

# **Histology of Female Reproductive System**

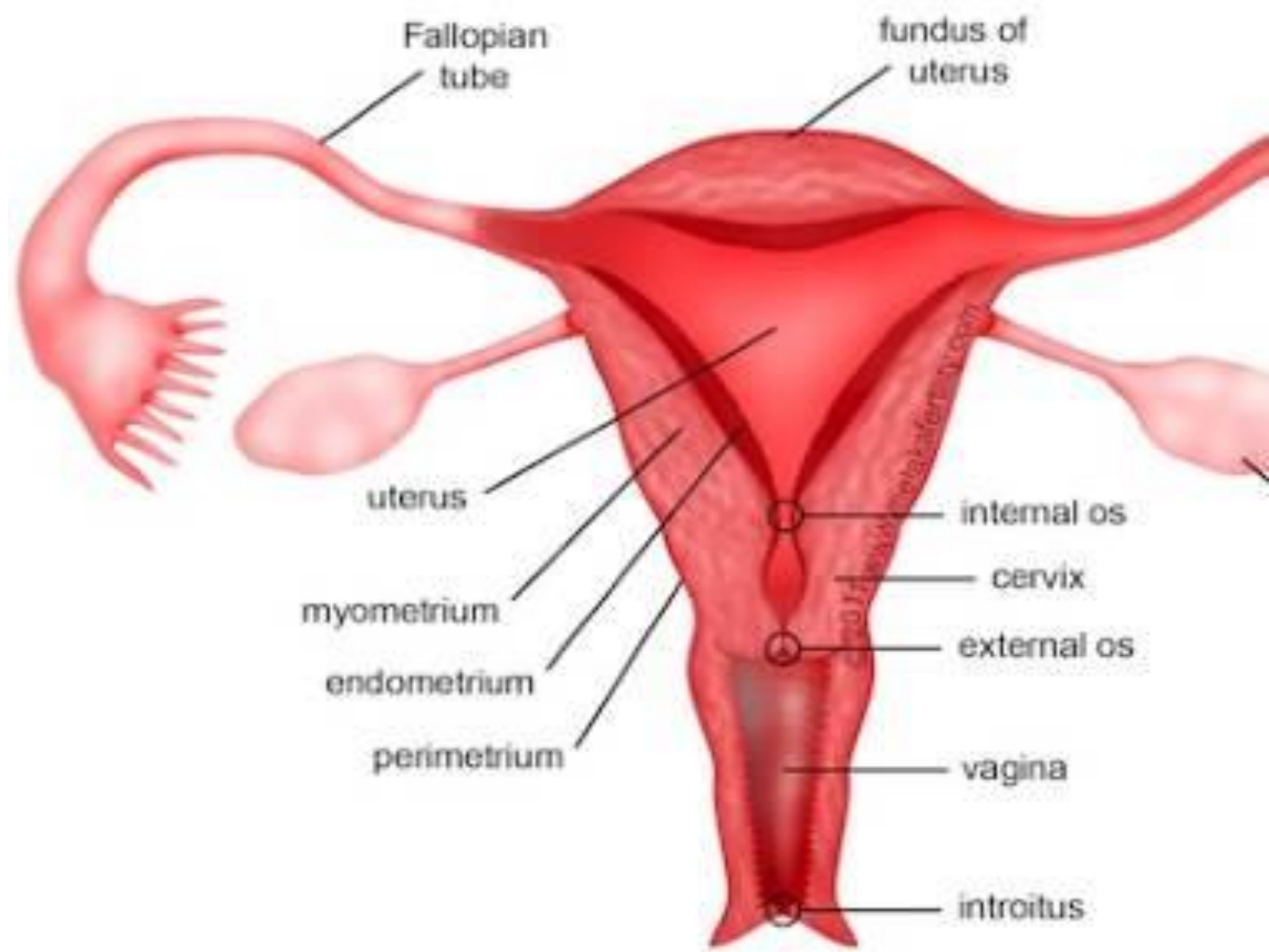
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# Female Reproductive System

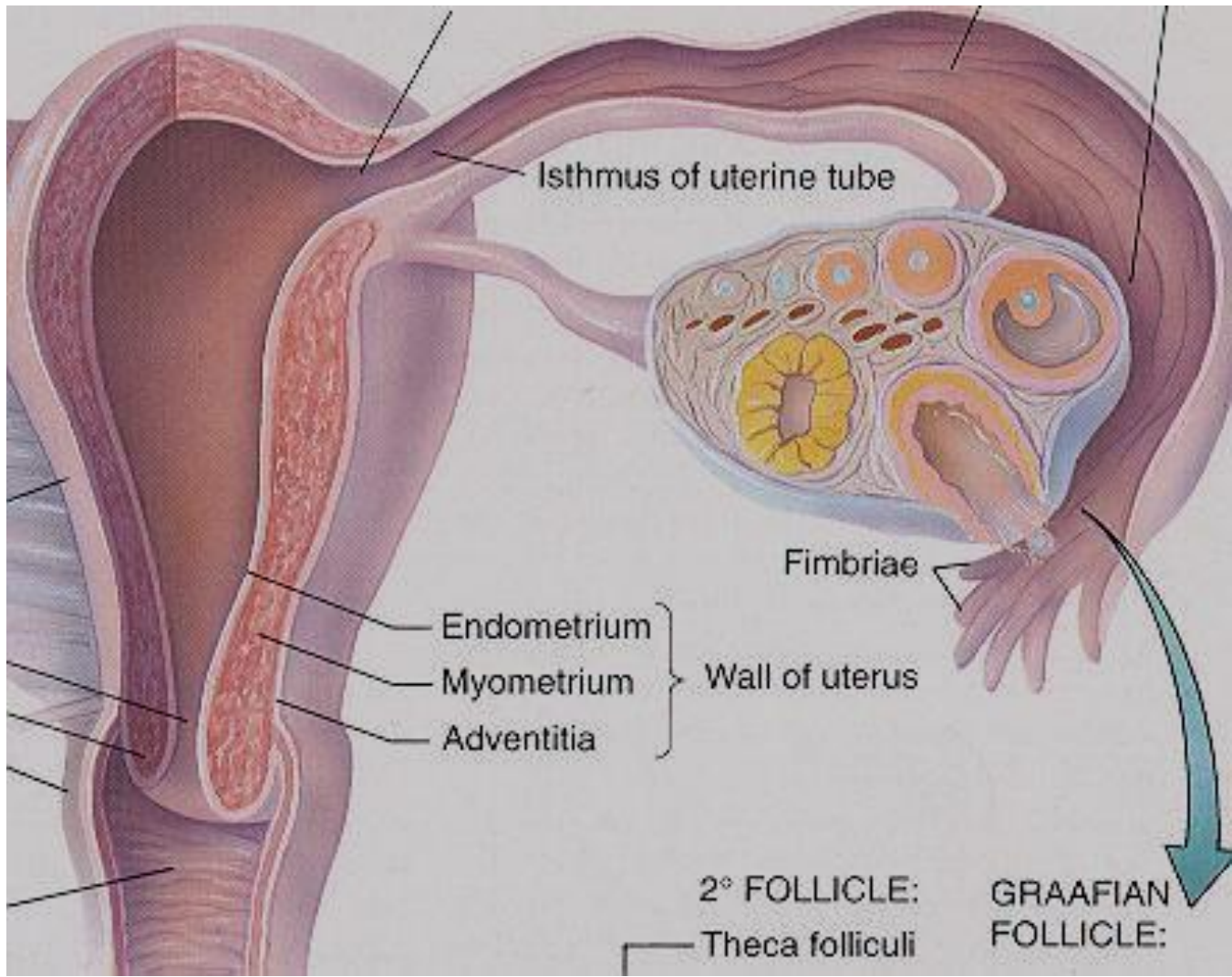
Female reproductive system comprises of the following organs:

- Ovaries
- Oviducts
- Uterus
- Vagina



# Uterus

- ❖ Uterus is a pear-shaped structure attached to oviducts at upper end and to vagina at lower end
- ❖ Uterus is divided into three regions:
  - Body
  - Fundus
  - Cervix
- ❖ Wall of uterus has 3 layers
  - Endometrium
  - Myometrium
  - Perimetrium (Adventitia/Serosa)



# Perimetrium

- The lower half of the anterior portion ( lies against the urinary bladder) covered by adventitia which is composed of loose connective tissue.
- The remaining portion of uterus covered by serosa composed of a layer of simple squamous cells (mesothelium) resting on an loose connective tissue.

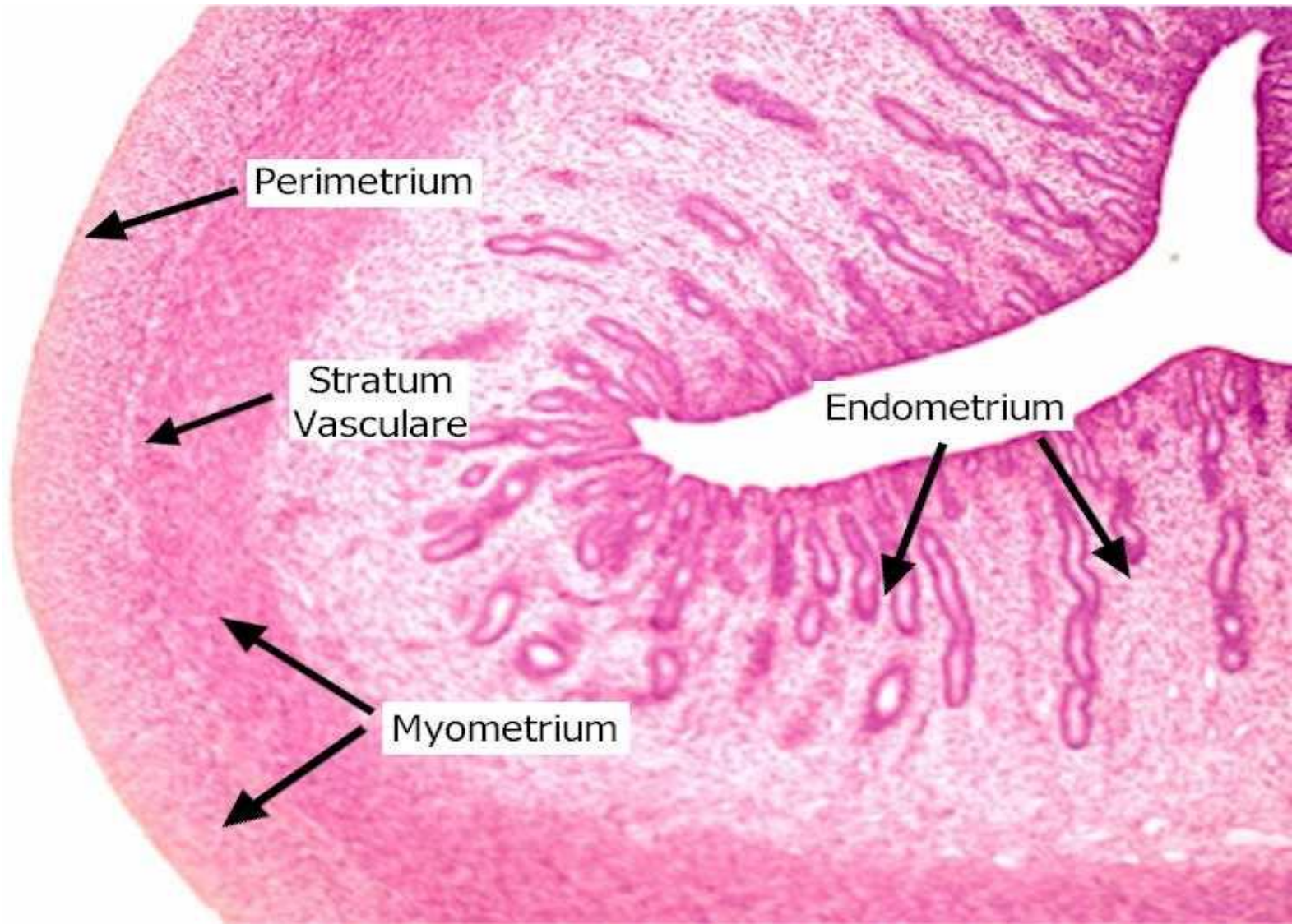
# Myometrium

- Myometrium is the thickest layer and composed of three poorly defined layers of smooth muscle separated by connective tissue
- Inner and outer layers are mostly longitudinal in orientation.
- Middle layer consist of mostly circularly arranged bundle of smooth muscle cells, large blood vessels are located in this layers and is known as *Stratum Vasculare*
- Middle layer thicken during pregnancy with more and large smooth muscle cells (hyperplasia and hypertrophy) and increased collagen fibers.
- After menopause the myometrium undergo atrophy.

# Endometrium

- **Endometrium** is mucosal lining of uterus composed of a **simple columnar epithelium**.
- Epithelium consists of *ciliated cells* and *secretory cells*.
- Epithelium invaginates into the lamina propria forming *uterine glands*.
- **Lamina propria** composed of dense irregular connective tissue and vessels supports epithelium.
- Endometrium has 2 zones
  - **Functional layer**
  - **Basal layer**





# Endometrial Layers

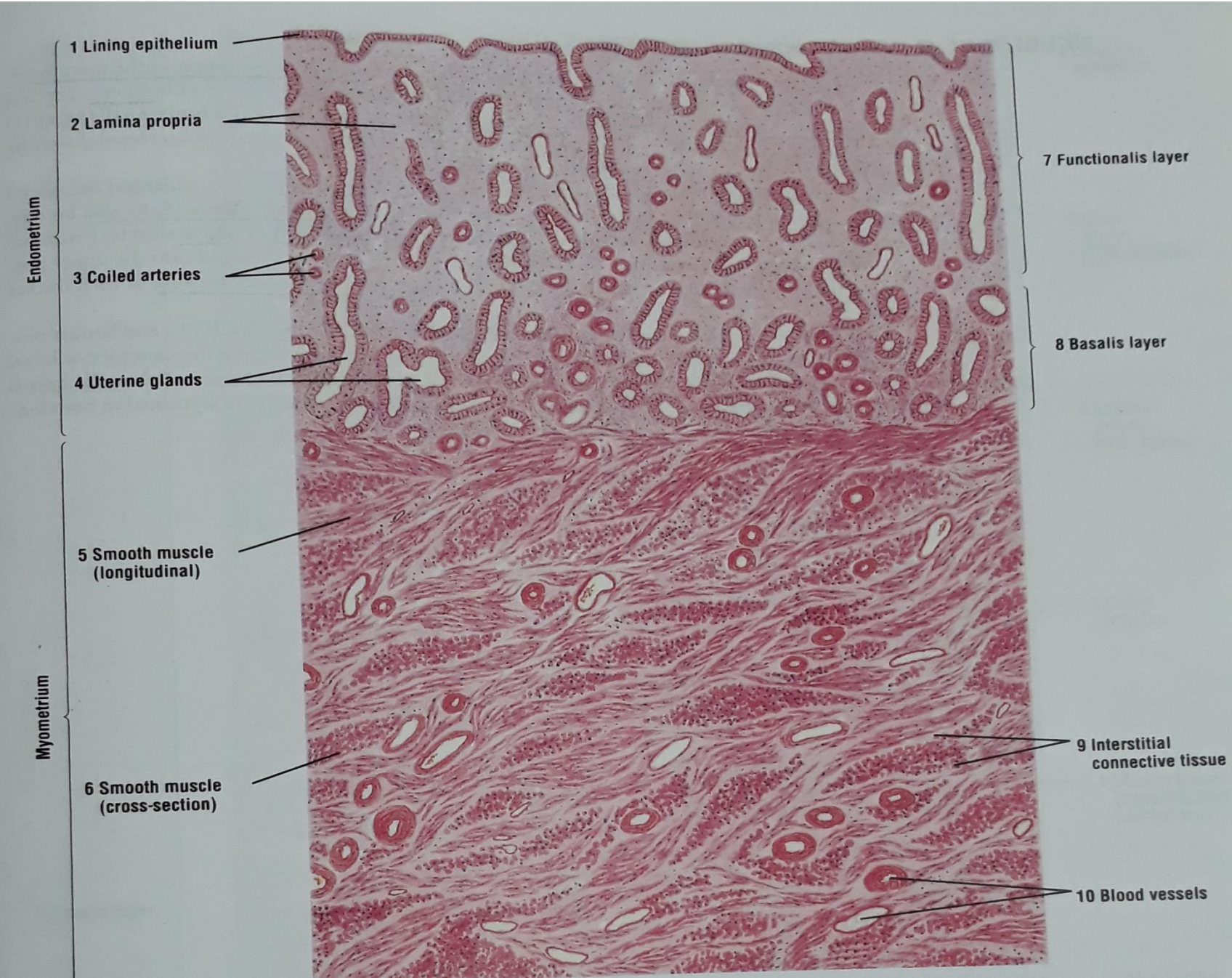
- **Functional layer** is a thick superficial layer shed off during menstruation and replaced during each menstrual cycle
- **Functional layer** vascularized by coiled helical arteries that originate from arcuate arteries in stratum vasculare
- **Basal layer** is a deep narrow layer retained after menstruation whose glands, epithelium and connective tissue element regenerate functional layer
- **Basal layer** supplied by short straight arteries which originate from arcuate arteries in stratum vasculare

# Menstrual Cycle

- Estrogen and progesterone from ovary stimulate changes in the endometrium
- The average menstrual cycle is 28 day , Ovulation around day 14.
- Begins age is about 12-15 years and ends age is about 45-50 years.
- The menstrual cycle has 3 main phases:
  - **Proliferative (follicular) phase: days 5-14**
  - **Secretory (luteal) phase: days 15-28**
  - **Menstrual phase: days 1-4**

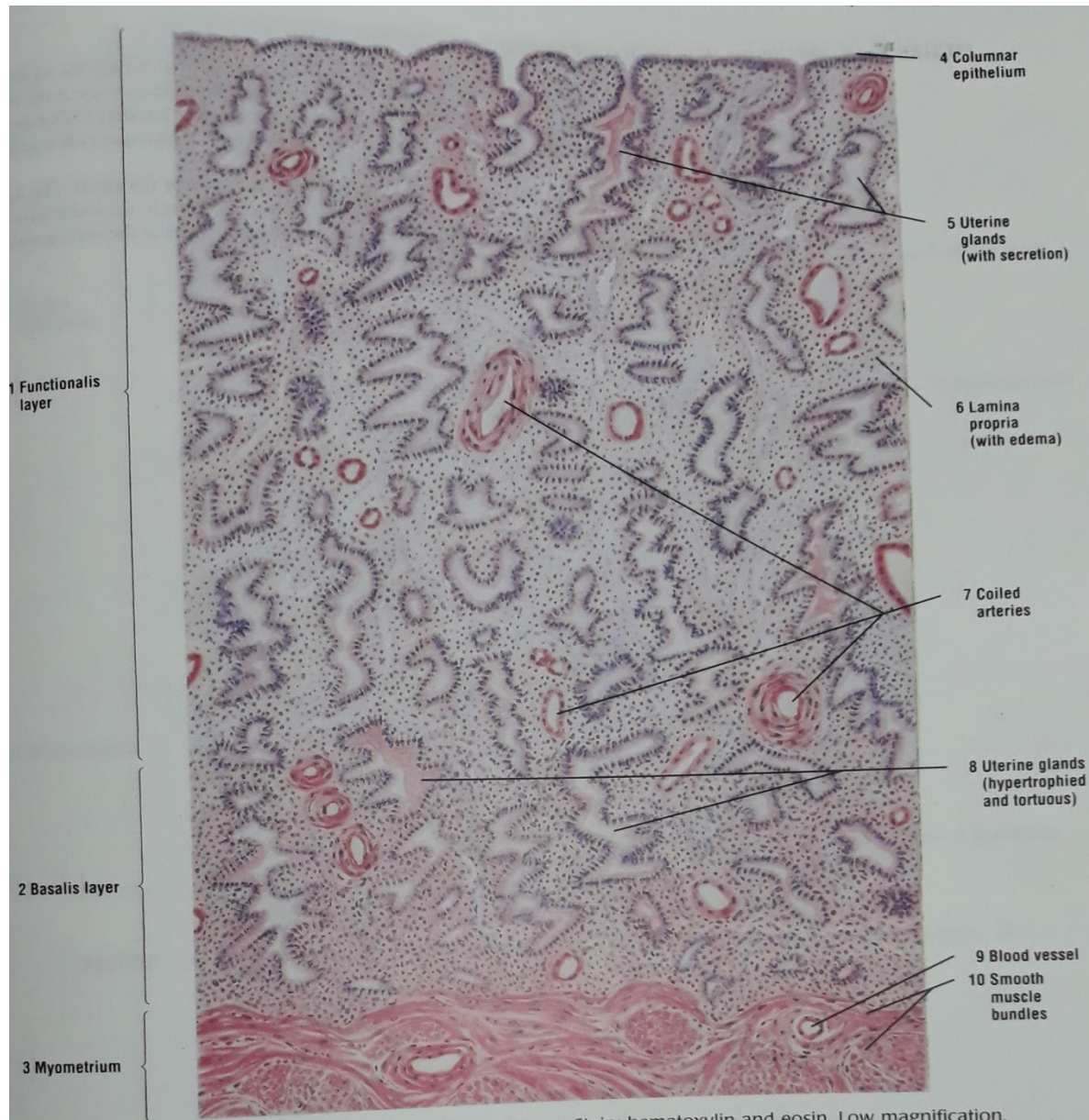
# Proliferative (Follicular) Phase

- The endometrium regenerates under the influence of estrogen secreted by growing follicles.
- The epithelial cells in the basal portion of gland rapidly proliferate and cover the denuded endometrial surface.
- Connective tissue cells proliferate in lamina propria and coiled arteries grow into lamina propria.
- Functional layer of endometrium become 3 mm in thickness
- At the day 14 the functional layer has been fully restored.

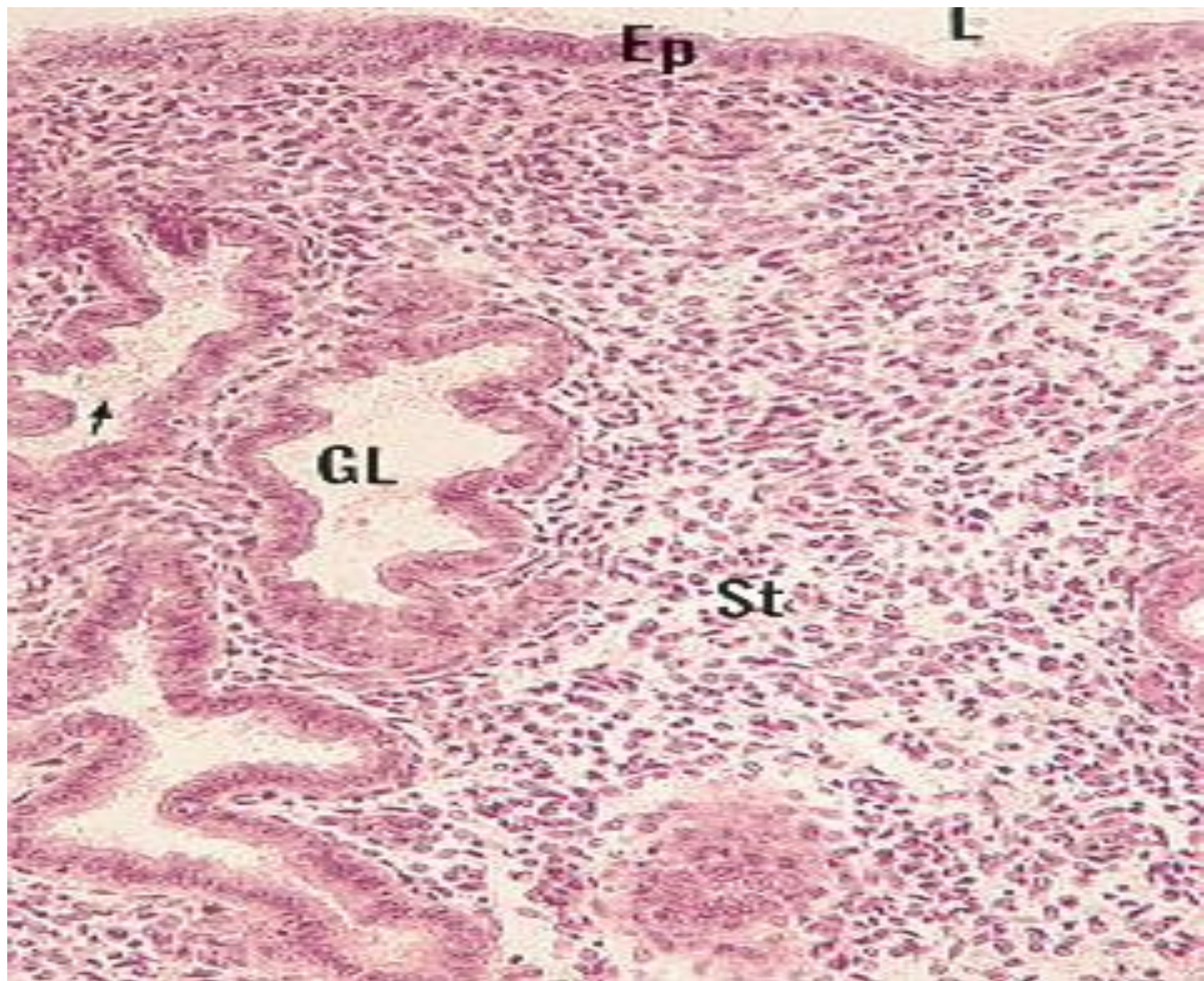


# Secretory (Luteal) Phase

- Begins after ovulation, days 15-28 in response to the progesterone by corpus luteum.
- Glands develop further, become highly coiled, branched and begin to secrete glycoprotein (nutritive source of early embryo)
- Coiled arteries also attain full development
- Endometrium reaches 6 mm in thickness due to edema and accumulated glycogen secretions of the glands



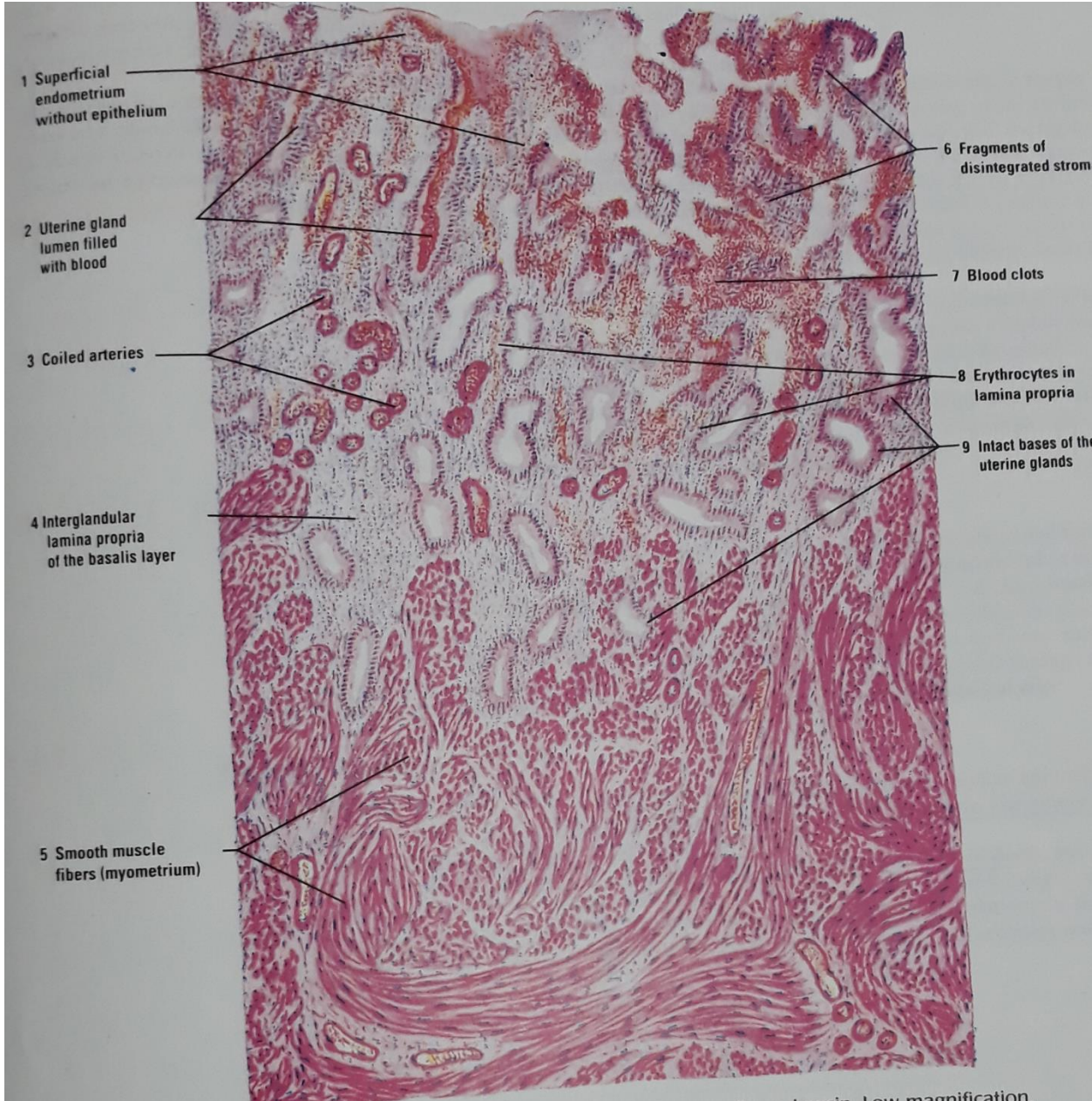
**FIGURE 19.13** ■ Uterus: secretory (luteal) phase. Stain: hematoxylin and eosin. Low magnification.





# Menstrual Phase

- If fertilization does not take place the corpus luteum stops secreting hormones after about 14 days
- Progesterone and estrogen decrease causing coiled arteries to intermittently constrict cutting off blood flow to the functional layer of endometrium
- Endometrial cells die and the functional layer is shed off.
- Then coiled arteries dilate once again, because they are weakened they rupture
- The disgorged blood removes patches of the functional layer as menses
- Vessels distal to constrictions are shed with the functional layer causing some bleeding
- About 35ml blood loss occur during menstruation



1 Superficial endometrium without epithelium

2 Uterine gland lumen filled with blood

3 Coiled arteries

4 Interglandular lamina propria of the basalis layer

5 Smooth muscle fibers (myometrium)

6 Fragments of disintegrated stroma

7 Blood clots

8 Erythrocytes in lamina propria

9 Intact bases of the uterine glands

Figure 1. Low magnification.

# Vagina

- The vaginal wall consists of three coats:

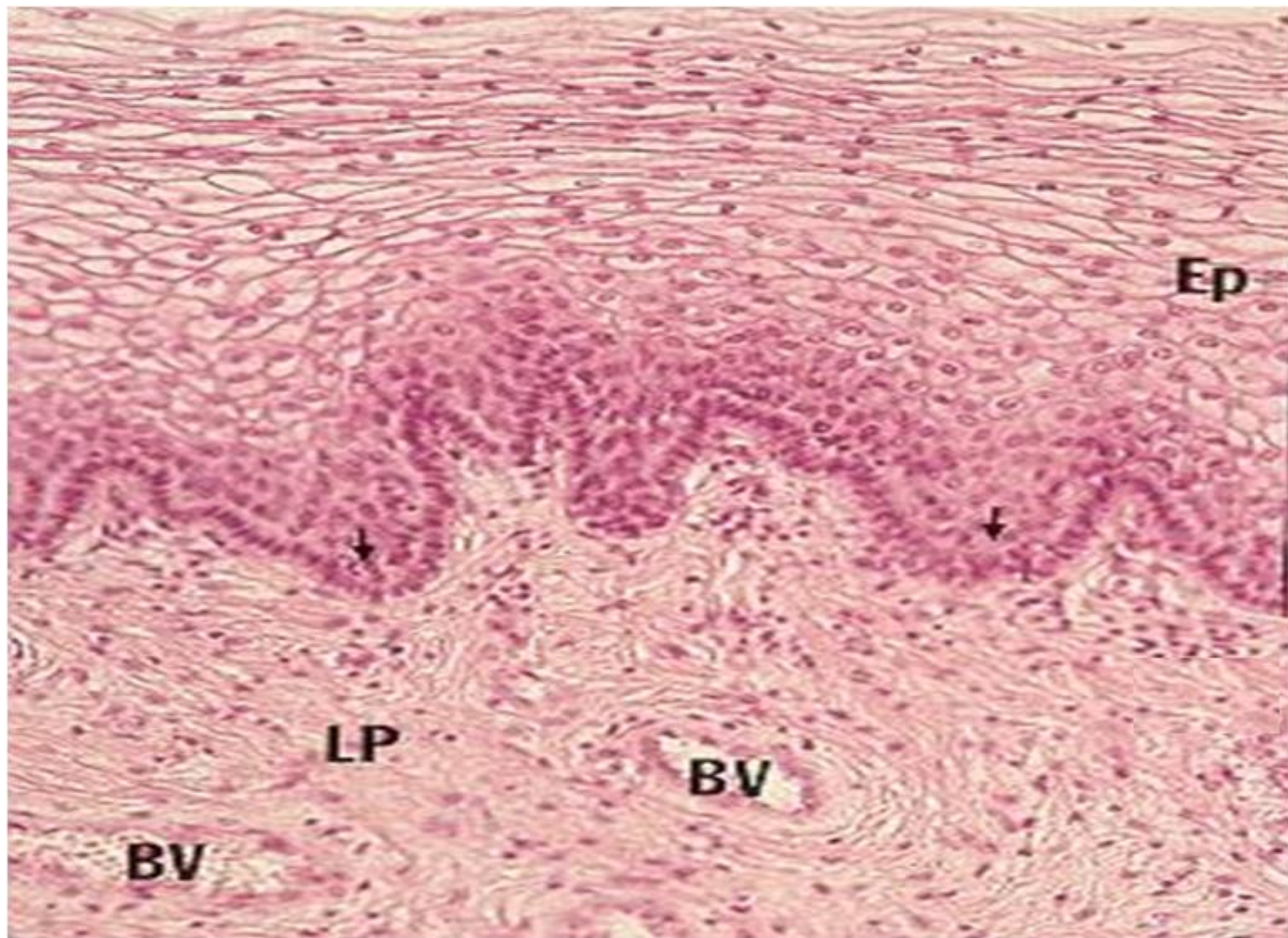
1. Mucosa
2. Muscularis
3. Adventitia

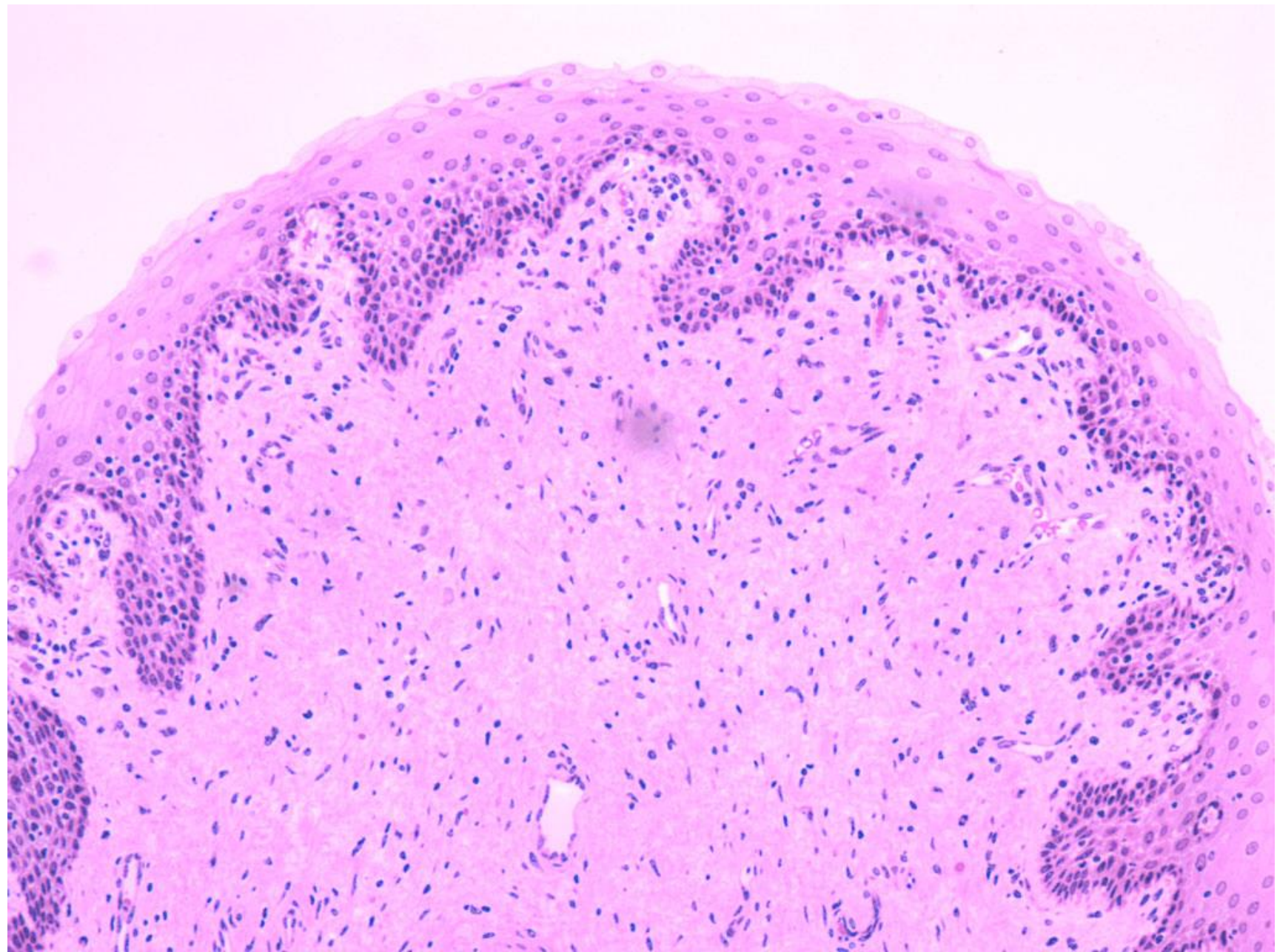
## Mucosa:

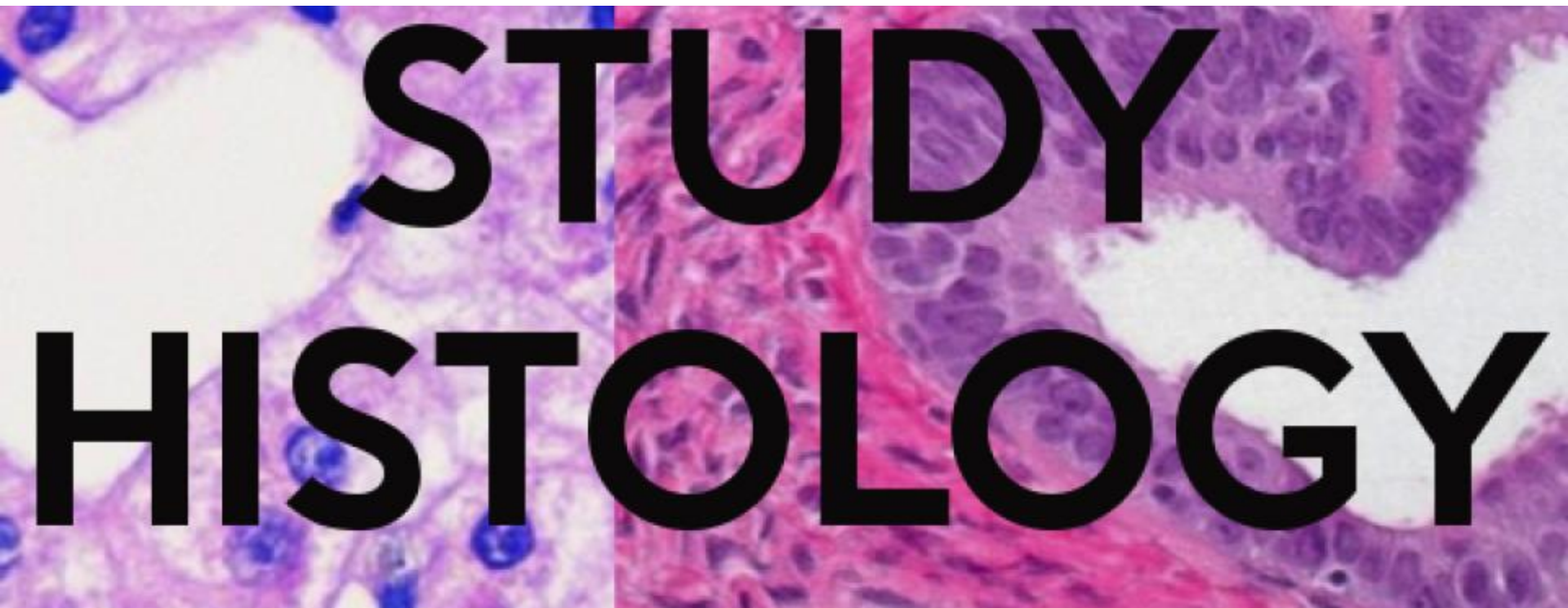
- The vaginal mucosa shows mucosal folds. A thick stratified squamous non keratinized epithelium lines the vaginal mucosa. No glands are found in vaginal mucosa.
- Lamina propria contains connective tissue with elastic fibers.
- Diffuse lymphatic tissue ,lymphatic nodules and blood vessels are present in lamina propria.

**Muscularis:** The inner layer is composed of circular muscle and the thick outer layer is composed of longitudinal smooth muscle fibers.

**Adventitia:** consist of dense connective tissue that binds the vagina to the surrounding structures.







**STUDY**

**HISTOLOGY**