Term-2

FREEMIND

Date 14/1/2022

Page

Chapter-2

How do organisms reproduce?

* Reproduction ⇒ The biological process in which living organisms give birth to young ones of their own kind.

It is important because it ensures the continuity of the species.

Do organisms create exact copies of themselves?

- DNA is the information source of making proteins and is present in the chromosomes in the nucleus of the cell.

- During reproduction, the DNA gets replicated by biological reactions and forms offsprings.

- In asexual mode of reproduction, only one parent is involved due to which DNA replication is very accurate but not completely accurate. Due to which, very little variation occurs in the offsprings.

- But in sexual mode of reproduction, due to the involvement of two parents, more variation occurs in the offsprings.

The importance of variation -

- It is useful for the survival of the species.
- Evolution occurs due to the variation in offsprings.

Modes of reproduction -

⇒ There are 2 modes of reproduction:

(i) Asexual reproduction.

(ii) Sexual reproduction.

Asexual reproduction -

⇒ The mode of reproduction in which a single parent is involves and no gametes (sex cells) are formed, is known as asexual mode of reproduction.

Examples: Amoeba, Hydra, Planaria, etc.

- Very less genetic variation occurs in asexual reproduction.
- A lot of offsprings are produced

in asexual reproduction, under favourable conditions.

Kinds of asexual reproduction:

⇒ There are mainly 6 kinds of asexual mode of reproduction.

(i) Fission.

- It occurs in unicellular organisms.
- In this method of reproduction, a single parent divides into two or more daughter cells to form new organisms.

It is of two types:

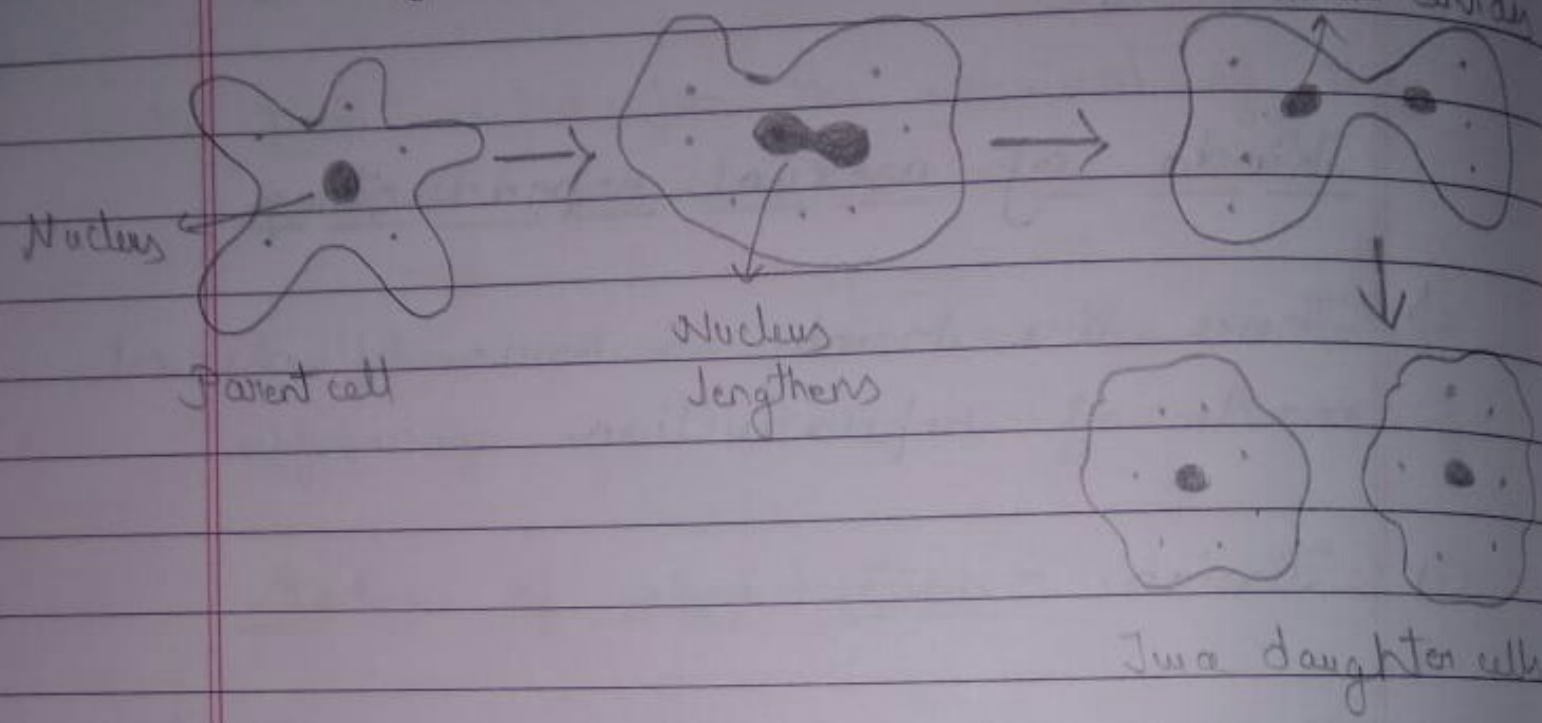
1) Binary fission - In binary fission, a single parent divides into 2 daughter cells.

Examples: Amoeba, Leishmania, Paramoecium, etc.

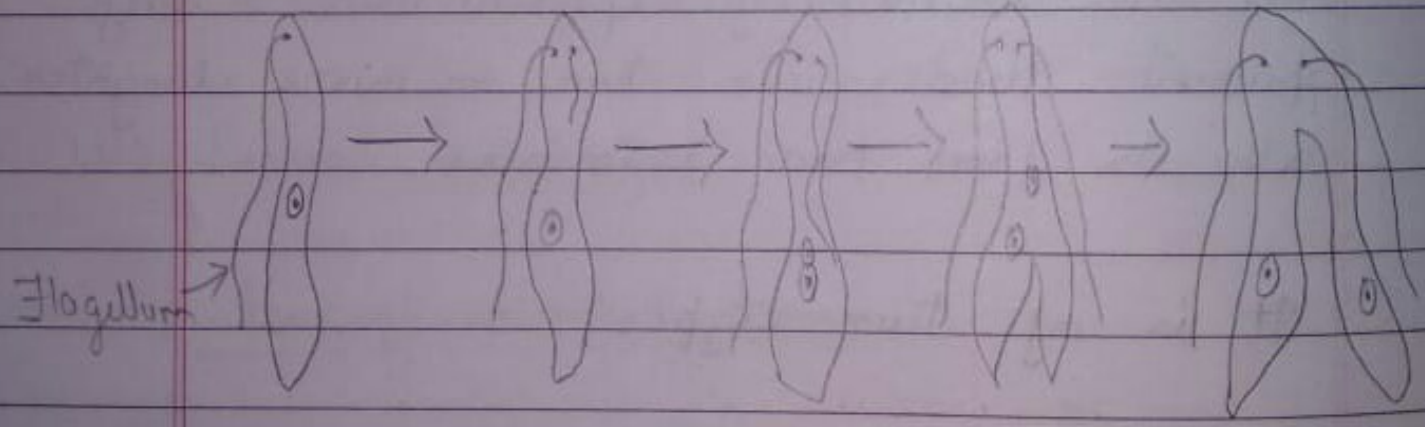
2) Multiple fission - In multiple fission, a single parent divides into several (more than 2) offsprings.

Example: Plasmodium, etc.

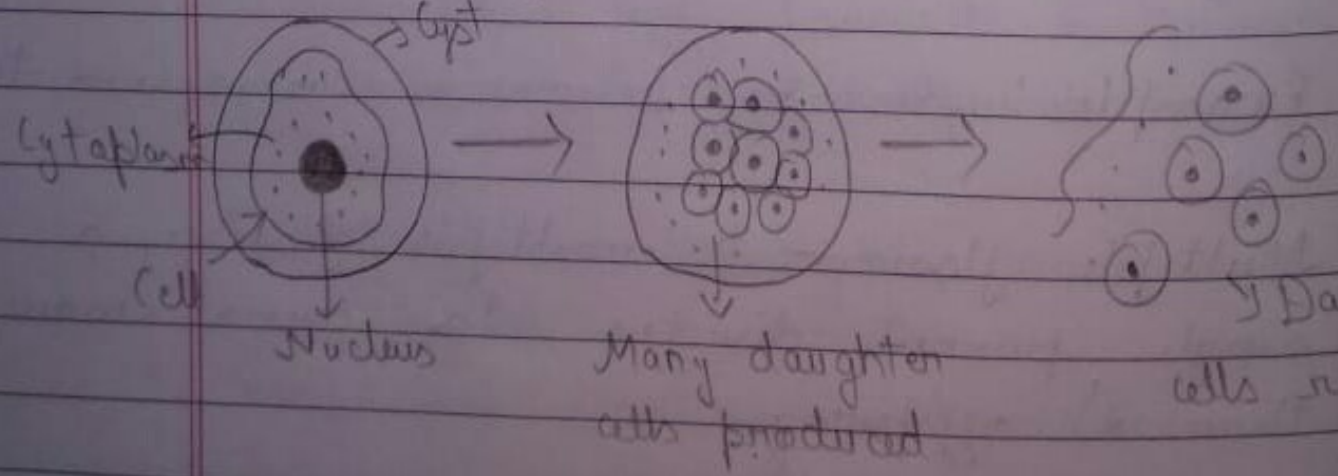
Binary fission in Amoeba-



Binary fission in Leishmania-



Multiple fission in plasmodium-



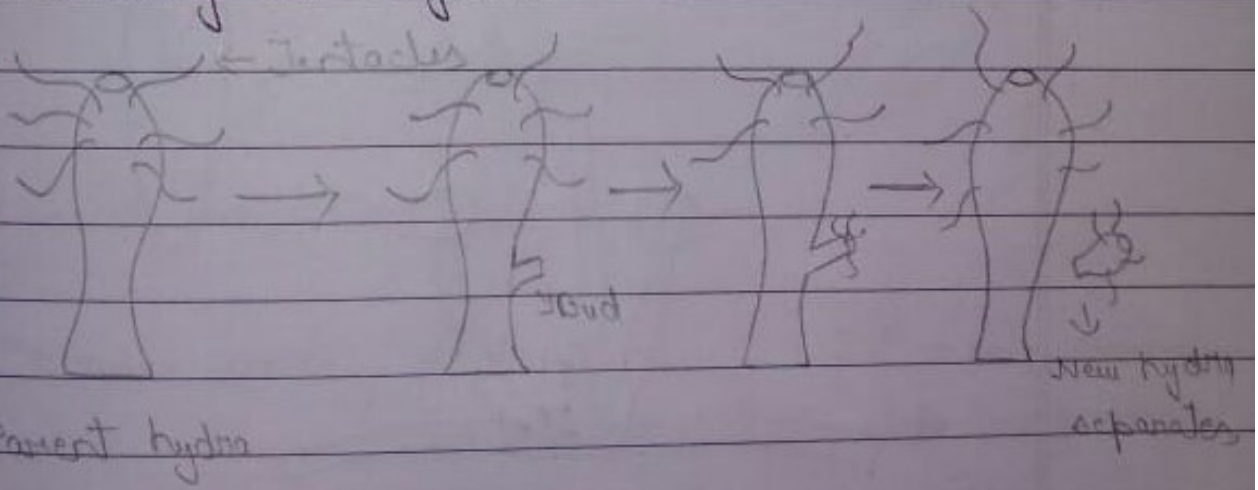
(iii) Budding

- It occurs in unicellular and simple multicellular organisms.
- In budding, the parent organisms grows an outgrowth known as 'bud' which when matures, detaches from the parent and form a new organism.

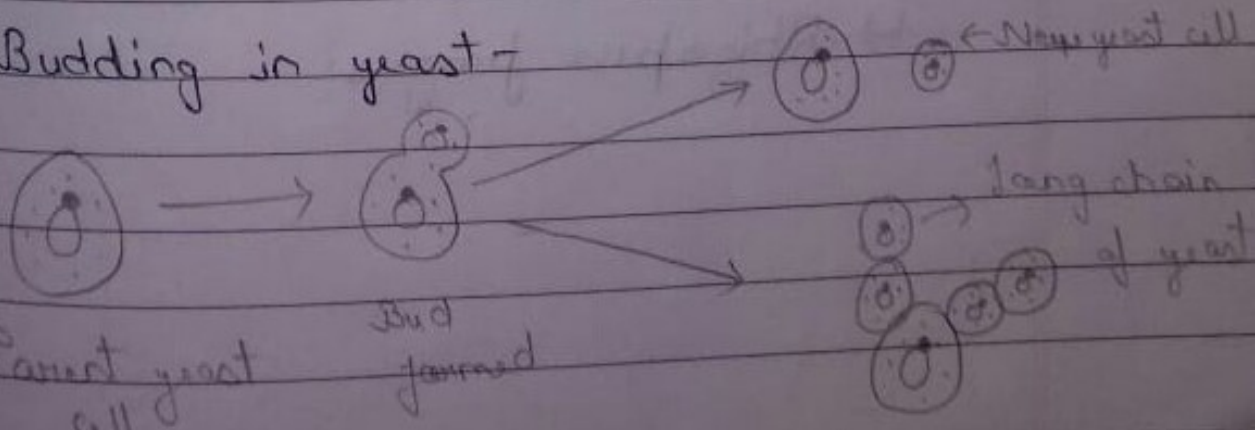
Examples: Hydra (animal), yeast (plant), etc.

- Sponges and corals also reproduce by budding but they do not detach from the parent.

Budding in Hydra-



Budding in yeast-

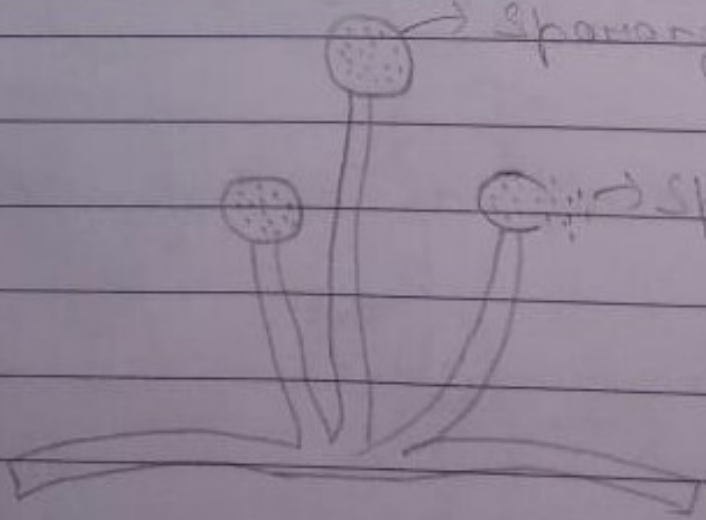


(iii) Spore formation

- Spores - These are 'asexual reproductive bodies' which are covered by a hard protective coat.

- In this mode of reproduction, the parent plant produces spores and when the spore case (Sporangium) burst, it spreads in the environment and land on food/soil under favourable conditions and begin to grow.

Examples: Rhizopus (bread mould), Penicillin fungus, Mucor and non-flowering plants like ferns and mosses, etc.



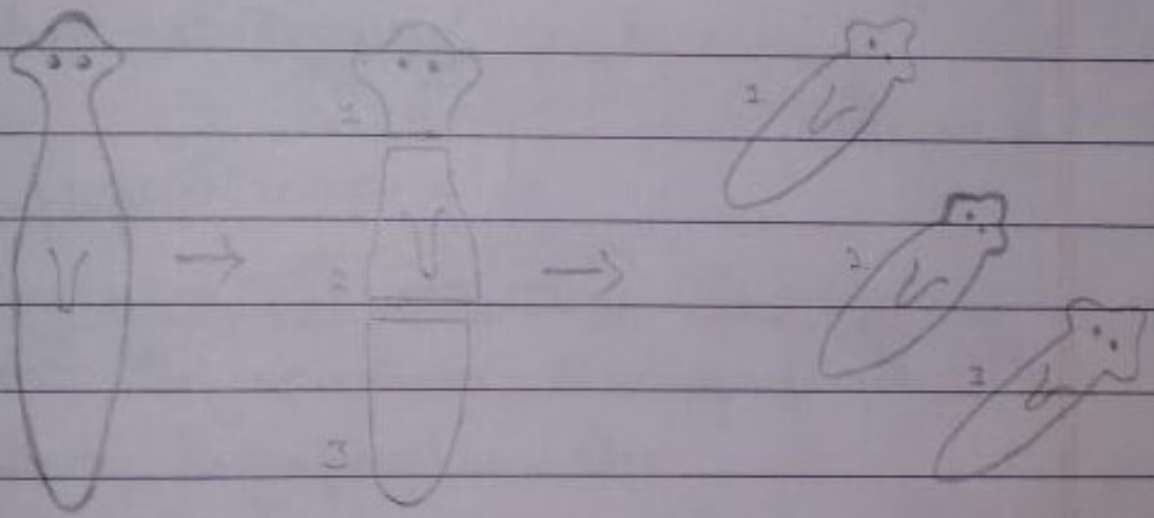
↳ Rhizopus fungus.

(iv) Regeneration

- It occurs in multicellular plants and animals.
- The process of reproduction in which an organism grows from its body parts, is known as regeneration.
- It required specialised cells.

Examples: Planaria (a flatworm), Hydra, etc.

Regeneration in Planaria -



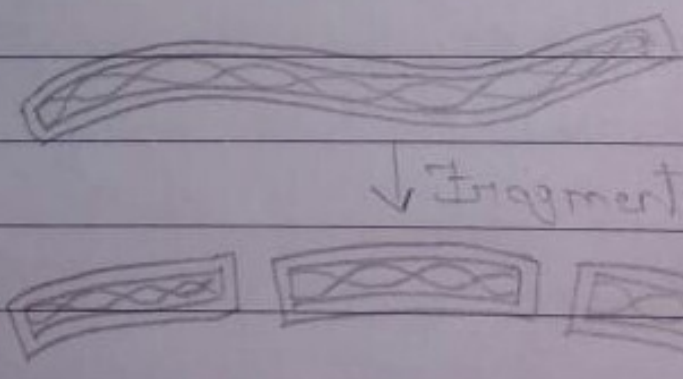
Planaria worm | Planaria cut into 3 pieces | 3 Planaria worms produced.

(v) Fragmentation.

- It occurs in simple multicellular organisms.
- The process of breaking up of the body of simple multicellular organisms on maturing and each part grows to form a new organism is called fragmentation.

Examples: Spirogyra (plant), sea anemone (marine animals), etc.

Fragmentation in Spirogyra-



- They do not need any specialised cell as in regeneration.

(vi) Vegetative propagation

- It occurs only in plants.
- The process of obtaining new plants from the parts of old plants without the help of any reproductive organ, is known as vegetative propagation.
- The parts of plant through which vegetative propagation occurs: stem, roots and leaves.
- The point on stem where a leaf is attached is called node.

Examples:

Stem- Bryophyllum, Money plant, etc.
Leaves- Bryophyllum, etc.
Roots - Potato, Guava, etc.

Other examples- Onion, Jasmine, Garlic, Straw berry, Tulip, Lily, Mint, etc.

Artificial propagation -

⇒ The process of growing many plants from one plant by man-made methods is called artificial propagation of plants.

The 3 common method of artificial propagation are:

(i) Cuttings - A small part of plant is removed by a cut is called cutting. It should contain buds for growing the plant.

Examples: Rose, Sugarcane, Banana, grapes, etc.

(ii) Layering - In this method, a branch of plant is pulled towards the ground and covered with soil, then the stem implanted will form roots and a whole plant.

Examples: Jasmine, Strawberry, Lemon, Guava, etc.

(iii) Grafting - In this process, cut stems of 2 different plants are joined together in such a way that the two stems grow as a single plant.

- The upper part is called - Scion.

- The lower part is called- Stock.

Examples: Apple, peach, apricots and pear trees, etc.

Tissue culture

⇒ The production of new plants from a small piece of plant tissue (or cells) removed from growing tips of a plant in a suitable growth medium, is known as tissue culture.

- The production of plants by the method of tissue culture is also known as micropropagation.

Q→ Why regeneration cannot be used by complex multicellular organism?

Ans→ The reproductive method of regeneration cannot be used by complex multicellular organisms because:

- They have complex body designs.
- They have separate organs at different positions for performing functions.

These features cannot be achieved by regeneration. So, this method is not useful for complex multicellular organisms.

Sexual reproduction

⇒ The mode of reproduction in which two parents are involved and formation of gametes takes place, is known as sexual mode of reproduction.

Examples: Humans, dogs, fish, cat, etc.

- More genetic variation occurs due to the involvement of 2 parents.
- less offsprings are produced.
- This process takes more energy and long time.

Germ cells ⇒ Sex cells ⇒ Gametes.

Q→ Why the amount of DNA does not get doubled in sexual reproduction?

Ans→ Sexual reproduction involves two parents. Although the amount of DNA does not get doubled because, in sexual reproduction special reproductive cells called gametes are fused to form a zygote and each gamete contains half the amount of chromosomes, and that's why the

amount of DNA does not get doubled.

- Sexual reproduction takes place by combination of special reproductive cells, known as sex cells. It is of two types:

(i) Male sex cell.

(ii) Female sex cell.

* Fertilization - The fusion of a male gamete with a female gamete to form a zygote is known as fertilization.

- Sexual reproduction leads to greater variety in population.

- It leads to the evolution of various species to become better.

Sexual reproduction in flowering plants:

- Different parts of flower - sepals, petals, stamens and pistil. Stamen is the male reproductive part and Pistil is the female reproductive part.

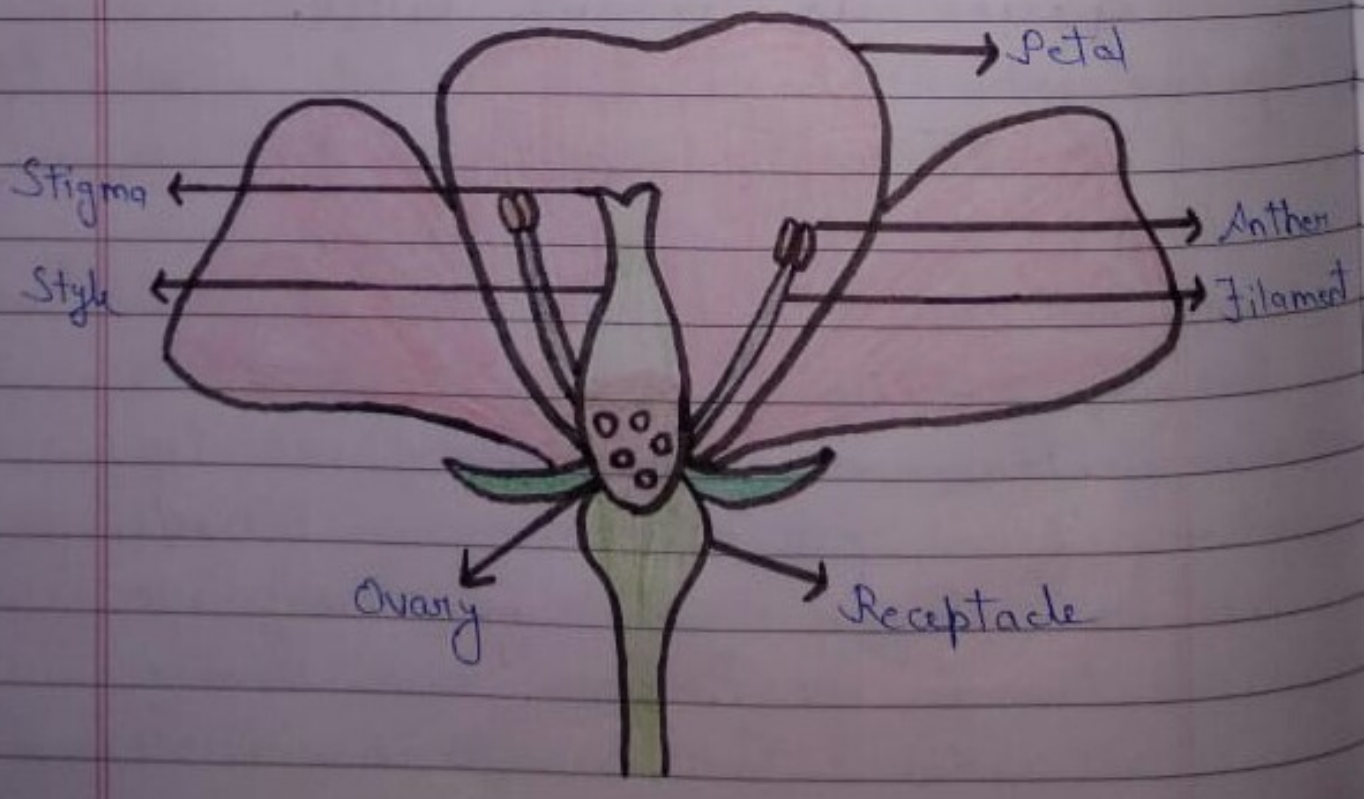
The flowers may be of 2 types:

1) Unisexual flowers - The flower which contain either stamens or pistils.

Example: Papaya, watermelon, etc.

2) Bisexual flowers - The flower which contains both stamens and pistils.

Example: Hibiscus, mustard, etc.



Main parts of flower:

1) Sepals ⇒ These are green, leaf-like parts in outermost circle of a flower. All sepals taken together are called 'calyx'. It protects the flower in initial stages.

2) Petals ⇒ The colourful part of the plant which surrounds the flower is called petal. All petals taken together are called 'corolla'. It is usually scented and colourful to attract insects for pollination.

3) Stamen ⇒ It is the male reproductive part of plant. It is made up of two parts: a filament and an anther. Anther makes the pollen grains and stores them.

Pollen grain ↑ the male gamete of flower.

4) Pistil ⇒ It is the female reproductive part of plant. It is made of 3 parts: stigma, style and ovary. Stigma recieves the pollen grains and it is sticky. Style is a tube which connects stigma to the ovary. The swollen part at bottom is the ovary which makes ovules and stores them. Pistil is also known as carpel.

Pollination:

=> The transfer of pollen grains from the anther of a stamen to the stigma of a carpel / pistil, is called pollination.

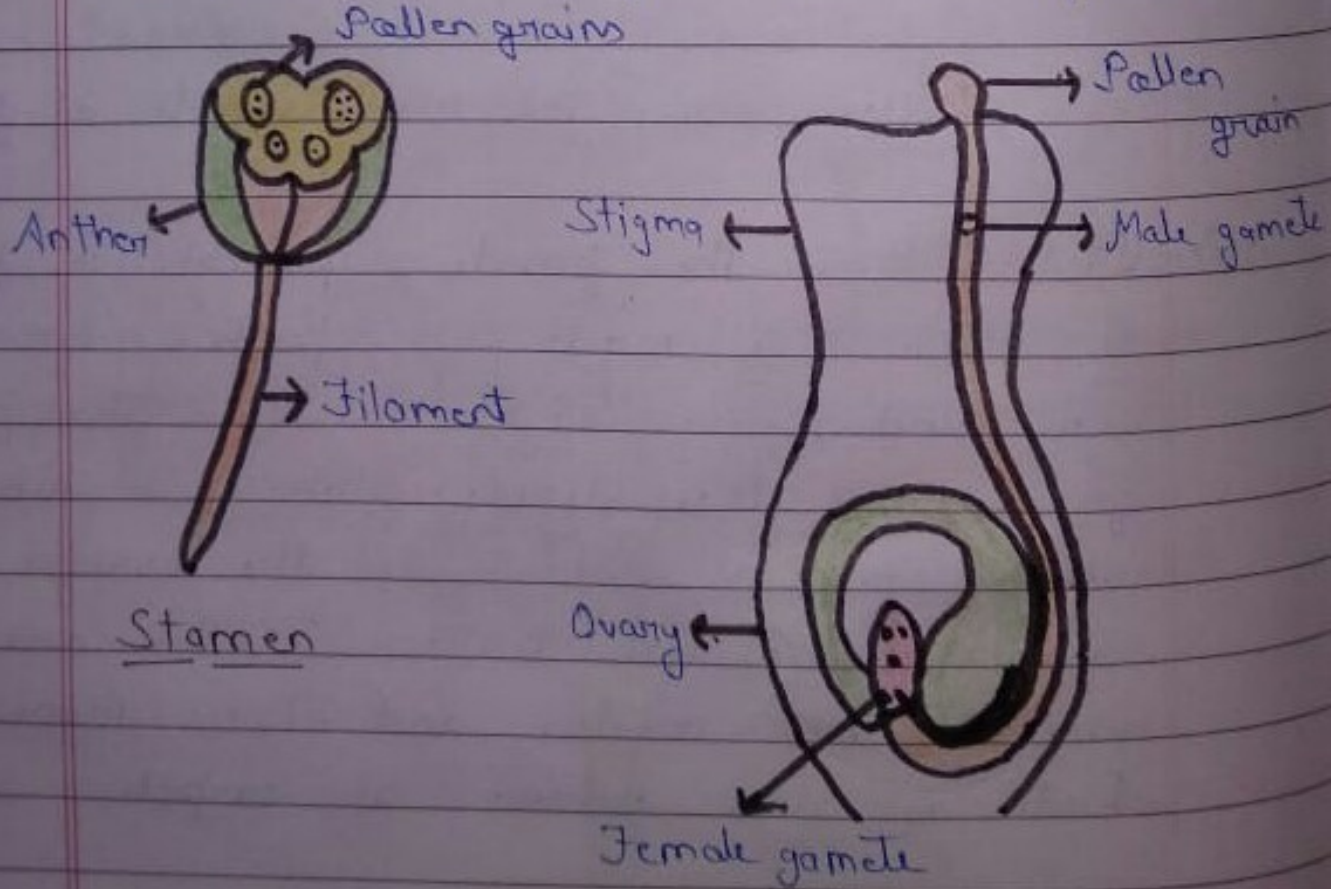
- It is done by natural agents such as wind, water, insects, etc.

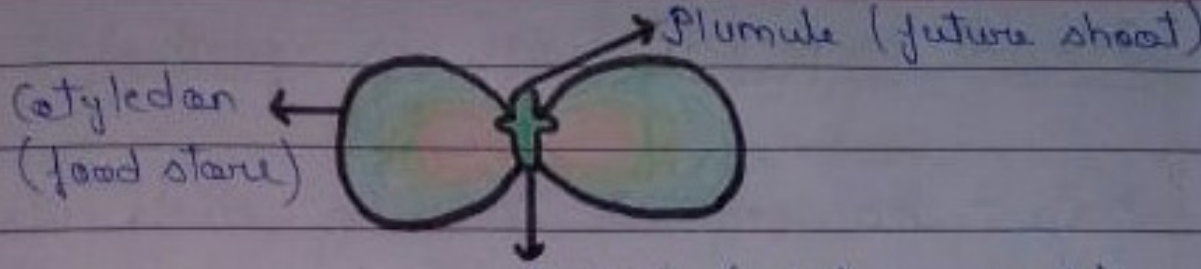
There are 2 types of pollination:

1) Self- pollination.

2) Cross- pollination.

* Germination => It is the process in which the seeds develop into new plants.





Germination

Process of sexual reproduction in flowering plants -

1) Stamen makes the male gametes. These male gametes are present in pollen grains.

2) Pistil makes the female gamete. The female gametes are present in ovules called ova, egg cells or eggs.

3) The male gamete present in pollen grains fertilise the female gametes present in ovules.

4) The fertilised ova (egg cells) grow within ovules and become seeds.

5) The seeds produce new plants on germination under suitable conditions.

Sexual reproduction in animals-

* Male - An animal having male sex cells called 'sperms' in its body is called male.

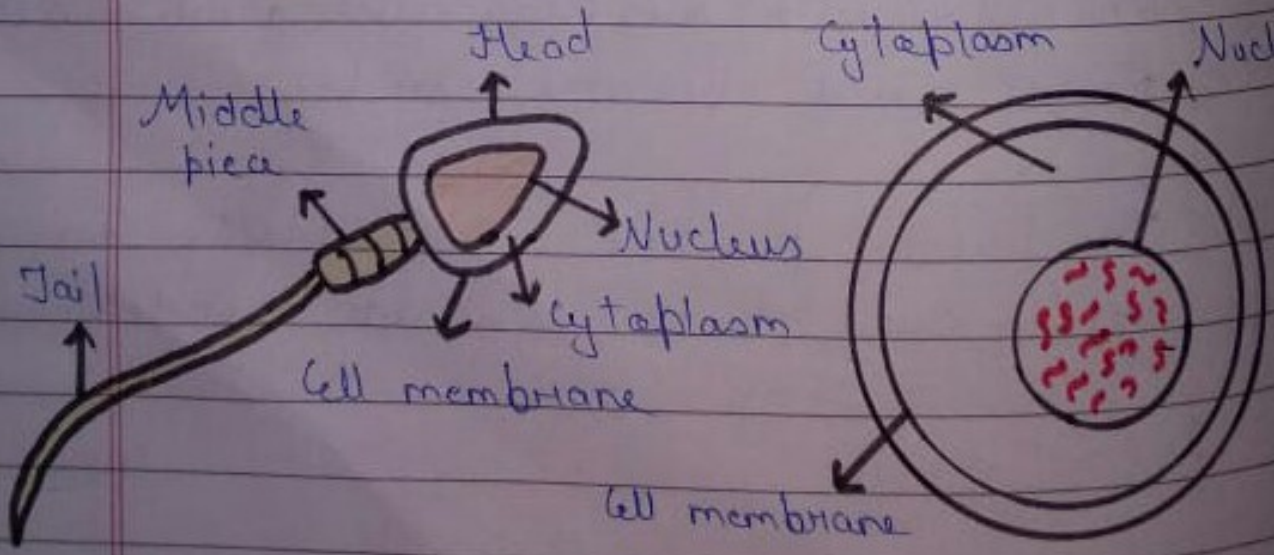
* Female - An animal having female sex cells called 'ova' in its body is called female.

Gametes

⇒ The cells involved in sexual reproduction are called gametes.

Male gamete ⇒ Sperm.
Female gamete ⇒ Ova or egg.

- Gametes have half the number of chromosomes (23).
- They are also called sex cells.



Human sperm Human ovum

Zygote

⇒ The cell which is formed by the fusion of a male and a female gamete is called zygote. It is simply a fertilised egg.

Internal and external fertilization

- The fertilization which occurs inside the female body is called internal fertilization.

Examples: Human beings, birds, reptiles, etc.

- The fertilization which occurs outside the female body is called external fertilization.

Examples: Frogs, toads, fishes, etc.

Process of sexual reproduction in animals:

⇒ Sexual reproduction in animals takes place in the following steps:

1) The male parent produces male

gamete called sperms and female parent produces female gamete called ova.

2) The sperm enters into the ovum and fuses with it to form a new cell called zygote.

3) The zygote divides again and again to form a whole new organism.

Puberty -

⇒ It is the period during which immature reproductive system of boys and girls mature and becomes capable of reproducing.

- Generally, boys attain puberty at the age of 13 to 14 years.
- Girls generally attain puberty at the age of 10 to 12 years.

Common changes in boys and girls:

- Thick hair grows in new parts of body such as armpits and the genital area

- Thinner hair also appears on legs and arms, as well as on face.
- The skin frequently becomes oily and begin to develop pimples.
- We begin to be conscious and aware of both our own bodies and those of others in new ways.

Changes in girls during puberty:

- Breast size begin to increase in girls, with darkening of the skin of the nipples at the tips of the breasts.
- Girls begin to menstruate at around this time.

Changes in boys during puberty:

- Boys begin to have new thick hair growth on the face and their voices begin to crack.
- The penis occasionally begins to become enlarged and erect, either in daydreams or at night.

⇒ All of these changes take place slowly and do not happen all at the same time. Also, each change does not become complete quickly.

All of these changes are aspects of the sexual maturation of the body.

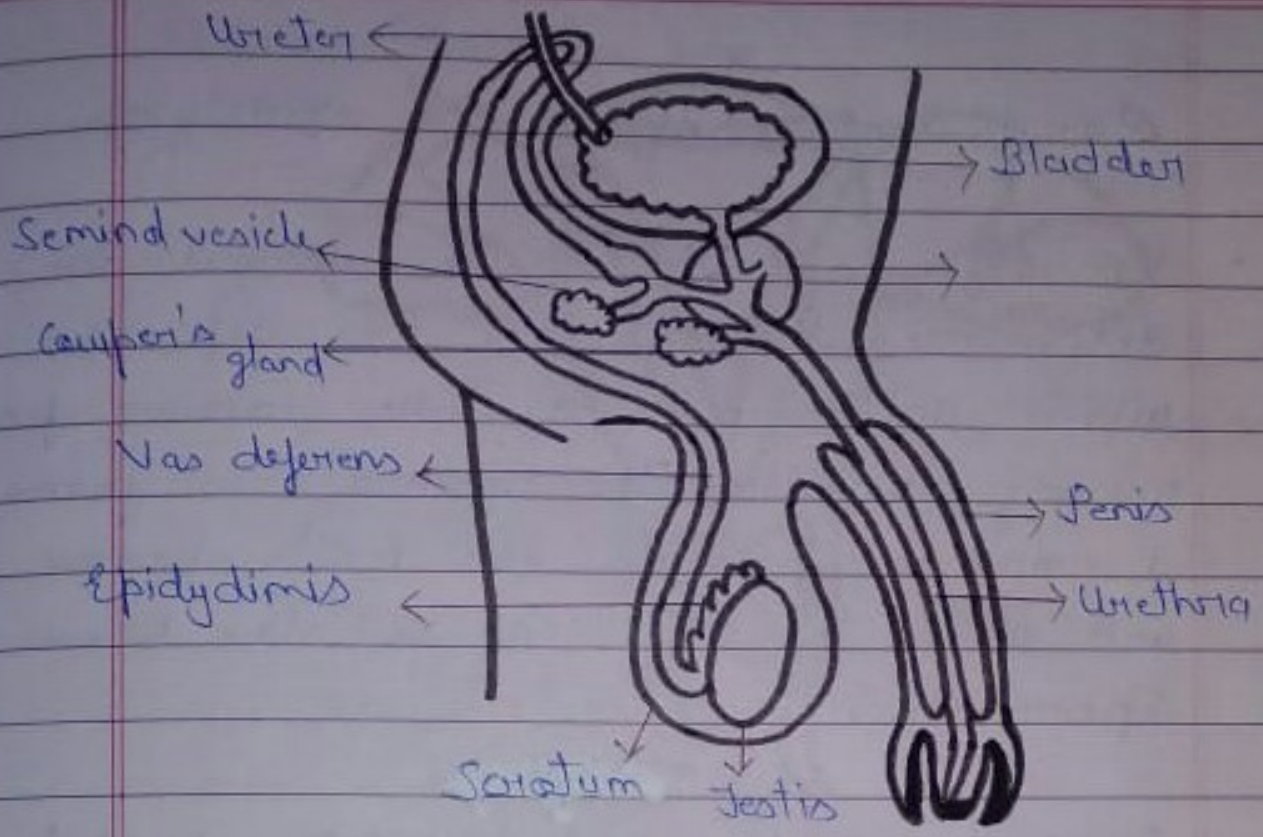
Human reproductive system:

⇒ The humans use sexual mode of reproduction. The organs associated with reproduction in males and females are different.

Male reproductive system

- The male reproductive system consists of two portion, one which produces the germ-cells (gametes) and the other that deliver the germ-cells at the site of fertilization.

- The male reproductive system consist of the following organs: Testes, scrotum, epididymis, Vas deferens (Sperm duct), Seminal vesicles, Prostate gland and penis.



Human male reproductive system

- Testes ⇒ The formation of sperms take place in testes (singular - testis). These are located outside the abdominal cavity in scrotum because sperm formation requires lower temperature than the normal body.

The are also responsible for the secretion of testosterone hormone. This hormone is responsible for the changes during puberty.

- Epididymis ⇒ The sperms formed in the testes come out and go into a coiled tube called epididymis. The sperms get

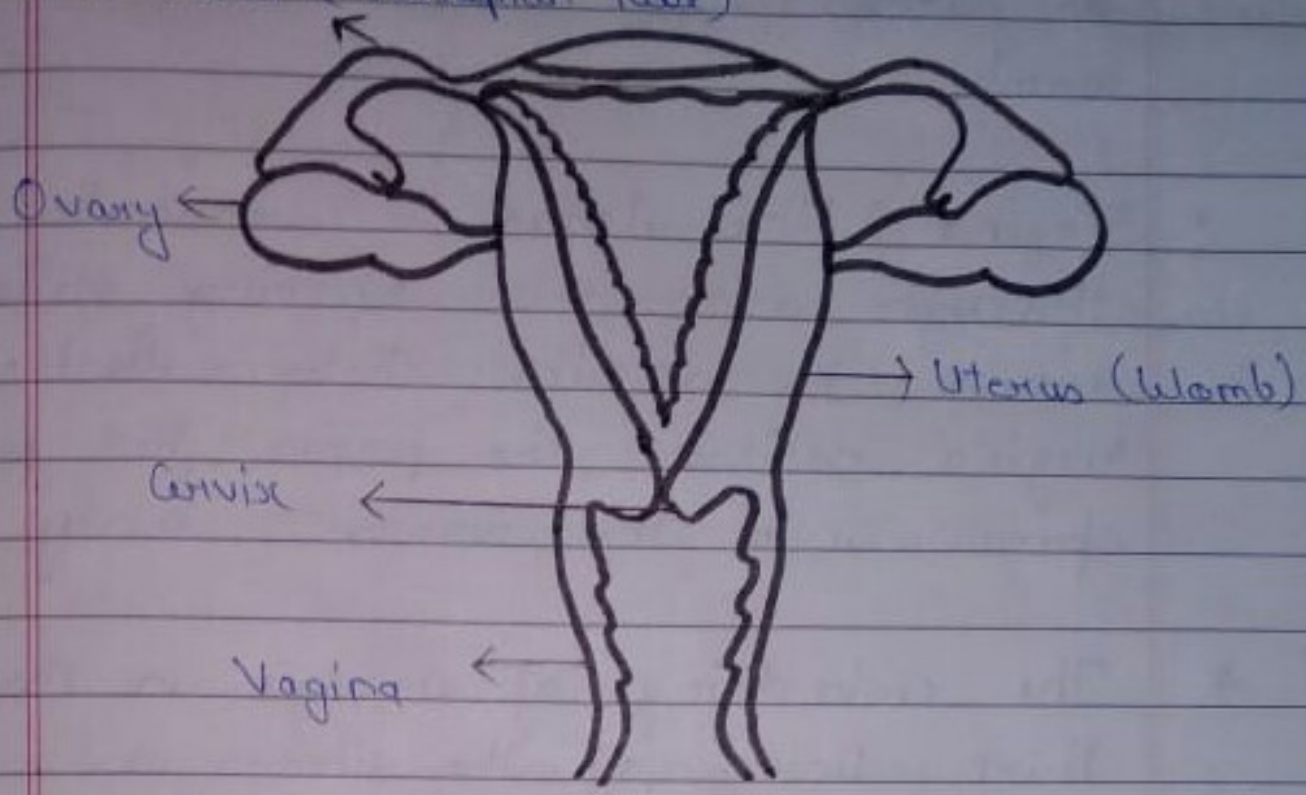
stored temporarily in the epididymis.

- Vas deferens ⇒ The sperms formed are delivered through the vas deferens which unites with a tube coming from urinary bladder. The urethra thus forms a common passage for both sperms and urine. Vas deferens is also known as Sperm duct.

- Seminal vesicles and prostate gland ⇒ Along the path of vas deferens, glands like prostate and seminal vesicles add their secretions so that the sperms are now in a fluid which makes the transport easier and also provides nutrition.

Female reproductive system

- The female reproductive system consists of the following organs: Ovaries, oviducts (Fallopian tubes), Uterus and vagina.



Human- female reproductive system

- Ovaries ⇒ These are oval shaped organs present inside the abdominal cavity. A woman has 2 ovaries. The female gametes are made in ovaries. They are also responsible for the production of hormones such as estrogen and progesterone.

- Oviducts ⇒ The egg is carried from the ovary to the womb (uterus) through a thin oviduct. It is also known as fallopian tube.

- Uterus ⇒ The two oviducts unite into an elastic bag-like structure known

as uterus. It is also known as womb.

- Vagina => The uterus is connected through a narrow opening called cervix to another tube called vagina. Vagina recieves the penis for putting sperms into the woman's body.

* The embedding of embryo in the thick lining of the uterus is called implantation.

After implantation, a disc-like tissue develops between the uterus wall (uterine wall) and the embryo called placenta.

The placenta is responsible for providing the nutrition and air for breathing to the foetus. Also, the exchange of waste products also takes place through placenta.

* Gestation => The time period from the fertilisation up to the birth of the baby is called gestation.

Difference between zygote, embryo and foetus:

Zygote

- It is formed by the fusion of male and female gametes.
- It is the beginning of the formation of a baby.
- A zygote is a single cell.

Embryo

- It is formed by repeated cell division of a zygote.
- An embryo is an unborn baby in the uterus in the early stages development.
- An embryo is multicellular.

Foetus

- It is formed by the growth and development of embryo.
- It is an unborn baby in the uterus in later stages of development (after 8

weeks till birth).

- It is also multicellular. The body features of developing baby can be identified.

Menstruation cycle in females

- It starts in females at the time of puberty.
- The ovary releases one egg every month, the uterus also prepares itself every month to recieve a fertilised egg. Thus its lining becomes thick and spongy.
- If a sperm is not available at the time of ovulation, then fertilisation does not take place and the uterus lining breaks down. This lining contains blood and other tissues which come out of vagina in the form of bleeding.
- Definition ⇒ The breakdown and removal of inner, thick and soft lining of the uterus alongwith its blood vessels

in the form of vaginal bleeding is called menstrual flow or menstruation.

* Ovulation- The release of an ovum from an ovary is called ovulation.

Menarche and menopause

- The first occurrence of menstruation (or periods) at puberty is called menarche. Menarche is the time from which a girl becomes capable of having a baby.
- The permanent stoppage of menstruation in a woman is called menopause. It occurs at the age of 45 to 50 years.

* Fertilisation occurs in fallopian tubes.

Reproductive health

- Sexual act is a very intimate connection of bodies, so there is a chance for spreading the sexually transmitted diseases.

Examples-

Bacterial infections - Gonorrhoea and syphilis

Viral infections - Warts, HIV-AIDS.

Birth control methods

⇒ Birth control can be done by preventing pregnancy. The prevention of pregnancy in woman is called contraception. Some methods of contraception are as follows:

1) Barrier methods.

- In barrier methods, the physical devices such as condoms and diaphragm are used.
- Condoms are used by males and diaphragm is used by females.
- An important benefit in the use of condom is that it protects a person from STDs.
- These physical devices prevent sperms from meeting the ovum.

2) Chemical methods.

- In chemical methods, the females use two types of pills: oral pills and vaginal pills.

- The oral pills contain hormones which stop the ovaries from releasing ovum into the oviduct.

- The vaginal pills contain chemicals called spermicides which kill the sperms.

- Chemical methods have side effects too, because they change the hormonal balance.

3) Intra-uterine contraceptive device (IUCD).

- It is also called Copper-T which is very effective in preventing pregnancy.

- It is placed inside the uterus and it prevents the implantation of fertilised egg in the uterus.

4) Surgical methods.

- Surgical methods can be done in both males and females.

- In males, a small portion of vas deferens is removed by surgical operation and both the cut ends are tied properly.

This prevents sperms from coming out. This procedure is called vasectomy.

- In females, a small portion of oviducts is removed and the cut ends are tied. This prevents the ovum from entering into oviducts. This procedure is called tubectomy.

* Female foeticide - The killing of the unborn girl child is called female foeticide. It is a very bad and illegal work.

Sexually transmitted diseases (STDs):

=> The diseases which are spread by sexual contact with an infected person are called sexually transmitted diseases.

Examples: Gonorrhoea, syphilis, HIV-AIDS, warts, etc.

- Gonorrhoea and syphilis are caused by bacteria and are curable diseases.

- AIDS stands for - Acquired Immuno-deficiency syndrome. It is caused by

a virus known as HIV (Human immunodyficiency virus) virus. It damages the body's immune system and body becomes weak. It has no definite cure.