

Wisdom Education Academy

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How do Organisms Reproduce

Ability to produce new organism is known as reproduction. There are two types of reproduction- asexual reproduction and sexual reproduction.

Different types of Reproduction

There are mainly two types of reproduction- asexual reproduction and sexual reproduction.

Asexual Reproduction

It is a mode of reproduction involving single parent. There are different modes of asexual reproduction-

- Fission is defined as the splitting of the organisms into two equal halves and each half give rise to a new organism. For example, *Amoeba*, bacteria. The most common type of fission in binary fission. It is a division of the organism such as bacteria into two or more parts. Binary fission can be irregular (division can take place in any plane), longitudinal (division occurs longitudinally), transverse (division occurs transversely) and can also be oblique (division occurs obliquely).

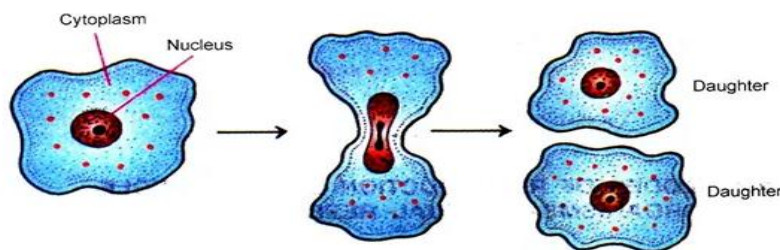


Fig.1. Binary fission in *Amoeba*

- Fragmentation is another mode of asexual reproduction in which organism breaks into pieces and each piece give rise to a new organism. For example, *Spirogyra*, *Planaria*.

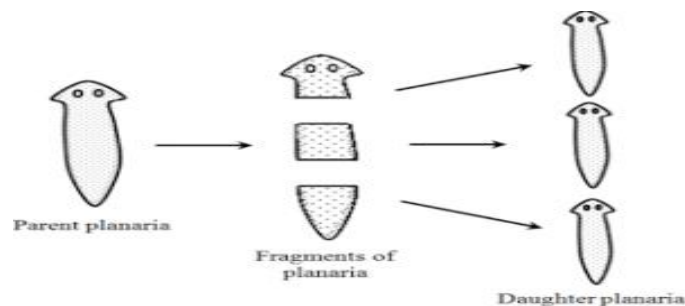


Fig.2. Fragmentation in *Planaria*

- Regeneration is the ability to form new organism from the body parts. Cut or broken part generates a new organism. For example, *Hydra*, *Planarians*

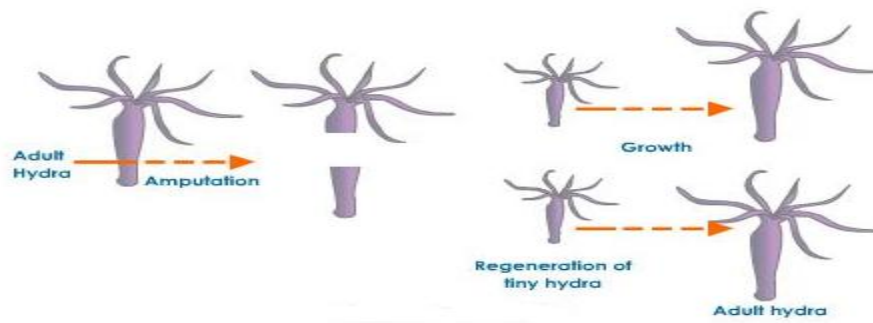


Fig. 3. Regeneration in *Hydra*

- Budding is defined as an outgrowth from the body of the organism. This outgrowth then detaches from the body and form a new independent organism. For example, *Hydra* and Yeast.

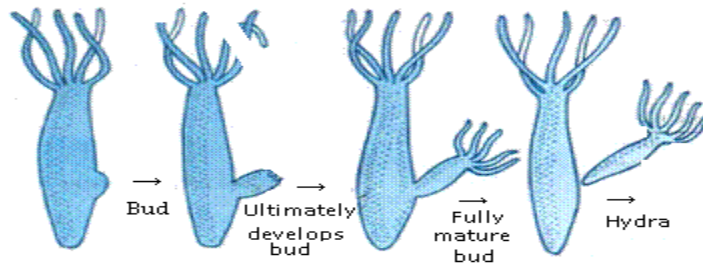


Fig .4. Budding in *Hydra*

- Vegetative reproduction is another method of asexual reproduction. In this form of reproduction, stem, root and leaves are used to form plants when provided with suitable conditions. Layering and cutting are the two common methods used for vegetative propagation. For example, banana, rose, jasmine etc. The plant produced through vegetative propagation is genetically identical to parent plant.

Cutting involves the rooting of the severed piece of the plant.

Layering involved rooting of the piece of the plant and then severing it.

Grafting occurs when two plant parts are joined together such as stem and root. The stem of the plant to be grafted is known as the scion, and the root is called the stock. (NTSE)

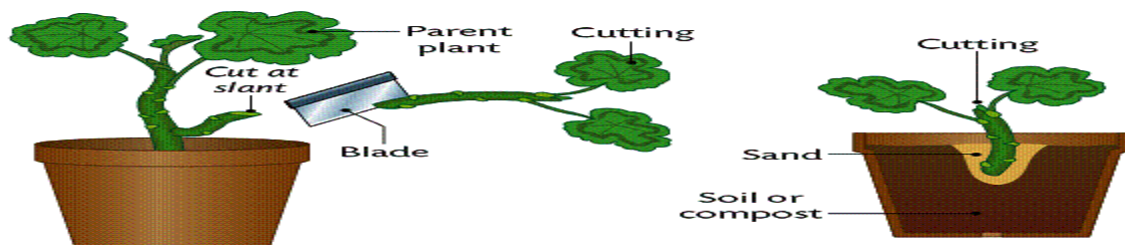


Fig.5. Vegetative Propagation

- Spore formation is another method of asexual reproduction that involves specific reproductive parts such as hyphae in *Rhizopus* and blob-on-a stick structure in *Rhizopus* are involved in reproduction.

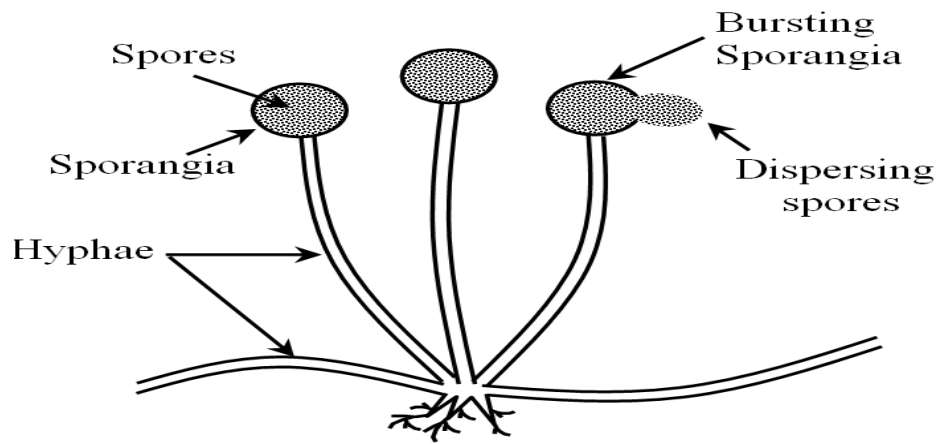


Fig.6. Spore formation in *Rhizopus*

Sexual Reproduction

Sexual reproduction involved two different parent organisms involving female and a male parent.

Significance of Sexual Reproduction

Sexual reproduction is the source of **variation**. Mixing of two organisms give rise to new recombinants or variants. Sexual reproduction involves the mating of germ cells also known as **gametes**. These gametes are haploid in nature, that is, they have half set of chromosomes. These gametes are formed through the process of meiosis. When male gametes and female gamete each with haploid set of chromosomes combine they will form a diploid zygote. Zygote undergo repeated divisions to form a new organism.

In human male gamete is small and motile whereas female gamete is large and non-motile.

Sexual Reproduction in Flowering Plants

Flower is the reproductive structure found in angiosperms. Flower consists of sepals, petal, stamens and pistils.

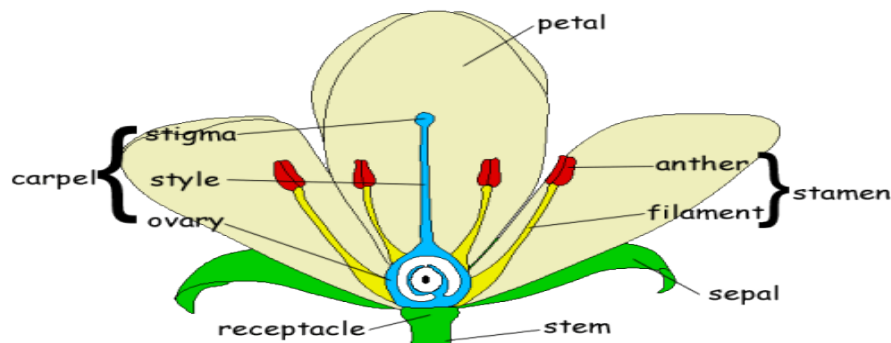


Fig.7. Structure of flower

A flower is said to be unisexual if it contains either stamens or pistils whereas if both stamens and pistils are present, it is known as bisexual. Papaya and watermelon are unisexual whereas *Hibiscus* and mustard are bisexual in nature.

Pistil/carpel is the female reproductive structure which consists of swollen basal part ovary, middle elongated style and terminal stigma. Ovary contain ovules and each ovule bear an egg cell. Stamen is the male reproductive part and it consists of anther and the stigma. Anther contain pollen grains which fuses with female gamete, that is, egg cell. Fusion leads to zygote formation which forms a new plant.

Transfer of pollen grains from the anther to the stigma of the flower is known as pollination. When the pollen and the stigma is of the same flower, it is known as self-pollination. When pollen from one flower lands on the stigma of another flower it is known as cross pollination.

Gametogenesis

Formation of gametes is known as gametogenesis. Male gamete is pollen grains whereas female gamete is present inside the ovary. Ovary contains ovule. Ovule contains the female gametophyte. Ovule also consists of outer layers known as integuments, nucellus and female gametophyte. Male and female gametes are produced and they are haploid in nature. There are two types of gametes- homogametes and heterogametes. When male and female gametes cannot be differentiated morphologically. They are known as homogametes. For example, gametes in *Cladophora*, Algae. When male and female gametes can be differentiated morphologically, it is known as heterogametes.

Post Fertilization Events

The most important post fertilization structure is embryo and seeds. Zygote forms the embryo. Zygote first forms proembryo which later converts into mature embryo. Seeds are the result of sexual reproduction. Ovules mature into seed whereas ovary develops into fruits.

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 sac. Out of these 7 celled and 8 nuclei, there are two synergids with egg cells, 3 antipodals and two polar nuclei are there. Two polar nuclei fuses with one sperm and other sperm fuses with egg cell to form zygote.

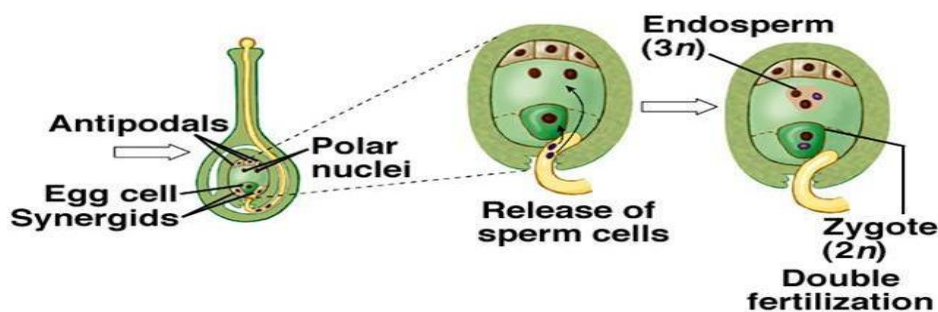


Fig.8. Double fertilization

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 secretion along with sperm form the semen.

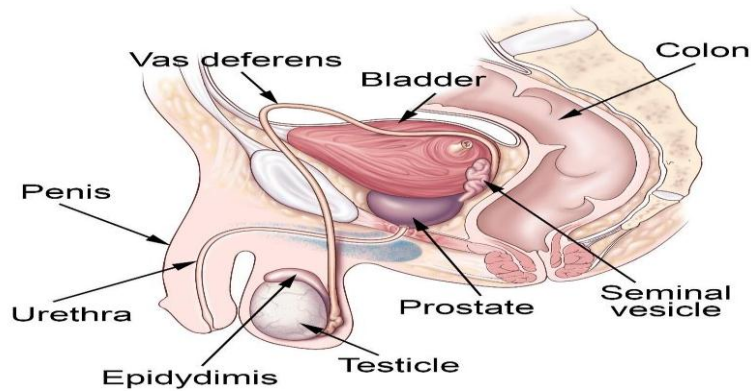


Fig.9. Male Reproductive System

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 and 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.

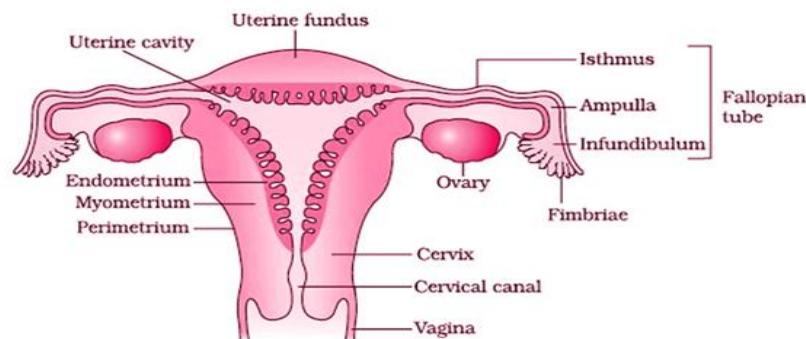


Fig.10. Female Reproductive System

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.

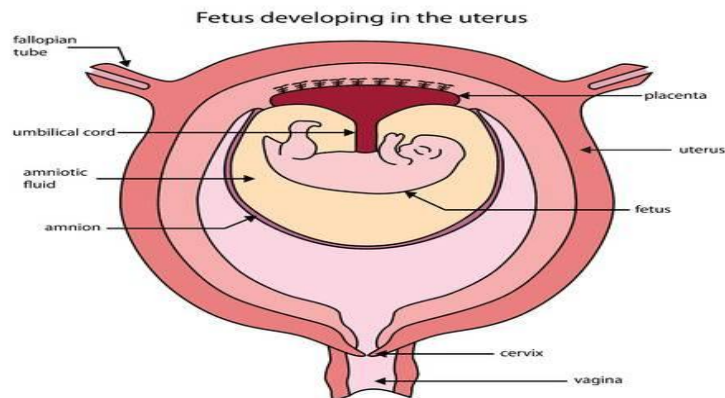


Fig.11. Human Placenta

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 mucous. This is known as **menstruation**. It last for about 2 to 8 days.

Reproductive Health

It is defined as state of well being 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 be 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, CuT
- 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.

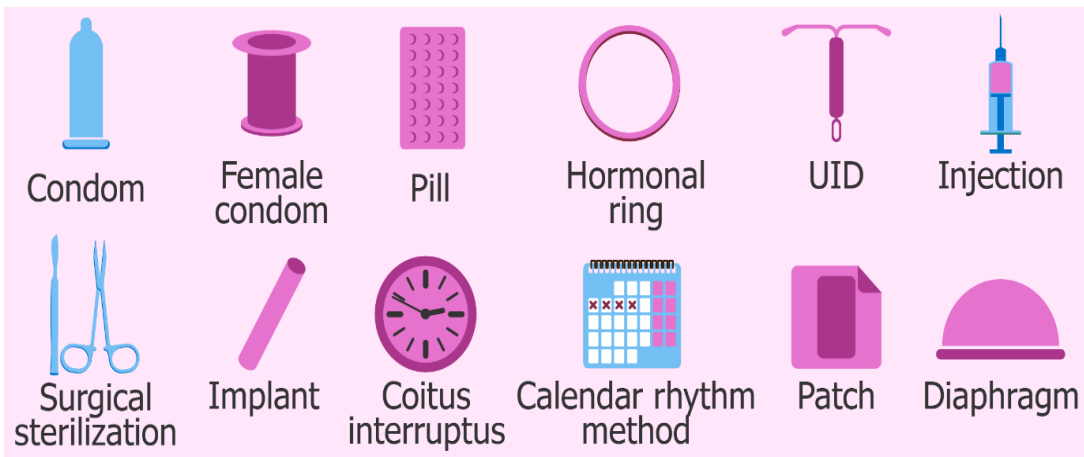


Fig. 12. Birth Control Methods

Thank You

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