

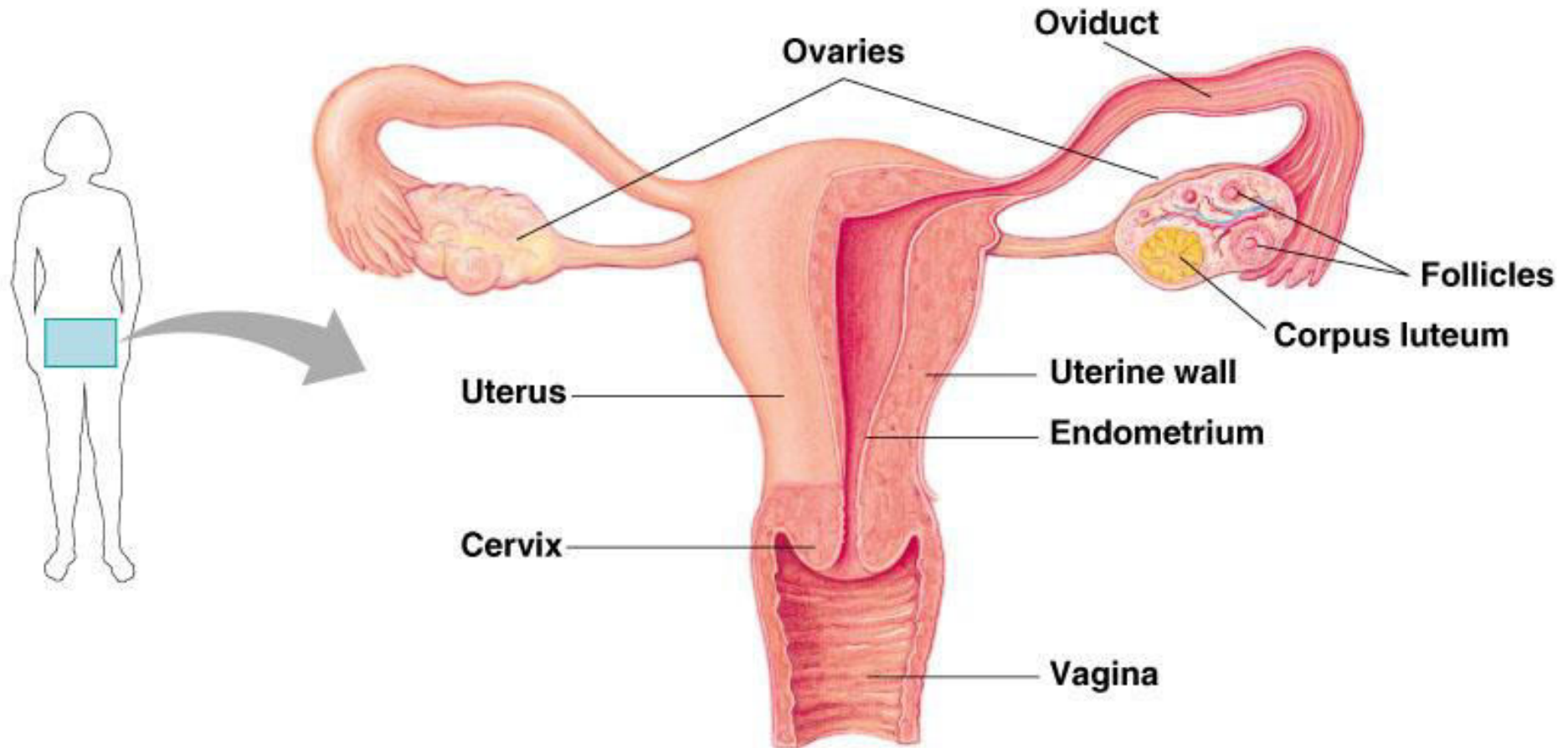
Female reproductive system

Ms. Manochitra

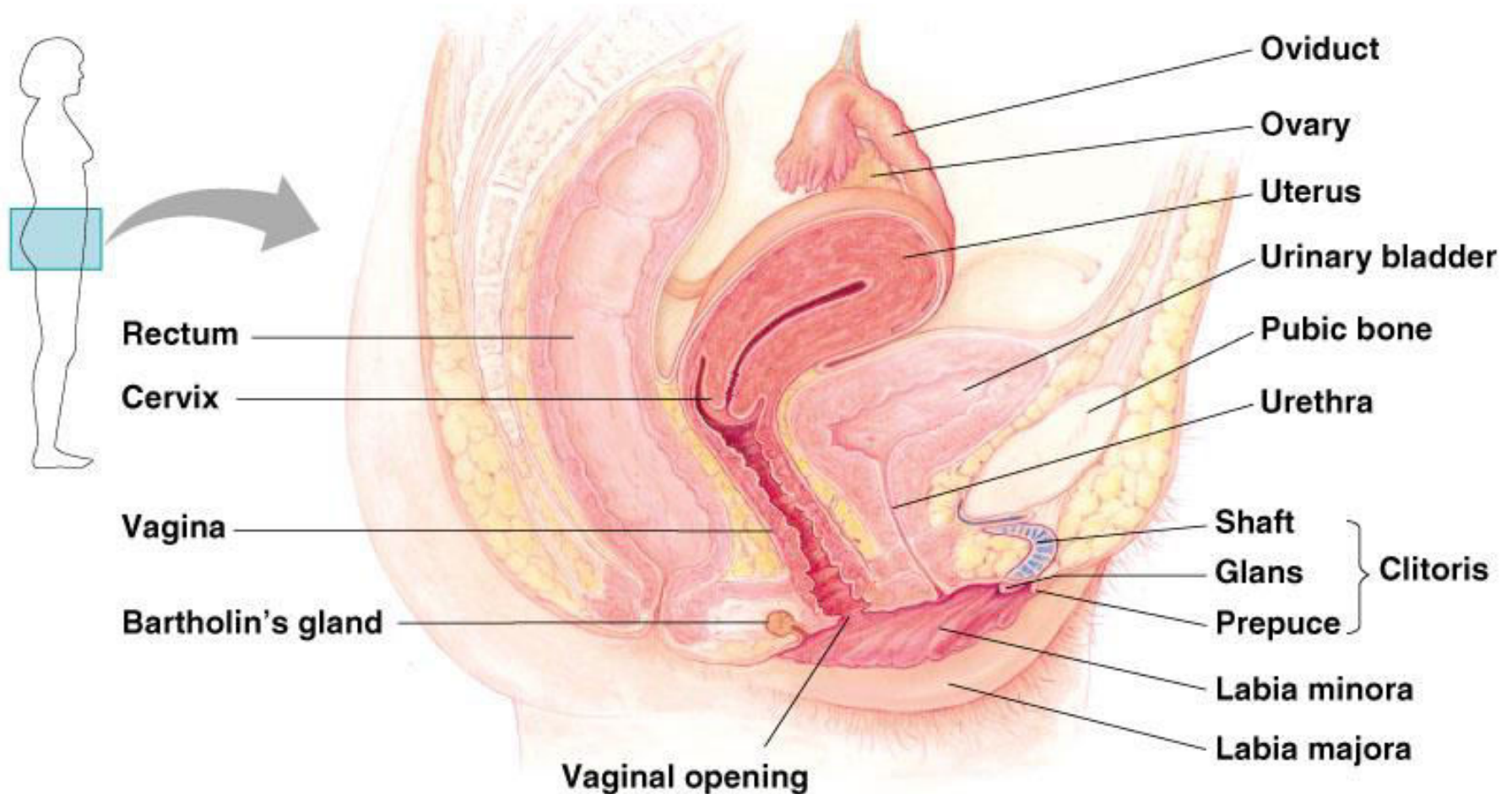
Guest Lecturer

Department of Biomedical science,
Bharathidasan University, Trichy

Female reproductive system

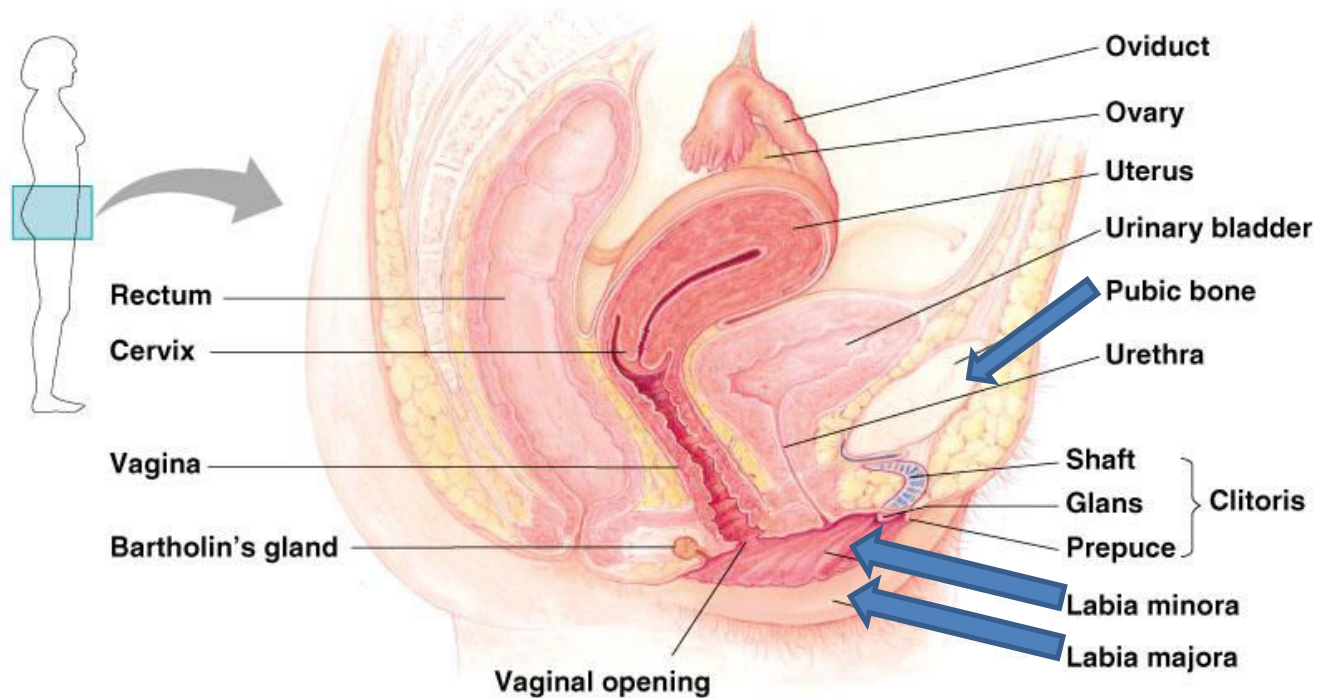
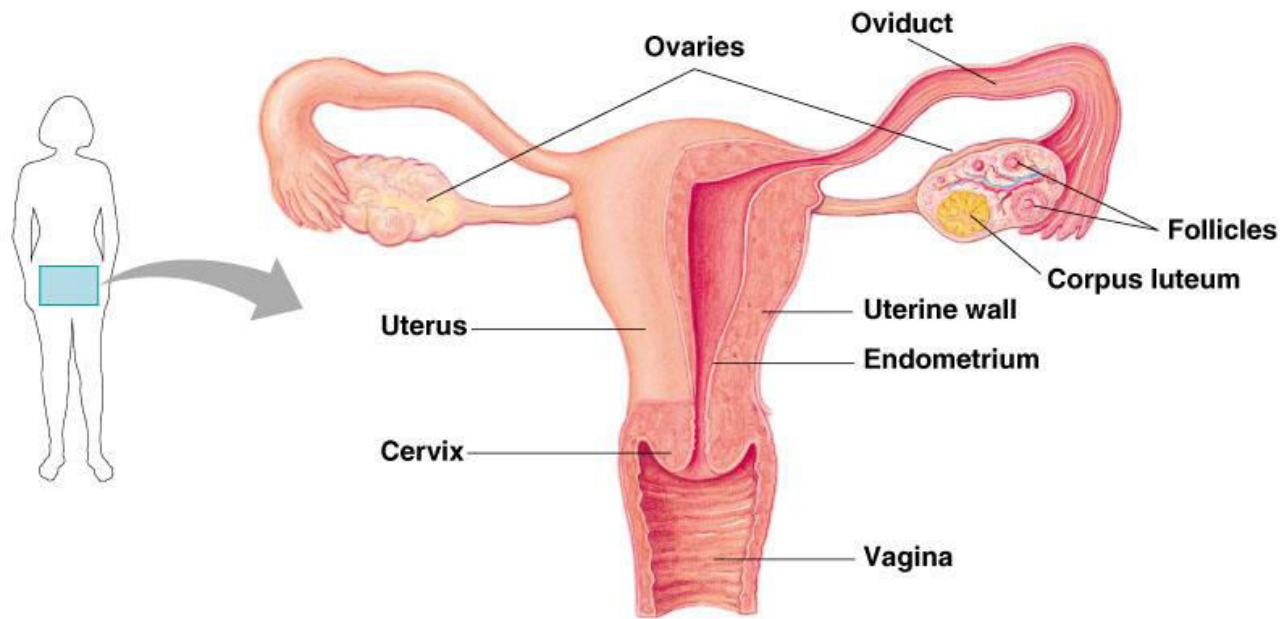


Female reproductive system- External Genitalia



Female Organs of Reproduction

- *External genitalia* → *Mons pubis*
Labia majora
Labia minora
Vestibule
Clitoris
Greater vestibular glands
- *Vagina*
- *Uterus*
- *Fallopian tubes*
- *Ovaries*



External genitalia(vulva)

Mons pubis :

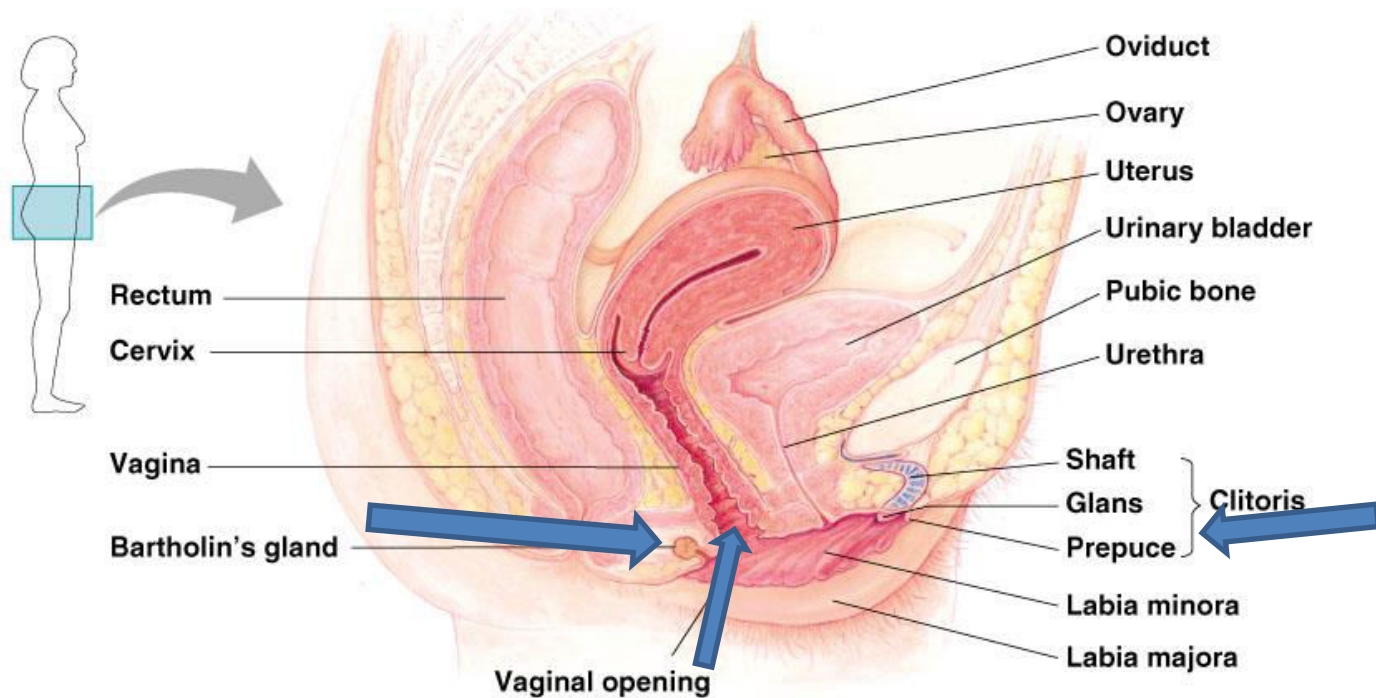
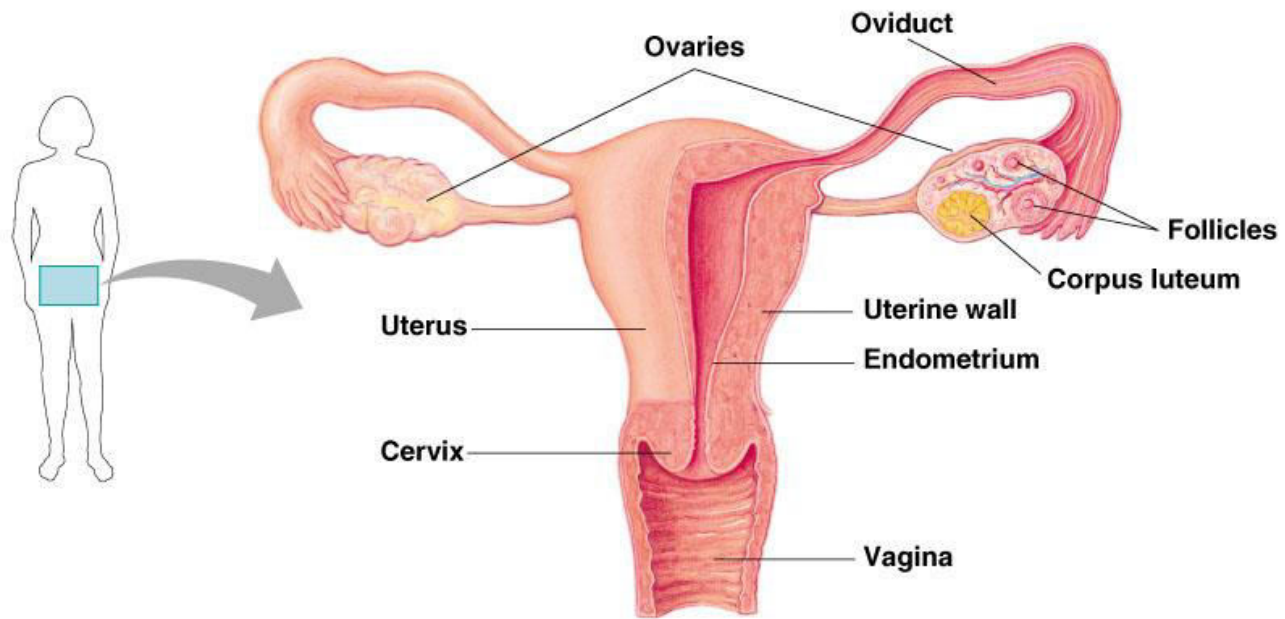
- *fibro-fatty tissue, which covers the body of the pubic bones.*
- *Interiorly the labium majors on each side of the vulva.*
- *In the adult, the skin that covers the mons pubis bears pubic hair.*

Labia majora :

- *two folds of skin with underlying adipose tissue bounding either side of the vaginal opening.*
- *contain sebaceous and sweat glands and a few specialized apocrine glands.*

Labia minora :

- *two thin folds of skin that lie between the labia majora.and anteriorly they divide into two to form the prepuce and frenulum of the clitoris.*
- *not well developed before puberty, atrophy after the menopause.*
- *Their vascularily allows them to become turgid during sexual excitement.*



Vestibule:

- *cleft between the labia minora.*
- *The urethra, the ducts of the Bartholin's glands and the vagina open in the vestibule.*
- *The vestibular bulbs are two oblong masses of erectile tissue that lie on either side of the vaginal entrance.*

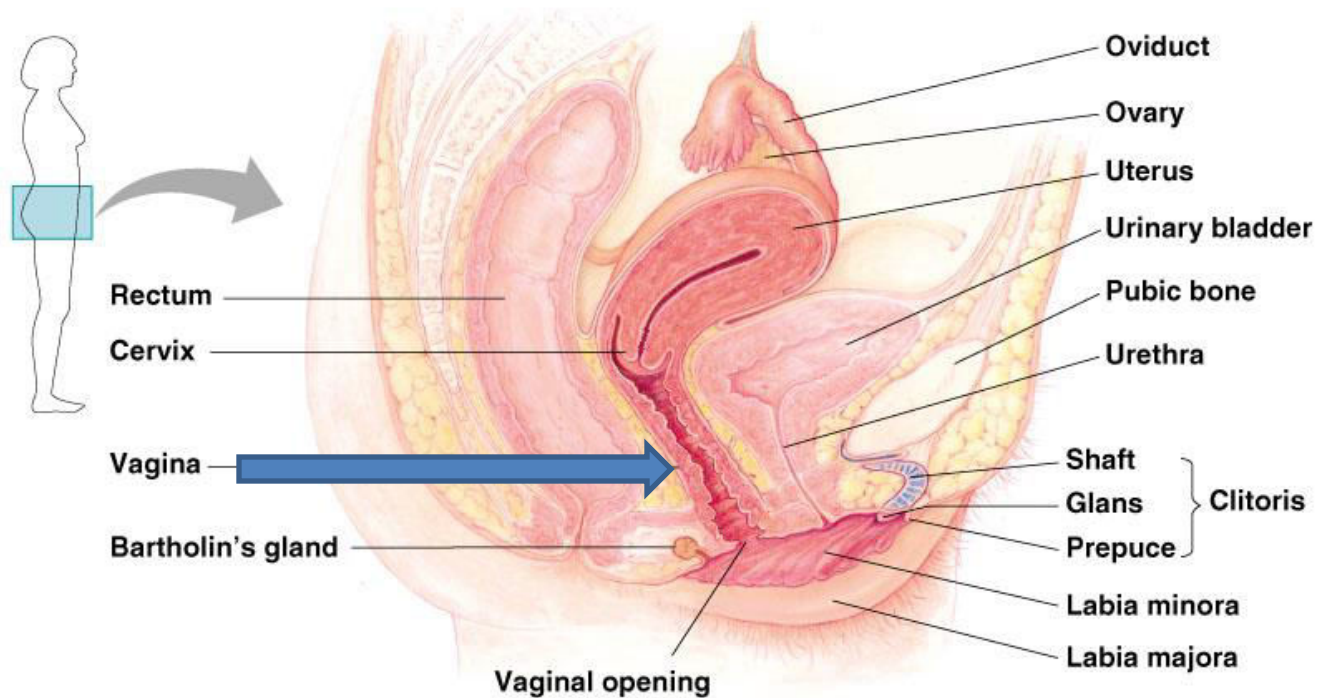
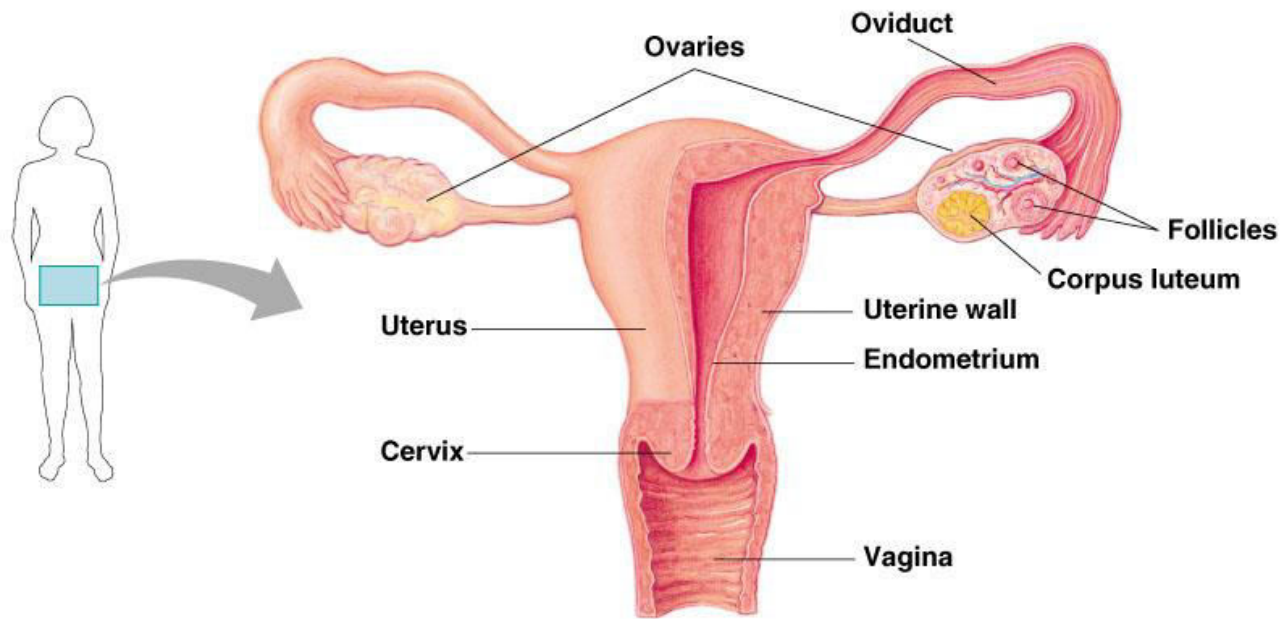
Clitoris:

- *small erectile structure, the body of the clitoris contains two crura, the corpora cavernosa, which are attached to the inferior border of the pubic ramí.*
- *It is covered by the muscles which inserts into its root.*
- *It is about 1cm long but has a highly developed nerve supply and is very sensitive during sexual arousal.*

Bartholin's glands:

size of a small pea, lie at the base of each bulb and open via a 2 cm duct into the vestibule between the hymen and the labia minora.

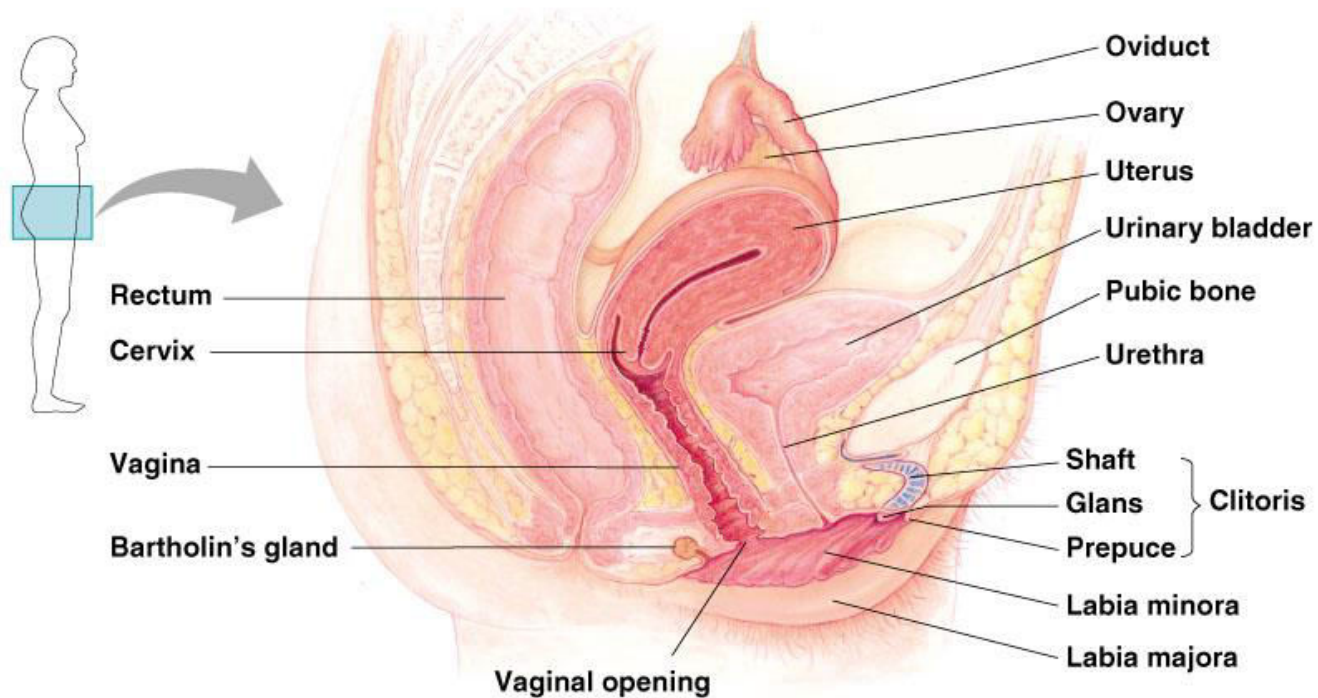
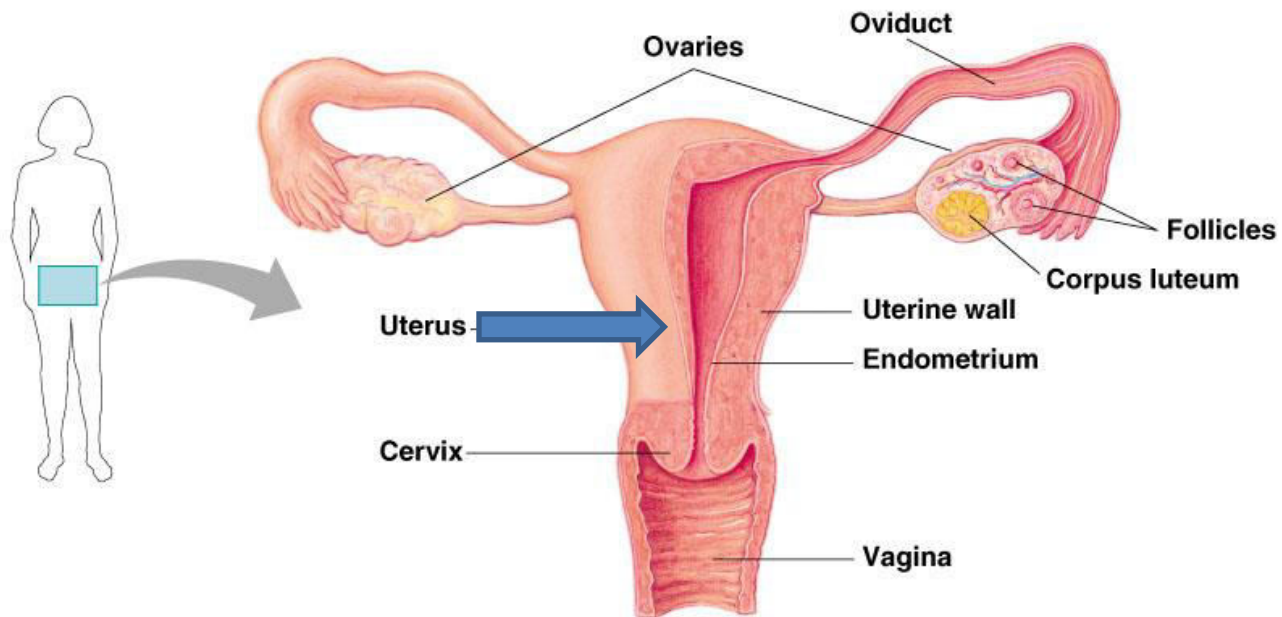
- *These are mucus-secreting, producing copious amounts during intercourse to act as a lubricant*



Vagina:

- *It is a fibromuscular epithelium from the uterus to the vulva.*
- *posterior wall (around 9 cm) , anteriorly (approximately 7 cm).*
- *The vaginal walls are rugose, with transverse folds.*
- *The vagina is kept moist by secretions from the uterine and cervical glands and has no glands.*
- *The epithelium is thick and rich in glycogen, which increases in the postovulatory phase of the cycle.*
- *PH of around 4.5*

- *Anteriorly, the lip of the vagina is in direct contact with the base of the bladder; the urethra runs down the lower half in the midline to open to the vestibule.*
- *Its muscles fuse with the anterior vaginal wall.*
- *Laterally, at the fornices, the vagina is related to the attachment at the cardinal ligaments.*
- *Below this are the levator ani muscles and the ischiorectal fossae.*
- *The cardinal ligaments and the uterosacral ligaments, which form posteriorly from the parametrium, support the upper part of vagina.*

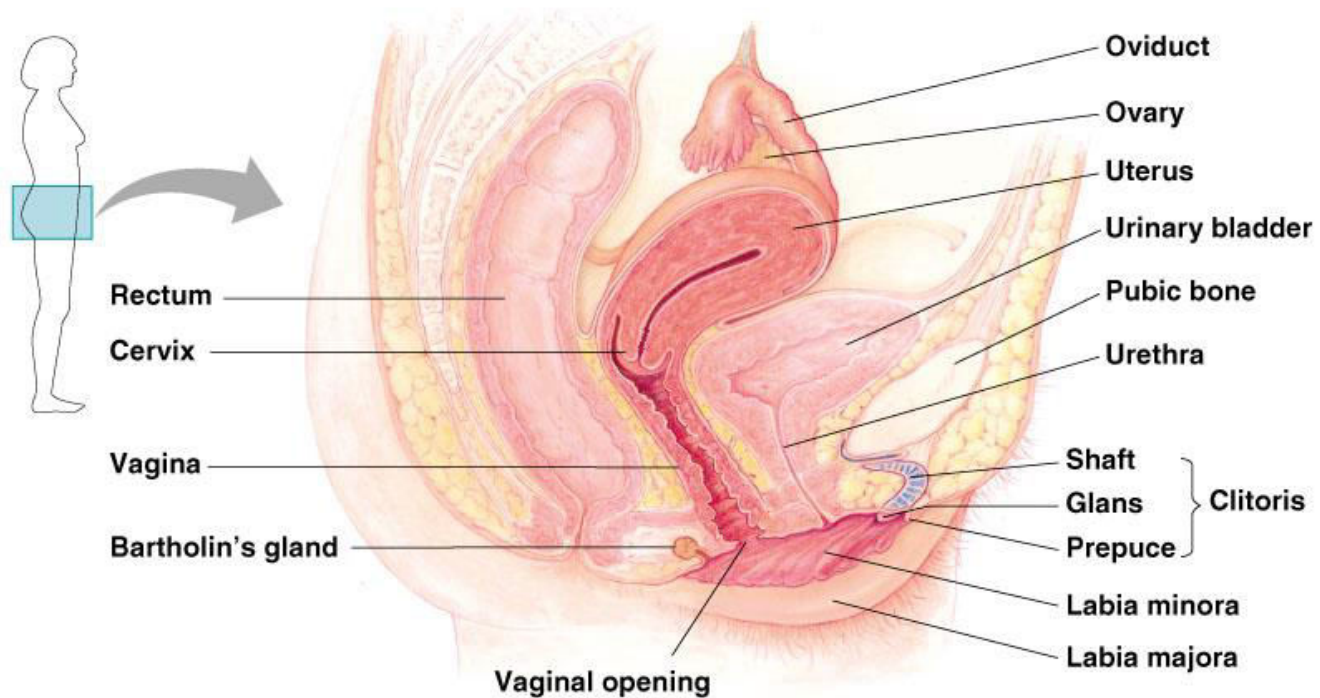
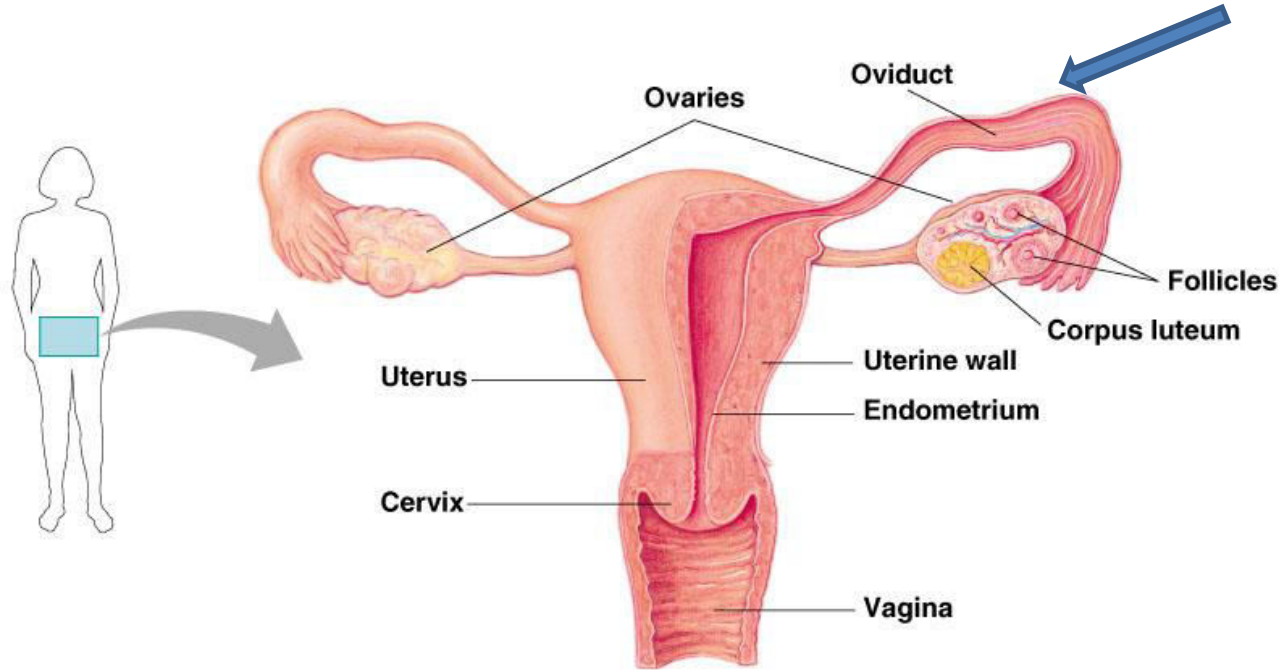


Uterus:

- *Is shaped like an inverted pear, tapering inferiorly to the cervix.*
- *It is hollow and has thick muscular walls, maximum external dimensions are approximately 7.5 cm long, 5 cm wide and 3 cm thick.*
- *An adult uterus weighs about 70 g.*
- *The upper part is termed the body or corpus and the area of insertion of each fallopian tube is termed the cornu.*
- *The fundus is the part above the cornu.*
- *It tapers to a small central constricted area, the isthmus, and below this is the cervix.*
- *The cervix projects obliquely into the vagina and can be divided into vaginal and supravaginal portions.*

- *The constriction at the isthmus where the corpus joins the cervix is the anatomical internal os.*
- *The site of the histological internal os is where the mucous membrane of the isthmus becomes that of the cervix.*
- *The uterus consists of three layers:*
 - the outer serous Layer(peritoneum)*
 - the middle muscular layer (myometrium)*
 - and the inner mucous layer (endometrium).*
- *The **peritoneum** covers the body of the uterus and, posteriorly, the supravaginal portion of the cervix.*
- *The serous coat is intimately attached to a subserous fibrous layer except laterally, where it spreads out to form the leaves of the broad ligament*

- *The muscular **myometrium** forms the main bulk of the uterus and comprises interlacing smooth muscle fibres intermingling with areolar tissue, blood vessels, nerves and lymphatics.*
- *The inner endometrial layer has tubular glands that dip into the myometrium.*
- *The **endometrial** layer is covered by a single layer of columnar epithelium.*
- *This epithelium is mostly lost due to the effects of pregnancy and menstruation.*
- *The endometrium undergoes cyclical changes during menstruation and varies in thickness between 1 and 5 mm.*



The Fallopian tubes:

each tube extends outwards from the uterine cornu to end near the ovary.

At the abdominal ostium, the tube opens into the peritoneal cavity, which is therefore in communication with the exterior of the body via the uterus and the vagina.

The tubes (oviducts) convey the ovum from the ovary towards the uterus, which provides oxygenation and nutrition for sperm, ovum and zygote should fertilization occur.

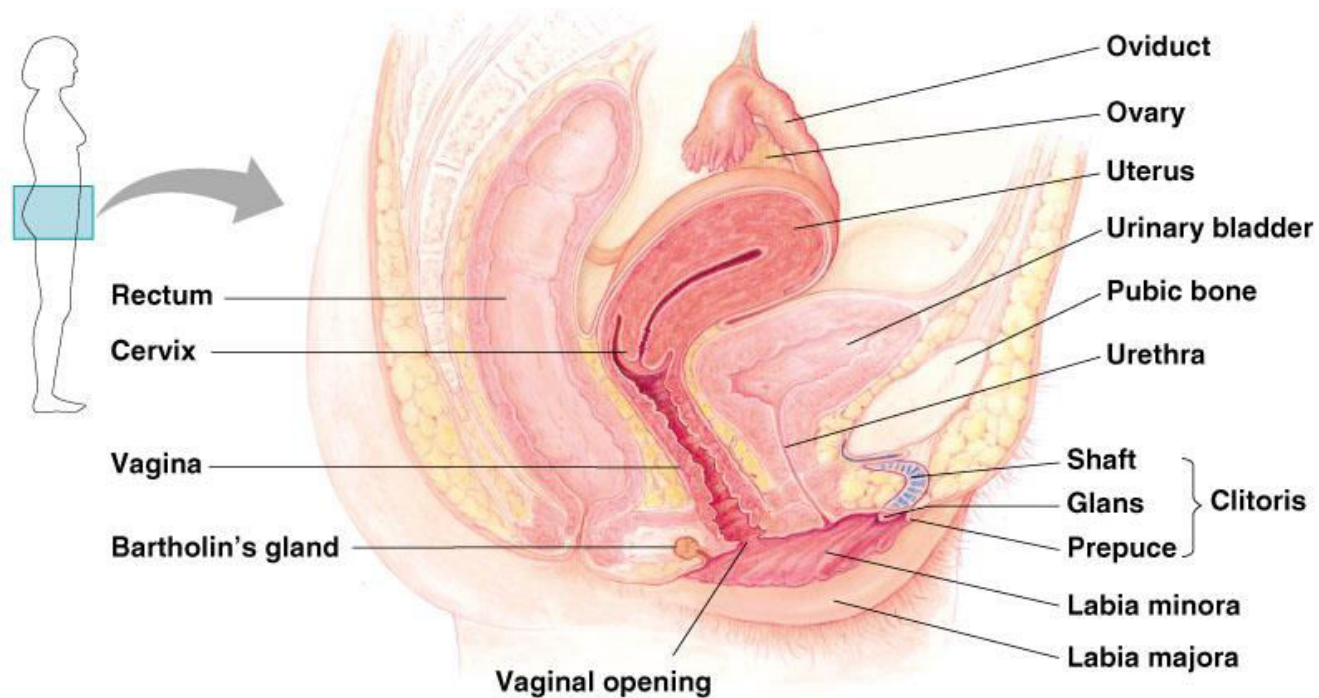
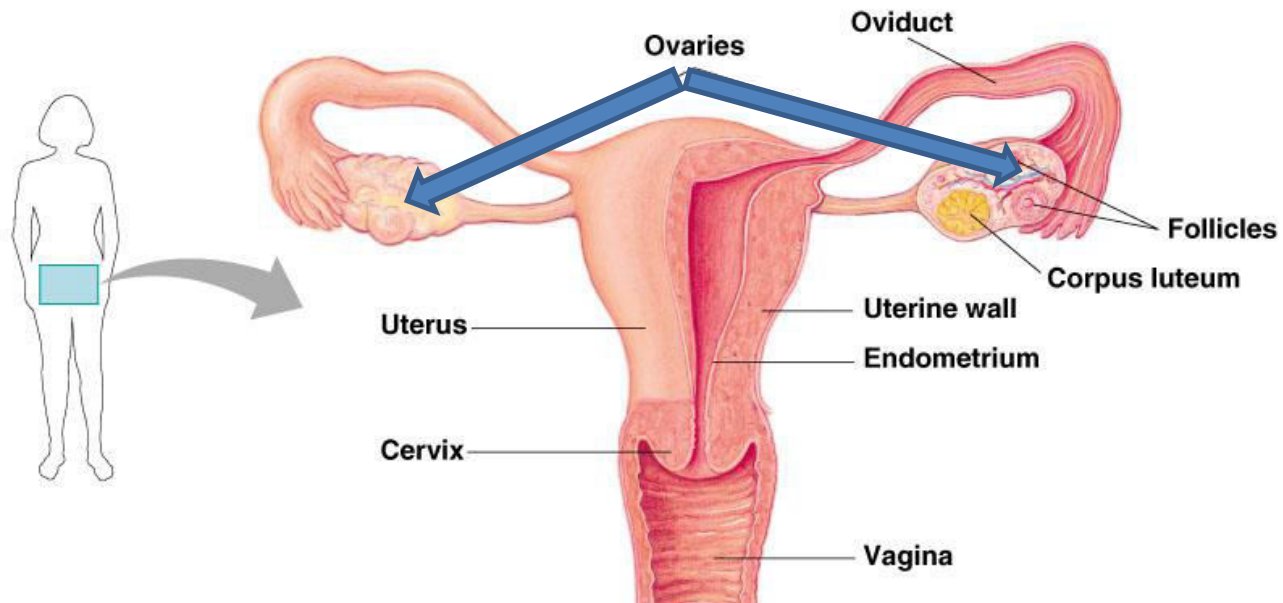
The Fallopian tubes runs in the upper margin of the broad ligament, part of which, known as the mesosalpinx, encloses it so that the tube is completely covered with peritoneum except for a narrow strip along this inferior aspect.

Each tube is about 10 cm long and is described in four parts:

- 1. the interstitial portion lies within the wall of the uterus.*
- 2. the isthmus is the narrow portion adjoining the uterus.*
- 3. the ampulla the widest and longest portion.*
- 4. the infundibulum, or fimbrial portion, the terminal part of the tube,*

where the funnel-shaped opening of the tube into the peritoneal cavity is surrounded by finger-like processes, called fimbriae.

- The inner surfaces of the fimbriae are covered by ciliated epithelium, which is similar to the lining of the Fallopian tube itself.*
- One of these fimbriae is longer than the others and extends to, and partly embraces, the ovary*



The ovary:

- *only intra-abdominal structure not to be covered by peritoneum.*
- *Each ovary is attached to the cornu of the uterus by the ovarian ligament, and at the hilum to the broad ligament by the mesovarium, which contains its supply of vessels and nerves.*
- *The ovary is bound behind by the ureter where it runs downwards and forwards in front of the internal iliac artery.*
- *In the young adult they are almond shaped, solid, a greyish pink and approximately 3cm long, 1.5cm wide and 1 cm thick.*
- *In the child, the ovaries are small structures, approximately 1.5cm long.*
- *They have a smooth surface.*

- *After the menopause, no active follicles are present and the ovary becomes a small, shrunken structure with a wrinkled surface.*
- *The ovary has a central vascular medulla consisting of loose connective tissue containing many elastin fibres and non-striated muscle cells.*
- *It has an outer thicker cortex, denser than the medulla, consisting of networks of reticular fibres and fusiform cells, although there is no clear-cut demarcation between the two.*
- *The surface of the ovaries is covered by a single layer of cuboidal cells, the germinal epithelium.*
- *Beneath this is an ill-defined layer of condensed connective tissue, the tunica albuginea, which increases in density with age.*

Microscopic structures

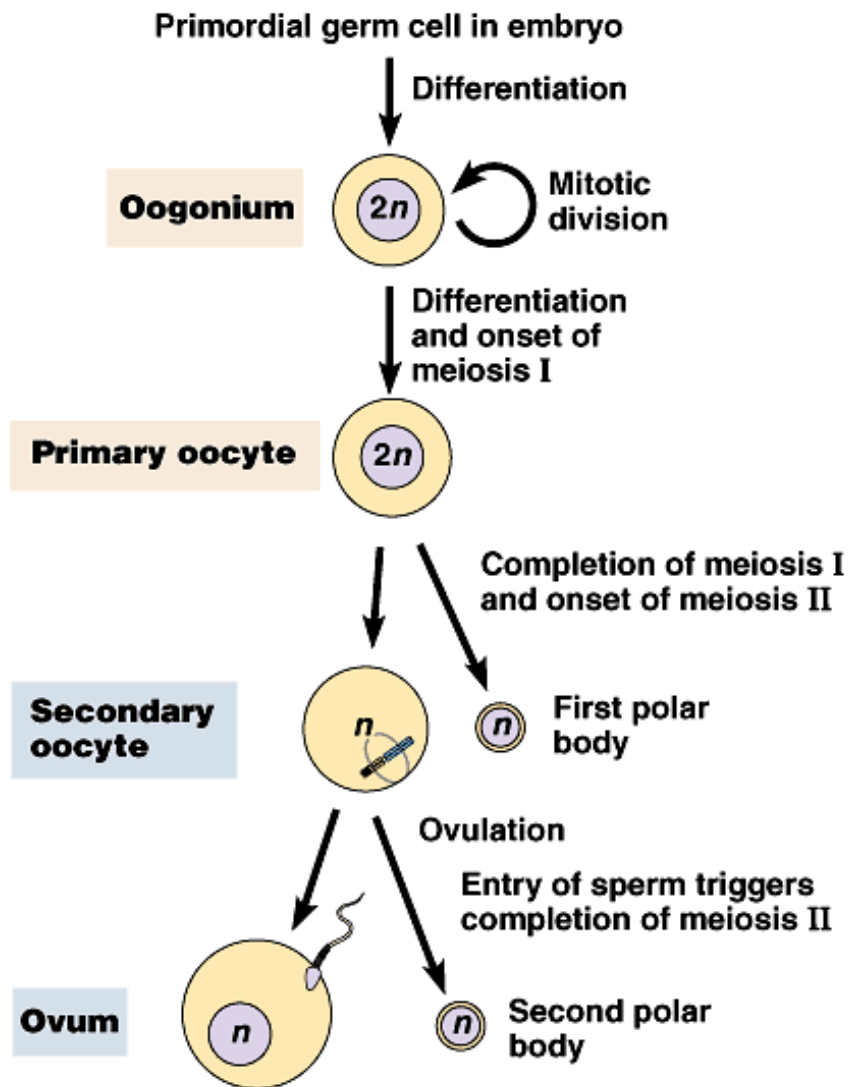
ovary



Follicle

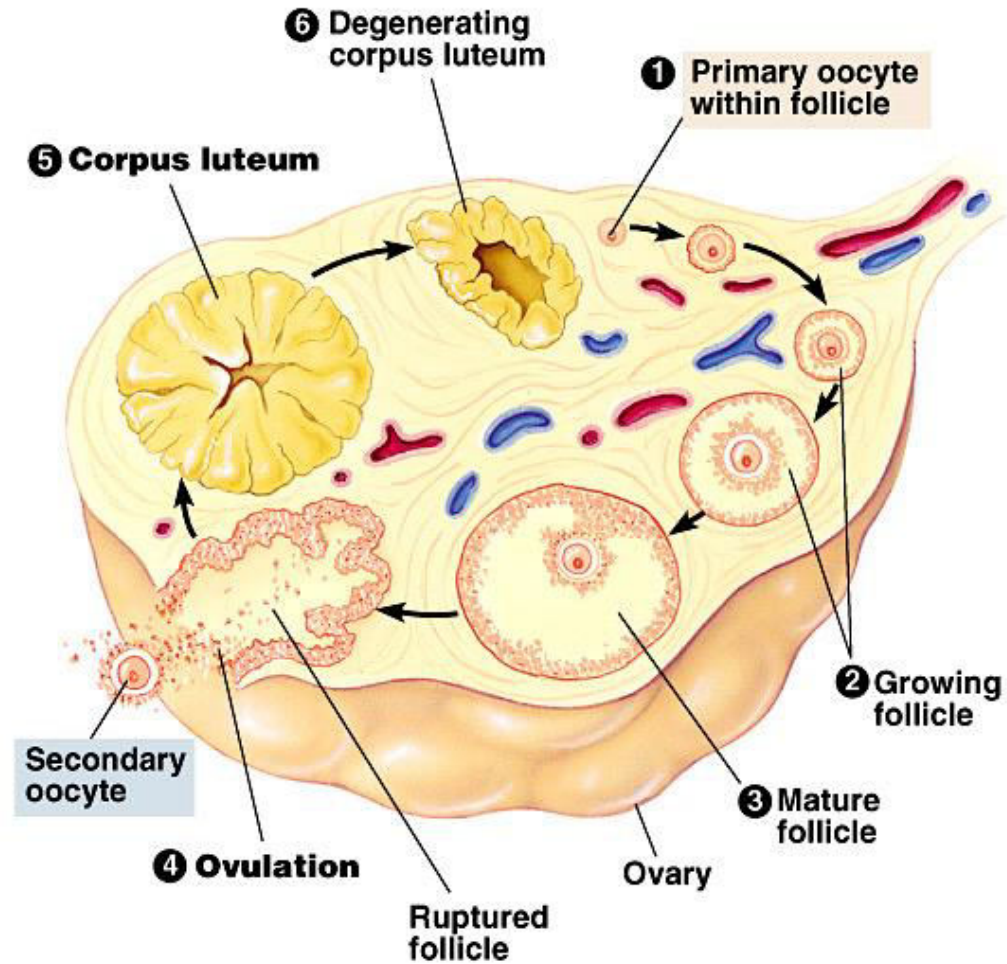


Oogenesis



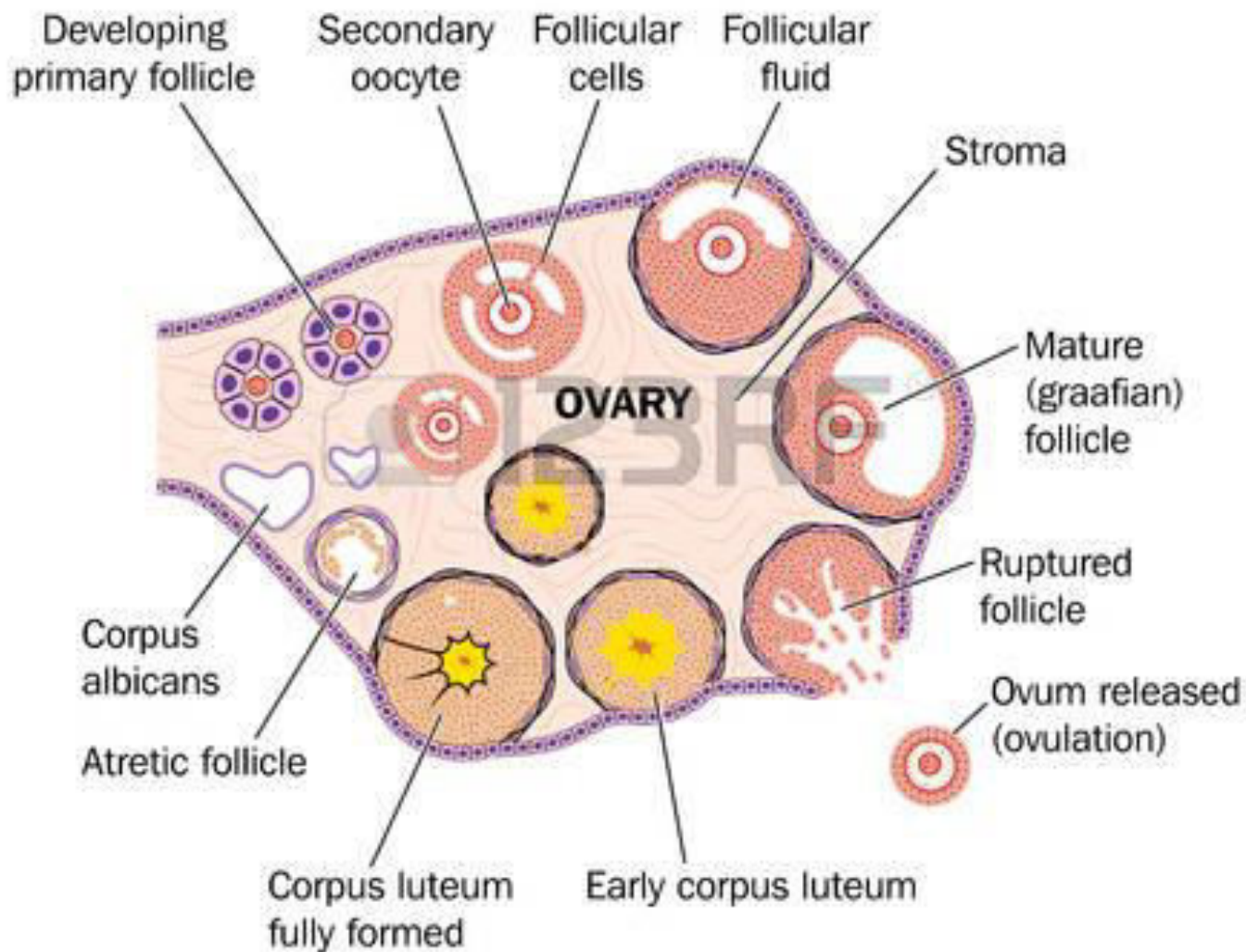
(a)

Stages of development in ovary



(b)

Normal ovary



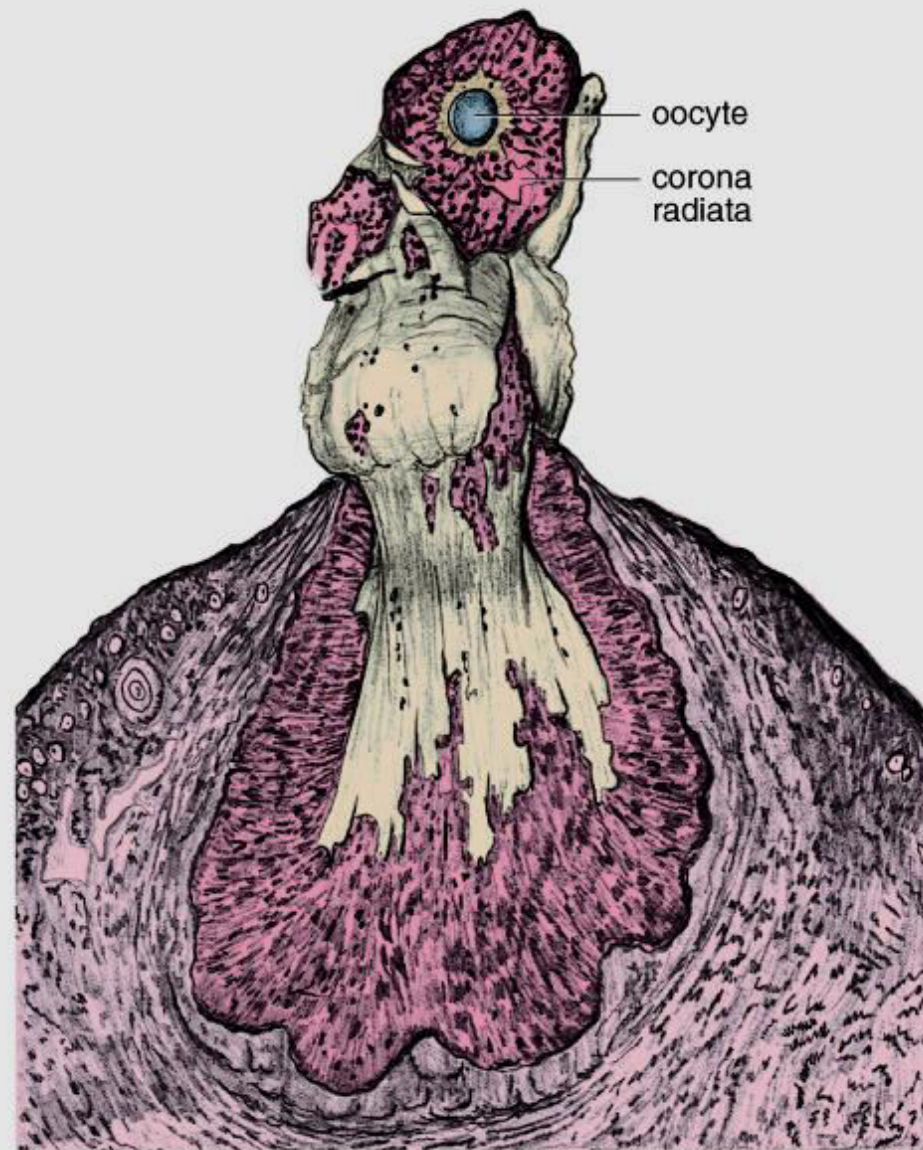


Figure 22.8. **Ovulation.**

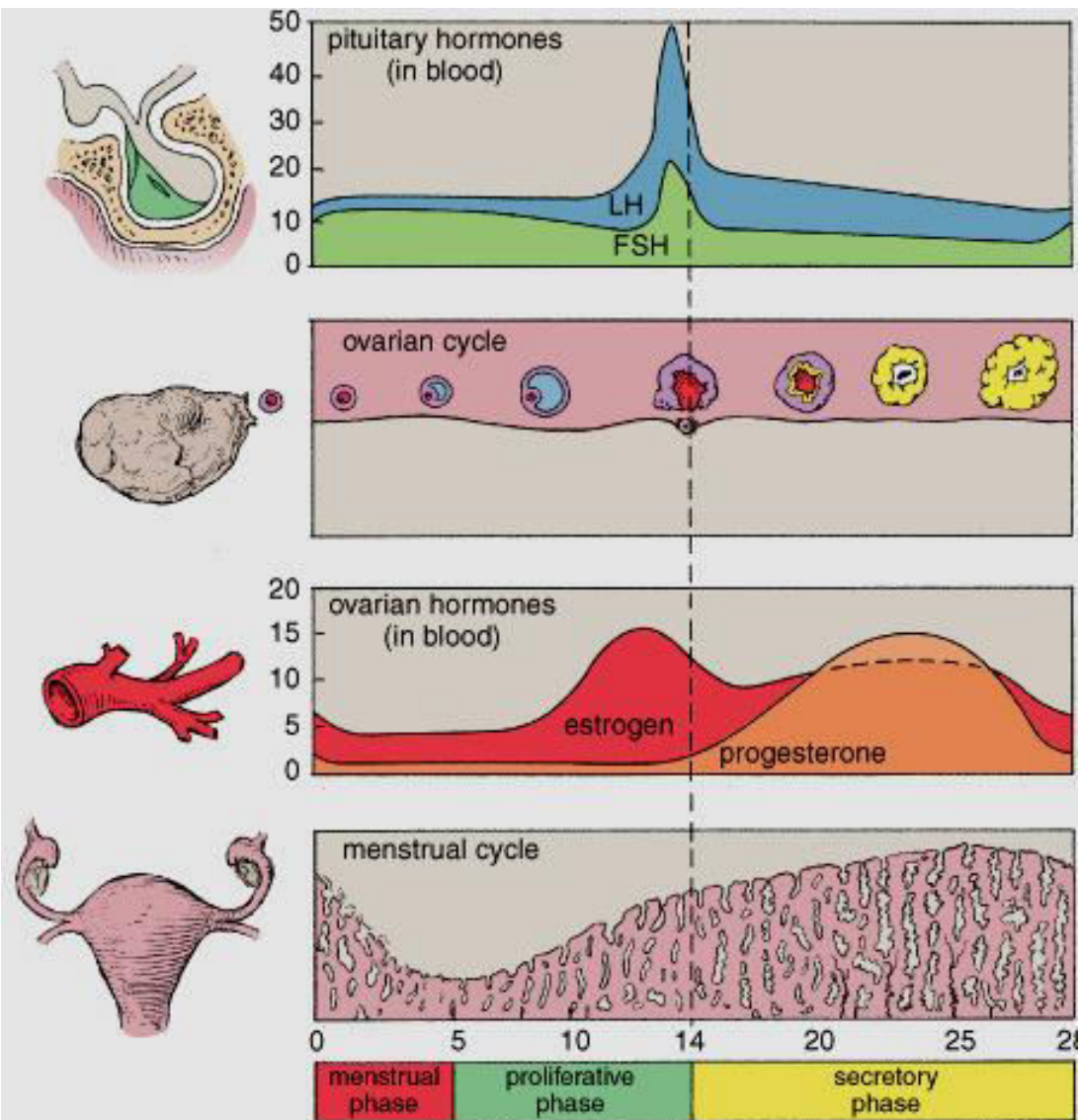
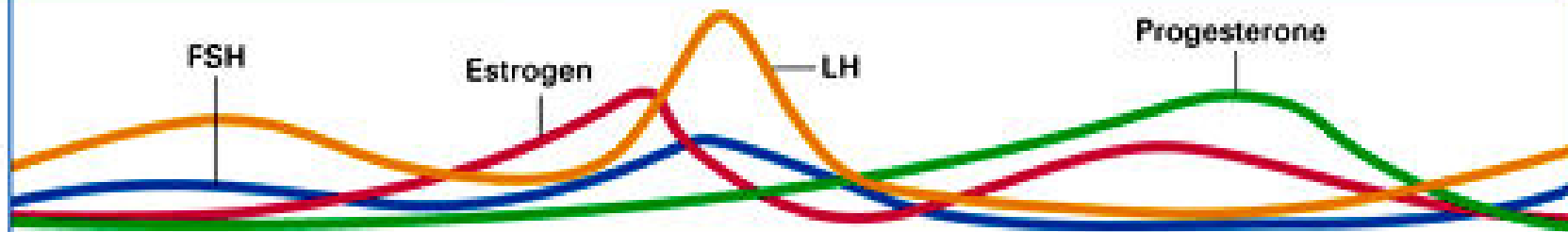


Figure 22.14. Relationship of morphological and physiological events that occur in the menstrual cycle.

Ovarian and Menstrual Cycles

Hormone Levels in the Blood



Menstrual Cycle



Days

1 2 4 6 8 10 12 14 16 18 20 22 24 26 28

Ovarian Cycle



Effects of Reproductive Hormones in Females

Hormone (Source)	Function
Releasing hormone (Hypothalamus)	Stimulates anterior pituitary
Follicle-stimulating hormone (FSH) (Anterior pituitary)	Stimulates follicle and oocyte development in ovary
Luteinizing hormone (LH) (Anterior pituitary)	Causes follicle to mature and break open
Estrogen (Follicle and corpus luteum)	Causes endometrium thickening; development of secondary sex characteristics
Progesterone (Corpus luteum)	Causes and maintains endometrium thickening