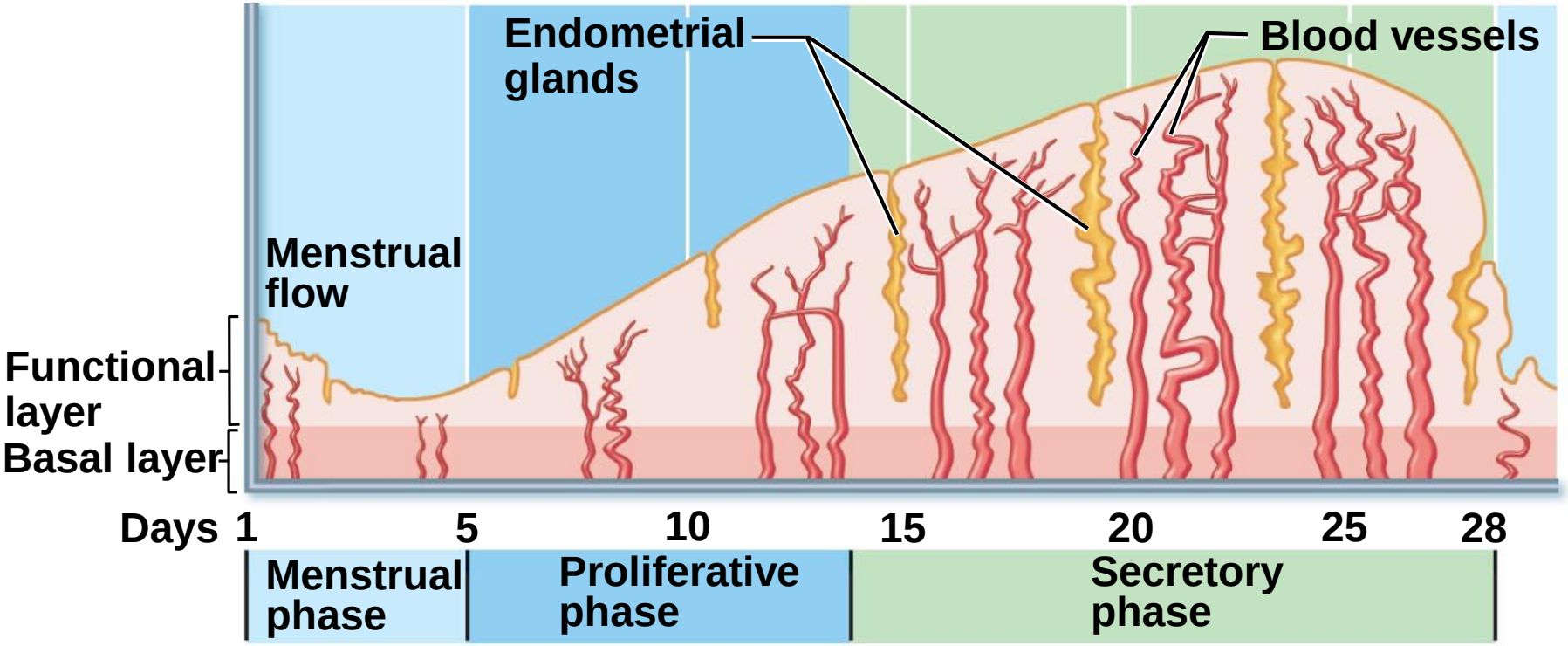
The Uterine (Menstrual) Cycle

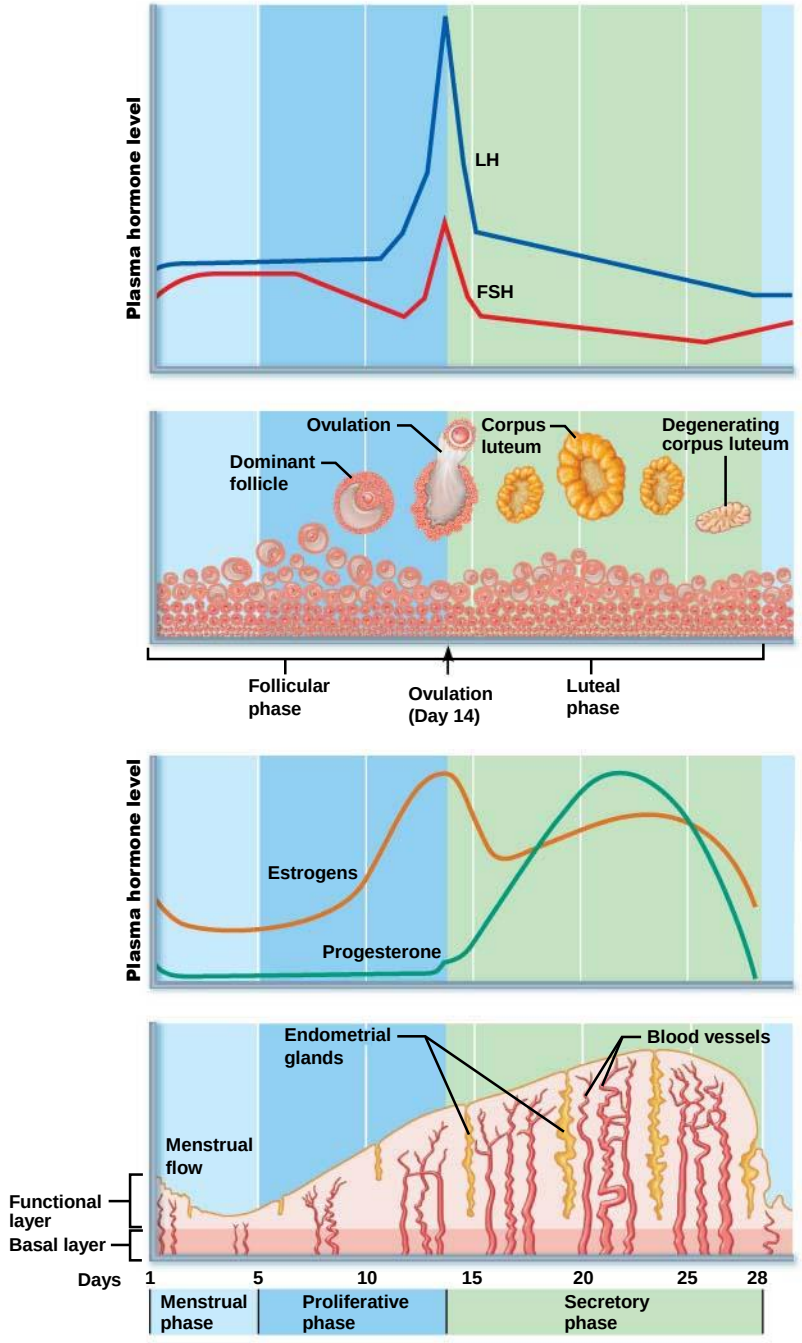
- Cyclic changes in endometrium in response to fluctuating ovarian hormone levels
- Three phases
    - Days 1–5 - **menstrual phase**
    - Days 6–14 - **proliferative** (preovulatory) **phase**
    - Days 15–28 - **secretory** (postovulatory) **phase**



The three phases of the uterine cycle:

- Menstrual
- Proliferative
- Secretory

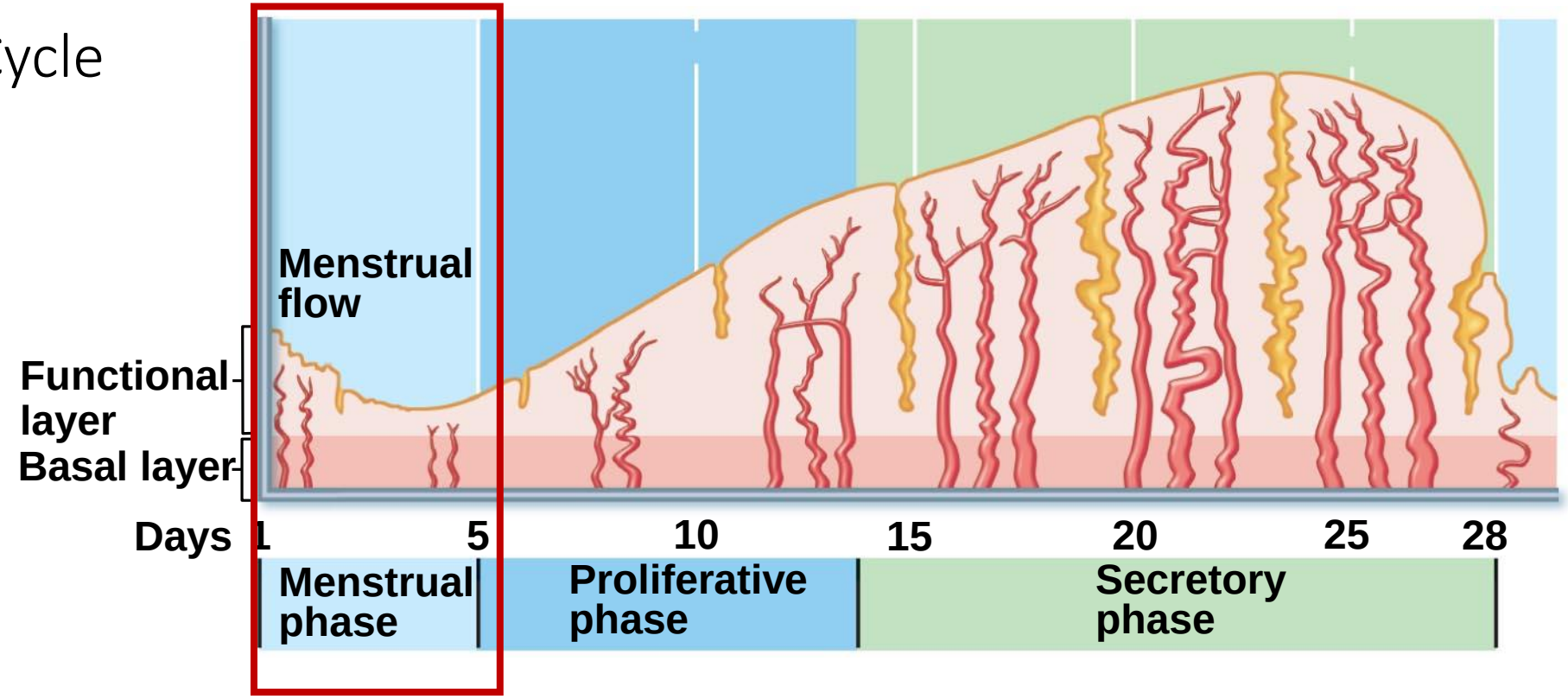
Correlation of anterior pituitary and ovarian hormones with structural changes of the ovary and uterus.



Both the **menstrual and proliferative phases** occur before ovulation, and together they correspond to the **follicular phase** of the ovarian cycle.

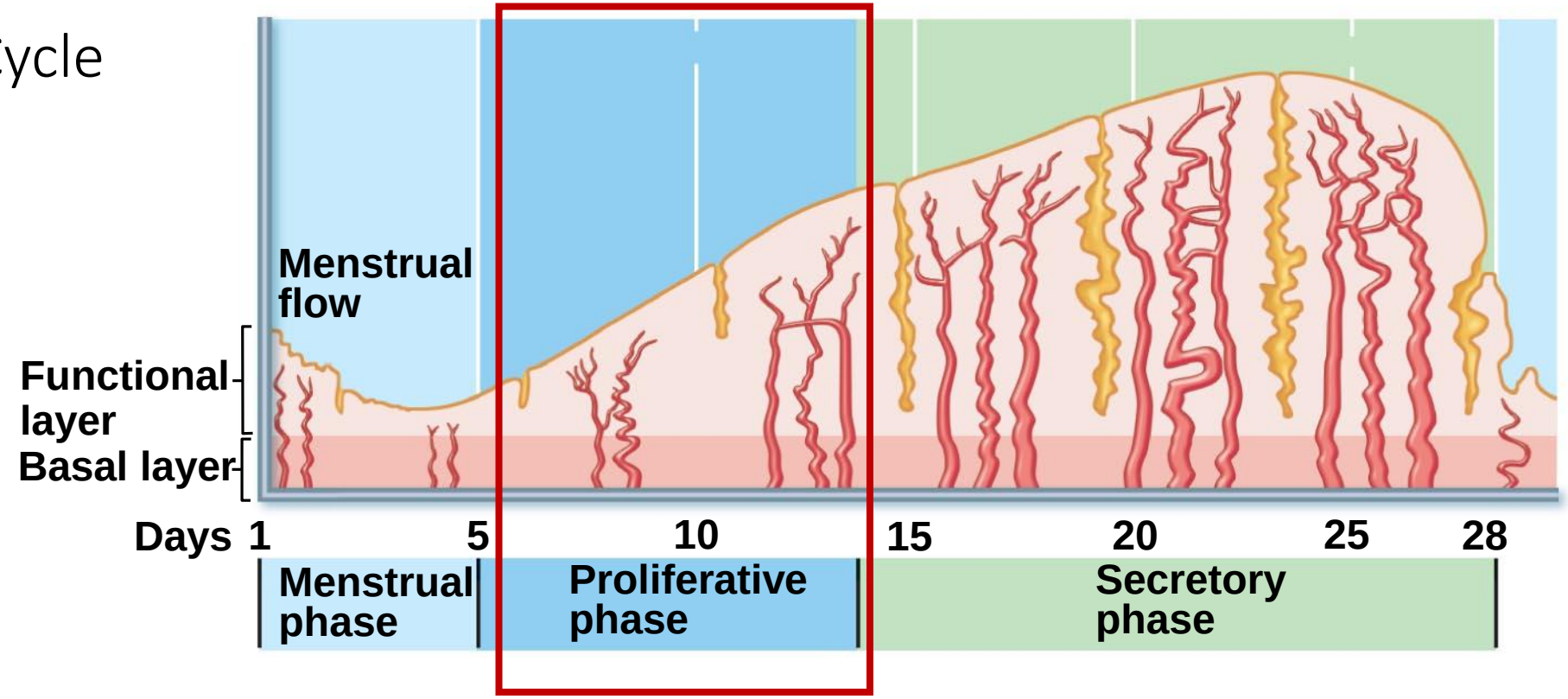
The **secretory phase** corresponds in time to the **luteal phase** of the ovarian cycle.

Uterine Cycle



- **Menstrual phase (Days 1 - 5)**
  - Ovarian hormones at lowest levels
  - Stratum functionalis shed; menstrual flow (blood and tissue) 3 - 5 days
  - By day 5 growing ovarian follicles produce more estrogen

Uterine Cycle



- **Proliferative phase (Days 6 - 14)**
  - Rising estrogen levels:
  - prompt generation of new stratum functionalis layer;
  - increased synthesis of progesterone receptors in endometrium;
  - glands enlarge and spiral arteries increase in number
  - Normally thick, sticky cervical mucus thins in response to rising estrogen (allows sperm passage)
  - Ovulation occurs at end of proliferative phase

UTERINE CYCLE

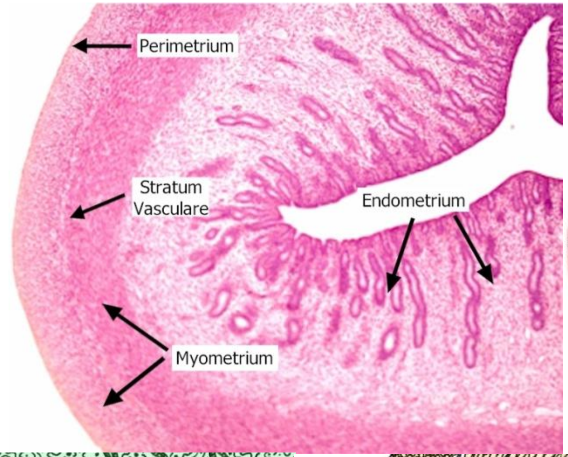
Menstrual and proliferative phase (Follicular Phase)

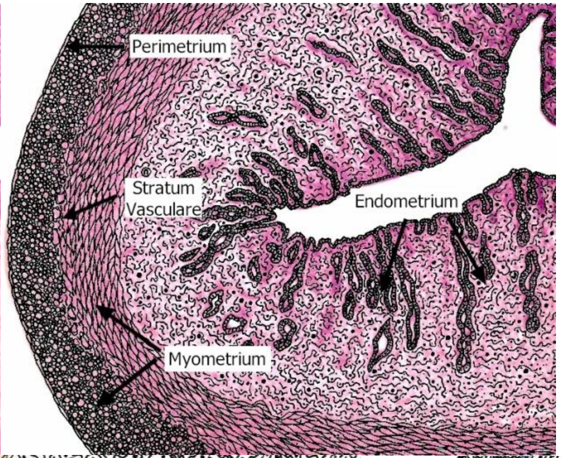
1. **endometrial glands** at **lowest level of size & secretion**
2. estrogen rises from granulosa cells in the developing follicles of the ovary
3. **uterine epithelial cells hypertrophy**
4. uterine glands proliferate
5. vascular supply increases

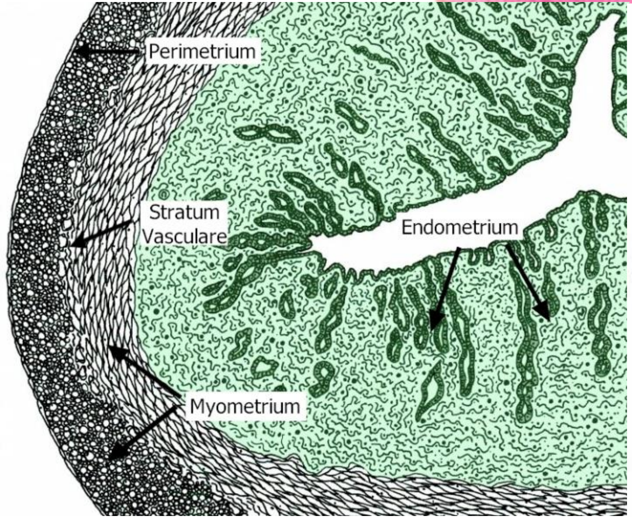
1. uterine epithelial cells continue to hypertrophy
2. uterine glands continue to proliferate

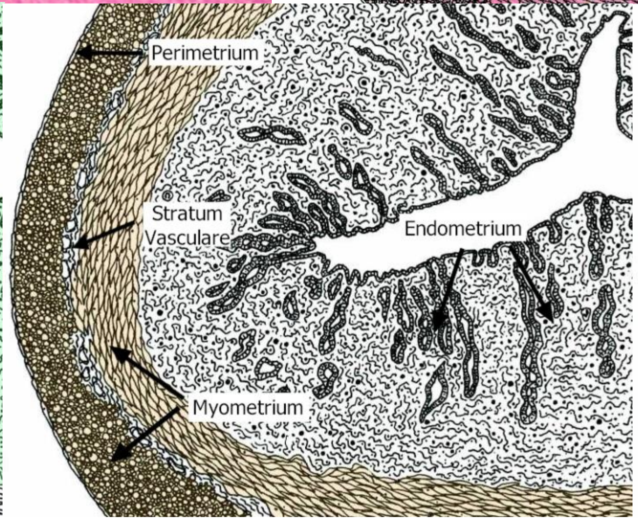
UTERINE CYCLE

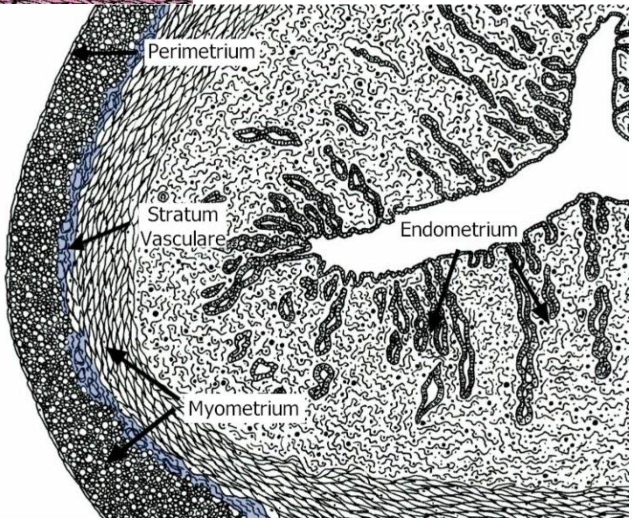
Menstrual and proliferative phase (Follicular Phase)









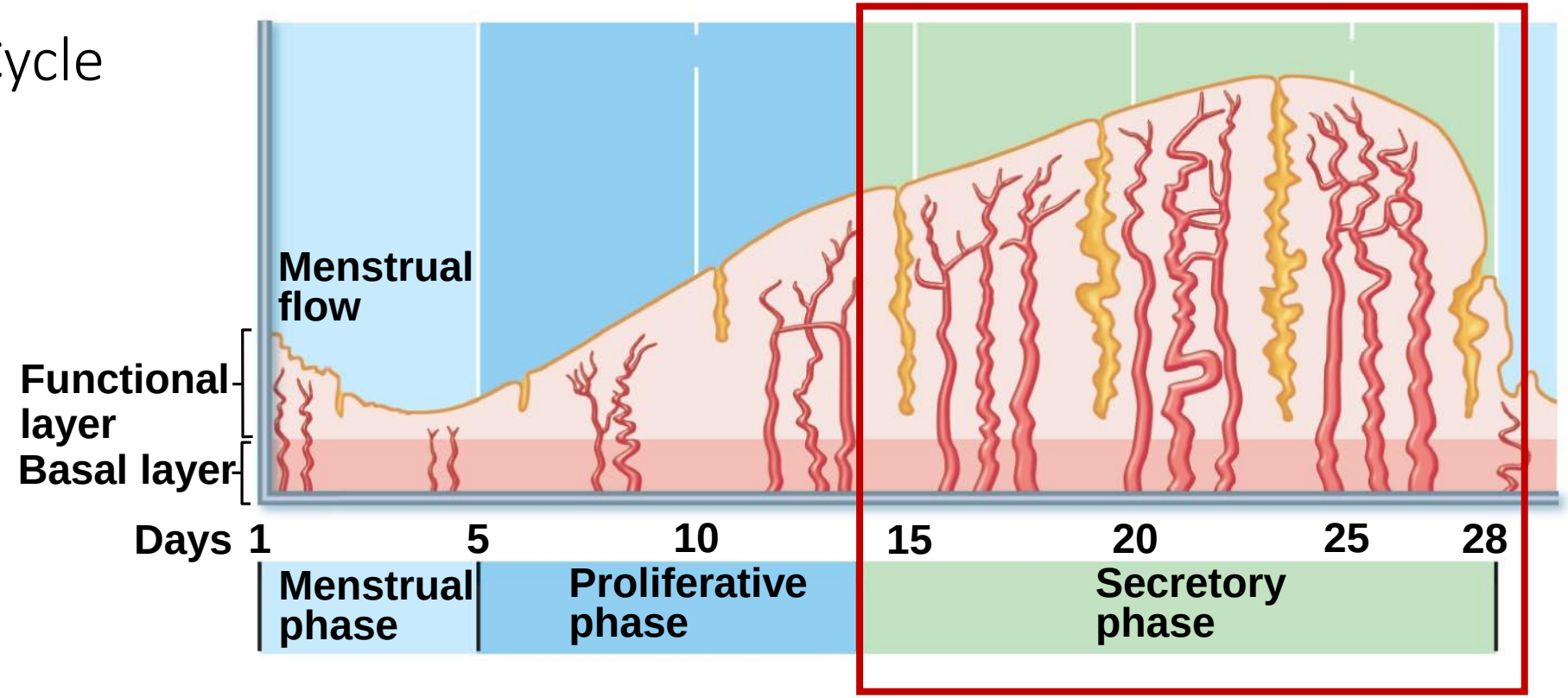


Endometrium:
Uterine Glands

Miometrium

Stratum vasculare

Uterine Cycle



- **Secretory phase** (Days 15 – 28)
  - Endometrium prepares for embryo
  - Rising progesterone levels prompt
    - Functional layer → secretory mucosa
    - Endometrial glands secrete nutrients
    - Formation of cervical mucus plug

UTERINE CYCLE

Secretory (Luteal Phase)

1. after ovulation progesterone rises
2. **uterine glands undergo hyperplasia & coiling**
3. uterine glandular **secretory activity high**

normal state (no fertilization)

· secretory activity is arrested

· lining cells and glands begin to involute

· vascularity of the entire wall decreases

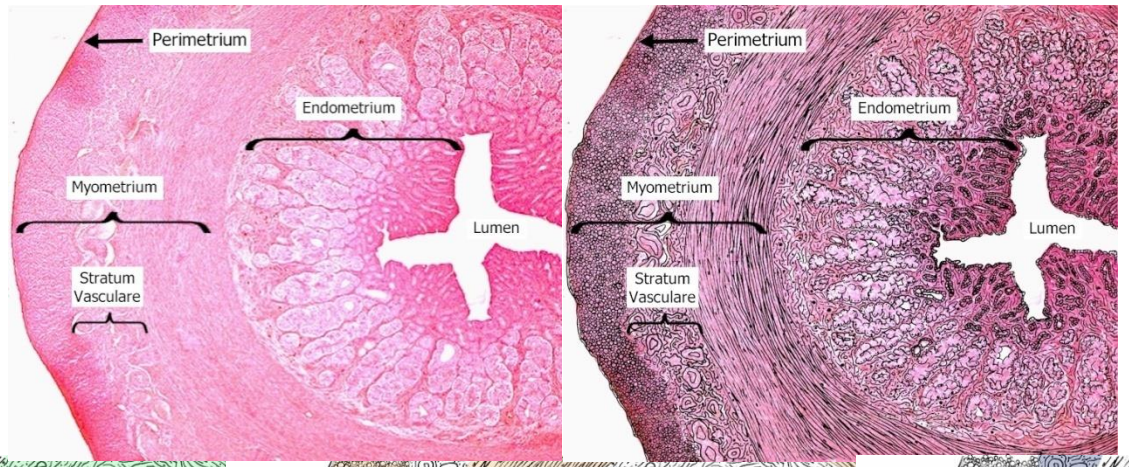
- the wall of the uterus returns to a state that resembles the beginning of the uterine cycle

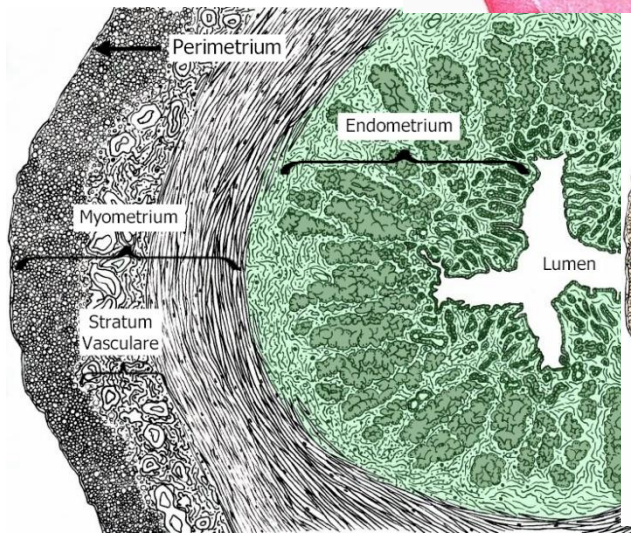
fertilized state

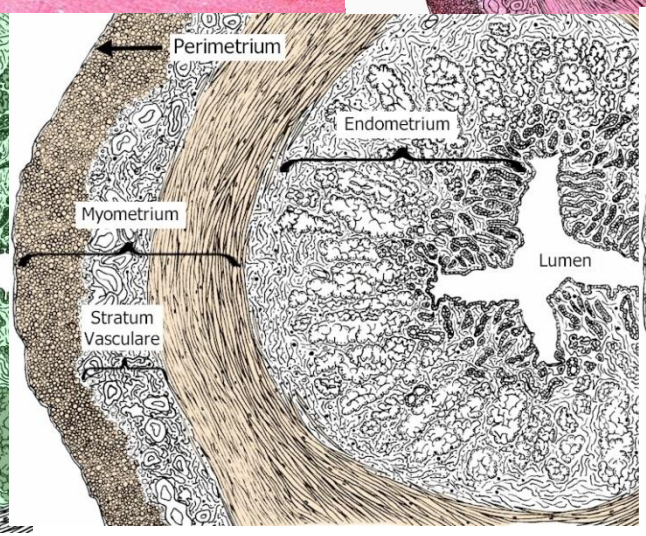
- secretory activity is maintained (in order to nourish embryo/fetus during pregnancy)

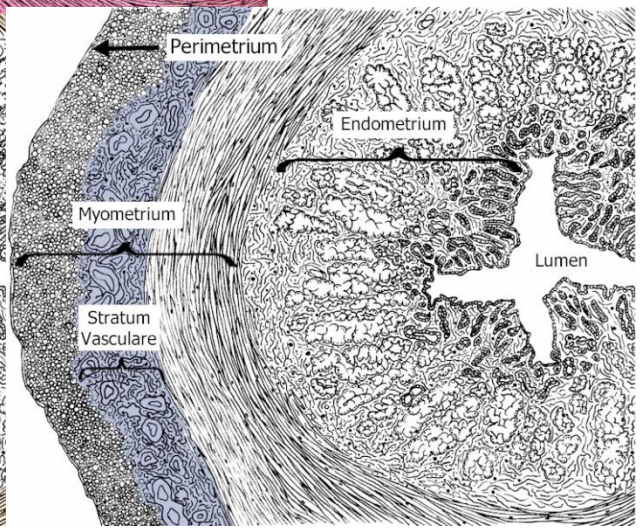
UTERINE CYCLE

Secretory (Luteal Phase)









Endometrium: Uterine Glands

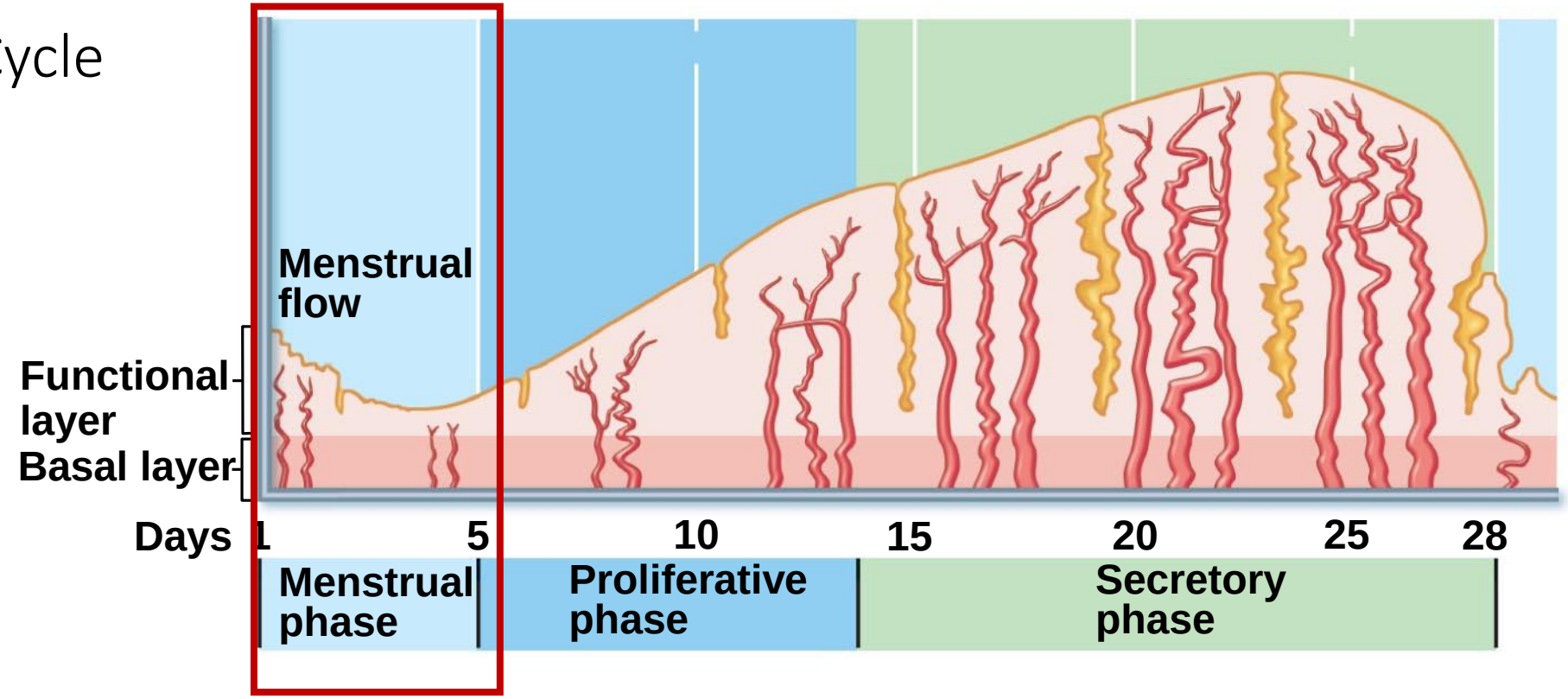
Miometrium

Stratum vasculare

Uterine Cycle

- **If fertilization does not occur (women)**
  - Corpus luteum degenerates toward end of secretory phase
  - Progesterone levels fall
  - Spiral arteries kink and spasm
  - Endometrial cells begin to die; glands regress
  - Spiral arteries constrict again, then relax and open wide
  - Rush of blood fragments weakened capillary beds and functional layer sheds

Uterine Cycle



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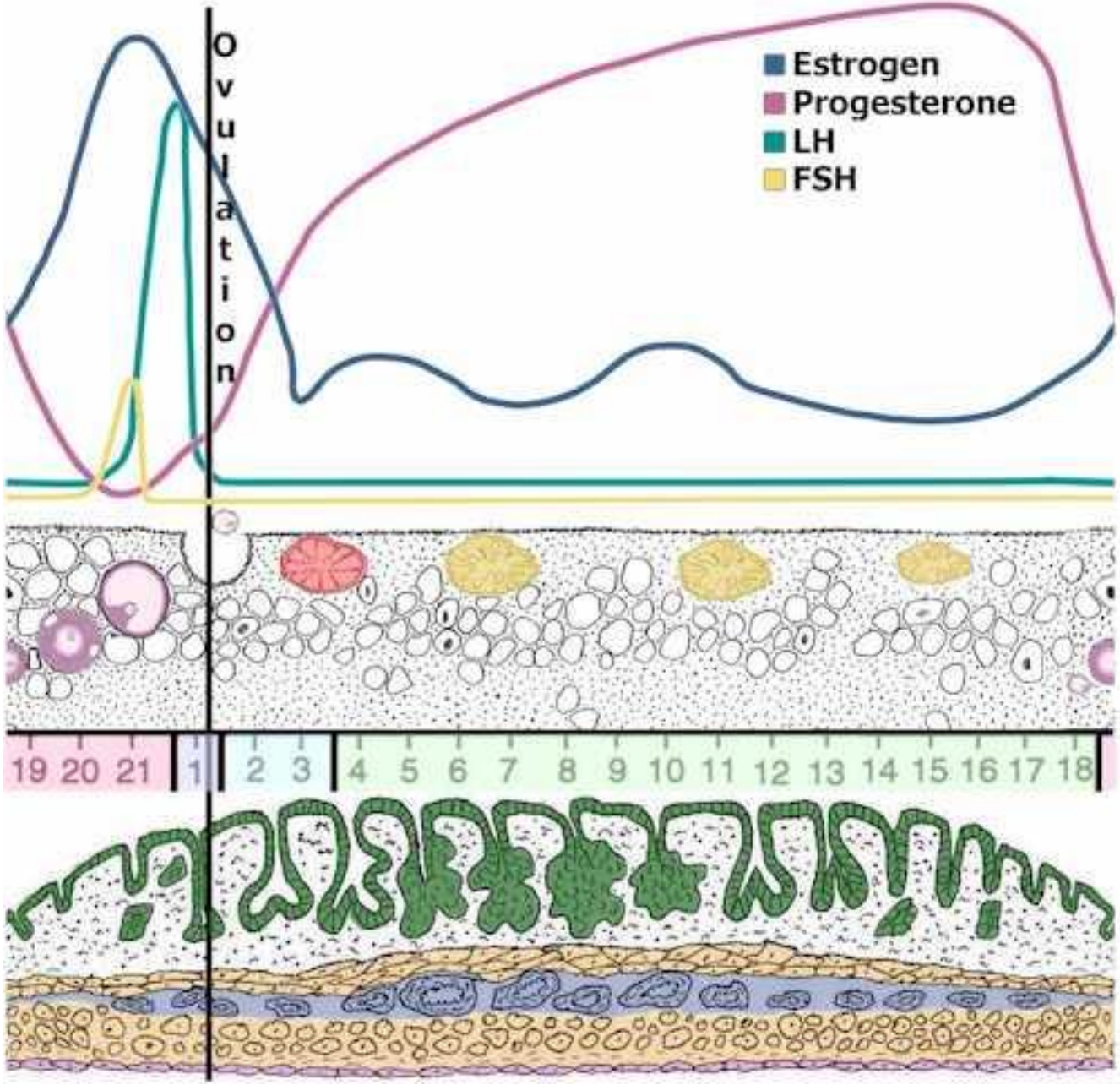
If fertilization does not occurs in domestic animals

Monestrous animals enter Anestrus

- the endometrium becomes very thin and lined with simple low columnar to cuboidal epithelium
- the uterine glands become very sparse & simple or branched tubular
- the wall of the uterus remains in this low activity state until stimulated to enter Proestrus.

Polyestrous animals enter Proestrus and begin the cycle again under the influence of rising estrogen secretion from the ovary.

UTERINE CYCLE
in domestic animals



cow

OVERT MENSTRUATION and COVERT MENSTRUATION

Overt menstruation (where there is bleeding from the uterus through the vagina) is found primarily in humans.

Covert menstruation. Females of domestic animals undergo estrous cycles, in which the endometrium is completely reabsorbed by the animal.

Some species, such as domestic dogs, experience small amounts of vaginal bleeding while approaching heat (estrus); this discharge has a different physiologic cause than menstruation.