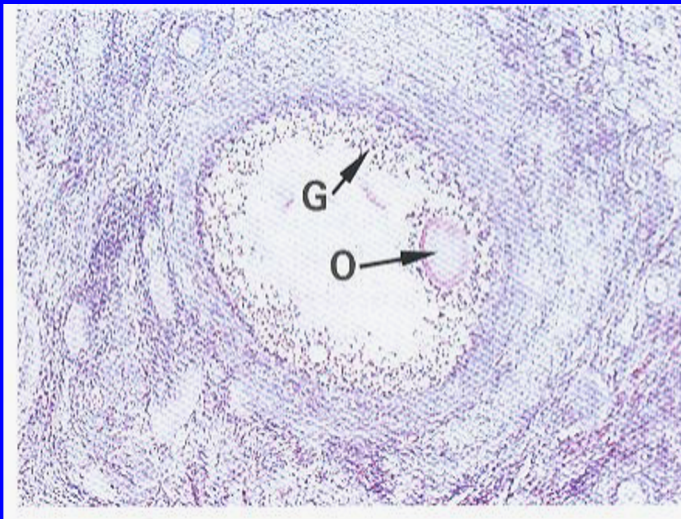
4. Mature (Graafian) Follicle

- large, thin walled
- wide follicular antrum
- large 1ry oocyte
- zona pellucida
- corona radiata
- cumulus oophorus
- zona granulosa
- basement membrane
- theca folliculi: theca interna & theca externa



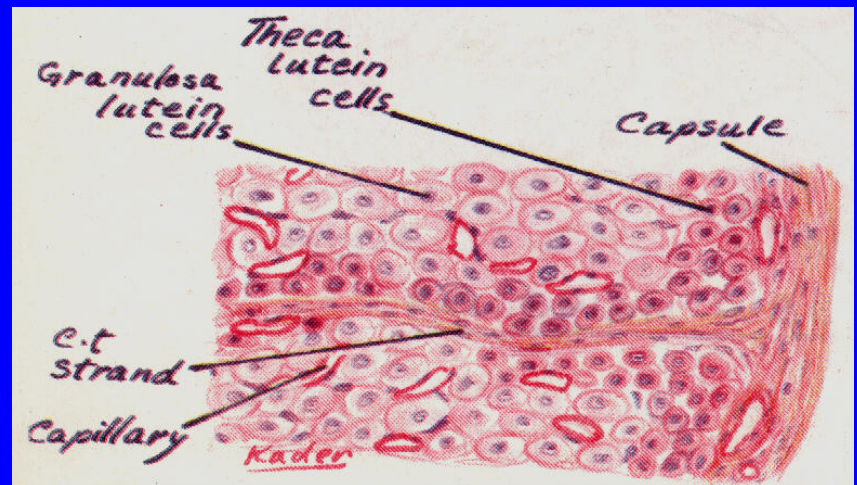
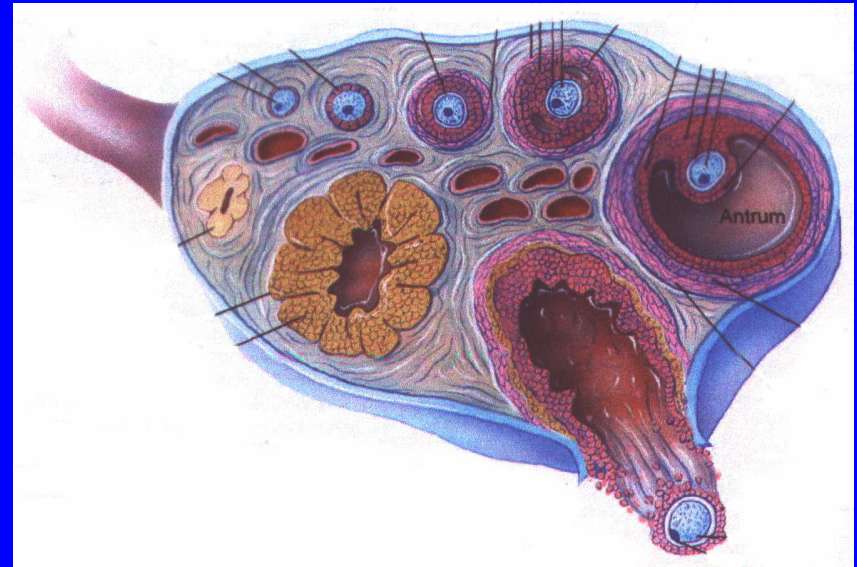
Atretic Follicles

- During growth of the ovarian follicles, many of them do not reach maturation and they degenerate, and are finally replaced completely by fibrous tissue and are called atretic follicles or corpora atretica.



Corpus Luteum

- Ovulation occurs at day 14 of the cycle, under the effect of LH.
- The follicle collapses and forms a corpus luteum.
- zona granulosa → **granulosa lutein cells.**
- Theca interna → **theca lutein cells.**
- Bleeding may occur → corpus haemorrhagicum.
- Fertilization → corpus luteum of pregnancy.
- No fertilization → corpus luteum of menstruation.
- At the end → corpus albicans.

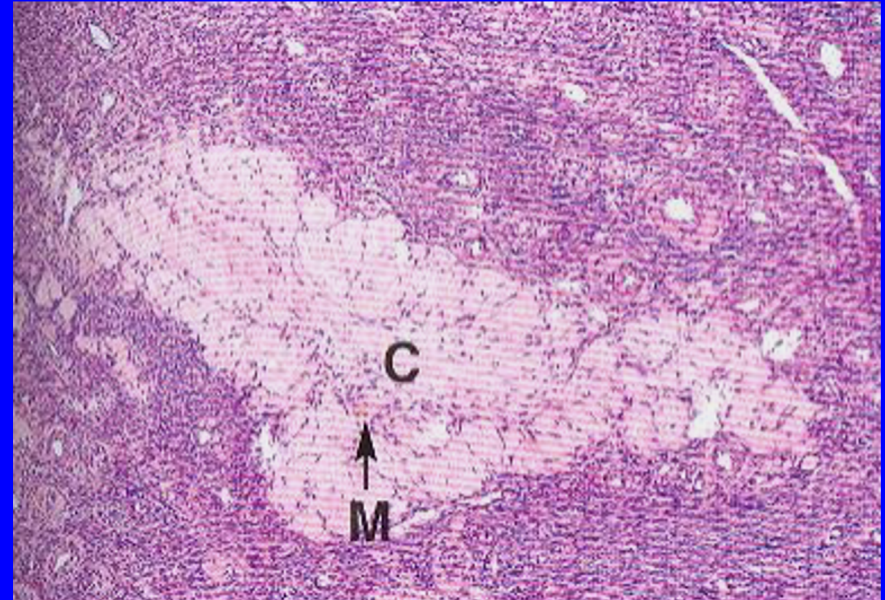


Corpus Luteum

- **Corpus luteum of menstruation** lasts about 10 days.
- **Corpus luteum of pregnancy** persists for six months.
- **Fate of corpus luteum:** formation of a white degenerated fibrous body, corpus albicans.
- **Function of corpus luteum:**
 - Granulosa lutein cells: secrete progesterone
 - Theca lutein cells: secrete estrogen.

Corpus Albicans

- It is a white degenerated fibrous body formed by involution of corpus luteum (degenerated corpus luteum).
- Secretory cells of corpus luteum degenerate and are phagocytosed by macrophages.



Oviducts (Fallopian Tubes)

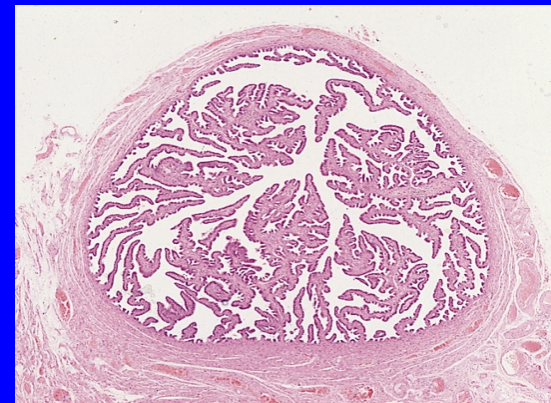
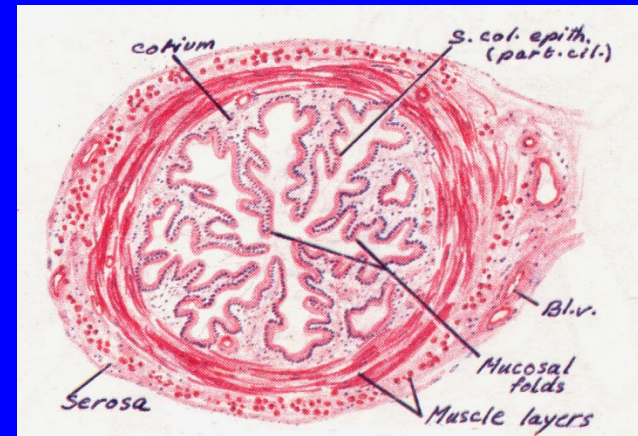
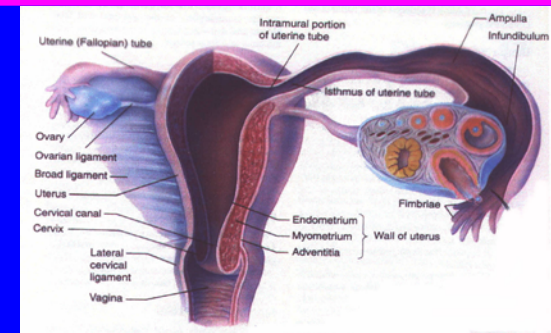
■ Mucosa:

- Highly folded.
- Epithelium: Simple columnar partially ciliated.
- Corium of C.T.

■ Muscularis:

- Inner circular.
- Outer longitudinal.

■ Serosa



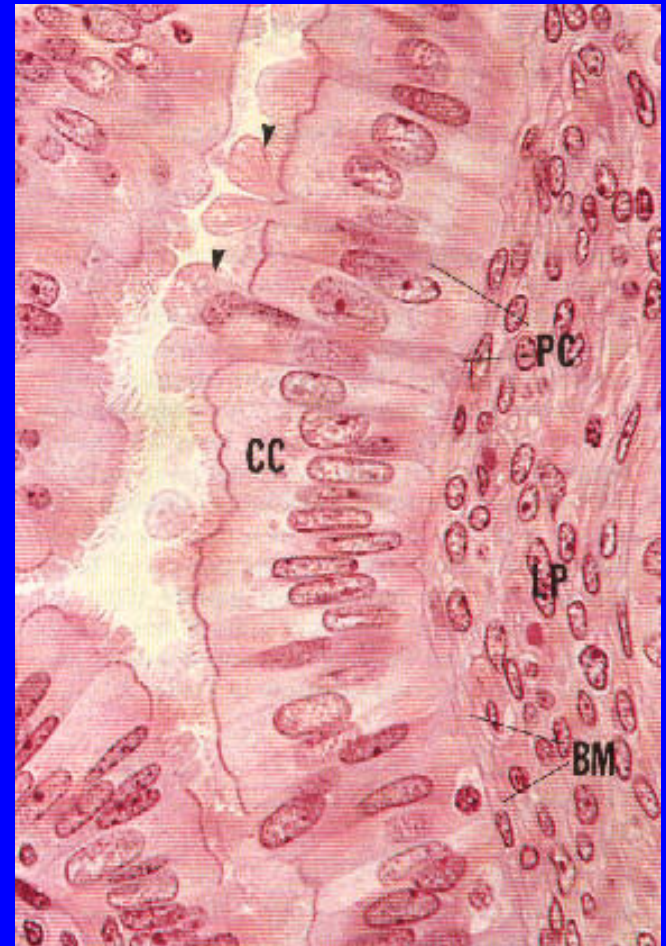
Oviducts (Fallopian Tubes)

■ Ciliated cells:

- Non-secretory.
- Cilia beat toward uterus.

■ Non-ciliated cells:

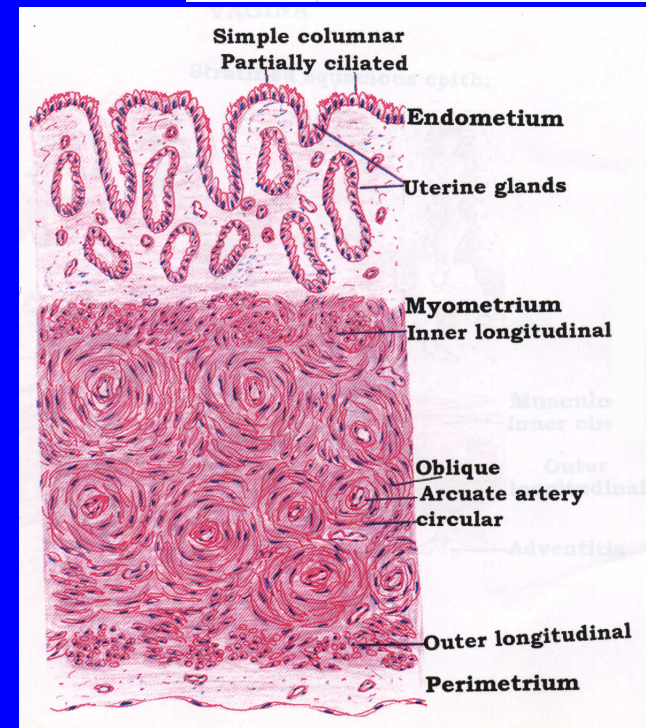
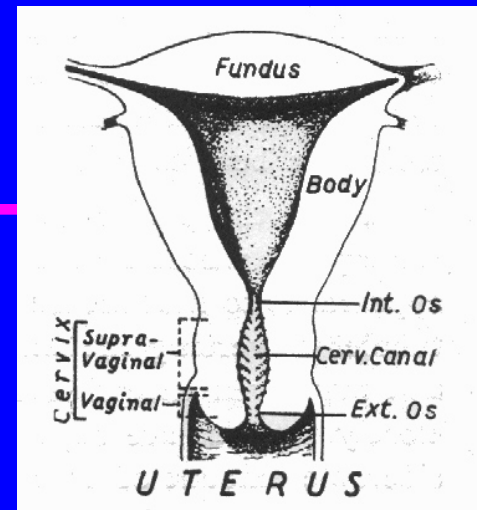
- Thinner, also called peg cells.
- Secretory cells.
- Apices bulge above ciliated cells.
- Their apices contain nutritive material to nourish gametes.



The uterus

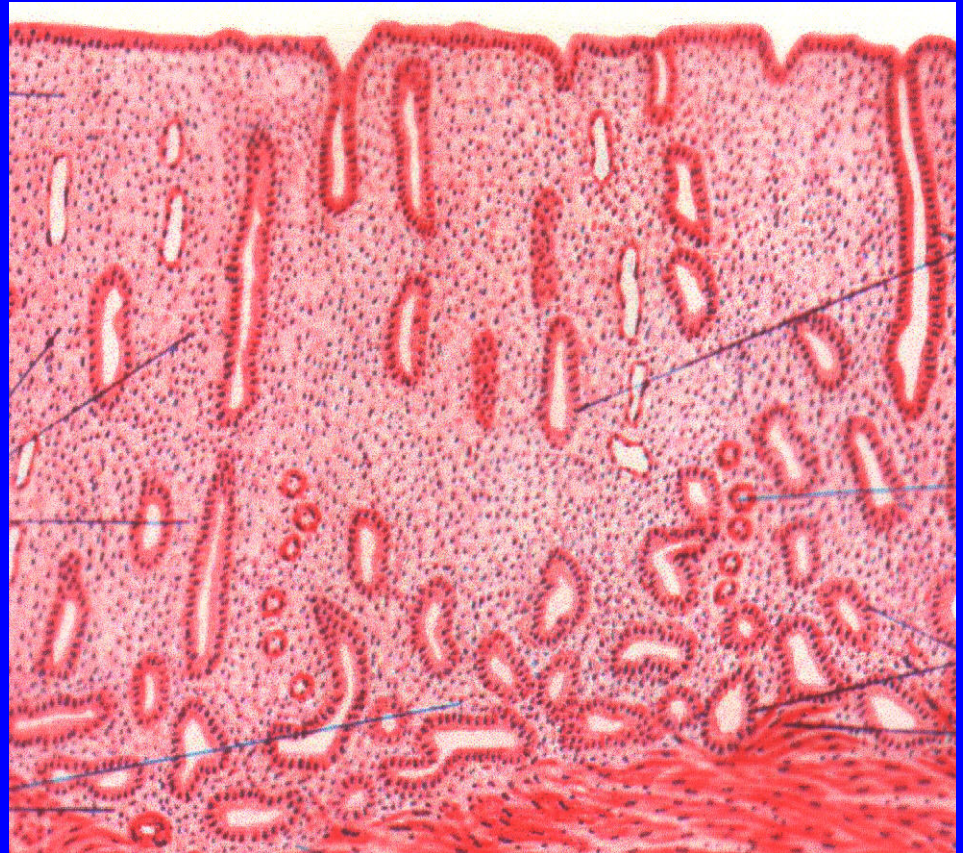
I-Fundus & Body

- Consist of:
 1. Endometrium (mucosa)
 2. Myometrium (musculosa)
 3. Perimetrium (serosa)



1. Endometrium

- **Epithelium:** simple columnar partially ciliated.
- **Corium:**
 - Endometrial glands: simple tubular.
 - Stromal cells.
 - Blood vessels.
 - Leucocytes.
 - Reticular fibers.

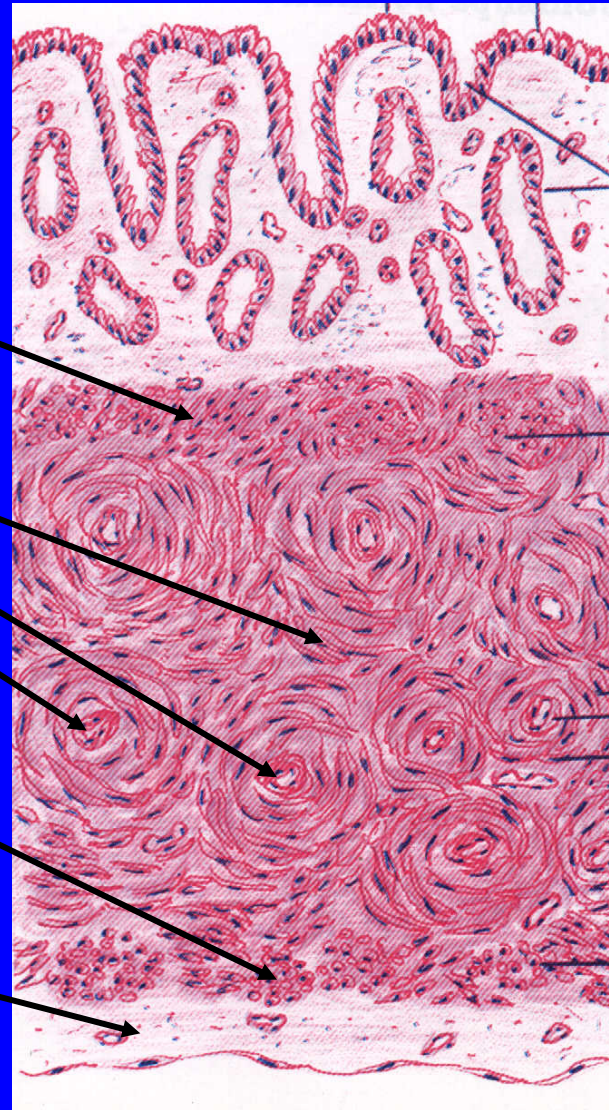


2. Myometrium

- 3 ill-defined smooth muscle layers:
 - **Stratum submucosum:** longitudinal.
 - **Stratum vasculare:** circular smooth muscle fibres in figure of 8 arrangement around large blood vessels.
 - **Stratum supravasculare:** longitudinal.

3. Perimetrium

Formed of simple squamous epithelium (mesothelium) and sub-epithelial C.T.

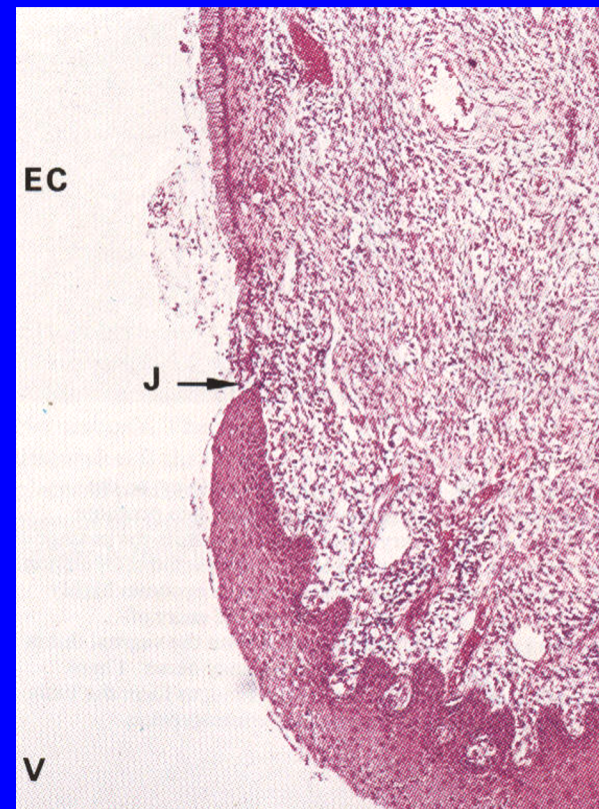
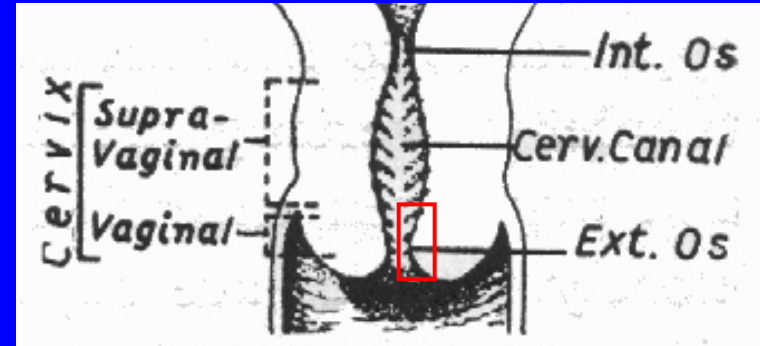


II-Uterine Cervix

■ Mucosa:

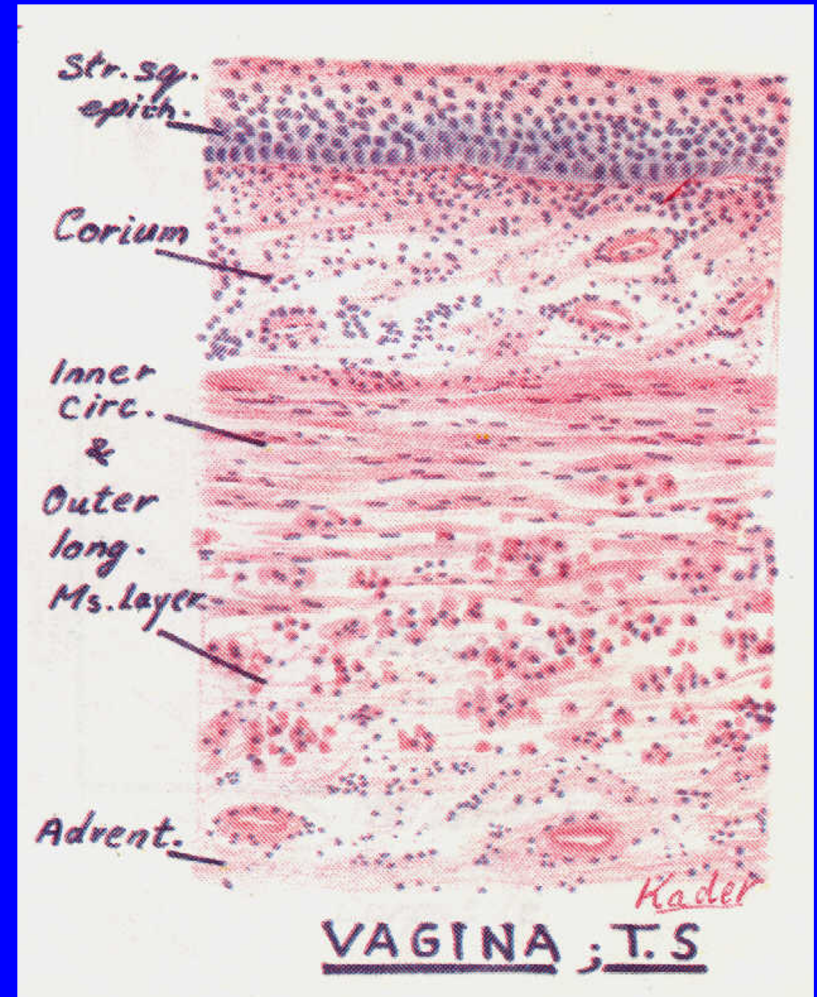
- **Epithelium:** simple columnar in the cervical canal, but it changes to stratified squamous epith. (non-keratinized) at the external os.
- **Corium:** CT containing tubulo-alveolar glands.

- ## ■ Substance of the cervix:
- dense fibrous tissue with few smooth muscle fibers.



VAGINA

- **Mucosa**: shows transverse folds and is made of:
 - **Epithelium**: stratified squamous epithelium non-keratinized, rich in glycogen.
 - **Corium**: of dense C.T., very rich in blood vessels, elastic fibres and leucocytes.
- **Musculosa**: formed of interlacing inner circular and outer longitudinal layers of smooth muscle fibres.
- **Adventitia**: formed of loose C.T.

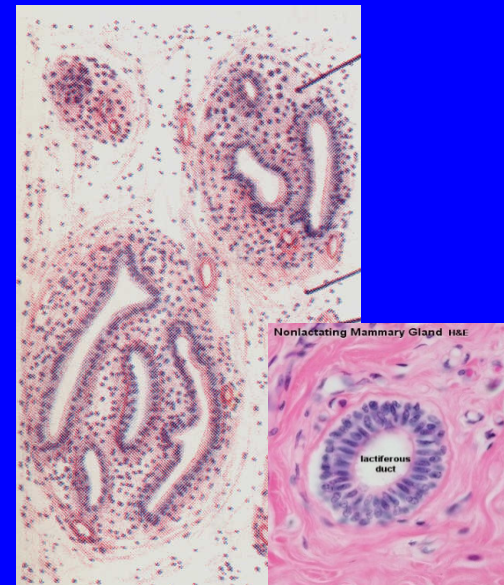
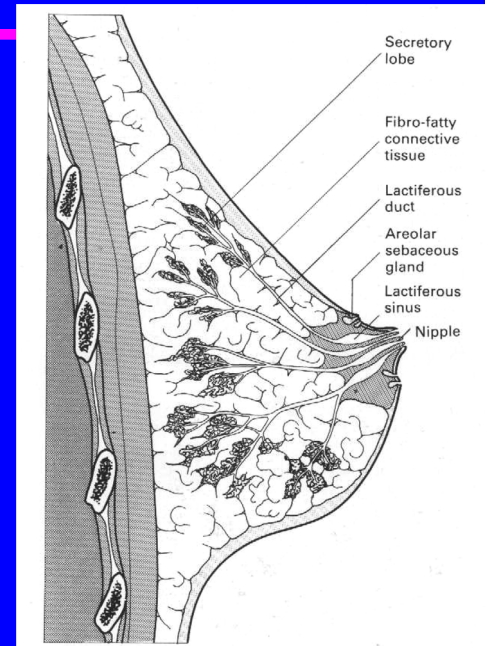


MAMMARY GLAND

- At puberty they enlarge by accumulation of fat, but contain only a duct system.
- Secretory units appear only during pregnancy and are functioning only during lactation.

I- Resting Mammary Gland:

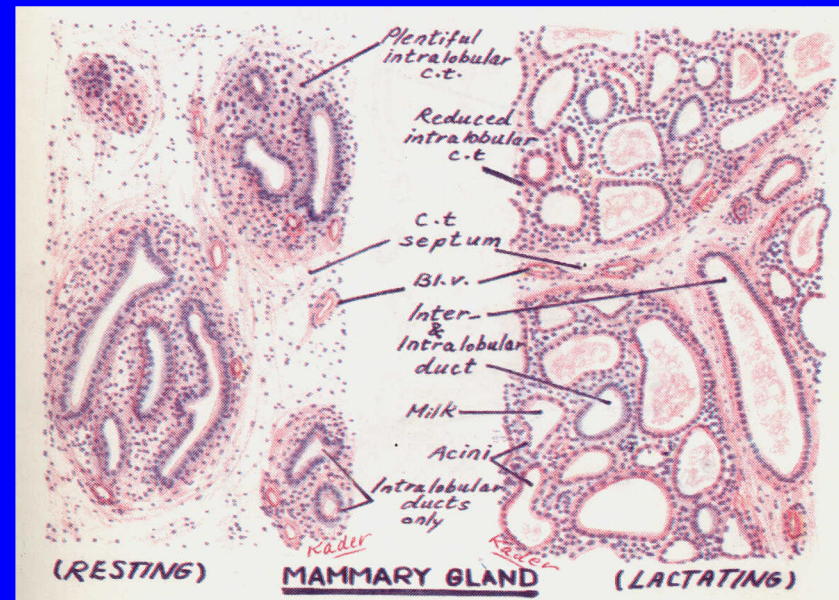
- It is divided into lobes and lobules.
- The **interlobular** C.T. is dense and contains numerous fat cells.
- The **intralobular** C.T. is loose and contains no fat cells.
- Within the lobules, there are widely separated **ducts** lined by simple cuboidal epithelium.
- Ducts collect to form **lactiferous ducts** lined by stratified columnar epithelium and open at the top of the nipple.



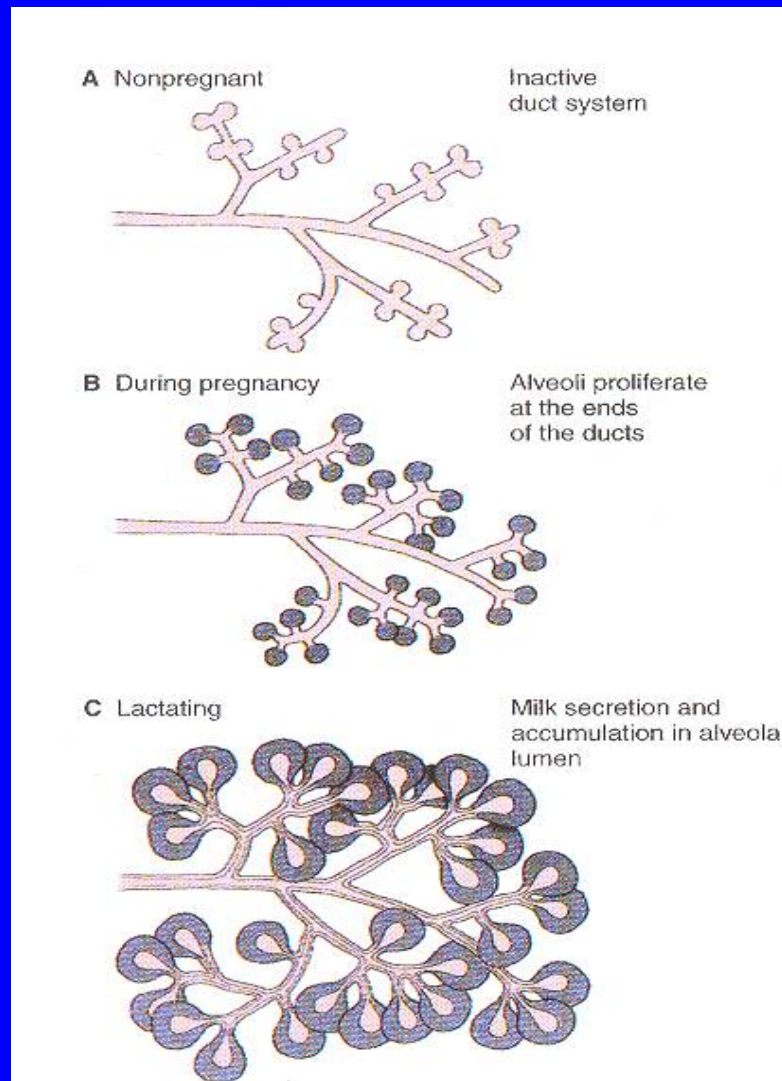
Mammary Gland

II-Lactating Mammary Gland:

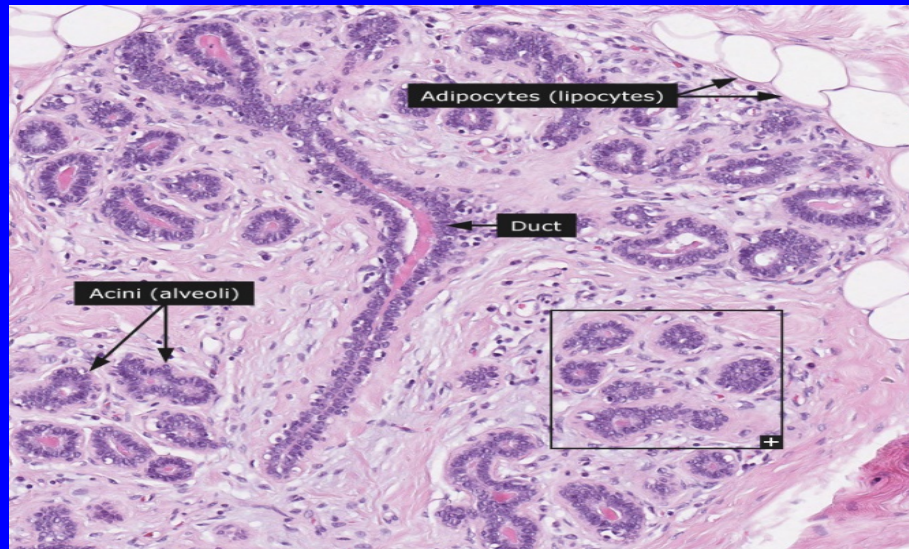
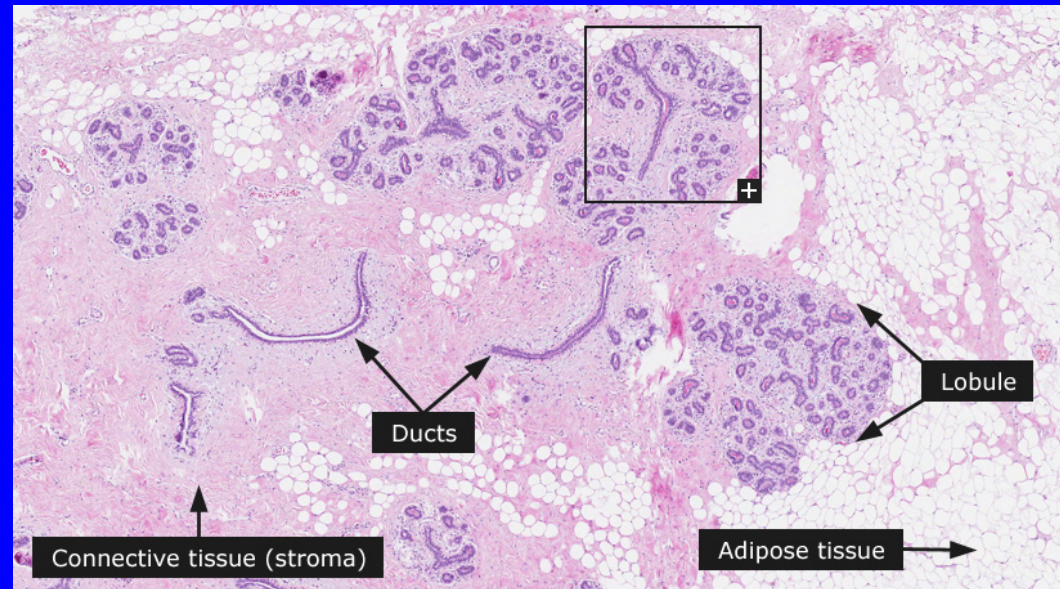
- Interlobular and intralobular C.T. become reduced.
- Lobules are made of ducts and alveoli.
- **Alveoli** are distended with milk and lined by cuboidal or flat cells surrounded by myoepithelial cells.
- **Milk** appears acidophilic with vacuoles of dissolved fat.



Mammary Gland



Resting Mammary Gland



Lactating Mammary Gland

