



ST. MARY'S CO-ED SCHOOL, HARDA

CLASS-X SUB-BIOLOGY

CHAPTER-8

HOW DO ORGANISMS REPRODUCE?

NOTES OF HOW DO ORGANISMS REPRODUCE

- Reproduction is the process by which living organisms produce new individuals similar to themselves. It basically involves the making copies of the blueprints of the body design.
- Reproduction ensures continuity of life on earth.
- Chromosomes in the cell contain the information for inheritance of features which are passed from generation to generation in form of DNA molecules.
- so reproduction involves copying of DNA and other cell apparatuses. The copies will be similar to original and not identical.
- This property is Variation which is the basis and necessary for evolution of living beings.
- Variations help the species to withstand drastic environmental changes, thus save the species from becoming extinct and promotes its survival for a longer time.

REPRODUCTION	
Asexual Reproduction 1. A single parent is involved 2. Gametes not formed 3. Progeny is Identical to parent	Sexual Reproduction 1. Both Parents involved 2. Gametes are formed 3. Progeny is only genetically similar to the parent but not identical

- Asexual Reproduction is extremely useful as a mean of rapid multiplication. It is common in lower plants and animals.

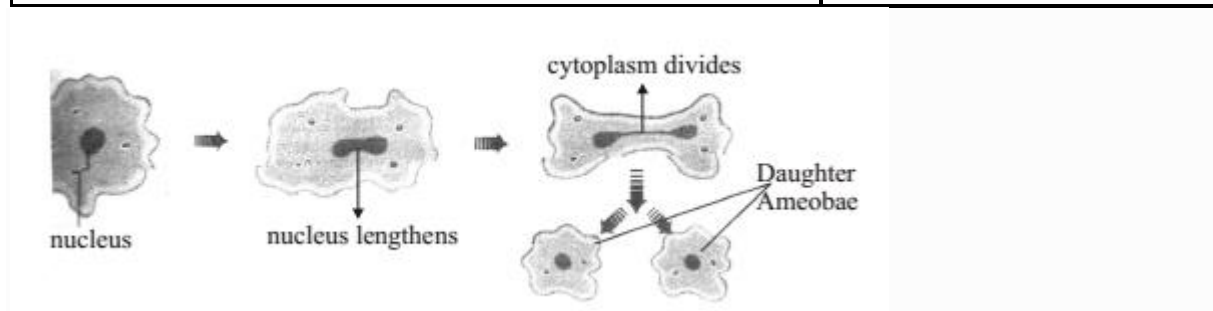
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MODES OF ASEXUAL REPRODUCTION: the mode depends on the body design of the organism.

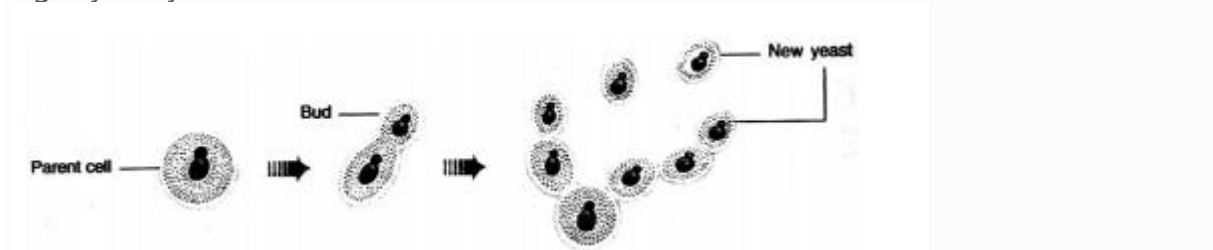
1. **FISSION**: The parent cell divides/splits into two daughter cell-Binary Fission; splits into many cells-multiple Fission.

FISSION	
Binary Fission The parents cell divides into two equal halves Equal halves (daughter cells) E.g. Amoeba follows transverse binary fission in any plane. ->Leishmania has a whip-like structure at one end and binary fission occurs in a definite orientation.	Multiple Fission The parent cell divides into many daughter cells simultaneously. E.g. Plasmodium



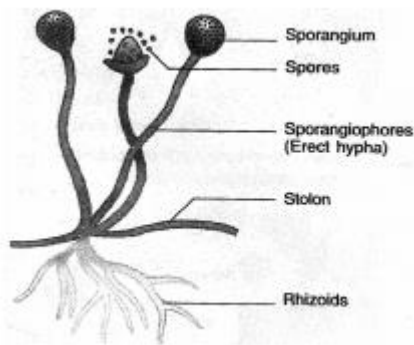
the process where nucleus lengthens is NUCLEOKINESIS and where the cytoplasm lengthens is CYTOKINESIS.

2. **BUDDING**: A bud develops as an outgrowth on parent body due to repeated cell division at a specific site. These buds detach from the parent body when they mature. E.g. Hydra, yeast.



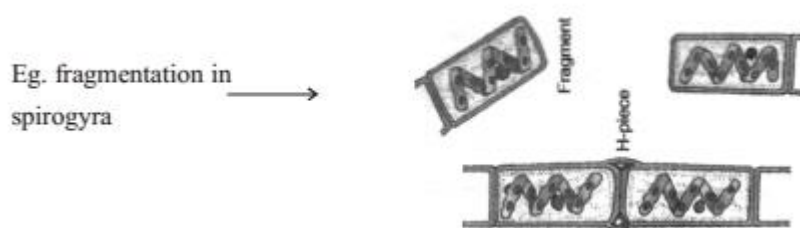


3. **SPORE FORMATION:** Spores which are present in sporangia, are small, bulb like structure which are covered by thick walls that protect them until they come in contact with suitable condition. Under favourable conditions, they germinate and produce new Rhizopus individual.

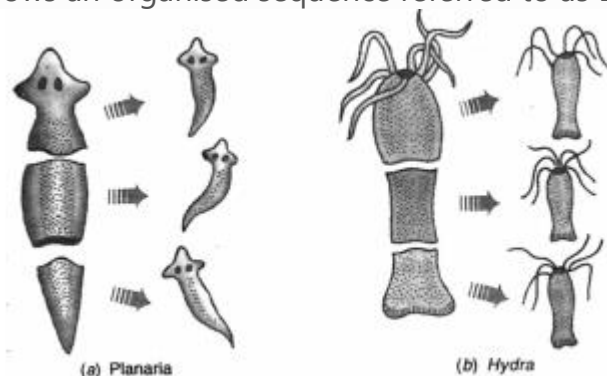


4. **FRAGMENTATION:** It takes place in multicellular organism with simple body organisation.

It is the accidental process when the broken pieces of an organism (fragments) grows into a complete organism.



5. **REGENERATION:** When the simple animals like Hydra, Planaria develop a new individual from their broken older part it is known as regeneration. It is carried out by specialised cells which divide and differentiate to form the complete individual. These cells multiply and from this mass of cells other parts are generated. Regeneration follows an organised sequence referred to as DEVELOPMENT.



Vegetative Propagation

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A mode of reproduction in which reproduction takes place from the vegetative parts like the stem, root, leaves.

Methods of Vegetative Propagation

Natural

1. **By Roots:** E.g. adventitious roots of Dahlias
2. **By Stems:** E.g. Potato (tuber), ginger (rhizome)
3. **By Leaves:** E.g. leaves of bryophyllum bear adventitious buds (in the notches of leaf margin) which develop into new plants.

Artificial

1. **Grafting:** E.g. Mango.
2. **Cutting:** E.g. Rose
3. **Layering:** E.g. Jasmine
4. **Tissue culture:** E.g. Orchids, Ornamental Plants.

Benefits of Vegetative Propagation

1. Plants can bear flowers, fruits earlier than those produced from seeds.
2. Growing plants like Banana, orange, rose, jasmine that have lost the capacity to produce seeds.
3. Genetical similarity is maintained in the plants.
4. Helps in growing seedless fruits.
5. Cheaper and easier method of growing plants.

Sexual Reproduction

When reproduction takes place as a result of fusion of two gametes, one from each parent, it is called sexual reproduction.

- The process of fusion of male and female gametes is called fertilization.
- The formation of gametes involves exchange of chromosomal (genetic) fragments between homologous chromosomes causing genetic recombination which leads to variation.

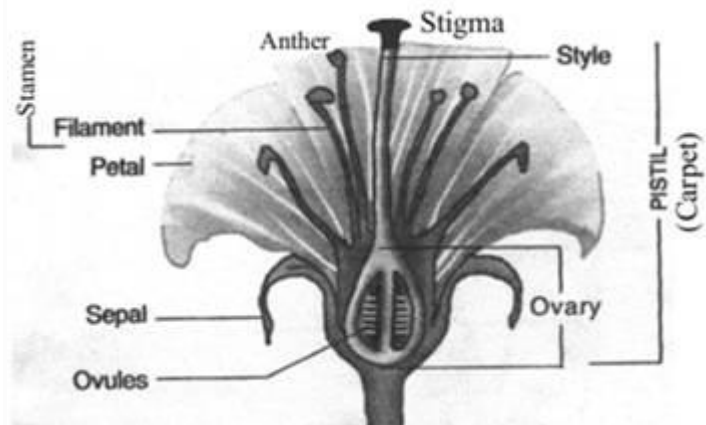
Sexual Reproduction in Plants

It occurs mostly in flowering plants. In fact, flowers are the reproductive organ of plants

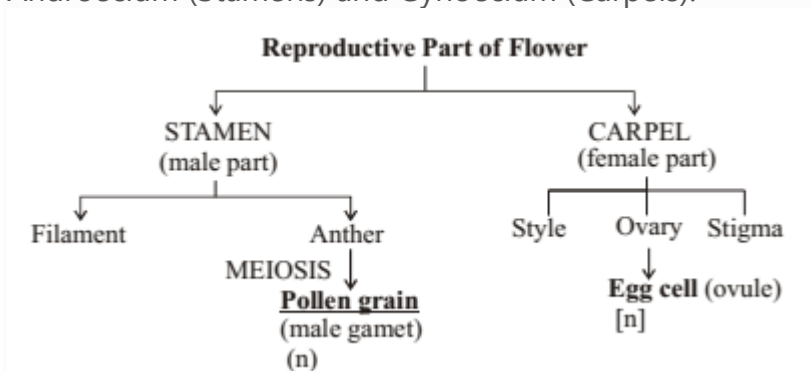
FLOWERS



Bisexual Flowers Both male and female reproductive part i.e., stamen & carpel are present & carpel is present. E.g. Hibiscus, mustard	Multiple Fission The parent cell divides into many daughter cell simultaneously. E.g. Plasmodium
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A typical flower consists of four main whorls namely calyx (sepals), Corolla (Petals), Androecium (Stamens) and Gynoecium (Carpels).

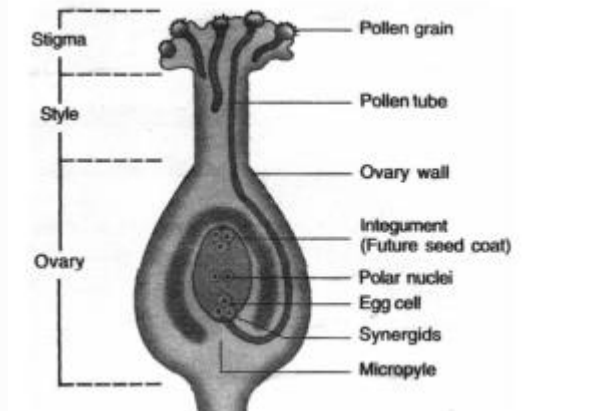


- Pollen grains of a flower, transfer to the stigma of the carpel of the same flower (**Self-Pollination**) or to the stigma of carpel of another flower (**Cross-Pollination**).
- This transfer of pollens is achieved by agent like wind, water or animals.
- After Pollination, a pollen tube grows out of pollen grains, through which male germ cell reaches the ovary and fuses with the female germ cell.
- Fertilization: The fusion of male and female gamete is called fertilization. It occurs inside the ovary. Zygote is produced in this process.

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- OVARY->OVULE->EGG CELL AND POLAR NUCLEI.



- Zygote divides several times to form an embryo within the ovule. The ovule develops a tough coat and is converted into a seed.
- Ovary grows rapidly and ripens to form a fruit, while the seed contains the future plant or embryo which develops into a seedling under suitable condition. This process is known as Germination.
- Flowers can also be unisexual (contain either stamen or carpel) or bisexual (contains both stamen and carpel).
- Unisexual flowers: PAPAYA, WATERMELON. Bisexual flowers: HIBISCUS, MUSTARD.

Reproduction in Human Beings

- Humans use a Sexual Mode of reproduction.
- It needs sexual maturation which includes creation of the germ cells ie, egg (ova) in the female and sperm in the male partner & this period of sexual maturation is called Puberty.

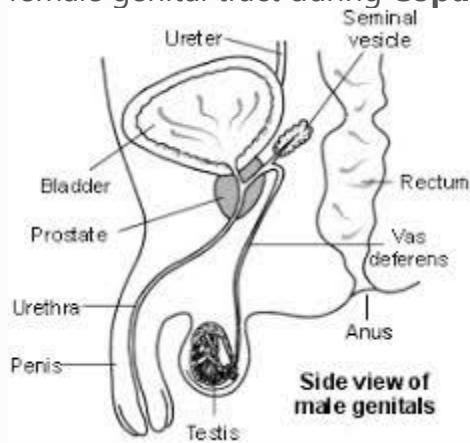
Male Reproductive System

- The formation of male germ cell (sperms) takes place in the testes (male reproductive organ)
- A pair of testes are located inside scrotum which is present outside the abdominal cavity. Scrotum has a relatively low temperature needed for the production of sperms by testes.
- Testes release a male sex hormone called **testosterone** and its function is to:
 1. Regulate the production of sperm



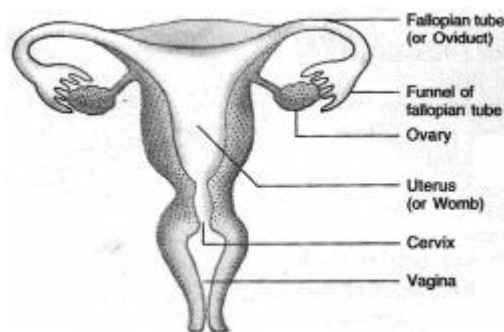
2. Bring about changes in appearance seen in boys at the time of puberty.

- The sperms along with the secretion of prostate gland and seminal vesicle, together constitute semen, which is released and made to enter into the female genital tract during **Copulation**.



Female Reproductive System

- The female germ cells or eggs are produced in the ovaries. (located in both side of abdomen).
- When a girl is born, the ovaries already contain thousands of immature eggs.
- At puberty, some of these eggs start maturing. One egg is produced every month by one of the ovaries.



- The Egg is carried from the ovary to the womb through a fallopian tube. These two fallopian tubes unite into an elastic bag like structure known as uterus.
- The Uterus opens into the vagina through the cervix.
- Fertilization occurs in the fallopian tube of female genital tract.
- The fertilized egg also called zygote ($2n$) gets implanted in the lining of the uterus, and start dividing. Actually, uterus is richly supplied with blood to

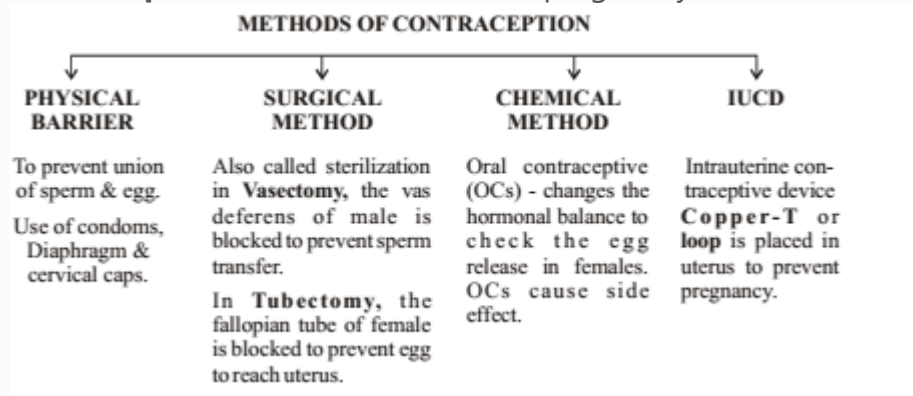


nourish the growing embryo. If zygote is not formed, the inner wall of uterus breaks which causes bleeding through vagina. This process is called **MENSTRUATION**. It occurs at a regular interval of 28 days.

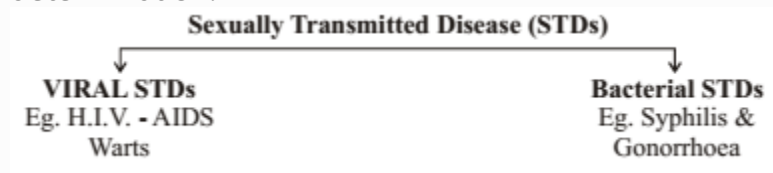
- The Embryo gets nutrition from the mother's blood with the help of a special tissue called PLACENTA. It provides a large surface area for glucose and oxygen to pass from the mother to the embryo. Similarly, the wastes from developing embryo are removed to mother's blood through placenta.
- The time period from fertilization up to the birth of the baby is called **Gestation Period**. In humans, it is about nine months (36 weeks).
- The sexual cycle (Menstruation) in a woman continues up to the age of 45-50 years. After that the ovaries do not release egg. This stage is called **Menopause**. It also marks the end of the reproductive life of a woman.
- Female sex hormones are oestrogen and progesterone which are produced by ovary.

Reproductive Health:

- Reproductive Health means a total well-being in all aspects of reproductive, i.e., physical emotional, social and behavioural.
- **Contraception:** It is the avoidance of pregnancy. It can be achieved



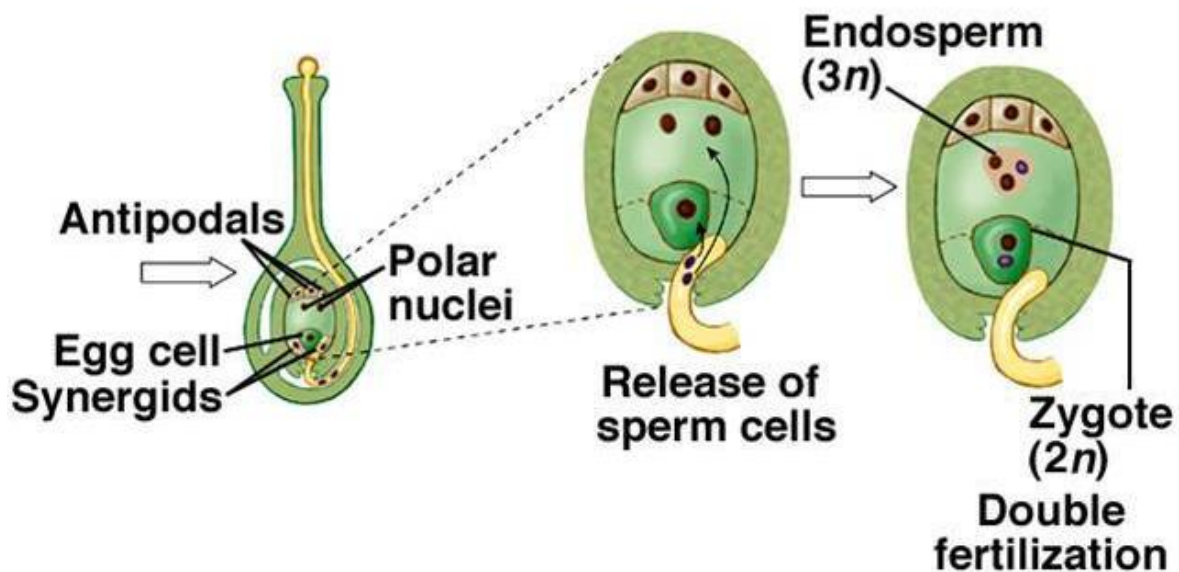
- Healthy society needs a balanced sex ratio that can be achieved by educating people to avoid malpractices like female foeticide & prenatal sex determination.





Double Fertilization

In flowering plants, one sperm fertilizes the egg cell, whereas the other sperm fuses with the two polar nuclei forming endosperm. This is known as double fertilization as two fertilization events are taking place. Zygote divides to form 7 celled and 8 nucleated embryo sacs. Out of these 7 celled and 8 nuclei, there are two synergids with egg cells, 3 antipodal and two polar nuclei are there. Two polar nuclei fuses with one sperm and other sperm fuses with egg cell to form zygote.



Reproduction in Human Beings

Humans reproduce sexually. When girls and boys attain puberty (reproductively active) there occurs lots of changes in their body. Development of hair in armpits and genital regions are common to both males and females. Girls have increased breast size, darkening of skin and tip of nipples etc. Some changes such as thick hairy facial growth, voice changes occur in males.

Male Reproductive System

Male reproductive system comprises of- a pair of testis, glands, accessory ducts, and male genitalia.

Testis is the site where male gametes or germ cells are produced. They are located outside the abdominal cavity in a sac-like structure known as scrotum. This is to maintain lower temperature required for the formation of sperm. Testis produces male hormone testosterone needed for the



development secondary sexual characteristics in males such as formation of beard and moustaches and also in the development of sperm.

Vas deferens is a duct that transport sperm to urethra, which is a common passage for both urine and sperm ejaculation.

Prostate glands and seminal vesicles are also found in males to nourish and for easy transport of sperm in the female genital tract. Cowper's gland produces mucus like fluid that neutralizes the acidity of the female vagina. All these secretions along with sperm form the semen.

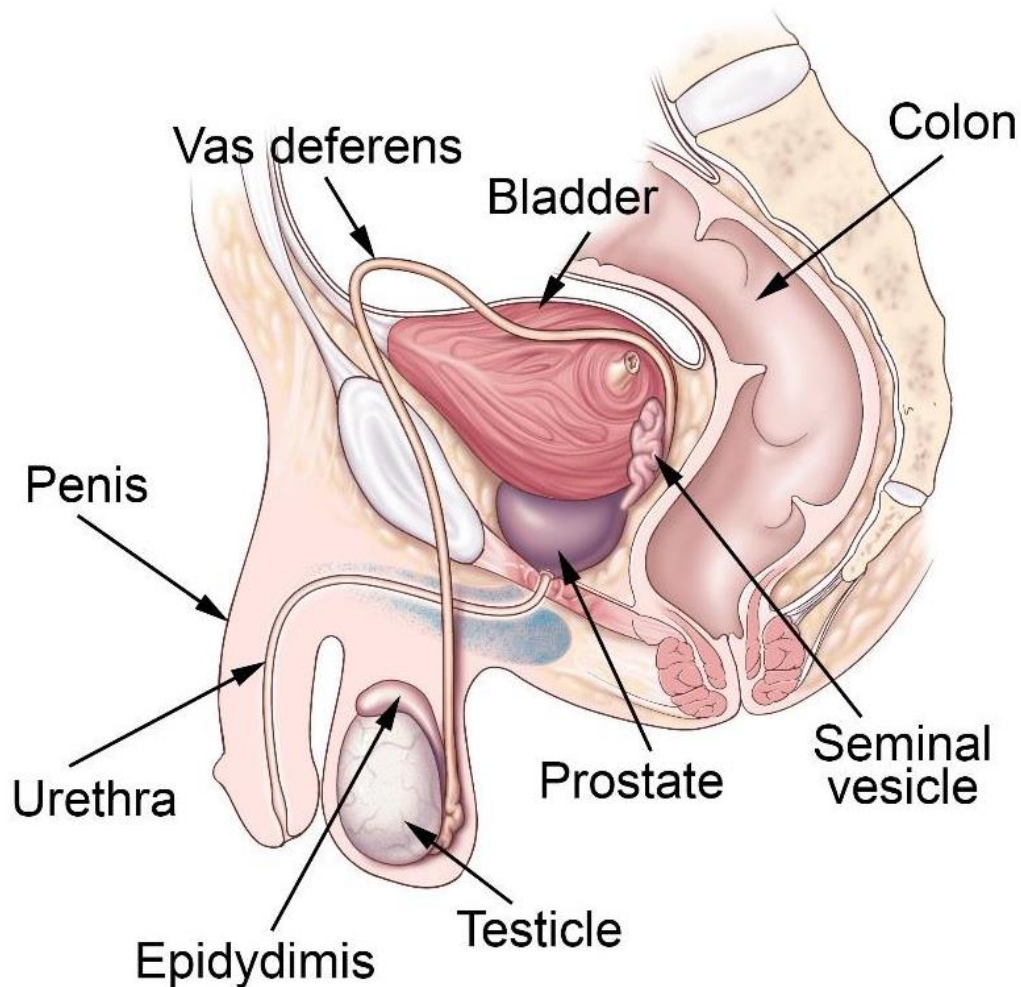


Fig.9. Male Reproductive System

Formation of male gametes or sperm in testes is known as spermatogenesis. Sperms are haploid in nature. Seminiferous tubules are the site for spermatogenesis.



Testis produces male hormone known as testosterone needed for the male secondary sexual characteristics as well as for spermatogenesis.

Female Reproductive Tract

The female reproductive system consists of a pair of ovaries, uterus, cervix, vagina, and external genitalia.

Female egg or ova are produced in ovaries. Formation of ova in ovaries is known as oogenesis. Ovary produces female hormones such as oestrogen, progesterone. These hormones are needed for female sexual development as well as for pregnancy. Fallopian tube carries ova from the ovary to the womb. Two oviducts joined to form uterus. Uterus then opens into Vagina via cervix.

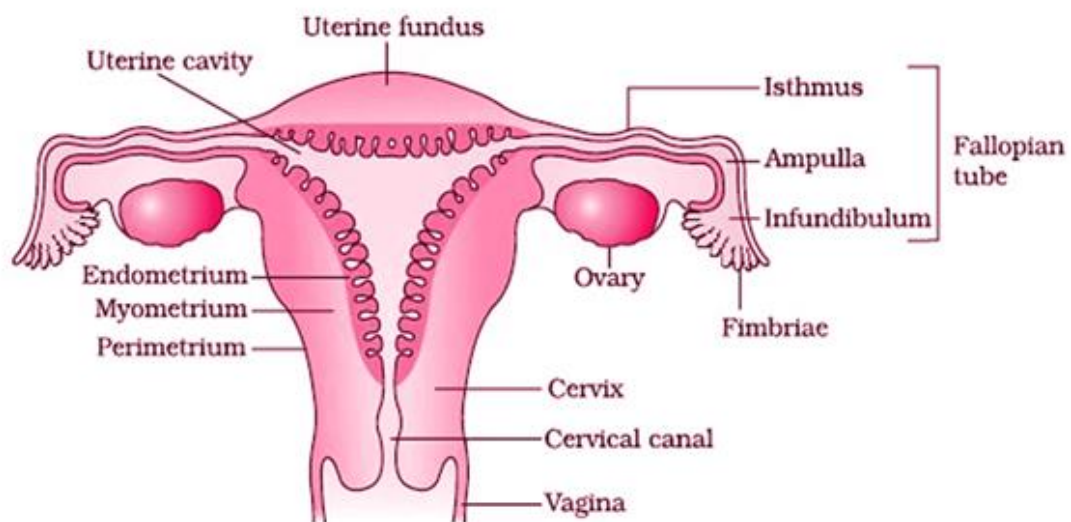


Fig.10. Female Reproductive System

Sperm enter into the female vagina at the time of sexual intercourse. Then the sperm reaches to fallopian tube where it fuses the ova to form zygote. This is known as fertilization. Then zygote divides to form embryo. The embryo gets implanted into uterus. The embryo development occurs in uterus to form foetus.

Mother supply nutrition to the growing foetus via placenta. Placenta helps in the exchange of nutrients, gases and removal of excretory products. The development of child inside the womb of the mother takes place for about 9 months. Then the rhythmic uterine contraction leads to delivery of the baby outside the female body.

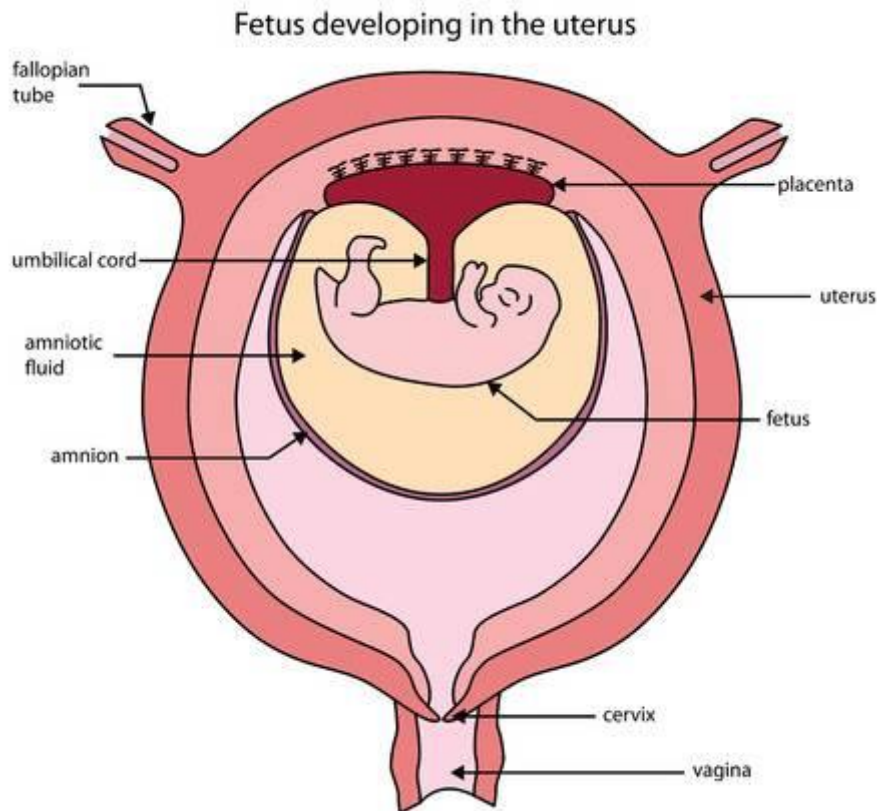


Fig.11. Human Placenta

If the egg is not fertilized, the uterine lining gets shed off in the form of fluid known as menstrual fluid. The discharge occurs from the vagina as blood and mucus. This is known as **menstruation**. It lasts for about 2 to 8 days.

Reproductive Health

It is defined as state of wellbeing in terms of safe sex, reproductive fitness as well as absence of any reproductive diseases. Unsafe sex leads to different diseases which are known as sexually transmitted diseases.

Some of the sexually transmitted diseases are as follows-

- Gonorrhoea is caused by bacteria
- Syphilis is caused by bacteria



- AIDS (acquired immunodeficiency syndrome) is caused by a virus HIV(human immunodeficiency virus)

In-vitro Fertilization (IVF)

IVF is an infertility treatment method. In this case, egg is fertilized with sperm outside the female body. Ovum is removed from the female body and is allowed to fertilized with sperm outside the body in In-vitro conditions.

Birth Control Methods

For a country like India where population is increasing continuously, there is a need for birth control methods.

- Condoms and diaphragms are barrier methods for birth control. They prevent the binding of sperm with ovum.
- Chemical method of birth control includes oral pills and vaginal pills.
- Intrauterine contraceptive devices are also there to prevent implantation of embryo in the uterus. For example, Cu T
- Surgical methods include vasectomy in males and tubectomy in females. Vasectomy is done by cutting the Vas deferens and then tie it up. Tubectomy involves cutting and tying of small portion of oviducts.

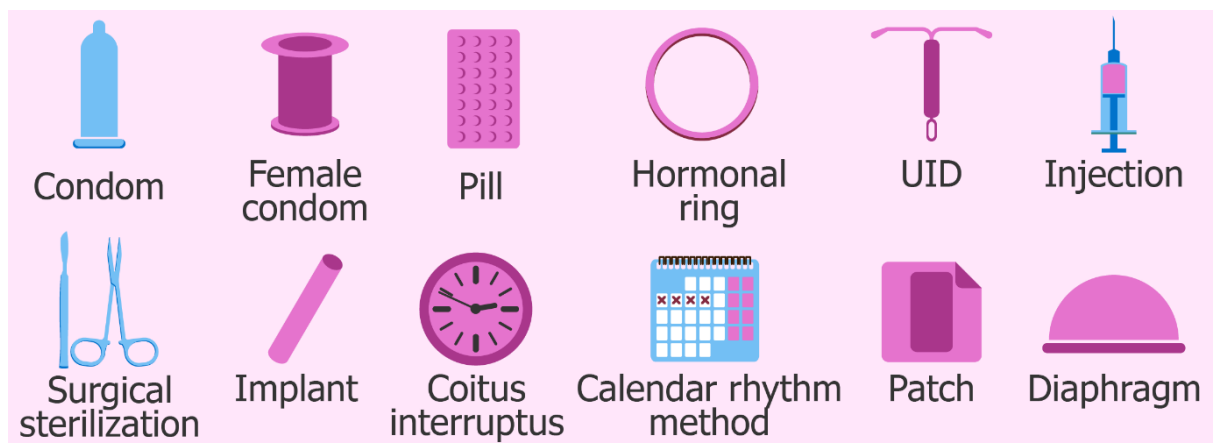


Fig. 12. Birth Control Methods

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