

REPRODUCTION SYSTEM

All the living organisms including plants and animals have the capability to produce new individuals during their lifespan. This process of producing a new organism from the existing organism (or the parent) of the same species is called **reproduction**.

Modes of Reproduction:

The various parts of a plant such as roots stem and leaves each with a specific function are called **vegetative parts**. After a certain period of growth, plants bear flowers. These flowers develop into fruits and seeds.

The parts of a plant that participate in the process of sexual reproduction are called reproductive parts or organs. In plants, the reproductive parts are a flower which may have the male or female part or both the parts on the same flower.

Different organisms reproduce in a different way. In plants, there are two different methods of reproduction:

1. **Asexual reproduction**
2. **Sexual reproduction**

Asexual Reproduction:

The process in which only one parent is involved in the production of new individuals of the same kind is called **asexual reproduction**.

Asexual reproduction in plants occurs through the following methods:

- **Budding:** In this process, a daughter individual is formed from a small projection on parent body called a bud. E.g. Yeast and Hydra.
Yeast grows and multiplies in every few hours, if provided with sufficient nutrients and favorable condition.
- **Fragmentation:** Some algae (Spirogyra) that are present in water bodies reproduce by fragmentation. In this- method, the body of the parent breaks into small pieces called fragments and each fragment grows up to become a new plant. Fragmentation of parent body occurs when they are matured.
- **Spore Formation:** Some fungus like bread mould reproduces asexually by spore formation. Spores (present in the air) are the small spherical bodies, having a thick protective wall that protects them from unfavorable conditions. When favorable conditions arrive the spores burst and germinate to develop into new plants.



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- **Vegetative Propagation:** It is the formation of new plants from vegetative units of bud, stem, etc. These vegetative units are called propagules.
 - 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.

SEXUAL REPRODUCTION IN PLANTS:

- Flowers are the reproductive part of a plant.
- They help the plants in sexual reproduction and producing fruits and seeds. In sexual reproduction, a male cell is produced by the male part of a flower which fuses with a female cell produced by the female part of the flower. These cells are called gametes, which when combined form a zygote by the process called **fertilization**.
- Reproduction is essential for species survival. A sexual reproduction involves only one parent, occurs only in lower organisms like Amoeba, yeast, Hydra, etc.
- Sexual reproduction involves fertilization or fusion of gametes from males and females. Fertilization may be external or internal.

Types of Asexual Reproduction in Organisms:

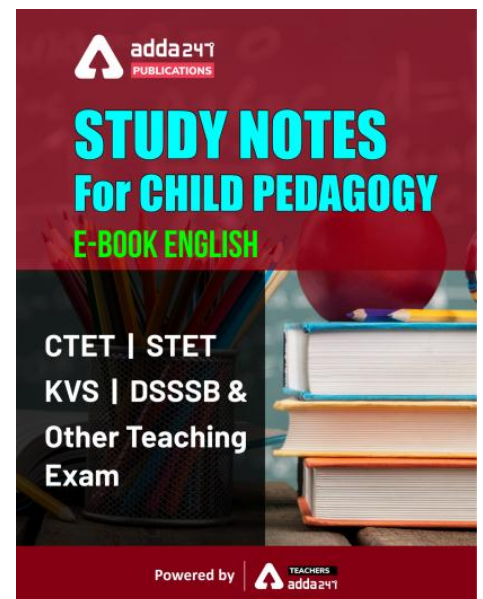
- **Binary Fission:** It is a division of the organism such as bacteria into two or more parts. Binary fission can be irregular, longitudinal, and transverse and can also be oblique. E.g. In Amoeba.
- **Multiple Fission:** Multiple fission is the process of asexual reproduction in which instead of 2 daughter cells, many daughter cells are produced from the parent cell. In this, the nucleus undergoes repeated division to produce a large number of nuclei. E.g. In Plasmodium.
- **Regeneration:** Regeneration is the ability to form new organism from the body parts. Cut or broken part generates a new organism. For example, Hydra, Planarians.

SEXUAL REPRODUCTION IN HUMAN BEING:

The sexual reproduction in human beings is a complex process. Both male and female individuals attain maturity by going through an adolescent phase.

Adolescence:

- The period of life when the body undergoes changes, which leads to reproductive maturity.
- The changes embedded during this period marks the onset of puberty and individuals at puberty (13-19 years) are referred to as teenagers.
- The significant changes include
 1. Increases in height.
 2. Change in body shape and weight.
 3. Voice in boys becomes significantly deep, while in women it is low pitch.
 4. Intellectual and emotional development.
 5. Increased activity of sex glands in both boys and girls.



Thus, after attaining sexual maturity, both male and female individuals produce gametes i.e. **sperm (by males) and ova (by females)**.

Male Reproductive System:

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

1. **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. Testes produce male hormone called **testosterone**.
2. **Vas deferens** is a duct that transport sperm to urethra, which is a common passage for both urine and sperm ejaculation.
3. **Prostate glands and seminal vesicles** are also found in males to nourish and for easy transport of sperm in the female genital tract.

Female Reproductive System:

1. **Ovaries** produce female cell, ovum. Also secrete hormones estrogen and progesterone.
2. **Fallopian tube** facilitates smooth passage of fertilized egg to uterus.
3. **Uterus** a muscular bag, where fetus is established and develops fully into a baby.
4. **Cervix and vagina**.

KEYFACTS :-

- A In fishes and frogs, external fertilization is observed. Frogs lay eggs in water, male frogs release sperms on them.
- Fertilization occurs in water, zygotes formed hatches into tadpoles.
- Iodine or salinity of water is required for metamorphosis of tadpole into frog.

Fertilization:

The female conceives and becomes pregnant once the union of male and female gamete occurs after the sexual act.

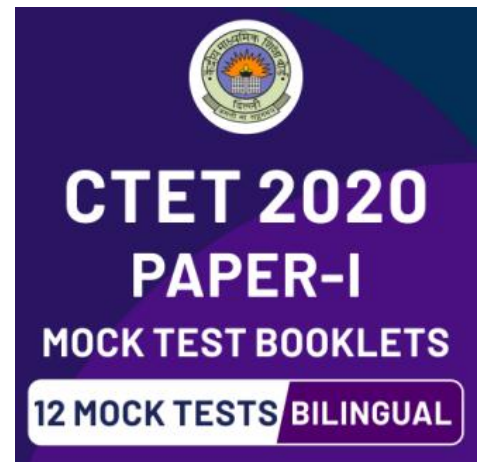
So fertilization in human is internal i.e. inside the human body and fetus develops in the uterus.

The developing fetus in a male or female is determined by the fetus of sex determination.

Menstruation: If the egg is not fertilized, the uterine lining gets shed of 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.

Sex Determination:

- After fertilization, the zygote or developing embryo may be a boy or girl.
- Sex is determined by the chromosomes present in the developing embryo.
- Humans have 23 pairs of chromosomes, which are responsible for all the inheritable traits. One pair is called the sex chromosomes.



- Males have X and Y sex chromosomes, while females have X and X
- **Egg cells contain (22 + X), i.e. 23 chromosomes.**
- Sperm may be (22 + X) or (22 + Y).

22 + X	+	22 + X	=	Girl child (XX)
(Male)		(Female)		
22+ Y	+	22+ X	=	Boy child (XY)
(Male)		(Female)		
- All growth and development of human body is regulated by hormones secreted from various glands.

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)

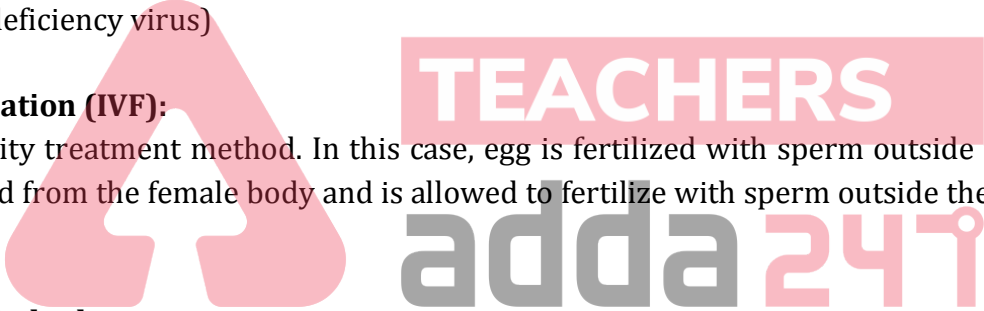
In-vitro Fertilization (IVF):

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 fertilize 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.

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



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