

Holy Faith Presentation School

CLASS: 10TH

SUBJECT: BIOLOGY

SESSION 2024-25

Term :- 1st

HOW DO ORGANISMS REPRODUCE

REPRODUCTION: - It may be defined as the production of new generation of individuals of the same species that are physically independent of their parents.

Reproduction is one of the important processes by which every living organism makes a copy like itself. It is the means of multiplication and perpetuation of the species because the older individuals of each species undergo senescence and die.

TYPES OF REPRODUCTION

All the reproductive methods are broadly categorized into two types-Asexual reproduction and sexual reproduction.

Asexual reproduction: - It may be defined as the production of offsprings by a single parent without meiosis, formation of gametes, fertilization and transfer of genetic materials between individuals.

S.No.	ASEXUAL REPRODUCTION	SEXUAL REPRODUCTION
1.	Asexual reproduction involves the participation of single individual parent.	Sexual reproduction involves the participation of two separate parents.
2.	It generally occurs without the formation of sex organs.	It usually requires the formation of sex organs.
3.	It does not involve meiosis but only mitosis and is very quick method of multiplication.	It involves both meiosis and mitosis and is very slow method of multiplication.
4.	Zygotes are not formed.	Zygotes are formed.

TYPES OF ASEAXUAL REPRODUCTION

I) **Fission:** - It may be defined as the splitting of a unicellular organism into two or more than two separate daughter cells. It is further of two types:

a) **Binary fission:** - Binary fission is the division of the parent into two small, nearly equal – sized daughter individuals.

Example; It is common in protozoans, but also occurs in certain animals such as flatworms, e.g., planarians.

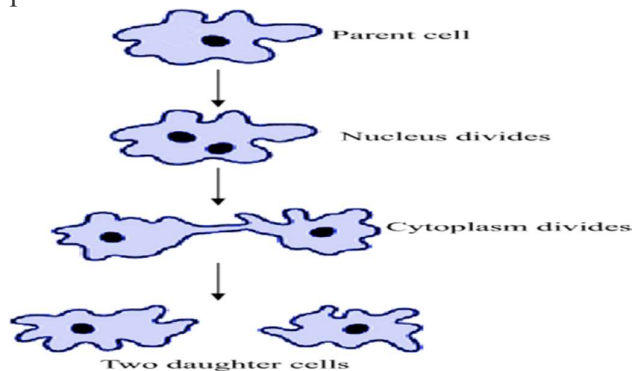


Figure of binary fission in amoeba.

b) **Multiple fission:** - It is the division of the parent into many small daughter individuals simultaneously. Examples; Multiple fission occurs in many protozoans such as plasmodium and amoeba.

Process: The nucleus of the parent divides a few to many times without division of the cytoplasm. Later, the cytoplasm also divides, each part enclosing one nucleus. This produces many small daughter individuals from one parent at the same time.

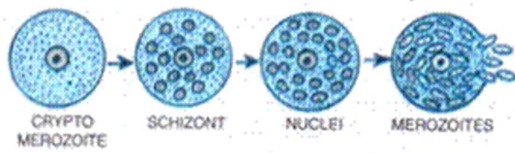


Fig. 1.5. Multiple fission of malarial parasite in RBC of man.

II) **Fragmentation**: - It is the breaking up of an animal's body into two or more pieces, each of which grows into a new individual.

It occurs in the flatworm *Microstomum*. Fragmentation is always accompanied by regeneration.

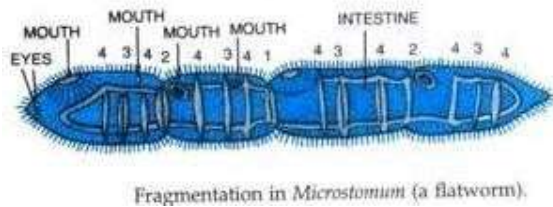


Fig. Fragmentation in a flatworm, *Microstomum*. Numbers indicate the sequence of fission planes that will divide the worm into 16 fragments.

III) **Regeneration**: - In certain organisms (planarians), new individuals can be regenerated from small body fragments. This method is applied by certain organisms for asexual reproduction and multiplication. It may be defined as the ability of an organism to regenerate its lost parts of the body which have been removed, as by injury or autonomy (self- amputation of body parts, e.g. some lizards can break off part of the tail).

Example; It is common in lower plants and animals Hydra, planarians, algae, fungi etc

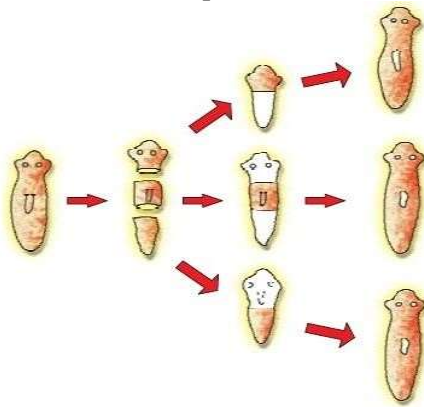


Figure showing regeneration in planarian.

IV) **Budding**: - Formation of a daughter individual from a small projection, the bud, arising on the parent body is called budding.

Examples; budding occurs in some protozoans and certain lower animals such as sponges (scypha), hydra, salpa etc.

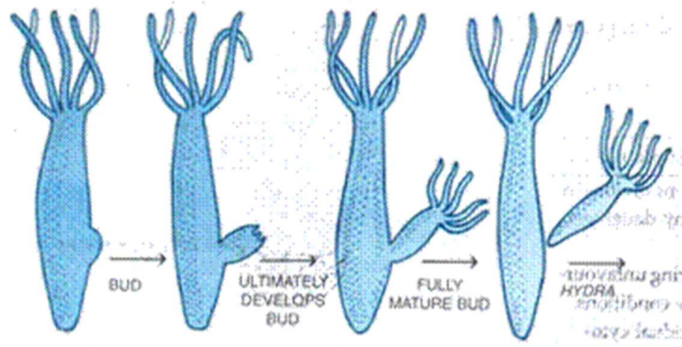


Fig. 1.7. External budding in *Hydra*.

V) **Spore formation:** - A spore is a single or several called reproductive structure that detaches from the parent and gives rise, directly or indirectly, to a new individual.

Reproduction by the formation of spores is a common method of asexual reproduction in some bacteria and most of the fungi. During the formation of spores the fungal hypha develops an enlarged sporangium. The nucleus of the developing sporangium divides several times. Each nucleus, within the developing sporangium, gets surrounded by a bit of cytoplasm and develops into a spore. Each spore grows into a new hypha after germinating in new habitat, ground or substratum. E.g., *Rhizopus*, *Mucor*, *Penicillium* etc.

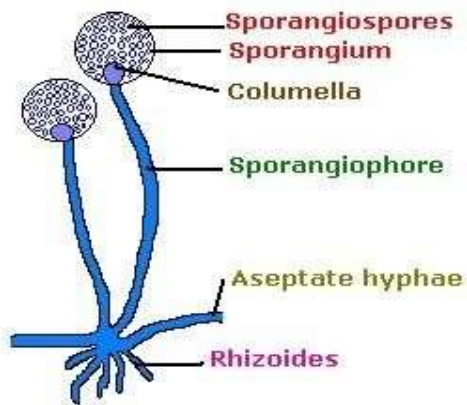


Figure showing spore formation in *rhizopus*.

VI) **Vegetative propagation in plants:** - Propagation in a plant a part of its body other than a seed is known as vegetative propagation. Among flowering plants, every part of the body such as roots, stem, leaves and buds take part in vegetative propagation. Methods of vegetative propagation have been further divided into two types –

1. Natural methods of vegetative propagation:

a. Roots: - Modified roots of sweet potato, dahlia etc can be propagated vegetatively when planted in soil. The buds present on the roots grow into leafy shoots called slips, above ground and adventitious roots at their bases. Each slip gives rise to a new plant.

b. Underground stem: - Underground modified stems such as suckers, rhizomes, corns, bulbs and tubers possess buds which grow into a new plant and help in vegetative propagation.

c. Leaves: - some plants develop adventitious buds on their leaves which get detached and develop new plants. Leaves of *Bryophyllum*, *Kalanchoe*, *Begonia*, *Streptocarpus* etc develop buds and thus help in vegetative propagation.

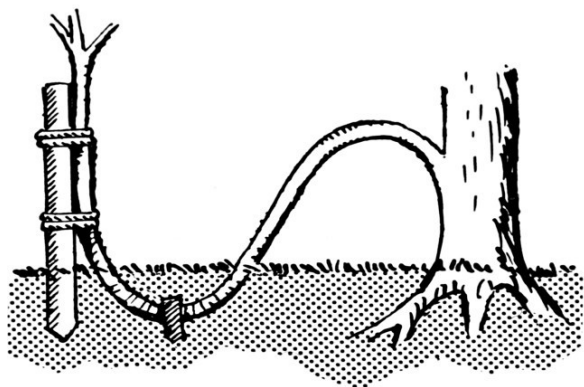
2. Artificial methods of vegetative propagation:

Several methods of vegetative propagation are man-made and developed by plant growers and horticulturists for commercial production of crops. They are called artificial methods. Common artificial methods are:

a. Cuttings: The small piece of any plant organ (stem or leaf) used for propagation is called cutting. Leaf cuttings are used to propagate Sansevieria, Begonia, and Bryophyllum etc. Root cuttings are used to propagate citron and tamarind. Stem cuttings are used to propagate rose, grapes, etc. stem cuttings are most commonly used for artificial vegetative propagation. Above 20-30cm long pieces of stem are planted in the natural position in the soil for proper sprouting.

b. Layering: In this method roots are artificially induced on the stem branches before they are detached from the parent plant for propagation. There are two types of layering-

I) **Mound Layering:** It is the most common method of propagating herbaceous plants. In this method, the lower branch of stem is bent down and partially defoliated. An injury is made in the defoliated portion. The injured and defoliated portion is covered with a light layer of moist soil in such a way that the growing tip of the branch remains above the soil surface. After a few days the pegged portion develops adventitious roots. The rooted branch is then cut, separated from parent plant and grown into a new plant. Examples: Jasmine, grapevine, strawberry, cherry etc.



II) **Air layering:** This method is commonly employed in case of shrubs and trees which do not possess branches near the ground. In this method, a ring of bark is removed or a slit at an upward angle is made at the base of an aerial branch. The girdled portion is then covered with moist moss or grafting clay (2parts clay, 1part cow dung, small pieces of hay, cotton and water) and wrapped with a polythene sheet. The girdled portion inside the grafting clay develops roots within a period of month or two. Now the branch is cut and planted in the soil after removing the polythene. This method is used in vegetative propagation of litchi, pomegranate, orange, lemon, lokat etc.

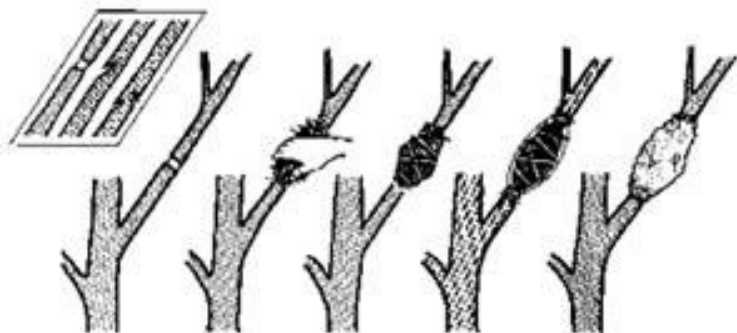


Figure showing air layering.

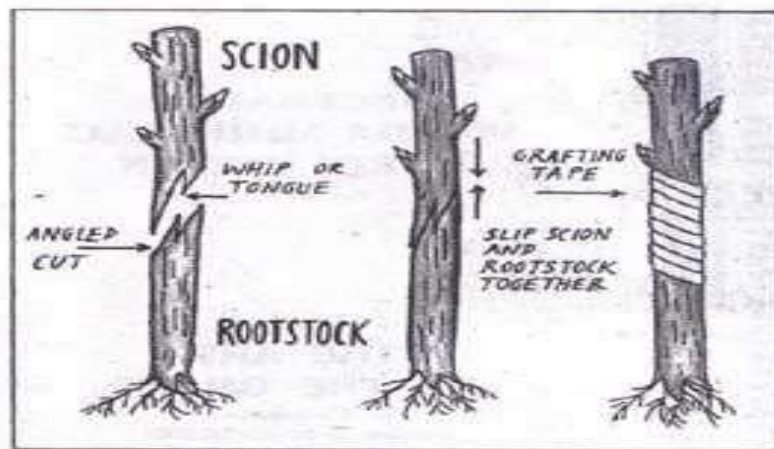
c. Grafting: It is the most common method of vegetative propagation described by ancient gardeners long before the science of horticulture became established. In this method, parts of two plants are joined

in such a way that they grow as one plant. Grafting is done between the two closely related dicotyledonous plants. The rooted supporting portion of one plant, called stock is joined with a twig of another plant called scion.

During grafting, about 4-12 inches long scion with all the buds intact is placed on the cut end of the stock and the joint is covered with a layer of wax or clay to prevent the evaporation of water or entry of pathogen. All the buds of stock must be removed.

Generally, the stock belongs to wild variety which is resistant to diseases and pests.

For example, a scion of Dussehri Mango is grafted on the stock of Desi mango, similarly, scion of high quality roses are grafted on wild rose root stocks.



VII) PROPAGATION BY PLANT TISSUE CULTURE: Plant tissue culture is a technique of growing cells, tissues or organs in sterilized nutrient media under controlled aseptic (free from micro-organisms) conditions. The plant materials to be cultured may be cells, tissues or plant organs such as excised root tip, shoot bud, leaf petiole, anther, embryo, ovule or ovary. The plant which is used to culture is called explant. Before transferring on the culture medium, the explant is first of all disinfected by surface sterilization using clorax water, sodium or calcium hypochloride solution or methiolate. Too much care is taken in this operation so that the cells do not die.

The disinfected explants are cultured on a liquid, semi-solid or solid culture medium. The solid medium is prepared by addition of 1% agar agar or gelatin. The major constituents of a nutrient medium include- (a) inorganic nutrients (i.e. salts providing all the essential macro and micro elements); (b) organic nutrients (i.e. source of energy in the form of sucrose, glucose, fructose or other carbohydrates; amino acids, glycine, vitamins, etc) and (c) Growth hormones (auxins, gibberellins, cytokinins, etc).

This nutrient media, used for culturing, are very good for the growth of bacteria and fungi. Therefore, proper cleanness and sterilization is needed.

SEXUAL REPRODUCTION

It is the production of offspring usually by two parents, male and female, involving four processes; (i) formation of special haploid cells, the gametes, by meiosis; (ii) fusion of the gametes in pairs, forming diploid cells, the zygotes; (iii) repeated mitotic divisions of the zygote to form embryos and (iv) growth of embryo into new individuals.

Thus, sexual reproduction may be defined as the production of offsprings (new individuals) by the fusion of two gametes (usually one from male parent and the other from female parent) to form a diploid zygote which develops into a mature organism.

SEXUAL REPRODUCTION IN PLANTS;

In flowering plants, all the steps of sexual reproduction occur within specialized reproductive organs, called the flowers. The development, arrangement and distribution of flowers over a plant are called inflorescence.

Parts of a typical flower:

A typical flower consists of four whorls of floral appendages on the receptacle- calyx, corolla, androecium and gynoecium. Of these, the two lower whorls (calyx and corolla) are sterile and are considered as non essential, accessory or helping whorls. The two upper whorls (androecium and gynoecium) are fertile and are considered as essential or reproductive whorls. These floral parts are briefly described as:

1. **Calyx**: This is the outermost whorl of floral leaves. The individual leaf segment of calyx is called sepal. The sepals are essentially green in color but in some cases they are colored like petals. Such a condition of calyx is called petaloid. They may fall immediately after the flower opens or may remain persistent and protect developing fruits.

2. **Corolla**: This is the second whorl of floral leaves that arise inner to the calyx. The individual leaf of corolla is called petal. Petals are generally brightly colored and sometimes fragrant which make the flower to become attractive. Petals usually attract the insect pollinators and help in pollination.

3. **Androecium**: This is the third whorl of floral appendages that arise inner to corolla. The individual appendage is the stamen which represents the male reproductive organ. Each stamen consists of anther and filament. Usually anthers are bilobed and contain four microsporangia (or pollen sacs) but sometimes they have only one lobe and two microsporangia.

4. **Gynoecium (or pistil)**: This is the fourth and last whorl of floral appendages or carpels. Each carpel resembles a leaf in having three vascular traces. The gynoecium represents female reproductive organ and consists of three distinct parts- (a) Ovary- it bears one or several ovules and is the basal part of carpel, (b) Stigma- it is the receptive spot which lodges the pollen grains and (c) Style- it is a connection between stigma and ovary.

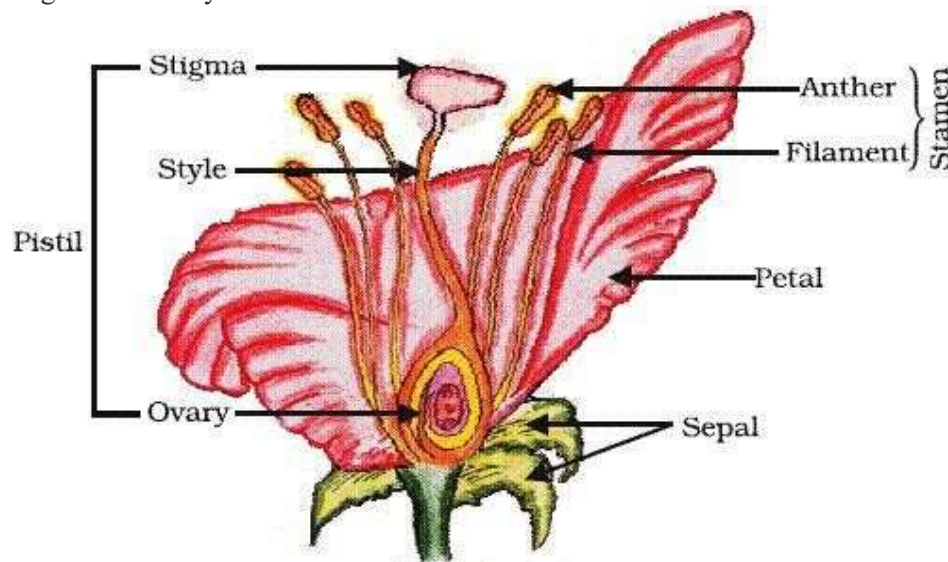


Figure showing floral parts.

POLLINATION

The transfer of pollen grains from the opened anther of the stamen to the receptive stigma of the carpel is called pollination. It is of two types: -

I) Self pollination:

Self pollination involves the transfer of pollen grains from the anther of a flower to the stigma of the same flower or to the stigma of another flower borne on the same plant i.e. genetically similar flower. It is of two types-

a) **Autogamy**: (GK. Autos = self, gamos = marriage): It is a kind of self pollination in which the pollen from the anthers of a flower is transferred to the stigma of the same flower.

b) Geitonogamy: (GK. Geiton = neighbour, gamos = marriage): It is a kind of self pollination in which the pollen from the anthers of one flower is transferred to the stigma of another flower borne on the same plant.

Advantages of self- pollination:

- 1) Chances of pollination are more.
- 2) Self- pollination maintains purity of the race and avoids mixing.
- 3) Does not need to produce much or large number of pollen grains.

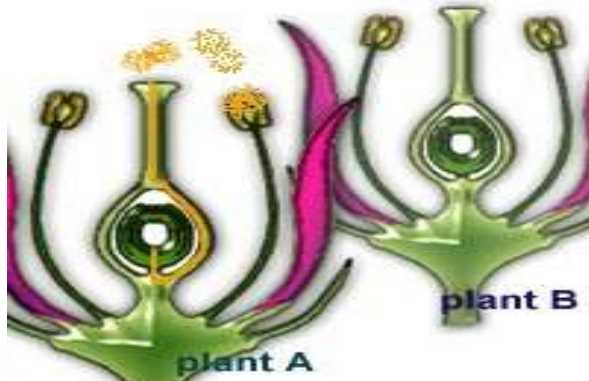


Figure showing self pollination.

II) Cross pollination:

Cross pollination involves the transfer of pollen grains from the flower of one plant to the stigma of the flower of another plant. It is also called xenogamy (GK. Xenos = strange, gamos = marriage) or allogamy (GK. Allos = other, gamos = marriage).

Advantages of cross- pollination:

- 1) Brings variations
- 2) Results in healthy and stronger offsprings.
- 3) Produces diseases resistant plants.
- 4) Results in the production of seed in self- sterile plants.



Figure showing cross pollination.

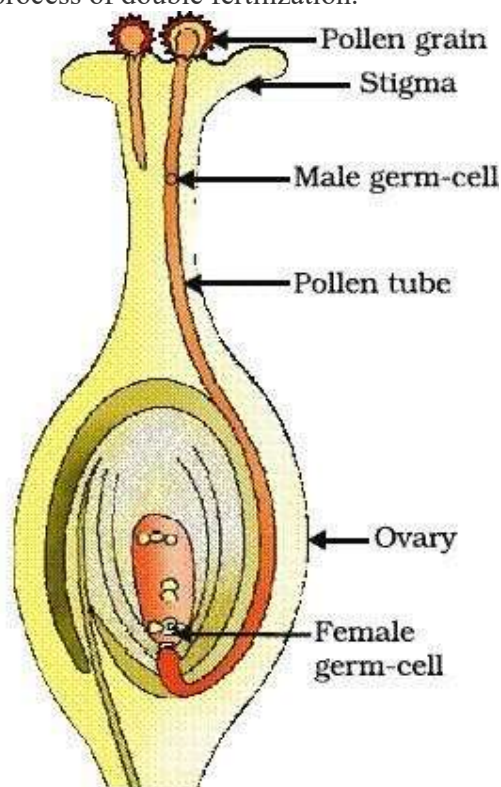
FERTILISATION IN PLANTS: -

The two- celled (sometimes three celled) pollen grains reach the receptive stigma of the carpel by the act of pollination. Pollen grains, after getting attached to the stigma, absorb water and swell. They release the wall- held proteins and other components so that “ recognition” factors from the pollen and stigma come

close to each other. Subsequent to mutual recognition and acceptance of pollen grains, the pollen grain germinates to produce a pollen tube which grows into stigma towards the ovarian cavity. The tube secretes exogenous pectinases and other hydrolytic enzymes to create a passage for its energy.

After reaching the ovary, pollen tube enters the ovule through the micropyle. The tip of the tube finally pierces the egg apparatus end of the embryo sac. After penetration, the tip of pollen tube ruptures releasing two male gametes into the embryo sac. The mature embryo sac consists of an egg apparatus (one haploid egg and two synergids), two polar nuclei and three antipodal cells.

During the act of fertilization, one male gamete fuses with the egg to form the diploid zygote. The process is called syngamy. The diploid zygote finally develops into embryo. The other male gamete fuses with the two polar nuclei to form triploid (3N) primary endosperm nucleus. The process is called triple fusion (or vegetative fertilization). This mechanism involving two acts of fertilizations constitute the process of double fertilization.



Fertilization in plants

REPRODUCTION IN HUMANBEINGS:

Human beings are unisexual. The reproductive system of each sex consists of many organs. The later are distinguishable into primary and secondary sex organs.

The difference between primary and secondary organs is as under

S.No.	Primary sex organs	Secondary sex organs.
1	These include the gonads, i.e. testes and ovaries.	These include reproductive ducts and reproductive glands.
2	They produce gametes: spermatozoa (sperms) and ova.	They carry gametes to the site of fertilization, may also provide space for embryonic development.
3	They secrete sex (male and female) hormones.	They secrete useful materials other than hormones.

Primary and secondary sexual characters:

Primary sexual characters are those present at birth, whereas secondary sexual characters are those that develop at puberty.

Puberty is the age of human males and females at which the reproductive organs become functional, gonads start producing gametes and sex hormones and the boys and girls become sexually mature. The secondary sexual characters distinguishes the two sexes of a species externally also. We can tabulate the secondary sexual characters in males and females as: -

S.No.	Character	Male	Female
1.	Body build	Body is larger, more muscular and stronger.	Body is smaller, less muscular and weaker.
2.	Hair	Beard, moustache and chest hair present.	Beard, moustaches, chest hair lacking.
3.	Breasts	Poorly developed.	Well developed.
4.	Skin	More hairy and coarse.	Less hairy and soft.
5.	Shoulders	Broad	Narrow.
6.	Pelvis	Narrow	Broad.
7.	Larynx (Adam's apple)	Prominent forward projection in the neck.	Little prominent.
8.	Voice	Low pitched.	High pitched.
9.	Subcutaneous fat	Very little.	Considerable to give a typical feminine contour.
10.	BMR.	1600Kcal/day.	1520Kcal/day.
11.	Behavior	Aggressive.	Mild.
12.	Other	Enlargement of penis and scrotum.	Initiation of menstruation and ovulation.

MALE REPRODUCTIVE SYSTEM: -

Human male reproductive system consists of a scrotum, a pair of testes, a pair of vasa deferentia, urethra and penis.

1. Scrotum: - The scrotum is a pouch of pigmented skin arising from the lower abdominal wall and hanging between the legs. The scrotum is divided internally into right and left scrotal sacs by a muscular partition, the septum scroti.

The scrotum acts as a thermoregulator, maintaining the testes at a temperature 2° lower than that of the body. This protects the sperms against relatively high body temperature falls; the scrotum shrinks, becomes thick, firm and corrugated and brings the testes close to the body to get warmth. When the temperature rises, the scrotum becomes relaxed, thin and flaccid to lose heat.

2. Testes: - The testes are the primary sex organs. Testes are the male gonads producing male gametes (sperms). They also produce male sex hormone- testosterone. The testes are soft, smooth, pinkish, oval organs about 4-5cm long. They are suspended in the scrotal sacs by spermatic cords.

3. Vasa deferentia: - The vas deferens is about 40cm long and is slightly coiled at first but becomes straight as it enters the abdominal cavity. It carries the sperms to the seminal vesicles. The sperms are stored temporarily in the seminal vesicle.

4. Urethra: - It is about **20cm** long and passes through the penis. The urethra carries urine as well as sperms and secretions of the seminal vesicles.

5. Penis: - The penis is a long and thick muscular organ made up of erectile tissue. It is an external intromittent organ through which the urethra runs. At the time of sexual excitement the erectile tissue gets filled with blood causing the penis to become erect. Through penis the sperms are ejaculated into the vagina of female for the purpose of reproduction.

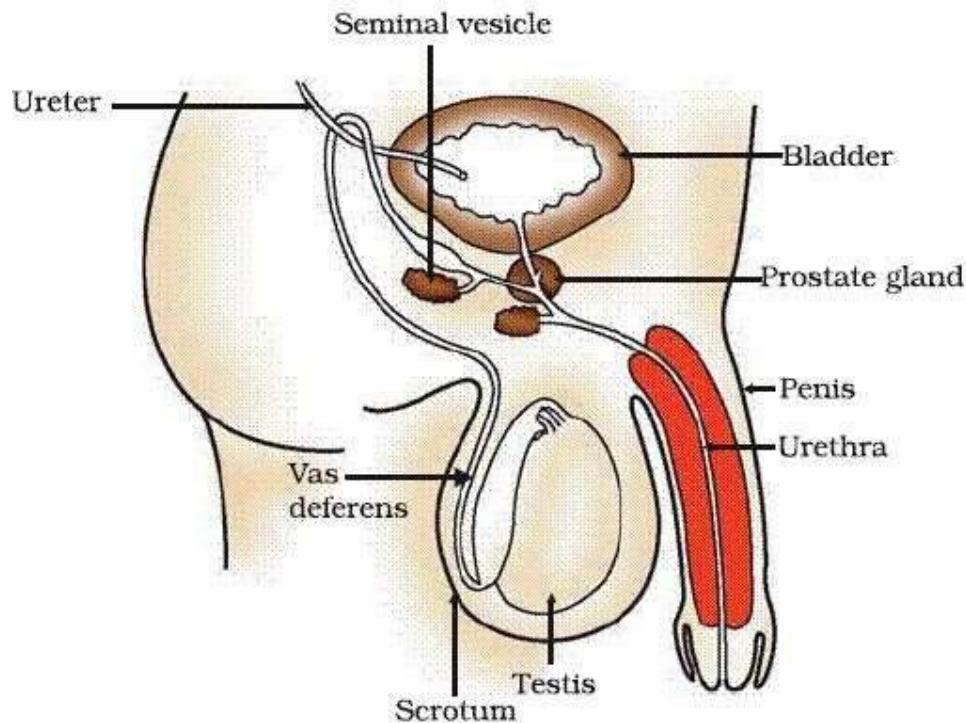


Figure of male reproductive system.

FEMALE REPRODUCTIVE SYSTEM:

The female reproductive system consists of a pair of ovaries, a pair of fallopian tubes (oviducts), uterus and vagina.

1. **Ovaries:** - The ovaries are the primary sex organs of the female. They are about the size and shape of an almond. They are about 3cm long, 2cm wide and 1cm thick. They have both exocrine function (production of ova) and an endocrine role (secretion of female sex hormones; estrogen and progesterone). After menopause, the ovaries become small and lose follicles.
2. **Fallopian tube (oviducts):** - It is about 10-12cm long muscular tube. It conveys the egg from the ovary to the uterus, and also provides the appropriate environment for its fertilization.
3. **Uterus:** - The uterus (womb) is a large, highly elastic median sac specialized for the development of the embryo. It is located between the urinary bladder and the rectum.
4. **Vagina:** - It is also called “birth canal” as it allows passage of the baby at the time of child birth. It is a large, median, elastic, muscular tube about 7.5cm. it is adapted for (i) receiving the male’s penis during copulation, (ii) allowing menstrual flow, and (iii) serving as the birth canal.

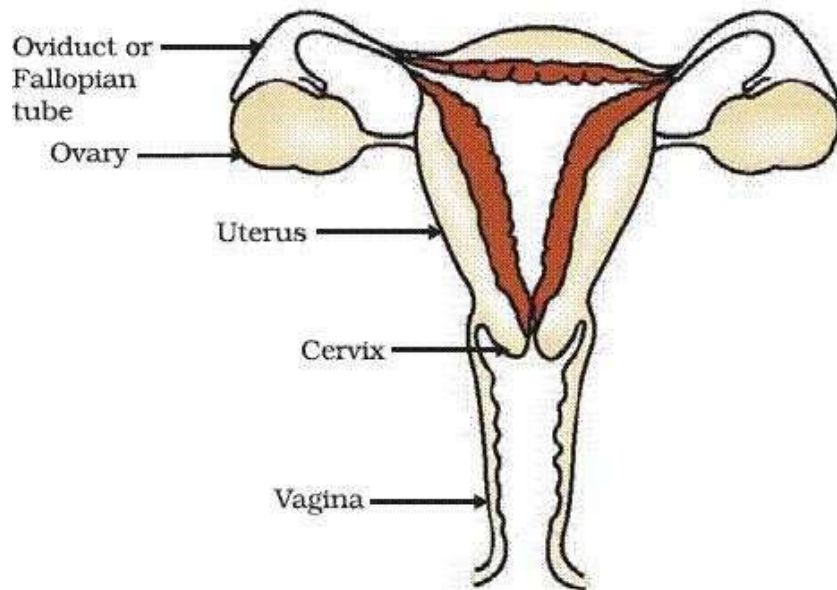


Figure of female reproductive system.

What happens when the egg is not fertilized?

OR

Menstrual or Ovarian cycle

If the egg is not fertilized, it lives for one day and is then expelled. This sets in motion what is called menstrual or ovarian cycle. Menstrual cycle is a series of cyclic changes that occur in the reproductive system of human females with a periodicity of about 28 days. The cycle begins with puberty. The first menstruation is called Menarche. It stops between age of 45 to 50 years. Stoppage of menstruation permanently is called menopause. The cycle also stops temporarily during pregnancy. Menstrual cycle consists of four phases.

- 1) **Menstrual Phase:** It is characterized by menstruation (menses , Greek word mensum which means month) Or discharge of blood, mucus and endometrial lining. Menstrual phase lasts for 3 – 5 days. The first day of menstrual phase or menses is also called the first day of menstrual cycle. A total of 50-100 ml of blood is lost. It does not clot inside the uterus due to the presence of anti clotting factor **Fibrinolytic**. However, as soon as the blood oozes out, it begins to clot.
- 2) **PROLIFERATIVE phase:** There is repair and growth of endometrium. Under the influence of hormone FSH, a few follicles grow but only one follicle called Graafian follicle matures in the two ovaries. It secretes hormone estrogen. Proliferative phase lasts from 5th to 14th day. There is rising level of estrogen which inhibits FSH Secretion and stimulates release of hormone LH(Luteinising hormone).
- 3) **Ovulation phase:** At about the middle of the menstrual cycle on 13th or 14th day, the growing follicle bursts and matures ovum is released from the ovary under the influence of estrogen and LH. The phenomenon is called ovulation. The empty follicle grows into Corpus Luteum that secretes hormones Progesterone. The released ovum is drawn into fallopian tube with the help of inward lashing movements of its internal cilia. It rests for 1- 2 days in the ampulla. The phase is called Fertility Period. Pregnancy can occur only during this phase.
- 4) **Secretory phase:** It lasts from middle of menstrual phase to end of the same i.e 14- 28 days. During this period the uterine wall thickens further. Glands present in the endometrial area become functional and begins to secrete materials for nourishment of the egg if it happens to get fertilized. In absence of fertilization, the menstrual phase begins again due to degeneration of Corpus Luteum and non secretion of Progesterone.

FERTILIZATION

Internal fertilization is an essential part of reproduction in human beings. This is achieved by copulation (mating). During copulation the human male inserts his penis into the vagina of the female and releases gametes (sperms) inside the genital tract. This is called ejaculation. One ejaculate contains 200-400 million spermatozoa and one ejaculate is about 3ml. the sperm are highly active and motile. They travel from here through the uterus to the top of fallopian tube within 5minutes. Only one sperm fertilizes the ovum in the fallopian tube. This fusion of sperm nucleus with the egg nucleus to form a diploid zygote is called fertilization.

POST FERTILIZATION CHANGES:

After fertilization the following processes take place: -

1. Cleavage (segmentation):-

It refers to a series of rapid mitotic divisions of the zygote following fertilization, forming a many-celled blastula. The young multicellular embryo, formed as a result of cleavage is now called blastocyst. The close attachment of the blastocyst to the uterine wall is called implantation. It takes place about seven days after fertilization.

2. Gastrulation or formation of germ cells:-

Transformation of the blastula into gastrula with three primary germ layers by rearrangement of the cells is called gastrulation. The three germ layers are ectoderm, mesoderm and endoderm. Each germ layer gives rise to specific tissues, organs and organ-systems of the young one to be developed.

3. Organogenesis:-

The establishment of the germ layers initiates the final phase of post fertilization change i.e. organogenesis. Here, the embryo is often called foetus. The first organs, formed in developing foetus, are neural tube and spinal cord.

The complete development of foetus, from the initial stage of conception till the birth of young one, is called gestation. It is also termed pregnancy.

Gestation is followed by parturition.

Parturition; It is the act of expelling the full-term young one from the mother' s uterus at the end of gestation.

POPULATION CONTROL:

With the present rate of population growth, earth will soon become overcrowded. Having pregnancies too frequently and giving child birth at quick succession reduce mother' s health and vitality and cause mental strain. There is need to control population and it can be controlled by avoiding unwanted pregnancies. The methods used for avoiding unwanted pregnancies are as under:-

1. Barrier/ mechanical means: - These are of three types:

- (a) Condom: is a thin sheet, usually made of rubber, to cover the erect penis. It is simple but effective method and has no side effect. It prevents deposition of semen in the vagina.
- (b) Diaphragm and cervical cap: -are dome shaped rubber plastic cover that are fitted on the cervix in the female' s vagina and check the entry of sperms into the uterus.
- (c) Intrauterine devices (IUDs): - are plastic or metal objects placed in the uterus by a doctor. They prevent fertilization of the egg and include copper-T, spiral ring etc.

2. Chemical means: - Foam tablets, jellies, pastes and creams, if introduced into the vagina before sexual intercourse kill the sperms.

3. Natural methods: - These methods include abstinence, rhythm method and coitus interruptus.

4. Surgical methods: - Surgical methods are safe in the long run but may be infectious and cause many problems if not done properly they include vasectomy and tubectomy. These are permanent methods.

Vasectomy: is a surgical procedure for male sterilization or permanent contraception. During the procedure, the male vasa deferentia are cut and tied or sealed so as to prevent sperm from entering into the urethra and thereby prevent fertilization of a female through sexual intercourse.

Tubectomy : In females a small portion of the oviducts is removed by surgical operation and the cut ends are ligated. This prevents the ovum or egg from entering into the oviducts. This surgical procedure carried out in females is called "Tubectomy".

REPRODUCTIVE HEALTH AND STD' S

Like physical, mental and social fitness, the human beings need fitness of reproductive life. This is called reproductive health. For reproductive health each and everyone must know that (i) marriage and child bearing during more mature stages of life, are important for reproductive health of a society, (ii) secondary school education which is lagging behind in many parts, must be enhanced, (iii) complications during pregnancy and child birth and unsafe abortion are the causes of death of women, and (iv) sexually transmitted diseases are spread by unsafe sex.

The infectious (communicable) diseases, which are spread from an infected person to a healthy person by sexual contact, are called sexually transmitted diseases. The common sexually transmitted diseases (STDs) are;

1. Gonorrhea: Gonorrhea is caused by a bacterium *Neisseria gonorrhoeae*. The victim feels burning sensation and pain during urination. There may be pus from the penis and excessive secretion of vagina. Incubation period is 2-14 days in males and 7-21 days in females.

2. Syphilis: syphilis is caused by spirochaete bacterium, *Treponema pallidum*. It affects the mucous membranes in genital, rectal and oral regions and causes lesions. The parasite first cause a primary lesion, called a chancre, at the site of infection. It can be cured with antibiotics.

Both Gonorrhea and Syphilis can be controlled by: - (i) prompt treatment of discovered cases; (ii) finding sources of infection and treating them; (iii) sex hygiene; (iv) avoiding multiple sexual partners; and (v) prophylaxis, e.g. condom at the time of exposure and penicillin after exposure.

3. HIV/AIDS: There is reduction in the number of helper T-cells which stimulate antibody production by B-cells. This results in the loss of natural defence against viral infection. It is caused by a virus named HIV. AIDS is transmitted only by a contact of infected cells- containing blood of a patient with the blood of a healthy person as in

(i) Unprotected sexual intercourse with an infected partner.

(ii) Use of contaminated needles and syringes.

(iii) Use of contaminated razors for shaving.

(iv) Use of contaminated needles for boring pinnae.

(v) Organ transplant.

(vi) Artificial insemination. Etc.

It can be prevented by using disposable needles and syringes, sexual habits should be changed. People should be educated; advantage of using condom, danger of sharing needles should be well understood.

