



## **Government of Tamilnadu**

### **Department of Employment and Training**

Course : TNPSC Group II Exam  
Subject : Zoology  
Topic : **Reproductive System**

#### **© Copyright**

The Department of Employment and Training has prepared the TNPSC Group-II Preliminary and Main Exam study material in the form of e-content for the benefit of Competitive Exam aspirants and it is being uploaded in this Virtual Learning Portal. This e-content study material is the sole property of the Department of Employment and Training. No one (either an individual or an institution) is allowed to make copy or reproduce the matter in any form. The trespassers will be prosecuted under the Indian Copyright Act.

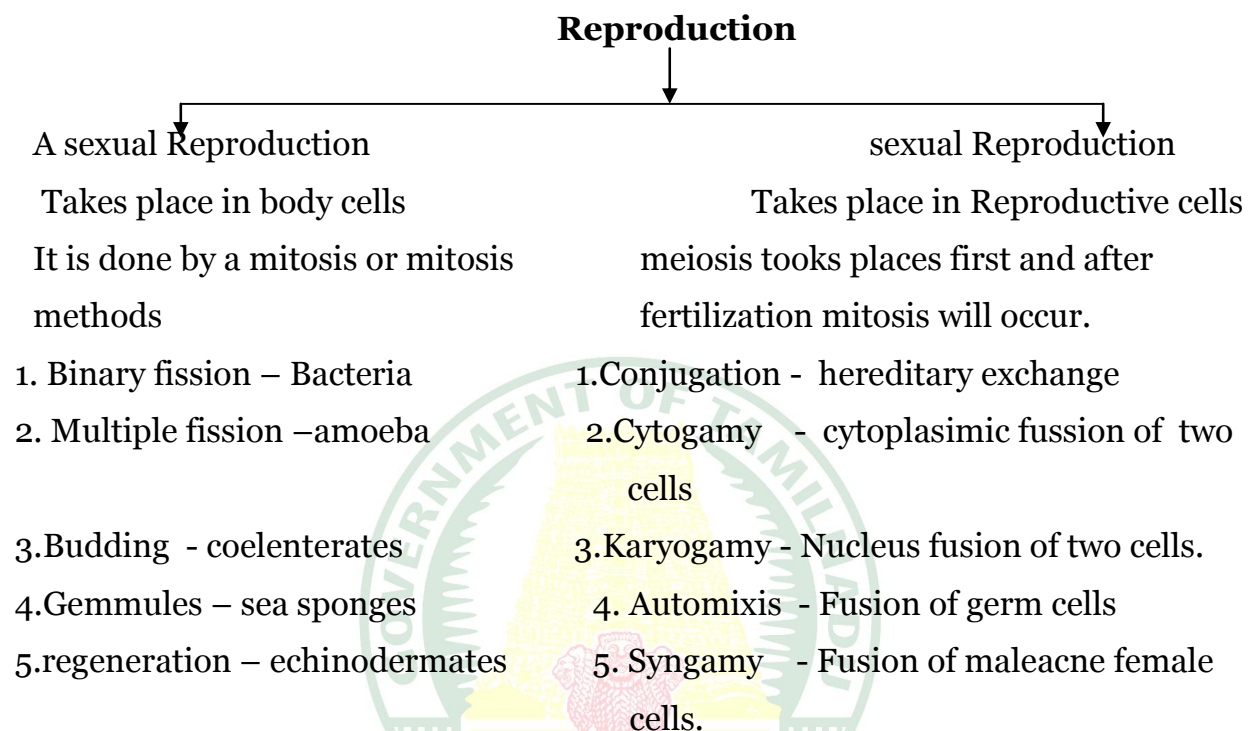
It is a cost-free service provided to the job seekers who are preparing for the Competitive Exams.

**Commissioner,  
Department of Employment and Training.**



# REPRODUCTIVE SYSTEM

- ❖ Reproduction is means one organism produces its phylogeny that is its off springs. It takes place in two modes.



Mode of Asexual reproduction	Organism
Fission	Amoeba, bacteria, flatworm
Budding	Hydra, Yeast and Sponge
Syngamy	Cockroach, Frog and human being

- \* Autogamy
- \* Excogamy
- \* Hologamy
- \* Pedogamy
- \* Mesogamy
- \* Isogamy
- \* Anisogamy
- \* Macrogamy
- \* Microgamy

## Sexual Reproduction:

- It is a important process of nature.
- Due to this healthier new generations will be produced.
- For this process the organisms maintain several provisions
- By this structural, physiological and anatomical changes have been evolved
- In humans internal and external genital organs were neatly coordinated. And also simple in functioning
- The functions are depending upon mental stress and hormonal factors
- The study of the fundamentals of sex education is very essential to eliminate misbehaviours in society
- Gynaecology - study of reproductive organs
- A.V. Leeuwenhoek - Discovered male sperm cells
- Carl Von Bohar - Discovered female ovary cells
- Bouveri - coined the term oocyte
- Bateson - coined the term zygote
- Danielli - developed cell in test tube

- Ronald Edward - first test tube baby
- Robert Burrchutti - invented viagra / awarded nobel prize

## Viviparous - Most mammals:

- The embryo is developed inside female body and it is comes out as a new one.

Gestation Periods of Some Animals	
Animal	Gestation Period
Buffalo	310 days
Elephant	610 days
Lion	120 days
Whale	365 days
Horse	340 days
Leopard	105 days
Tiger	103 days
Squirrel	40 days

## Oviparous – Reptiles, Birds

- The fertilized egg is covered with calcium layer and it is kept in a secure place outside of the body.
- It is hatched till the new one come out from the egg.

## Types of Eggs :

### 1. Depending on egg yolk:

- A lecithal - yolk less egg - human
- Micro lecithal - less amount of yolk - acidian
- Meso lecithal - exact amount of yolk - frog
- Mega lecithal - more amount of yolk- reptiles, birds.

### Distribution of Egg Yolk :

- Homo lecithal - equally distributed - ascaris
- Telo lecithal - present in one sided - frog
- Meso lecithal - present in corner (denser) - reptiles, birds
- Centro lecithal - present at centre - insects

## MALE REPRODUCTIVE ORGANS

### Vas deferens or ductus deferens

- ❖ It emerges from the tail end of the epididymis and ascends along the posterior side of the testis.
- ❖ It becomes associated with the blood vessels and nerves that supply the testis.
- ❖ Collectively these structures constitute the **spermatic cord**.

Thus the spermatic cord consists of

- ❖ Vas deferens
- ❖ testicular artery and venus plexus
- ❖ lymph vessels
- ❖ nerves
- ❖ fibrous processes and muscles.
- ❖ This cord enters into the pelvic region. The end of the vas deferens enlarges to form the **ampulla**.
- ❖ At this region the vas deferens is surrounded by smooth muscles capable of peristaltic contraction. They help to propel the sperm cells through the ductus deferens.

### Ejaculatory Duct :

- ❖ Nearer to the ampulla of each vas deferens there is a sac like **seminal vesicles**. It joins the ductus deferens to form the ejaculatory duct.
- ❖ These ducts are about 2.5 cm long. They project into the prostate gland and end by opening into the urethra.

### Urethra :

- ❖ The male urethra extends from the urinary bladder to the distal end of the penis.

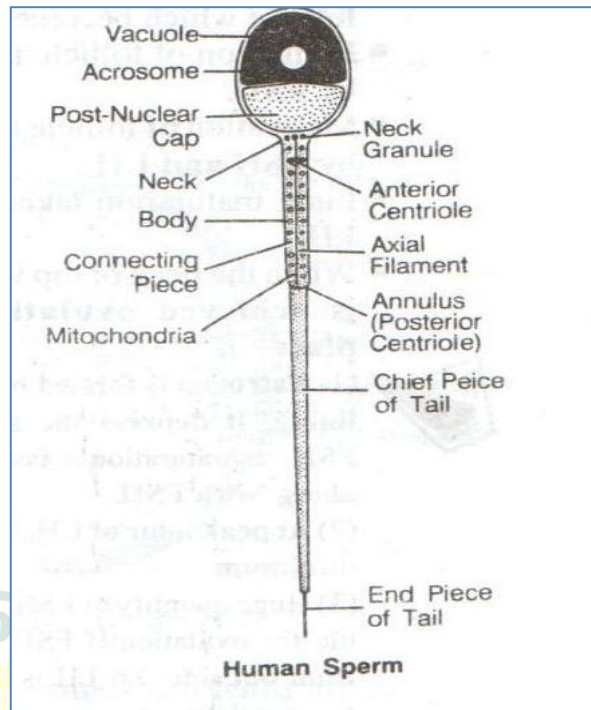
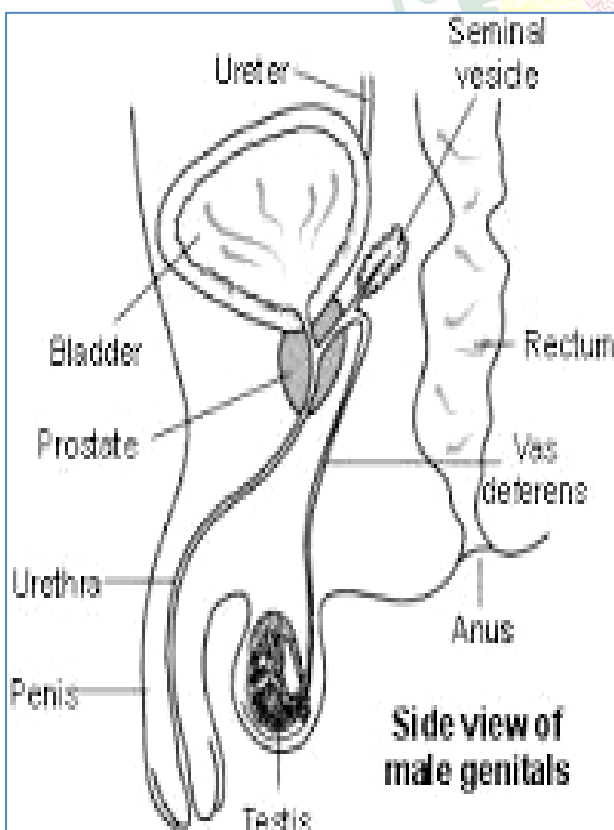
- ❖ It is about 20 cm long. It is a passage way for both urine and reproductive fluids.
- ❖ The urethra is divided into three parts.
- ❖ They are

### 1. The Prostatic Urethra :

- ❖ It is closest to the bladder and passes through the prostate gland

### 2. The membranous urethra

- ❖ It is the shortest part of the urethra and it extends from the prostatic urethra.



### 3. The spongy urethra or penile urethra –

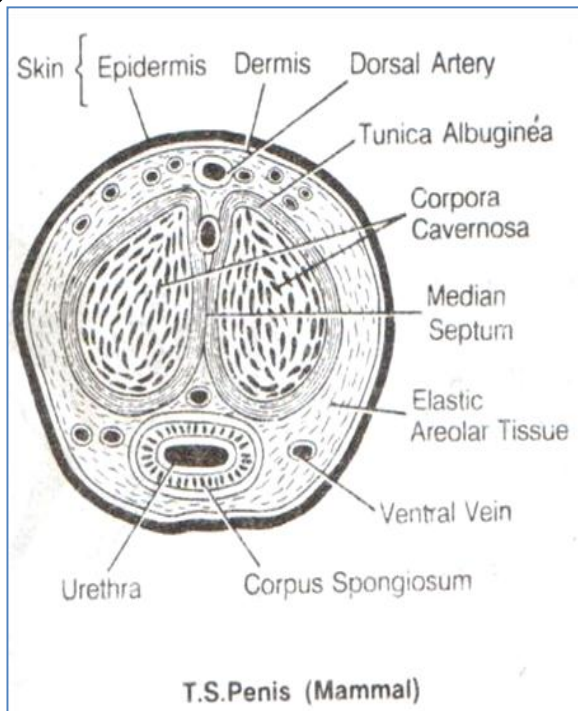
- ❖ It is the longest part of the urethra. It extends from the membranous urethra, through the length of the penis. There are several minute mucus secreting urethral glands opening into the urethral passage.

### Penis :

- ❖ It is the male copulatory organ.
- ❖ It consists of two parts namely **the radix** or **root** and **the corpus** or **body**.
- ❖ The radix attaches the penis to the lower abdomen.



## REPRODUCTIVE SYSTEM



- ❖ The corpus is normally pendulous. It is covered by a loose skin.
- ❖ The corpus of the penis consists of three masses of erectile tissue.
- ❖ Flooding these tissues with blood causes the penis to enlarge and become firm.
- ❖ These tissues are the right and left **corpora cavernosa** and the median **corpus spongiosum penis**.
- ❖ Most of the corpus is formed of the corpora cavernosa.
- ❖ The corpus spongiosum penis surrounds the urethra and near the end of the penis it expands into a conical, **glans penis**.

- ❖ Its swollen base is the **corona glandis**.
- ❖ The skin over the penis is thin. It is loosely connected to the **tunica albuginea**.
- ❖ At the tip of the penis it is folded to form the **prepuce** or the **foreskin**.
- ❖ It overlaps the glans penis. The corona glandis and penile neck have numerous **preputial glands**.

### Seminal vesicles :

- ❖ These are two sac-like structures located between the bladder and rectum.
- ❖ Each vesicle is about 5 cm long. Their secretions contribute about 70% of the seminal fluid.

### Prostate :

- ❖ It is a firm structure. It is partly glandular and partly fibromuscular.
- ❖ It is found around the beginning of the male urethra. It is about 3 cm in diameter. It weighs about 8g.
- ❖ The muscular part of the prostate may help in dilating the urethra to hold the seminal fluid (3-5ml)



during the period of sexual excitement prior to ejaculation.

- ❖ After the middle age the prostate often enlarges. It may project into the bladder and interrupt urination.

### **Bulbo-urethral gland :**

- ❖ These are two glands. They are small round masses about 1 cm in diameter.
- ❖ They lie lateral to the membranous urethra.
- ❖ Its secretion may control genito-urinary diseases.

### **Scrotum :**

- ❖ It is a fibromuscular sac. It contains the testes and their associated ducts.
- ❖ It is divided into right and left by cutaneous raphe. Its left side is usually lower.
- ❖ The external appearance varies according to age and body temperature.
- ❖ The scrotal skin is thin and pigmented. It has numerous sweat glands and nerve endings.

## **FEMALE REPRODUCTIVE ORGANS**

- ❖ In human female the internal reproductive organs are the **ovaries, uterus, uterine tubes** and **vagina**. Externally the organs are the **mons pubis, labia majora** and **labia minora, clitoris** and **vestibular glands**.

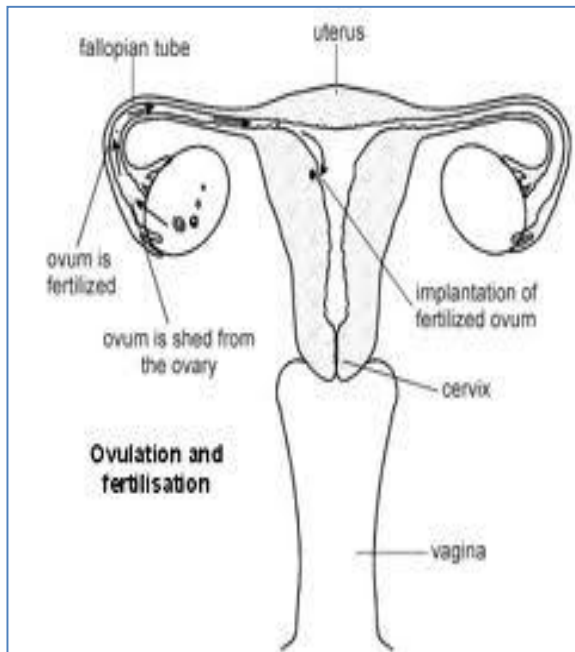
### **Ovaries :**

- ❖ These are paired structures.
- ❖ The two ovaries are placed on each side of the uterus in the pelvic region.
- ❖ They are greyish pink in colour.
- ❖ Each ovary is almond shaped. They are about 3cm long, 1.5cm wide and 1cm thick.
- ❖ The ovary is attached to the posterior surface of the inner body wall by a membranous fold called the mesovarium.
- ❖ The ovary is further supported by suspensory and ovarian ligaments.

### **Ovarian structure :**

- ❖ In young female the surface of the ovary is covered by a layer of **ovarian surface epithelium**.





- ❖ It consists of a single layer of cuboidal cells. Beneath the epithelium the ovary is surrounded by a tough coat named **tunica albuginea**.
- ❖ It is made of collagenous tissue.
- ❖ The ovary proper is divisible into two regions, namely the **cortex** and the **medulla**.
- ❖ The cortex region contains the ovarian follicles.
- ❖ The medulla is interior. It receives blood vessels and nerves at the hilum.
- ❖ After puberty **the cortex** forms the major part of the ovary.
- ❖ It contains **ovarian follicles** and **corpora lutea** of various sizes.

- ❖ Their size depends on the stage of menstrual cycle or age. The cortex is filled with stroma composed of collagen.
- ❖ The follicles are embedded in the stroma.

### Ovarian follicles

- ❖ The formation of the female gamete has many different phases and it is complex.
- ❖ At birth, the primordial follicles are found in the superficial zone of the cortex. They contain primary oocytes (about 25mm in diameter).
- ❖ Each one of them is surrounded by a single layer of flat follicular cells.
- ❖ The follicles undergo changes as the female attains puberty.
- ❖ The various follicular stages are:

#### 1. Primary follicle :

- ❖ The follicle cells are converted from squamous to cuboidal cells.
- ❖ The follicular membrane or **membrana granulosa** becomes multilayered.



- ❖ The oocyte increases in size. It has an outer thick layer called the **zona pellucida**.
- ❖ The follicular cells divide and form **granulosa cells**.

## 2. Secondary follicle :

- ❖ It is about 20µm thick. The granulosa cells surround the oocyte and form a mound of cells called the **cumulus ovaricus**.

- ❖ The inner and outer theca become prominent. The **theca interna** is well established.

## 3. Tertiary follicle :

- ❖ Only one follicle reaches the tertiary stage.
- ❖ It increases in size (2mm diameter).
- ❖ Now it is called the **graafian follicle**.
- ❖ The oocyte and ring of cells surrounding the oocyte (corona radiata) break away and float freely in the follicular fluid.
- ❖ Finally the wall of the follicle ruptures and the contents are released into the peritoneum.

- ❖ The ovary of the foetus at 5 months gestation has 7 million oocytes.
- ❖ At birth the ovary of the child contains about 1 million oocytes.
- ❖ Due to further degeneration at the time of puberty only about 40,000 oocytes remain.
- ❖ Of the 40,000 oocytes only about 400 undergo ovulation during the reproductive years.

## Corpus luteum :

- ❖ It is formed after ovulation.
- ❖ The walls of the empty follicle collapses and fold extensively.
- ❖ The granulosa cells of the theca externa get enlarged.
- ❖ They are now termed as **luteal cells**. They secrete hormones.
- ❖ In pregnancy the corpus luteum persists.
- ❖ Otherwise, it degenerates after 10-12 days.
- ❖ The connective tissue cells get enlarged.
- ❖ It becomes white in colour and is now called as the **corpus albicans**.
- ❖ In course of time it shrinks and disappears.

♦.....♦  
**Uterine tubes (Fallopian tubes) :**

- ❖ There are two uterine tubes or **oviducts**, one on each side of the uterus.
- ❖ Each one is associated with an ovary.
- ❖ Each tube is about 10 cm long.
- ❖ The terminal part of the tube is enlarged to form the infundibulum.
- ❖ It opens into the peritoneal cavity.
- ❖ The opening is called the **ostium**.
- ❖ The uterine tube consists of three parts. The part nearer to the infundibulum is called the **ampulla**.
- ❖ It is the longest part. That part of the tube nearer to the uterus is called the **isthmus**.
- ❖ It is narrow. The tubular part entering into the uterus is called the **uterine** or intramural part.

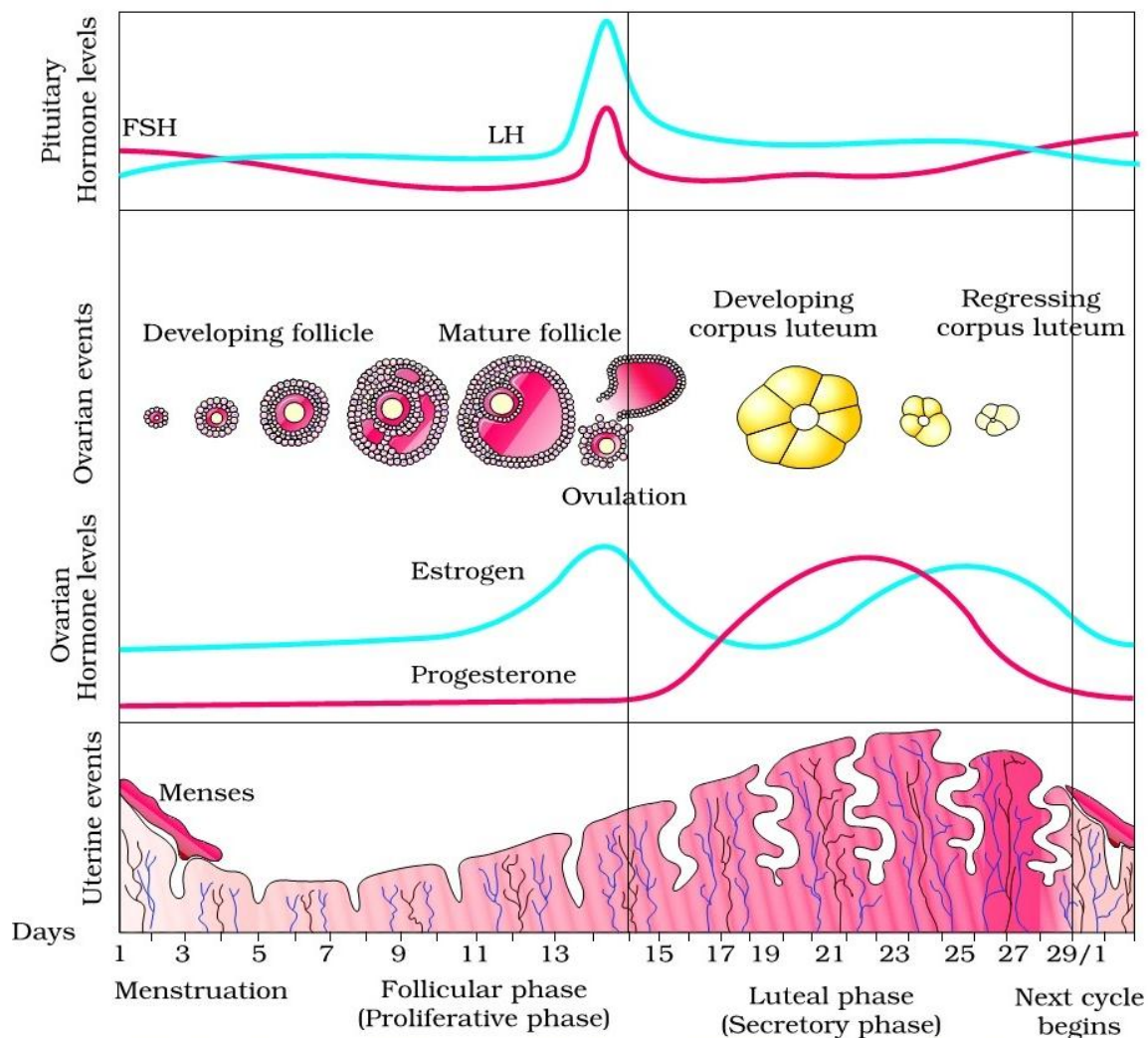
- ❖ The narrower part is called as the **cervix**. The cervix is directed inferiorly.
- ❖ The middle part is the **body**.
- ❖ The uterus continues as the **cervical canal** and opens into the vagina through an opening called the **ostium**.
- ❖ The wall of the uterus is three layered.
- ❖ The outermost layer is the **perimetrium** or **serous layer**.
- ❖ The major part of the wall is made up of the next layer called the **myometrium** or **muscular coat**.
- ❖ The innermost layer is the **endometrium** or **mucus membrane**.
- ❖ The endometrium is a functional layer.
- ❖ It undergoes menstrual changes and sloughing during female sex cycle.

**Uterus**

- ❖ It is a hollow thick walled muscular organ.
- ❖ It is pear shaped. It is about 7.5cm long and 5 cm wide. It weighs about 50g.
- ❖ During pregnancy its weight may go upto 1kg.
- ❖ Its larger rounded part is called as the **fundus**.

**Vagina :**

- ❖ It is the female copulatory organ.
- ❖ It is a fibromuscular tube. It is about 10 cm long.
- ❖ It extends from the uterus to the outside.
- ❖ The vaginal passage is used during intercourse and it allows menstrual flow and child birth.



Diagrammatic presentation of various events during a menstrual cycle

## External Genitalia

### Vestibule :

- ❖ The external female genitalia is known as the **vulva** or **pudendum**.
- ❖ It consists of the vestibule and its surrounding structures.
- ❖ The vestibular region remains in between the two **labia majora**.
- ❖ It contains the vaginal opening and the **urethral opening**.

- ❖ The vestibular region is surrounded by the **mons pubis** anteriorly and **labia majora** and **labia minora** on the lateral sides.

### Mons pubis :

- ❖ It is a rounded eminence situated anteriorly.
- ❖ It is made up of subcutaneous adipose connective tissue.
- ❖ It is covered by coarse hair at the time of puberty.

## REPRODUCTIVE SYSTEM

- ❖ It corresponds to similar structure in the male.

### **Labia majora :**

- ❖ These are two longitudinal folds of skin.
- ❖ They form the outer boundary for the vestibule.

### **Labia minora :**

- ❖ These two small skinfolds lie between the labia majora.
- ❖ They remain nearer to the vaginal opening.

### **Clitoris :**

- ❖ It is homologous with male penis. It is an erectile structure.
- ❖ It is found in the anterior margin of the vestibule.
- ❖ It is a sensitive region having sensory receptors.

### **Hymen vaginae :**

- ❖ It is a thin mucus membrane.
- ❖ It is found within the vaginal orifice or opening.
- ❖ If the membrane completely closes the vaginal opening, it should be removed to allow menstrual flow.

- ❖ In young women the hymen may normally get torn during physical exercise.

- ❖ In some women it may be absent. It has no established function.

### **External urethral opening :**

- ❖ This opening is about 2.5 cm below the clitoris.
- ❖ It is anterior to the vaginal opening. It remains as a small cleft.