

HOW DO ORGANISMS REPRODUCE

- Reproduction is essential for the survival of a species on this earth. So, living organisms produce more organisms of their kind to maintain the life of their species on this earth.
- Reproduction gives rise to more organisms with the same basic characteristics as their parents. For example human beings always produce human babies; cat always produce kittens.
- If, however, some species of the living organisms cannot reproduce due to certain reasons, then the organisms of this species will gradually die out and disappear from this earth one day.
- Existing organisms or organisms are called parents and the new organisms produced by them are called offsprings.

Types of Reproduction

There are many different ways in which new organisms are produced from their parents. All the different ways of reproduction can be divided into two main groups

- (i) Asexual reproduction and
- (ii) Sexual reproduction

ASEXUAL REPRODUCTION

- In asexual reproduction, the offspring arises from a single parent.
- It is called asexual reproduction because it does not use special cells called 'sex cells' (or gametes) for producing a new organism.
- In Asexual reproduction, only one parent is needed to produce a new organism.

Asexual reproduction takes place by six different methods:

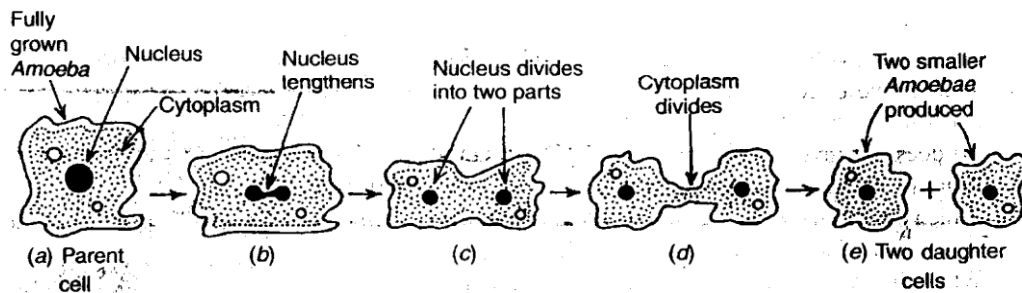
1. Fission

In the process of fission, a unicellular organisms divides to form two (or more new organisms). Fission is of two types Binary fission and Multiple fission.

(a) Binary Fission

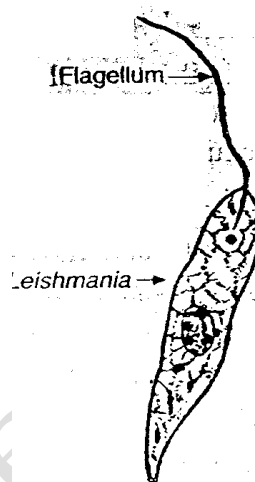
In binary fission, the parent organism divides to form two new organisms. When this happens, the parent organism ceases to exist and two new organisms come into existence. For example

- (i) Amoeba reproduces by binary fission by dividing its body into two parts. First the nucleus of amoeba lengthens and divides into two parts. After that cytoplasm of amoeba divides into 2 parts, one part around each nucleus. In this way, one parent amoeba divides to form smaller daughter Amoebae. In the unicellular organisms, Such as Amoeba, the splitting of parent cell during fission can take place in any plane.



(ii) Paramecium, a unicellular organisms also reproduce by the method of binary fission.

(iii) Leishmania is a unicellular parasite, which causes the disease known as kala-azar. Leishmania has a whip-like structure called Flagellum at its one end. It reproduces by the process of binary fission. In Leishmania, the splitting of parent cell during fusion takes place in a definite plane (longitudinally) with respect to flagellum at its end.

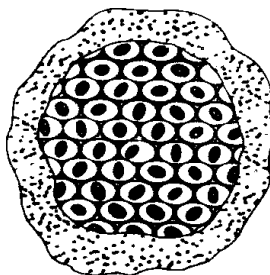


(b) Multiple Fission

In multiple fission, the parent organism splits (or divides) to form many new organisms at the same time. This happens as follows: Sometimes, a cyst or protective wall is formed around the cell of a single-celled organisms, like that of plasmodium a malarial parasite.

(i) Inside the cyst, the nucleus of cell divides several times to form many smaller nuclei called daughter nuclei. Little bit of cytoplasm collect around each daughter nuclei and thin membranes are formed around them.

(ii) In this way, many new daughter cells are formed when the favorable conditions arrive, the cyst break open and many daughter cells are present in it are released, each forming a new organisms.

**Binary Fission**

- This is the division of parent cell into 2 small nearly equal sized identical daughter individuals.
- The parent cell does not break away.

e.g., Amoeba

Multiple Fission

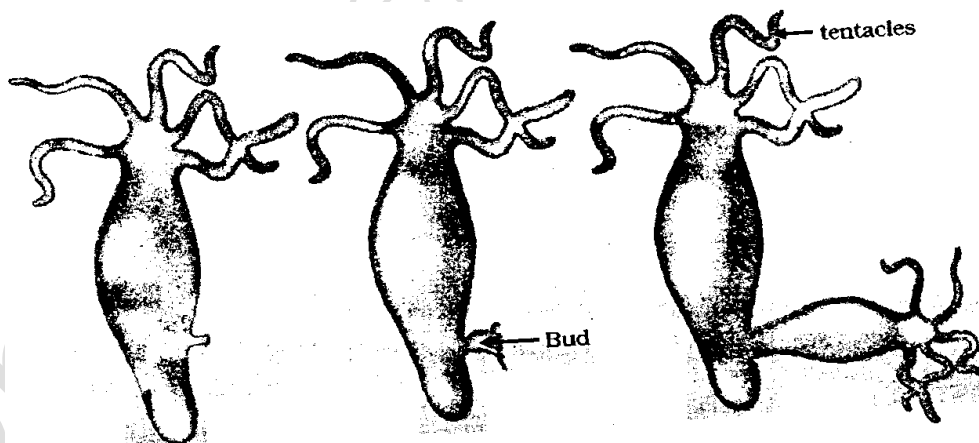
- This is the division of parent cell into several small, nearly equal size daughter individuals.
- The parent cell breaks away, releasing many individuals at once.

e.g., Plasmodium

2. Budding

In budding, a small part of the body of the parent organism grows out as a 'bud' which then detaches and becomes a new organism. The asexual reproduction by budding is observed in Hydra and yeast.

Organisms such as Hydra use regenerative cells for reproduction in the process of budding. In hydra, a bud develops as an outgrowth due to repeated cell division at one specific site. These buds develop into tiny individuals and one fully mature bud, detach from the parent body and becomes new independent individuals.

**ACTIVITY - 1**

AIMS: To observe various budding stages

PROCEDURE:

- Dissolve about 10 gm of sugar in 100ml of water.
- Take 20 ml of this solution in a test-tube and add a pinch of yeast granules in it.
- Put a cotton plug on the test-tube and keep it in a warm place.

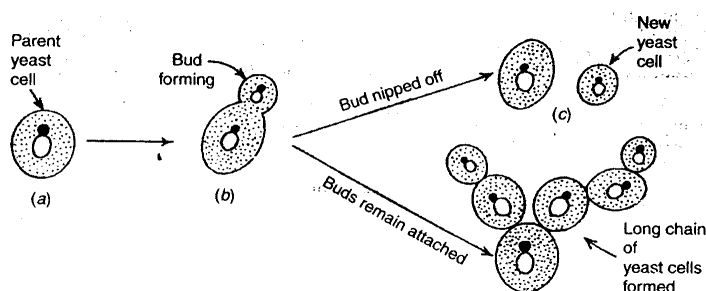
- After 1 or 2 hours, put a small drop of yeast culture from the test-tube on a slide and cover it with a cover slip.
- Slide is observed under a microscope.

OBSERVATION:

Yeast cells may be seen. Some of the yeast may show chain budding also.

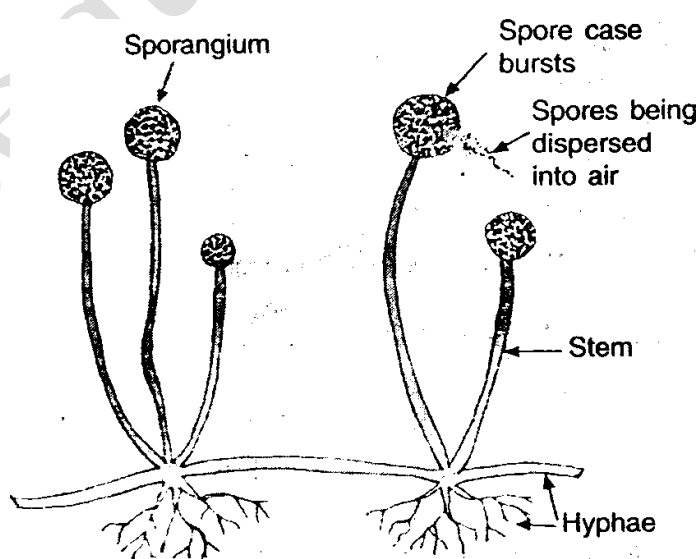
CONCLUSION:

In yeast reproduction takes place by budding. Buds are the small out growth from the parent body. This bud get detaches and eventually grows to form an new organism.

**3. Spore Formation**

In spore formation, the parent plant produces hundreds of microscopic reproduction units called 'spores'. When the spore case of the plant bursts, then the spores spread into air. When these air-borne spores land on soil under favorable conditions, they germinate and produce new plants.

The human bread mould (or *Rhizopus fungus*) reproduce by the method of spore formation. The common bread mould plant consists of fine; thread like projections called hyphae and these stems having knob-like structures called sporangia. Each sporangium contains hundreds of minute spores.



ACTIVITY - 2

AIM: To observe the stages of sporangial development.

PROCEDURE:

- Wet a slice of bread and keep it in cool, moist and dark place.
- Observe the surface of the slice with a magnifying glass.

OBSERVATION:

A white colony mass is seen spreading in the surface. After a week, white colony mass turns into black mass due to the formation of sporangia and spores.

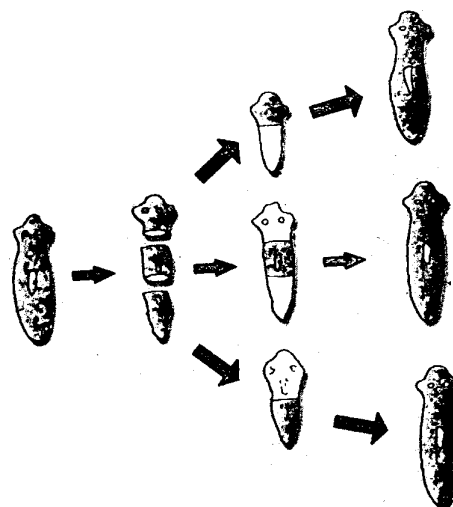
CONCLUSION:

In Rhizopus, reproduction takes place mainly by formation of spores. The spores when come into contact with moist surface begin to grow.

4. Regeneration

In some organisms, small cut parts of their body can grow (or regenerate) to form whole new organisms complete in all respects. The process of getting back a full organism from its body parts is called regeneration.

- For example, simple animals like Hydra and Planaria can be cut into any number of pieces and each piece grows into complete organism. This is known as regeneration.
- Regeneration is carried out by specialised cells. These cells proliferate and make large number of cell.
- From this mass of cells, different cells undergo changes to become various cell types and tissues.
- These changes take place in an organised sequence referred to as development. However, regeneration is not the same as reproduction, since most organisms would not normally depend on being cut up to be able to reproduce.



5. Fragmentation

- The breaking up of the body of a simple multicellular organisms into two (or more) pieces on maturing, each of which subsequently grows to form a complete new organisms, is called fragmentation.
- The organisms like Spirogyra and Sea anemones can reproduce by the method of fragmentation.
- Spirogyra simply breaks into 2 or more fragments on maturation, and each fragment then grows into a new spiroyra.

ACTIVITY - 3

AIM: To observe a slide under microscope.

PROCEDURE:

- Collect water from a lake or pond that appears dark green and contains filamentous structures.
- Put one or two filament on slide.
- Put a drop of glycerine on these filaments and cover it with a cover slip.
- Observe the slide under microscope.

OBSERVATION:

Spirogyra filament consisting of many cells are seen. These cells are attached in a linear fashion to form a filament.

CONCLUSION:

In spiroyra, the body are arranged in a filamentous form. The filament simply breaks up into smaller pieces upon maturation. These pieces or fragments grow into new individuals.

6. Vegetative propagation

- The reproduction by vegetative propagation occur only in plants. In this, new plants are obtained from the parts of old plants (like stems, roots and leaves), without the help of any reproductive organs.
- Some of the examples of plants which can be reproduced by vegetative propagation are: Bryophyllum, Guava, Potato, Onion, Banana, Garlic, Water hyacinth, Mint, Strawberry and Lily.
- Buds produced in the notches along the leaf margin of Bryophyllum fall on the soil and develop into new plants.

ACTIVITY - 4

AIMS: To show vegetative propagation by stem

PROCEDURE:

- Take a potato and observe its surface.
- Cut the potato into small pieces such that some pieces contain a notch or bud and some do not.
- Spread some cotton on a tray and wet it. Place the potato pieces on this cotton.

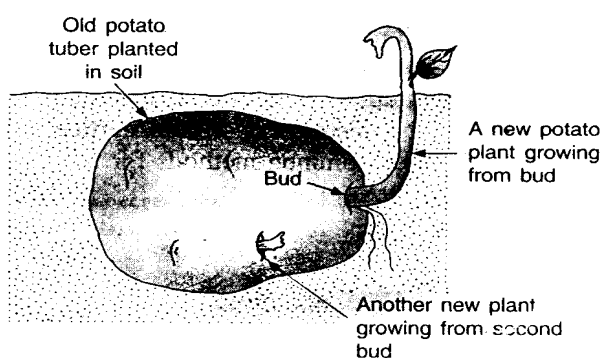
- Note where the pieces with the buds are placed.
- Observe changes taking place in these potato pieces over the next few days. Make sure that the cotton is kept moistured.

OBSERVATIONS:

The potato pieces which were having buds in notches show growth of young shoot and roots. The pieces which were not having eye buds did not show any growth of shoot or root.

CONCLUSION:

In potato, stem get modified into tuber. It has a number of buds (eyes) which grow into new plants. So, in these pieces having buds, growth of young shoot and roots takes place while in those pieces which do not have eye buds did not show any growth of shoot or root.



ACTIVITY - 5

Aim: To show vegetative mode of reproduction by leaves.

Procedure:

- Select a money plant.
- Cut some pieces such that they contain at least one leaf.
- Cut out some other portion between 2 leaves.
- Dip one end of all the pieces in water.
- Observe over the next few days.

Observation:

The pieces of money plant with leaves will form new plant while without leaves will not form new plant.

Conclusions:

The green leaves can synthesize food and have the ability to grow into a plant. This experiment shows vegetative propagation by leaves.



ARTIFICIAL PROPAGATION OF PLANTS

The three common methods for the artificial propagation of plants are: Cutting, Layering and Grafting.

1. Cutting

In this method, a cutting of the parent plant (stem or shoot) having some buds on it is taken and its lower part is buried in the moist soil. After a few days, the cutting develops roots and grows into a new plant.

The plants like Rose, boogainvillea, grapes, Chrysanthemum, sugarcane, cactus, etc. can be grown by means of cuttings.

2. Layering

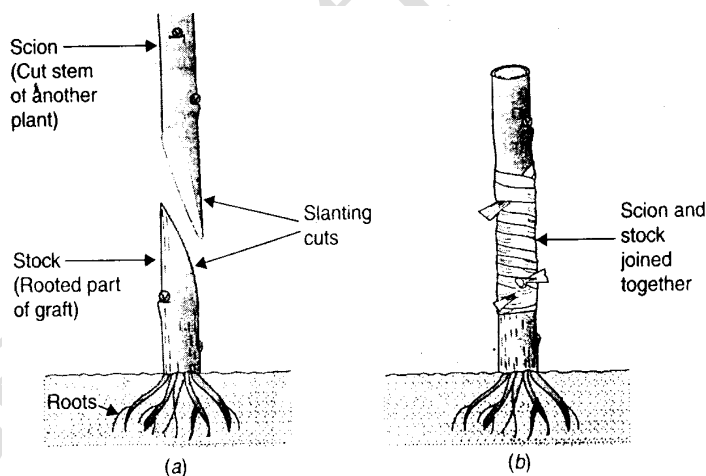
In this method, a branch of the plant is pulled towards the ground and a part of it is covered with moist soil leaving the tip of the branch exposed above the ground. After sometime, new roots develop from the part of the branch buried in the soil and then grows to become a new plant.

Jasmine plant (chameli) is propagated or produced by the layering method.

3. Grafting

Grafting is a method in which the cut stems of 2 different plants (one with roots and other without roots) are joined together in such a way that the two stems join and grow as single plant.

Apple, peach, apricot and pear trees are often grafted.

**Advantages of Artificial vegetative propagation are**

1. The new plants produced by artificial vegetative propagation will be exactly like the parent plants. Any desirable features of the parent plant will be replicated in new plants.
2. Plants raised by vegetative propagation can bear flowers and fruits earlier than those produced from seeds.
3. Many plants can be grown from just one parent plant by artificial propagation.
4. We can also get seedless plants like banana by artificial propagation.

TISSUE CULTURE

The propagation of new plants from a small piece of plant tissue (or cells) removed from the growing tips of a plant in a suitable growth medium (called culture solution) is called tissue culture.

The process of tissue culture for producing new plants is carried out as follows:

- A small piece of plant tissue is taken from plant and placed on culture medium. The plant tissue piece divide rapidly producing mass of cells, called as Callus.
- Callus is then treated with various transplanted hormones to develop roots and shoots. The callus with roots and shoots is called plantlets.
- These plantlets can then transplanted into soil, where they can grow to form mature plants.

The tissue culture technique is being used for plant like orchids, dahlia, chrysanthemum, etc.

DO ORGANISMS CREATE EXACT COPIES OF THEMSELVES IN ASEXUAL REPRODUCTION?

- Asexual reproduction is the division of a nucleus into two identical nuclei. Each daughter nucleus has the same genetic make up because of the replication of DNA (or copying of DNA) of the parent cell.
- After the division of the nucleus, the rest of parent cell divides to form two genetically identical daughter cells. The daughter cells can then form 2 offsprings.
- From this we conclude that all the offsprings produced by one parent as a result of asexual reproduction are usually genetically identical.
- But still, slight variation are introduced in asexual reproduction.
- The replication of DNA in the cell is done by certain biochemical reactions. No biochemical reaction can reproduce 100 percent same result.
- So, during replication of DNA, slight variations come in the 2 copies formed.
- The importance of variation in organization introduced during reproduction is that it helps the species of various organisms to survive and flourish even in adverse environment.
- For example, if there is a population of certain bacteria living in temperate water (which is neither very hot nor very cold) and the temperature of water increases too much due to global warming, then most of these bacteria will not be able to tolerate excessive heat and hence die. But, some bacteria which had variations to resist heat would survive and grow further.

SEXUAL REPRODUCTION

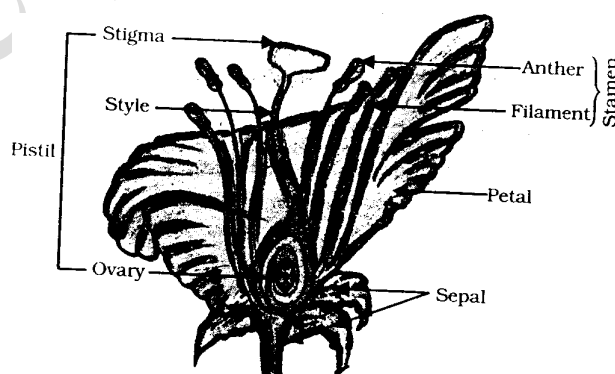
It is a type of reproduction in which both sexes males and females are involved to produce new generations.

Significance of sexual mode of reproduction

- It is highly evolved process and has many advantages over asexual reproduction.
- Sexual reproduction promotes diversity of characters in the offsprings because it results from the fusion of two gametes coming from two different and sexually distinct individuals.
- There is increasing opportunity for new combination of characters and therefore it plays a prominent role in the origin which is necessary for confection of new species. It leads to variation.

WHY THE SEXUAL MODE OF REPRODUCTION?

- The creation of two new cells from one involves copying of the DNA as well as of the cellular apparatus.
- The DNA copying mechanisms cannot be absolutely accurate, and thus sometimes variations occur in populations of organisms. But in a population, variations are useful for ensuring the survival of the species.
- Each new variation is made in a DNA copy that already has variations accumulated from previous generations. Thus, two different individuals in a population would have quite different patterns of accumulated variations.
- Combining variation from 2 or more individuals would thus create new combinations of variants. Each combination would be new, since it would involve two different individuals.
- Two sexual mode of reproduction incorporates such a process of combining DNA from two different individuals during reproduction.
- Each new generations is the combination of the DNA copies from two pre-existing individuals then each new generation will be having twice the amount of DNA than the previous generation.
- This will mess up the control of the cellular apparatus by the DNA For this problem organisms have special lineages of cells in specialised organs which have only half the number of chromosomes and half the amount of DNA as compared to the non-reproductive body cells.
- These special cells are the germ cells. When these germs cells from two individuals combine during sexual reproduction to form a new individual, it results in reestablishment of the number of chromosomes and the DNA content in the new generation.
- One germ cell is large and contains the food-stores while the other is smaller and likely to be motile. The motile germ cell is called the male gamete and the germ-cell containing the stored food is called the female gamete.

SEXUAL REPRODUCTION IN FLOWERING PLANTS

Sexual reproduction begins with the fertilisation which is defined as the union of two different gametes. The sperm is the male gamete and egg is the female gamete. The process of fusion of two gametes is called fertilisation. After fertilisation a zygote is formed, which develops into new organism.

ADVANTAGES OF SEXUAL REPRODUCTION

- It is highly evolved process.
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- In sexual reproduction, there is increasing opportunity for new combination of characters and therefore it plays a prominent role in the origin of new species.
- It leads to variation, which is necessary for evolution.

REPRODUCTIVE PARTS OF FLOWERING PLANTS ARE LOCATED IN FLOWER

A flower has different parts: • Sepals, • Petals, • Stamens and • Carpel

The flower may be

- **Unisexual** when it contain either stamen or carpel
For example: papaya, watermelon
- **Bisexual** when it contains both stamens and carpels.
For example Hibiscus, mustard.

Sepals and petals are non-essential accessory floral organs which do not take any direct part in sexual reproduction. Stamens and carpels are essential organs. They are directly involved in sexual reproduction. They contain the germ cells.

SEPALS

They constitute the outermost and lowermost part of a flower. They are mostly small green leaf like structures. They are primarily protective in function and protect un-opened floral bud. The sepals collectively are referred as Calyx.

PETALS

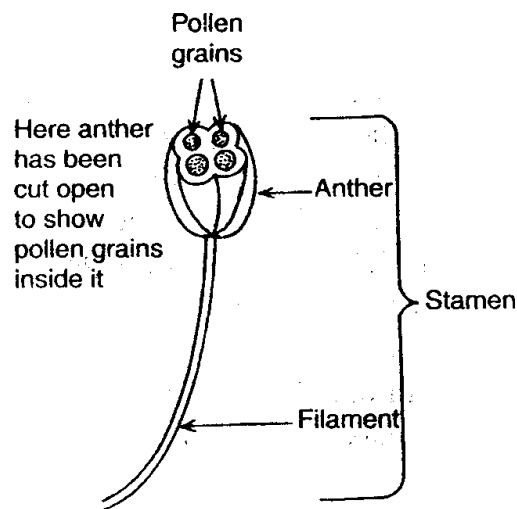
They contribute the second whorl in a flower. They are normally large, often fragment, brightly coloured structures. Their primary function is to attract animals and insect for pollination They are collectively called **corolla**.

STAMENS

It is the main reproductive part and it produces pollen grains that are yellowish in colour-each stamen is made up of two parts:

filament — the stalk of stamen

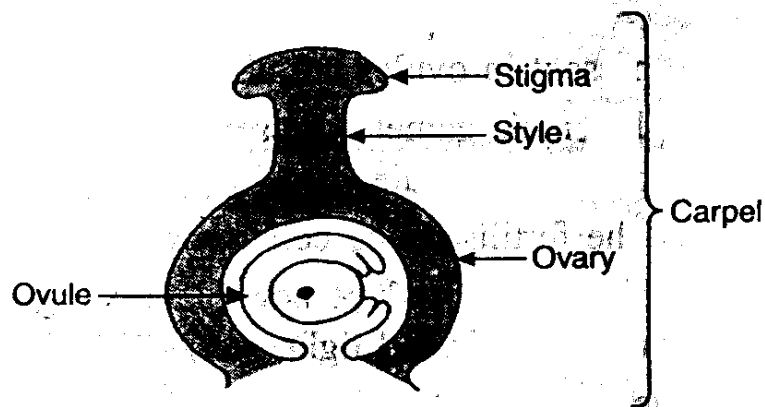
Anther — the swollen tip of stamen



The Anther has two anther lobes united together by a connective tissue. Each anther lobe has two pollen sacs which contains millions of tiny pollen grain.

Carpel (Pistil)

It is present in the center of a flower and is the female reproductive organ of plant. It is made up of 3 parts- Stigma, style and Ovary.



1. **Stigma:** It is the terminal part of the carpel, which may be sticky, rough or hairy to catch hold of pollen grain.
2. **Style:** It is the middle elongated part of the carpel.
3. **Ovary:** It is the swollen bottom part of the carpel. the ovary contains ovules and each ovule has a egg cell (female gamete)

POLLINATION

- It is the transfer and deposition of pollen grains from the anther to the stigma of a carpel.
- It is necessary that before the sexual union could occur, the pollen grains must be transferred to the stigma of the carpels. Thus pollination is one of the several events which must occur in a certain sequence before reproduction can be completed.
- The pollen grains are transferred by many agent , such as insects, birds, man, wind and water.

POLLINATION IS OF 2 TYPES:

- (a) **Self pollination:** It is the transfer of pollen grains from the anther of a flower to the stigma of the same flower or another flower of same plant.
- (b) **Cross pollination:** It is the transfer of pollen grains from the anther of one flower to the stigma of another flower of a different plant of same species.

Advantages of Cross Pollination

1. It brings about variations in the offsprings.
2. New and improved varieties of plants can be produced by this method.

Self-pollination

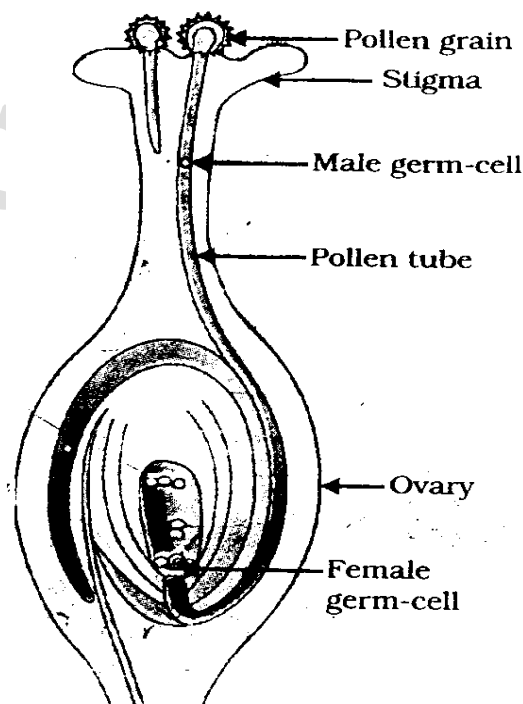
- It is the transfer of pollen grains from anthers to stigma of same flower.
- External agent is not required.

Cross-pollination

- It is the transfer of pollen grains from anther of one flower to stigma of another flower.
- External agent is essential for carrying cross-pollination.

FERTILISATION IN PLANTS

- Pollination is followed by fertilisation in plants.
- After the pollen lands on a suitable stigma, it has to reach the female green cells in the ovary.
- The pollen tube grows out of pollen grain and travels through the style to reach the ovary where ovules are located.

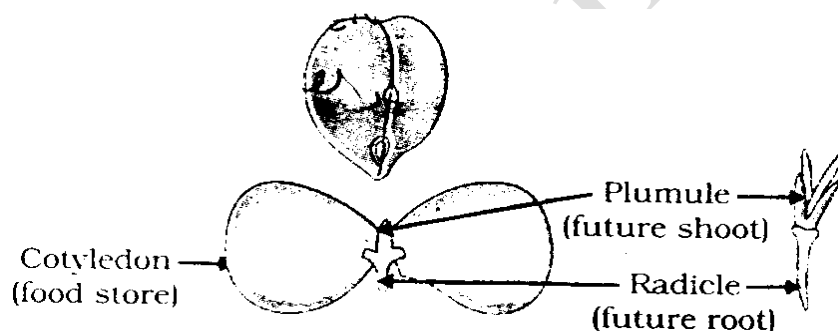


- The pollen tube normally enters the ovule through small opening called **micropyle**.

- Inside the ovule, the pollen tube releases two male gametes into the embryo sac.
- The embryo sac of the ovule contains the egg.
One male gamete fuses with the egg. The fusion of male and female gamete is called **syngamy** and its product is the **zygote**.
- The other male gamete fuses with the two polar nuclei and this process is called **Triple fusion**. It is called triple fusion because 3 nuclei are involved in the fusion process, one male gamete and two polar nuclei.
- Inside each embryo sac, two fusions syngamy and triple fusion, take place. This mechanism of two fusions occurring in an embryo sac is called **double fertilisation**.
- After fertilization, the zygote divides several times to form an embryo within the ovule.
- After fertilization, the ovary develops into the fruit.
- The ovule develops a tough coat and is gradually converted into a seed.

GERMINATION:

The seed contains the future plant or embryo which develops into a seedling under appropriate conditions. This process is known as germination.


ACTIVITY - 6

AIM: To identify the various parts of the seed.

PROCEDURE:

- Soak a few seeds of Bengal gram and keep them overnight.
- Draw in the excess water and cover the seeds with a wet cloth and leave them for a day.
- Make sure that the seeds do not become dry.
- Cut open the seeds carefully and observe the different parts.

OBSERVATION:

The different parts of seed observed were: two cotyledons, Plumule, Radicle.

CONCLUSION:

The seed consists of two cotyledons where food is stored. The lower end is radicle which will give rise to root and upper leafy end is plumule which will give rise to shoot in near future.

REPRODUCTION IN HUMAN BEINGS

Human use, sexual mode of reproduction. For this, they developed different reproductive organs. i.e., testis in male and ovary in female. These organs become functional only after attaining sexual maturity.

ASPECTS OF SEXUAL MATURATION OF THE BODY. Our bodies change as we become older. Our height and weight increases, acquire teeth, lose the old, so called milk teeth and acquire new ones. All these changes are the general process of growth.

But in early teenage, a whole new set of changes occurs which is not a simple one. Instead, the appearance of the body change.

SOME OF THESE CHANGES ARE COMMON TO BOTH BOYS AND GIRLS ARE:

- Skin frequently becomes oily and begin to develop pimples.
- Thick hair growing in new parts of the body such as armpit and the genital area between the thighs, which become darker in colour.
- Thinner hair can also appear on legs and arms as well as on the face.

There are also changes taking place that are different between boys and girls.

IN GIRLS:

- Breast size begins to increase.
- Darkening of nipple skin at breasts tip.
- Start of menstruation.

IN BOYS:

- Thick hair growth on the face.
- Voices began to crack.
- Penis occasionally began to become enlarged and erect.

All these changes differs from person to person. Thus all these changes are aspects of the sexual maturation of the body.

PUBERTY

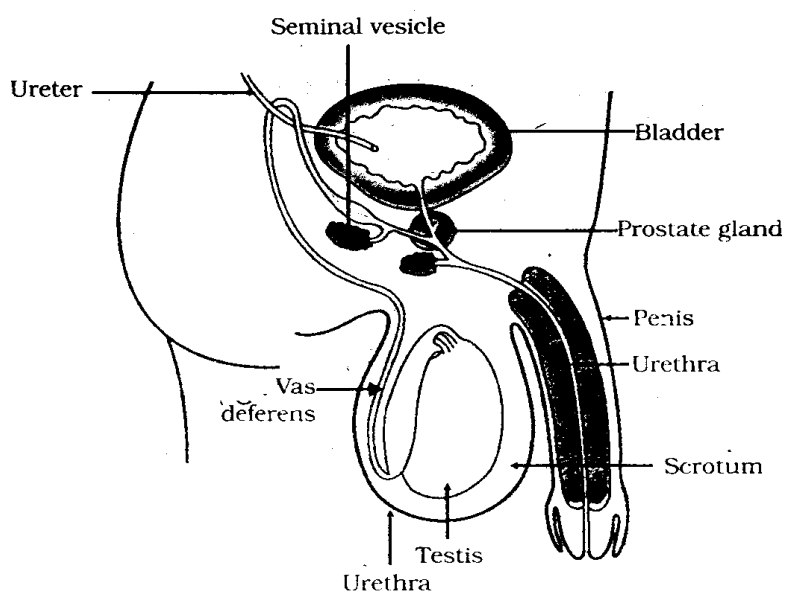
- In multicellular bodies there is a need for specialised cell to carryout specialised functions. The creation of germ-cells to participate in sexual reproduction is another specialised function. Human beings develop special tissues for this purpose.
- The structure associated with reproduction are different in male and female, there by forming a specialised male reproductive and female reproductive system.
- In the life of human beings, the age at which the sex hormones or gametes begin to be produced and the human beings reproductive system becomes mature or functional are called Puberty.
- Males attain puberty at the age of 13 to 14 years, while female attain it at the age of 10 to 12 years.

Sexual mode of reproduction means that germs cells from two individuals have to join together. This can happen by the external release of germ cells from the bodies of individuals as happens in flowering plants. Or it can happen by two individuals joining their bodies together for internal transfer of germ cells for fusion, as happens in many animals.

If animals are to participate in the process of mating, their state of sexual maturing must be identifiable by other individuals. Many changes during puberty, such as new hair growth patterns, are signals that sexual maturation is taking place.

The actual transfer of germ cells between two people needs special apparatus for the sexual act, such as the ability of the penis to become erect. In mammals, such as humans, the baby is carried in the mother's body for a long period, and will be breast-fed later. The female reproductive organs and breasts will need to mature to accommodate these possibilities.

MALE REPRODUCTIVE SYSTEM



The male reproductive system consists of portions which produce the germ cells and other portion that deliver the germ cells to the site of fertilisation.

The human male reproductive system consists of following organs.

1. **Scrotum:** It is a pouch of deeply pigmented skin divided into 2 separate sacs. Each sac contains one testis. The normal temperature of the testis in the scrotum is about 2° lower than the internal body temperature. It is ideal temperature for developing sperms.
2. **Testis:** The formation of germ-cells or sperms take place in the testis. These are located outside the abdominal cavity in scrotum because sperm formation requires a lower temperature than the normal body temperature.

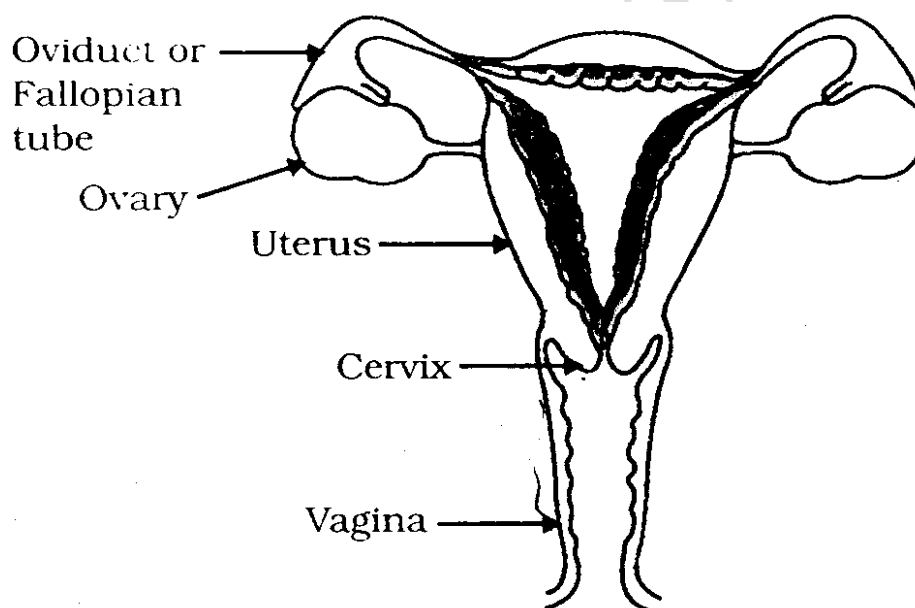
The function of testis is to produce sperm and the male sex hormone testosterone brings about changes in appearance in boys at the time of puberty.

3. **Epididymis:** It is a coiled tube-like structure firmly attached to the testis and serves as the store house of the sperm.
4. **Vas deferens:** The sperms formed are delivered through the vas deferens which unites with a tube coming from the urinary bladder.

5. **Urethra:** The urethra forms a common passage for both the sperms and urine.
6. **Prostate gland:** It is a single large gland that surrounds the urethra. It secretes a milky fluid that aids in sperm motility.
7. **Seminal vesicles:** They are one pair of sac like structures near the base of the bladder, this duct join the vas deferens to form the ejaculatory ducts.

Along the path of vas deferens glands like the prostate and seminal vesicles add the secretions so that the sperm are now in a fluid which makes their transport easier and the fluid also provide nutrition.
8. **Penis:** It is the male external genital organ. It is the copulatory organ with thick muscular walls. It transfers into the reproductive tract of female during sexual intercourse.
9. **Semen:** It is a collection of secretions from the seminal vesicles, prostate gland etc. and sperms from testis. when penis is erect, semen is ejaculated from penis during ejaculation.
10. **Sperms:** They are tiny bodies that consists of mainly genetic material and a long tail that helps them to move towards the female germ cell.

FEMALE REPRODUCTION SYSTEM



The female germ cells or eggs are made in the ovaries. They are responsible for the production of some hormones.

The various organs in the female reproductive system:

1. **Ovaries:** They are primary sex organ of human female. In females, paired ovaries are located in the abdominal cavities near the kidney. the ovaries perform dual function of
 - production of female gamete (ovum) and
 - secretion of female hormones (estrogen and progesterone).

Each ovary is composed of ovarian follicles. At puberty these follicles undergo maturation to produce ova.

2. **Fallopian tube or Oviduct:** They are a pair of long convoluted tubes that carry the ovum from the ovary to the uterus. Fertilisation of the ovum generally takes place in the upper portion of the fallopian tube.
3. **Uterus (womb):** It is hallow muscular and pear shaped structure. It lies in the pelvic cavity between the urinary bladder and the rectum. After fertilisation the embryo gets attached to the uterine wall where it is nourished and protected. Its upper portion is broader, while its lower portion is narrower called cervix. It opens into vagina.
4. **Vagina:** It is a tubular structure. It is also called “**birth canal**” as through this canal young one is born after completion of development inside uterus. this provides a passage way for the menstrual flow, serves as the receptacle for sperm during intercourse.

In females urinary opening (urethra) and vaginal opening are separate.

Ovum is released from the respective ovary into fallopian tube by a process called Ovulation.

FERTILISATION IN HUMAN FEMALES

- Fertilisation is the fusion of male gamete and a female gamete to form a zygote during sexual reproduction.
- In human beings fertilisation mainly occurs in the fallopian tube.
- The sperms (male gametes) enter through the vaginal passage during sexual intercourse, move up through cervix and reach the oviduct where they encounter the egg.
- If the fallopian tube only one sperm fertilises the ovum.
- Fertilisation takes place by the union of the sperm and the ovum. After this zygote is formed.
- Fertilisation is marked by the absence of menstrual flow.
- The embryonic development of zygote starts immediately in the fallopian tube and pregnancy begins.
- The embryo moves down to reach the uterus and get attached to its thickened inner wall.
- The close attachment of the embryo with the uterus is called implantation. After implantation embryo starts dividing.
- The uterus prepares itself to nurture the growing embryo . The lining thickens and is richly supplied with blood to nourish the growing embryo.
- The embryo gets nutrition from the mothers blood with the help of a special tissue called Placenta.
- The placenta is a disc which is embedded in the uterine wall. It contains villi on the embryo's side of the tissue.
- On the mother's side are blood spaces, which surround the villi. This provides a large surface area for glucose and oxygen to pass from the mother to embryo.
- The developing embryo will also generate waste substances which can be removed by transferring them into the mother's blood through the placenta.
- The development of the child inside the mother's body take approximately nine months.
- The child is born as a result of rhythmic contractions of the muscles in the uterus.

MENSTRUAL CYCLE

The cycle of events taking place in the ovaries and uterus over twenty eight days and marked by the menstrual flows is called **menstrual cycle** (sexual cycle in human female).

- In a normal healthy woman ovulation takes place in the mid of the menstrual cycle around 14th day. Menstruation occurs over 28 to 30 days.
- The commencement of menstruation of puberty is termed **menarche**, and marks the beginning of reproductive life of a woman.
- The development of foetus inside the uterus till birth is called gestation.
- On completion of gestation, the birth of fully developed foetus is termed as parturition.
- The Break down and the removal of the thickened inner wall of the uterus along with blood vessels and mucus in the form of vaginal bleeding is called menstrual flow or Menstruation. It usually lasts for about 2 to 8 days.
- The stoppage of menstrual flow and other events at a certain age is termed Menopause. It happens around at the age of 50 years.

SEXUAL TRANSMITTED DISEASES

- **STDs**, sexual transmitted diseases are the diseases which are spread by sexual contact from an infected person to a healthy person. The diseases can be bacterial infections such as gonorrhea and syphilis and viral infection such as warts and HIV/AIDS.
- In most cases, the symptoms of these disease are burning sensation at urination and urethral discharge, these disease are curable.
- AIDS caused by a virus called **Human Immunodeficiency Virus (HIV)** which suppress the body's immune mechanism and thereby making it susceptible to any diseases. It has no definite cure.

REPRODUCTIVE HEALTH

The sexual act always has the potential to lead to pregnancy which will make major demands on the body and mind of the woman and if she is not ready for it, her health will be adversely affected. Therefore many ways have been devised to avoid pregnancy.

A number of techniques have been developed to prevent and control pregnancy.

1. MECHANICAL BARRIER METHOD

This includes the creation of a barrier so that sperm does not reach the egg. Here condoms on penis by male and a covering worm in the vagina are used by female.

2. CHEMICAL METHOD

In these methods specific drugs are used by females which are of two types

- (a) **ORAL PILLS:** It contains hormones which stop the ovaries from releasing ovum into fallopian tube. These pills are also called Oral contraceptive (OCs) which acts by changing the hormones balance of the body so that eggs are not released and fertilisation cannot occur.
- (b) **IUCDs:** The use of intrauterine contraceptive devices (IUCD) prevents implantation in the

uterus. This device is a copper-T placed in the uterus to prevent pregnancy.

(c) **VAGINAL PILLS:** These pills contain the chemical called spermicides which kill the sperms.

3. SURGICAL METHOD

- In males, a small portion of vas deferens or sperm duct is removed by surgical operation and both the cut ends are tied properly. This blocked the vas deferens and sperm transfer will be prevented. This is called **VASECTOMY**.
- In females, a small portion of the fallopian tubes is removed by surgical operation and cut ends are tied. This blocked the fallopian tube and the egg will not be able to reach the uterus, thus fertilisation will not take place. This is called **TUBECTOMY**.