

Class 10 Science Notes Chapter 7 How Do Organisms Reproduce: Complete Study Notes

From simple single-celled organisms to complex plants and animals, different organisms use different methods of reproduction based on their body structure.

This class 10 science notes chapter 7 how do organisms reproduce explains how reproduction takes place, the role of DNA and variation and the processes involved in plant and human reproduction.

How do Organisms Reproduce

Reproduction is the biological process by which living organisms produce new individuals of their own species, ensuring the continuity of a species from one generation to the next.

Although reproduction is not essential for the survival of an individual organism, it is necessary for maintaining the population of a species. Without reproduction, a species would eventually become extinct as existing individuals die.

The offspring produced resemble their parents because they inherit genetic information from them, helping maintain the characteristics of the species.

However, they are not always exact copies. Small variations arise during reproduction, enabling organisms to adapt to changing environmental conditions over time.

Modes of Reproduction Used by Organisms

The method of reproduction depends on the body structure and complexity of an organism. Organisms reproduce mainly through two methods:

1. Asexual reproduction
2. Sexual reproduction

Asexual reproduction involves a single parent and produces offspring that are mostly similar to the parent.

Sexual reproduction involves two parents and produces offspring with greater variations.

Asexual Reproduction

Asexual reproduction is a mode of reproduction in which a single organism produces new individuals without the involvement of gametes.

The offspring produced are genetically similar to the parent because they are formed through DNA copying from a single organism.

Asexual reproduction is commonly seen in unicellular organisms and simple multicellular organisms.

Types of Asexual Reproduction

The different methods of asexual reproduction include:

- Fission
- Fragmentation
- Regeneration
- Budding
- Vegetative Propagation
- Spore Formation

a. Fission

Fission is a type of asexual reproduction in which a single-celled organism divides into two or more new individuals.

It is commonly seen in unicellular organisms such as bacteria and protozoa.

i) Binary Fission

In binary fission, one parent cell divides into two daughter cells.

Example:

- Bacteria
- Amoeba

In Amoeba, the cell divides in any direction because it does not have a definite shape.

In organisms like Leishmania, binary fission occurs in a specific direction because of their specialised body structure.

ii) Multiple Fission

In multiple fission, a single organism divides into many daughter cells at the same time.

Example: Plasmodium

During multiple fission, the nucleus divides repeatedly, followed by the formation of many daughter cells.

iii) Difference between Binary Fission and Multiple Fission

Binary Fission	Multiple Fission
One parent cell divides into two daughter cells.	One parent cell divides into many daughter cells.
Division occurs once.	Multiple divisions occur simultaneously.
Example: Amoeba, bacteria	Example: Plasmodium

b. Fragmentation

Fragmentation is a method of reproduction in which an organism breaks into smaller fragments and each fragment develops into a new individual.

This method is commonly observed in simple multicellular organisms.

Example: Spirogyra

When Spirogyra matures, its body breaks into smaller pieces. Each fragment grows into a new organism under suitable conditions.

Fragmentation is possible in simple organisms because their body organisation is not highly complex.

c. Regeneration

Regeneration is the ability of an organism to develop a complete organism from its body parts.

Specialised cells divide and produce new cells, which later develop into different tissues and organs.

Examples:

- Hydra
- Planaria

When these organisms are cut into pieces, each piece can grow into a complete organism.

However, regeneration is not considered a common method of reproduction in complex organisms because their bodies contain highly specialised tissues and organs.

d. Budding

Budding is a method of asexual reproduction in which a small outgrowth called a bud develops on the parent organism.

The bud grows through repeated cell division and eventually separates from the parent to form a new individual.

Example:

- Hydra
- Yeast

In Hydra, the bud develops at a specific location on the body. After becoming mature, it detaches and grows independently.

e. Vegetative Propagation

Vegetative propagation is a method of asexual reproduction in plants in which new plants develop from vegetative parts such as roots, stems and leaves. In this method, new plants grow directly from the parent plant's vegetative parts instead of being produced from seeds.

Examples:

- Sugarcane
- Rose
- Potato
- Banana
- Jasmine
- Bryophyllum

Advantages of Vegetative Propagation

- Plants produced are genetically similar to the parent plant.
- Plants grow faster compared to seed-grown plants.
- Useful for plants that do not produce seeds.
- Helps produce plants with desirable characteristics.

f. Tissue Culture

Tissue culture is a technique in which new plants are developed from small pieces of plant tissues or cells.

The cells are placed in an artificial nutrient medium where they divide and form a group of cells called a callus.

The callus is then treated with hormones to develop into complete plants.

Uses of Tissue Culture:

- Production of disease-free plants.
- Rapid multiplication of plants.
- Growth of ornamental plants.
- Conservation of rare plant species.

g. Spore Formation

Spore formation is a method of asexual reproduction commonly seen in fungi.

In this process, reproductive structures called sporangia produce spores. These spores have thick protective walls that help them survive unfavourable conditions.

When spores come in contact with suitable conditions such as moisture and nutrients, they grow into new organisms.

Example: Rhizopus (bread mould)

Advantages of Spore Formation:

- Spores can survive harsh environmental conditions.
- Large numbers of spores can be produced.
- Spores spread easily through air and help in reproduction.

Sexual Reproduction

Sexual reproduction is a mode of reproduction that involves two individuals and the fusion of male and female gametes.

Compared to asexual reproduction, sexual reproduction produces greater variation among offspring because genetic material comes from two different parents.

Sexual reproduction is commonly observed in complex organisms, including plants and humans.

Importance of Sexual Reproduction

- Produces genetic variations.
- Helps organisms adapt to changing environments.
- Supports evolution.
- Combines characteristics from two parents.

During sexual reproduction, specialised reproductive cells called gametes are produced.

Male gametes and female gametes combine during fertilisation to form a zygote, which develops into a new organism.

How DNA is Copied During Reproduction

DNA copying is an essential step in reproduction because it transfers genetic information to the next generation.

During DNA copying:

- The cell creates a copy of its DNA using chemical reactions.
- An additional cellular structure is formed along with the copied DNA.
- The cell divides into two new cells, each receiving a copy of DNA and cellular machinery.

The new cells produced are similar to the parent cell but may not be completely identical because DNA copying is not a perfectly accurate process.

Small changes may occur during DNA replication, resulting in variations among individuals.

Why are Offspring Similar but Not Identical to Their Parents

When organisms reproduce, the offspring usually resemble their parents because they inherit genetic information from them.

However, they are not exact copies. This is because the genetic material is copied during reproduction and small changes may occur during the copying process, leading to variations among individuals.

Organisms of the same species have similar body structures because they share similar genetic information. This information is stored in DNA (deoxyribonucleic acid), which is present in the chromosomes inside the nucleus of a cell.

During reproduction, DNA is copied and passed from the parent to the offspring, ensuring the transfer of inherited characteristics while also introducing small variations.

Flow of Genetic Information During Reproduction

Parent Organism → DNA Stores Genetic Information → DNA is Copied During Reproduction → Genetic Information is Passed to the Offspring → Offspring Resemble Their Parents with Small Variations