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HOW ORGANISMS REPRODUCE?

Reproduction :-

Reproduction is the process by which living organisms produce new individuals of the same species. Reproduction is necessary for the survival and increase in the population of a species. If organisms do not reproduce, their population decreases and species will become extinct.

Do organisms create carbon copies of themselves ?

The DNA (Deoxyribo nucleic acid) molecules in the chromosomes in the nucleus is responsible for the transfer of characters from the parents to the off springs. During reproduction the reproductive cells produce two copies of the DNA which separate into two cells. The DNA copies will be similar but not identical to each other. So the new individuals have slight variations from their parents. This is the basis for variations and evolution of new species.

The importance of variation

DNA copying during reproduction is important for maintaining the body designs of different organisms to survive in the existing environment. But the environment is constantly changing due to changes in temperature, climate, water levels etc. If organisms cannot adjust themselves to the changes in the environment then their species will become extinct.

If there are variations in some individuals of a species they may be able to survive the changes in the environment. So variations in species is necessary for the survival of different species and for the evolution of new species.

Types of reproduction :-

There are two main types of reproduction in living organisms. They are asexual reproduction and sexual reproduction.

Asexual reproduction :- is reproduction in which new individuals are produced from a single parent.

Sexual reproduction :- is reproduction in which two individuals are involved to produce a new individual.

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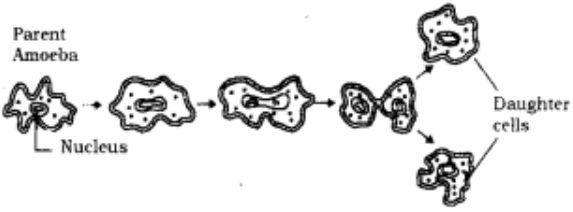
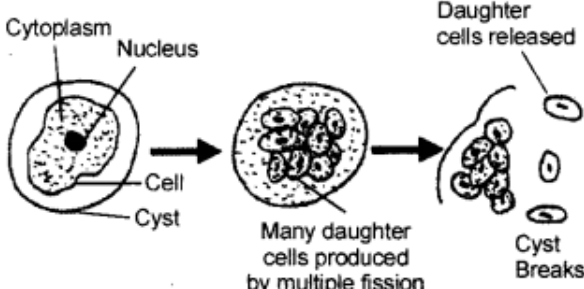
Asexual reproduction is of different types. They are:- fission, budding, regeneration, fragmentation, spore formation, vegetative propagation etc.

i) Fission:- Fission is an asexual reproduction by which a unicellular organism divides and forms two or more new individuals. Fission is of two types.

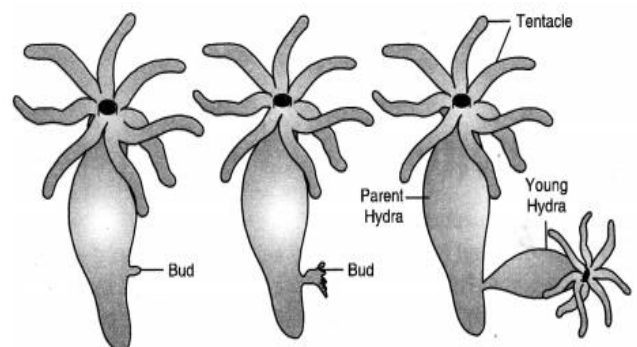
i) Binary fission :- In this method an organism divides and forms two individuals. First the nucleus divides and forms two nuclei. Then the cytoplasm divides and forms two daughter cells.

Eg:- Amoeba, Paramecium etc.

ii) Multiple fission :- In this method one organism divides into many daughter cells. Eg. Plasmodium (Malarial parasite).

Binary Fission	Multiple Fission
<ol style="list-style-type: none"> 1. It refers to the division of parent cell into two small, nearly equal sized identical daughter individuals. 2. The parent cell does not break away. Example <i>Amoeba</i>.  <p style="text-align: center;">Binary Fission in Amoeba</p>	<ol style="list-style-type: none"> 1. It refers to the division of parent cell into several small, nearly equal sized daughter individuals. 2. Parent cell breaks away, releasing many individuals at once. Example : <i>Plasmodium</i>.  <p style="text-align: center;">Multiple Fission in Plasmodium</p>

ii) Budding :- In this method a bud like projection is formed on the body of the organism. The bud then develops into a new individual. It then separates from the parent and forms an independent individual. Eg:- Hydra, Yeast etc.



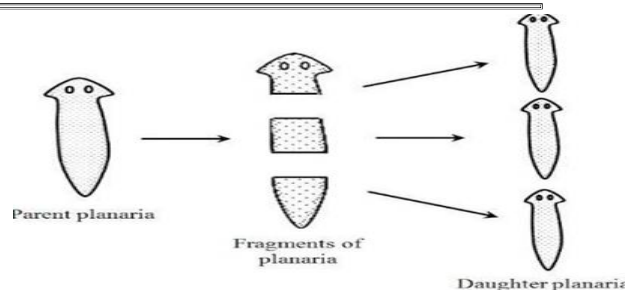
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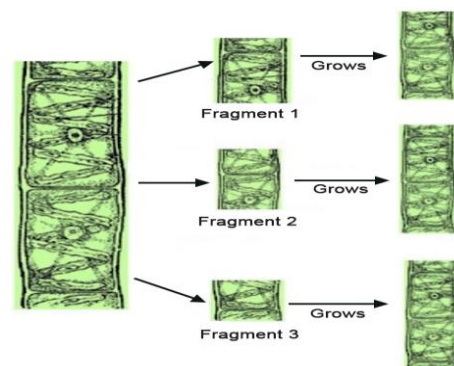
iii) Regeneration :- In this method a part of the body of the organism if cut or broken can develop into a new individual.

Eg :- Hydra, Planaria, Star fish etc.



iv) Fragmentation :- In this method the body of a simple multicellular organism breaks up into smaller pieces on maturation and each fragment develops into new individuals.

Eg :- Spirogyra.



v) Spore formation :- In this method structures called sporangia produce tiny cells called spores. When the spores come in contact with a moist surface, it develops into new individuals.

Eg :- Rhizopus, Mucor, Penicillium etc.

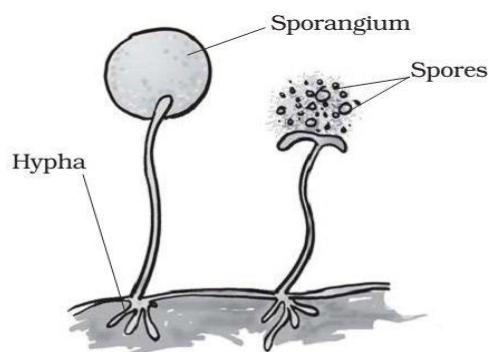


Fig. 12.7 Reproduction through spore formation in fungus

vi) Vegetative propagation :-

In this method new plants are produced from the vegetative parts of the plant like root, stem or leaf. Eg:- from roots – dhalia, sweet potato, from stem – potato, ginger, from leaf – bryophyllum, begonia.

Plants produced by vegetative propagation produce flowers and fruits earlier than those produced from seeds. It also helps in the propagation of plants which do not produce seeds like rose, jasmine banana etc.

Vegetative propagation can also be done artificially by cutting, layering, grafting etc.

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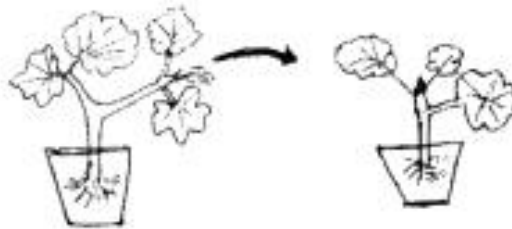
1) Ground layering



2) Grafting



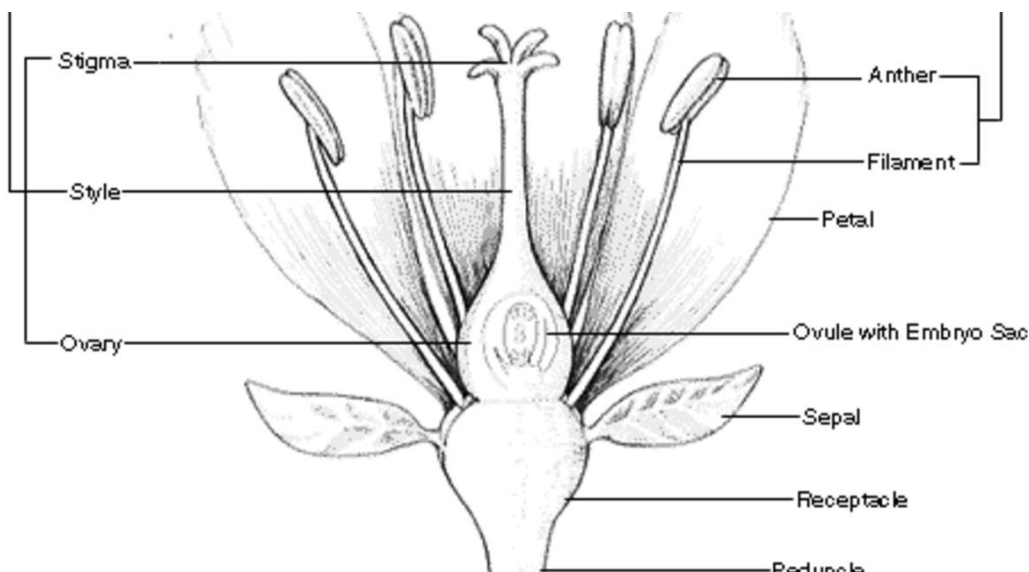
3) Cutting



Sexual reproduction in flowering plants :-

a) Reproductive parts of a flower :-

The stamen and pistil are the reproductive parts of the flower. Stamen is the male reproductive part. It produces pollen grains in the anther which contains the male germ cell (male gamete). Pistil is the female reproductive part. It produces ovules in the ovary which contain the female germ cell (female gamete).



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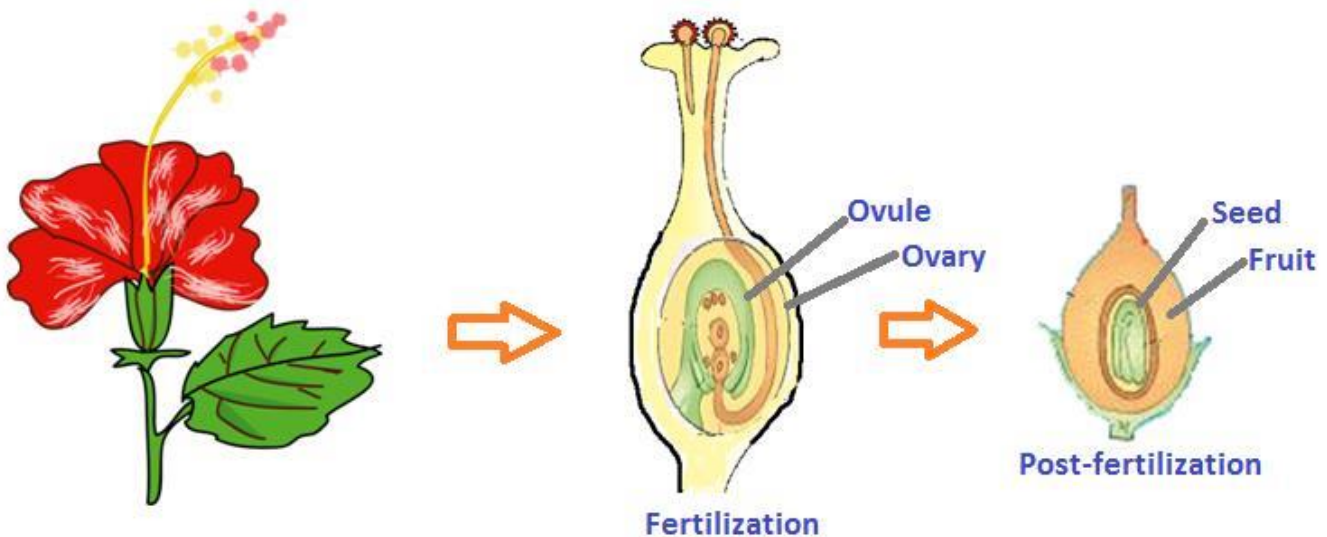
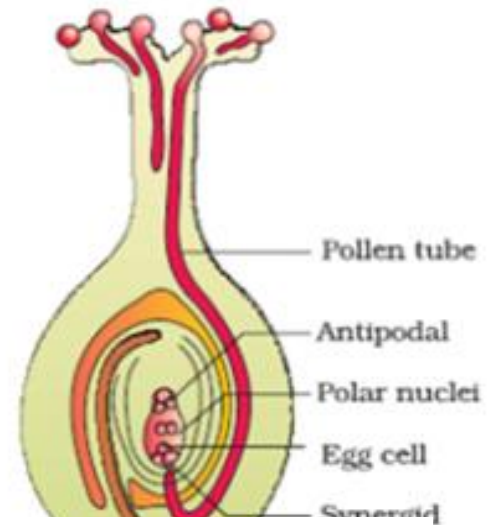
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b) Pollination :-

The transfer of pollen grains from the anther to the stigma of a flower is called pollination. It takes place by wind, water or insects. If the pollen grains are transferred from the anther to the stigma of the same flower it is self pollination and if it is transferred from the anther of one flower to the stigma of another flower it is cross pollination. Pollination takes place by insects, wind, water etc.

c) Fertilisation :- After the pollen grain is transferred to the stigma it produces a pollen tube which passes through the style and enters the ovary and ovule. In the ovule the male germ cell (male gamete) fuses with the female germ cell (female gamete) to form a zygote. This process is called fertilisation.

After fertilisation the zygote divides several times and forms the embryo which then develops into the seed and the ovary develops into the fruit.



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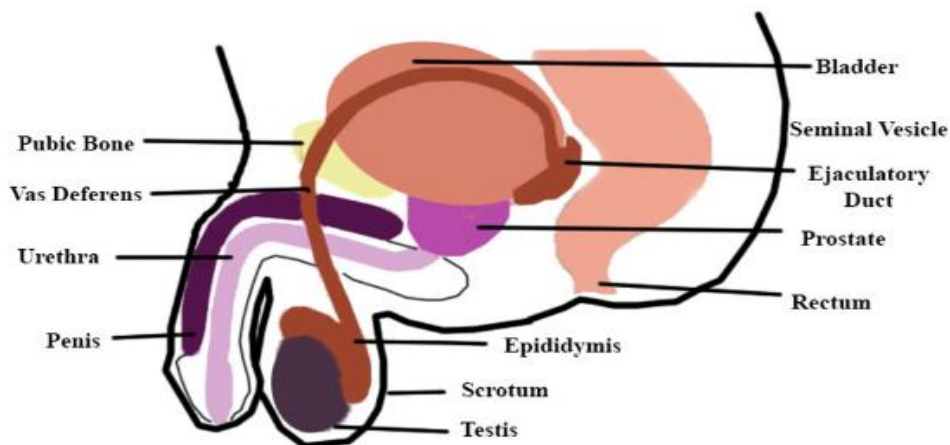
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Reproduction in Human Beings.

- The mode of reproduction in human beings is sexual mode. There are some changes that begin in the teenage age that start to prepare us for the reproductive phase of life. This period of adolescence leads to sexual maturation. The body needs to create specialised germ-cells to take part in the sexual reproduction. The period of maturation of the reproductive tissues in the body is termed as puberty.
- Numerous changes are noticed in both boys and girls during this period. The boys start to have hair growth on their face and body, voice change, active functioning of sweat and sebaceous glands, enlargement of penis etc. The changes in the girls include growth of pubic hair, enlargement of breasts, oily skin leading to pimples, onset of menstruation etc. Both of them undergo changes in their body appearance and they become more conscious of these bodily changes.

Male Reproductive System

The system consists of some external organs like penis, scrotum, testes and internal organs like urethra, prostate and seminal vesicles.



Testes: Testes is responsible for the production of the male germ-cell or sperms and the male hormone testosterone. Testes are present in a structure known as scrotum, located outside the abdominal cavity. This is thus located because the formation of sperm requires a temperature that is lower than the normal body temperature. The hormone testosterone plays a role in regulating

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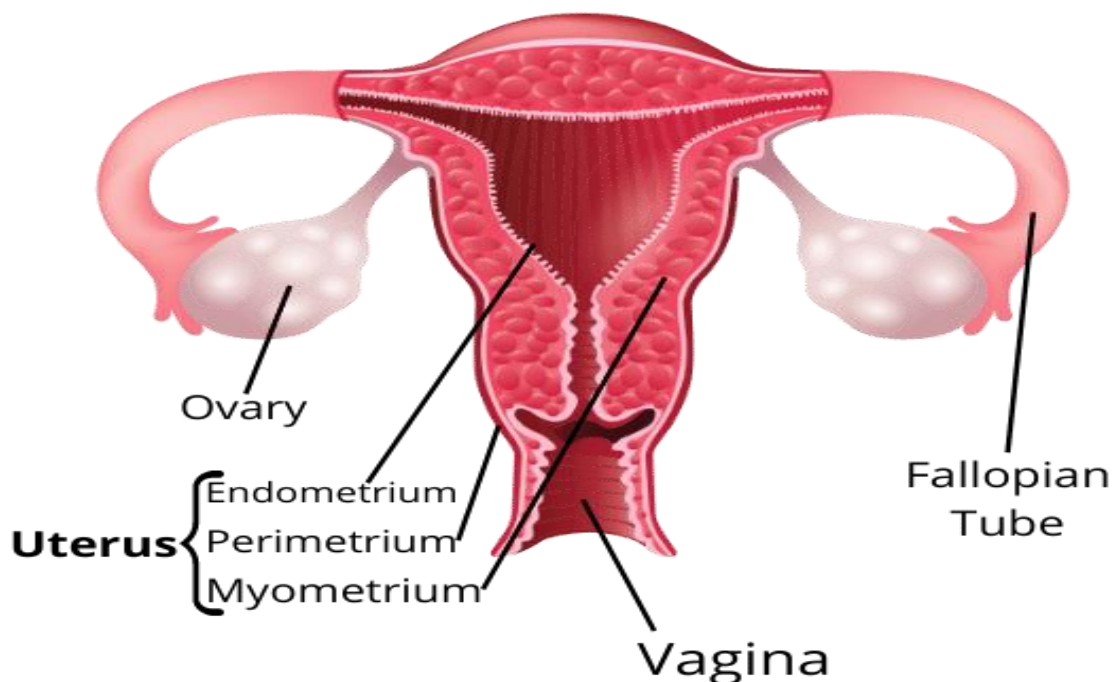
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the formation of sperms and also the development of the secondary sexual characteristics that are seen in boys during puberty.

1. **Vas Deferens:** The sperms that are produced in the testes are stored in the epididymis. Vas deferens is a tube that transports these sperm to the urethra.
2. **Urethra:** This is a common passage for the sperm as well as urine. The same passage connects the urinary bladder and the vas deferens.
3. **Prostate Gland and Seminal Vesicles:** These glands are located along the vas deferens. They secrete a fluid, called semen that nourishes the sperm. This semen helps in the easier movement of sperms.

Female Reproductive System.

- This system includes a pair of ovaries, a pair of oviducts, uterus and vagina that opens externally through the urethra.



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1. **Ovaries:** The ovaries are a pair of glands that are located on either side of the uterus. The female gametes are the eggs that are produced in the ovaries. They also produce some hormones like estrogen and progesterone that are responsible for the onset of secondary sexual characteristics in girls at puberty.
2. **Fallopian tube:** This is also known as oviduct. This is a thin tube that connects the ovaries to the uterus. The eggs that are released by the ovary are transported through this tube.
3. **Uterus:** This is a bag-like muscular elastic structure into which the two oviducts open. The uterus is the site where the fertilized egg is implanted and it grows into a foetus. It is made of 3 tissues, outer perimetrium, middle layer of myometrium and the inner endometrium.
4. **Cervix:** This is the site where the uterus opens into vagina. This facilitates a passage for the entry of the sperm into the uterus.

Fertilization and Development:

- The process of fertilization of a male and female gamete or sperm and egg starts when the sperm enters the female reproductive system through the vaginal passage during a sexual intercourse. From the vaginal passage they move up through the uterus towards the fallopian tubes.
- The eggs are present in the fallopian tube, meet the sperm and get fertilized.
- The fertilized egg, which is known as the zygote, starts dividing repeatedly and travels down the fallopian tube to the uterus.
- The ball of cells or embryo gets implanted in the endometrial lining of the uterus and continues to grow into a foetus. The embryo gets its nourishment from the mother through a special tissue called the **placenta** which acts as a connection between the mother and the developing embryo. It helps to transport glucose and oxygen to the embryo and remove the wastes generated by the embryo.
- It takes about nine months for the complete development of the child inside the mother's body. The child is born due to the rhythmic contractions of the uterine muscles.

Menstrual cycle

- An egg is released by the ovary every month in anticipation of it getting fertilised. In case the egg does not get fertilized, it can survive for only a day. Similar to the ovary releasing

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an egg every month, every month, the uterus too prepares itself to the fertilized egg by creating a thick and spongy lining in order to provide nourishment to the embryo.

When the fertilization does not occur, this lining too is not required and this lining and the egg is shed as blood and mucous through the vagina. This is called menstruation. This cycle occurs every month and lasts for about 2 - 8 days roughly.

Contraceptive methods

Mechanical barriers

- ➔ These prevent the meeting of sperm and ova.
- ➔ e.g., condoms on the penis or similar coverings worn in the vagina.

Oral pills

- ➔ These changes the hormonal balance of the body.
- ➔ Eggs are released and hence fertilisation cannot occur.

IUDs

- ➔ Intra uterine devices (IUDs) such as loop or copper-T are placed in the uterus to prevent pregnancy.
- ➔ These devices are widely accepted in India.

Surgical methods

- ➔ **Vasectomy:** Surgical blockage of vas deferens in males to block sperm transfer.
- ➔ **Tubectomy:** Surgical blockage of fallopian tube in females, prevent egg transfer.