

# Chapter 8

## How do Organisms Reproduce?

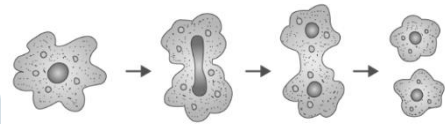
- Reproduction is the process through which living organisms generate new individuals, ensuring the continuity of life on Earth. This process is controlled by the presence of DNA, contained within the cell nucleus, as the hereditary material.
- **DNA replication** results in the formation of new cells, introducing variations. While these new cells are similar to the original cell, they may not be identical, and these variations are crucial for the **survival** and evolution of individuals and species.
- **Variation** in reproduction means that even when parents have babies, those babies are not exactly the same. They can be a bit different from each other, like how you and your siblings may look or act a little differently, even though you have the same parents.

- Sexual reproduction is valuable for introducing variations in species and is typically adopted by higher organisms.

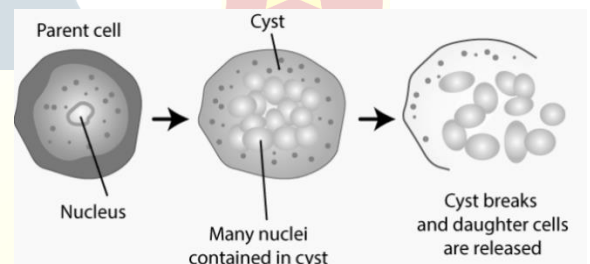
### Modes of Asexual Reproduction

**1. Fission:** The parent cell divides into daughter cells.

- **Binary fission:** Two cells are formed, e.g., amoeba.



- **Multiple fission:** Many cells are formed, e.g., Plasmodium.



### Types of Reproduction

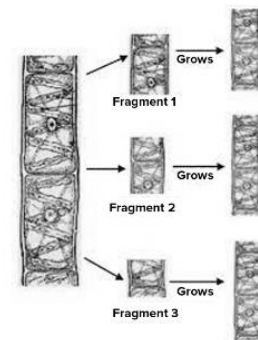
#### 1. Asexual Reproduction

- A single individual gives rise to a new individual.
- Gametes are not formed in this process.
- The new individual is an identical copy of the parent, making it a rapid multiplication method.
- This method is primarily adopted by lower organisms.

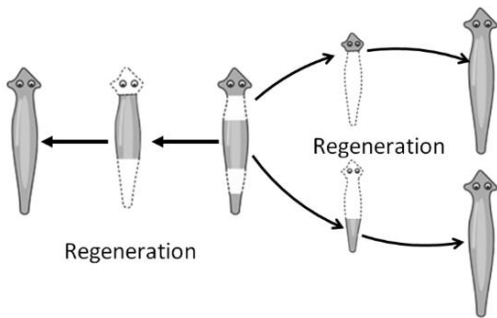
#### 2. Sexual Reproduction

- Requires the involvement of two individuals, one male and one female, to produce a new individual.
- Gametes are formed.
- The new individual is genetically similar but not identical to its parents.

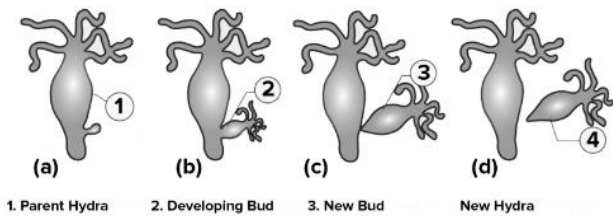
**2. Fragmentation:** The organism breaks into smaller pieces upon maturation, with each piece developing into a new individual, e.g., Spirogyra.



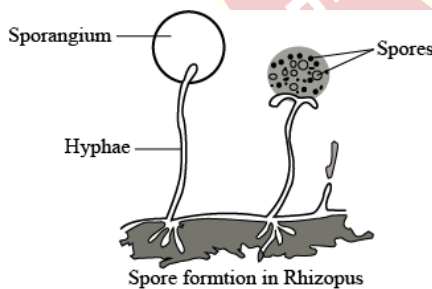
**3. Regeneration:** If the organism is cut or broken into many pieces, each piece grows into a complete organism, e.g., Planaria, Hydra.



**4. Budding:** A bud forms and develops into a tiny individual, detaching from the parent body upon maturation and evolving into a new individual, e.g., Hydra, yeast, etc.

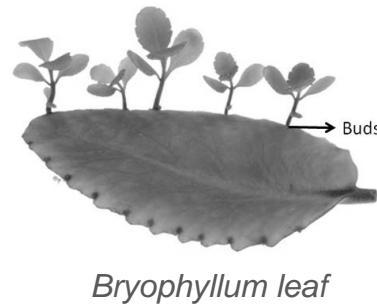


**5. Spore Formation:** Spores are small bulb-like structures covered by thick walls. Under favourable conditions, they germinate and produce a new organism, e.g., Rhizopus.



**6. Vegetative Propagation:** In many plants, new plants develop from vegetative parts.

- By roots, e.g., dahlias, sweet potato.
- By stem, e.g., potato, ginger.
- By leaves, e.g., bryophyllum (leaf notches bear buds that develop into new plants).



➤ **Artificial Methods in Vegetative Propagation:**

- (i) Grafting, e.g., Mango.
- (ii) Cutting, e.g., Rose.
- (iii) Layering, e.g., Jasmine.
- (iv) Tissue culture: New plants are grown using the growing tip of a plant. e.g., ornamental plants, orchid.

➤ **Benefits of tissue culture:**

- It allows the growth of plants like banana, rose, jasmine, etc., which have lost the capacity to produce seeds.
- New plants are genetically similar to parents.
- Helps in growing seedless fruits.

**Sexual Reproduction**

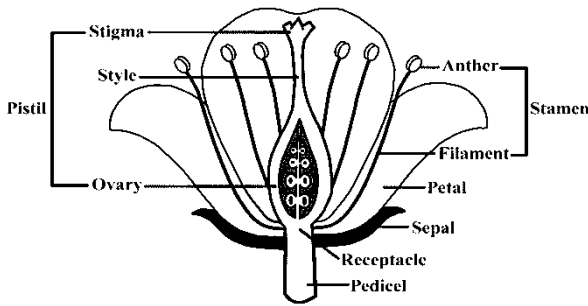
Occurs through the fusion of male and female gametes, known as sexual reproduction. This fusion is called **fertilization** and results in variation.

➤ **Sexual Reproduction in Plants**

- Flowers are the reproductive organs of plants.
- A typical flower consists of four main parts: **sepals, petals, stamen, and pistil.**
- **Types of Flowers:**

- **Bisexual flower:** Both male and female reproductive parts are present, e.g., Hibiscus, mustard.
- **Unisexual flower:** Either male or female reproductive part is present, e.g., Papaya, watermelon.

➤ **Structure of Flower**



➤ **Process of Seed Formation:**

- Pollen grains, produced in the anther, are transferred to the stigma of the same flower (**self-pollination**) or the stigma of another flower (**cross-pollination**) through agents like air, water, or animals.
- Pollen grains germinate and form pollen tubes that pass through the style to reach the ovules in the ovary.
- The fusion of male and female gametes, called **fertilization**, occurs, resulting in the production of a **zygote** inside the ovary.
- The zygote divides to form an **embryo**, and the ovule develops a thick coat, gradually becoming a **seed**.
- The ovary transforms into **fruit**, and other parts of the flower fall off.
- The seed germinates to form a plant under suitable conditions, such as air and moisture.

**Reproduction in Human Beings**

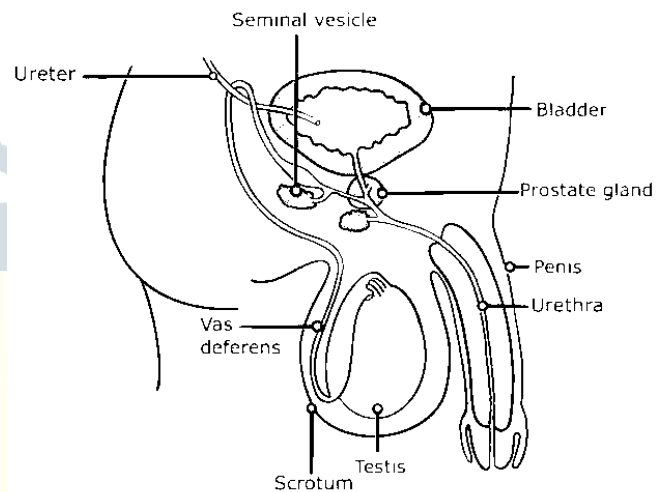
- Humans use sexual reproduction as the primary mode of reproduction.
- Sexual maturation, the period when the production of germ cells (ova in females

and sperm in males) begins in the body, is known as **puberty**.

➤ **Changes at Puberty**

- Common changes in both males and females include thick hair growth in armpits and the genital area and oily skin that may result in pimples.
- In girls, changes include an increase in breast size and the onset of menstruation.
- In boys, changes include thick hair growth on the face and a voice that begins to crack. These changes indicate the onset of sexual maturity.

**Male Reproductive System**



(i) **Testes:**

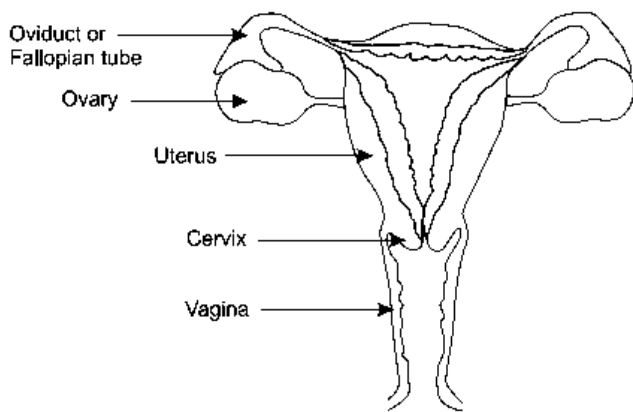
- A pair of testes is located inside the scrotum, outside the abdominal cavity.
- The scrotum provides the relatively lower temperature needed for sperm production.
- Male germ cells, i.e., **sperm**, are formed here.
- Testes release the male sex hormone, **testosterone**.
- Functions of the testes include regulating sperm production and bringing about changes at puberty.

(ii) **Vas deferens:** Passes sperm from the testes to the urethra.

(iii) **Urethra:** Serves as a common passage for both sperm and urine, with its outer covering referred to as the penis.

(iv) **Associated glands:** Seminal vesicles and the prostate gland add their secretions to the sperm. This fluid provides nourishment to sperm and facilitates their transport. Together, sperm and these secretions form **semen**.

## Female Reproductive System



### (i) Ovary:

- A pair of ovaries is located on both sides of the abdomen.
- Female germ cells, i.e., eggs, are produced here.
- At birth, thousands of immature eggs are present in the ovary.
- At the onset of puberty, some of these eggs start to mature, and one egg is produced each month by one of the ovaries.

### (ii) Oviduct or Fallopian tube:

- Receives the egg produced by the ovary and transfers it to the uterus.
- **Fertilization**, the fusion of gametes, takes place here.

### (iii) Uterus:

- A bag-like structure where the development of the baby takes place.
- The uterus opens into the vagina through the cervix.

### ➤ Fertilization of the Egg

- In cases where the egg is fertilized, the fertilized egg, called a **zygote**, is implanted in the uterus and develops into an **embryo**.
- The embryo receives nutrition from the mother's blood through a special tissue called the **placenta**, facilitating the exchange of glucose, oxygen, and waste materials.
- The period from fertilization to the birth of the baby is called the **gestation period**, which lasts approximately nine months.
- In cases where the egg is not fertilized, the uterus prepares itself each month to receive a fertilized egg. The uterine lining thickens and becomes spongy to support the embryo. When fertilization does not occur, this thickened lining is no longer needed and is shed through the vagina as blood and mucus, resulting in a monthly cycle called **menstruation**.

## Reproductive Health

- Reproductive health encompasses overall well-being in all aspects of reproduction, including physical, emotional, social, and behavioural health.
- **Sexually Transmitted Diseases (STDs):** Many diseases can be sexually transmitted, including **bacterial diseases** like gonorrhoea and syphilis, as well as **viral infections** like warts and HIV-AIDS. The use of condoms can help prevent these infections to some extent.
- **Contraception:** Contraception involves avoiding pregnancy by preventing the fertilization of ova.

**Methods of Contraception:**

- (i) **Physical barrier:** Methods to prevent the union of egg and sperm, including the use of condoms, cervical caps, and diaphragms.
  - (ii) **Chemical methods:** These methods, like oral pills, alter the hormonal balance of the body to prevent the release of eggs, although they may have side effects.
  - (iii) **Intrauterine contraceptive device (IUCD):** Devices like Copper-T or a loop are placed in the uterus to prevent pregnancy.
  - (iv) **Surgical methods:** In males, **vasectomy** blocks the transfer of sperm, while in females, **tubectomy** blocks the transfer of eggs.
- **Female Foeticide:**
- The practice of killing a female child inside the womb is known as female foeticide.
  - To promote a healthy society with a balanced sex ratio, educating people to avoid practices like female foeticide and prenatal sex determination is essential.
  - Prenatal sex determination is a legal offense in many countries, including our own, to maintain a balanced sex ratio.