



Chapter- 2 – Reproduction in Plants and Animals

STUDY MATERIAL- 5

REPRODUCTION

Reproduction is the process by which all organisms multiply in number and increase their population. It is the formation of new individuals by sexual or asexual means, which can repeat the process in their own turn.

ASEXUAL REPRODUCTION

Asexual reproduction is a method of reproduction that involves only one organism. A single organism reproduces two or multiple organism on its own. This is seen in all unicellular organism, some multicellular organism and few plants.

SEXUAL REPRODUCTION

The mode of reproduction that involves two individual; one male and one female. They produce sex cells or gametes which fuse to form a new organism.

Gametes are very small. They must normally unite to produce zygote which through a process of development, finally become the offspring.

DIFFERENCES BETWEEN SEXUAL AND ASEXUAL REPRODUCTION

SL NO.	ASEXUAL	SEXUAL
1.	No mixing of genetic material, therefore no or less variation in offspring.	Genetic mixing, increased variation
2.	No gametes are formed	Gametes are formed
3.	Normally more offspring	Fewer offspring
4.	Only one parent is involved	Usually two parents are involved
5.	It is a rapid process during favourable conditions.	Slower process

TYPES OF ASEQUAL REPRODUCTION

1. BINARY FISSION

The parent cell divides into two equal halves (daughter cells). 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).

It occurs during favourable conditions.

E.g. Amoeba follows transverse binary fission

Leishmania has a whip-like structure at one end and binary fission occurs in a definite orientation.

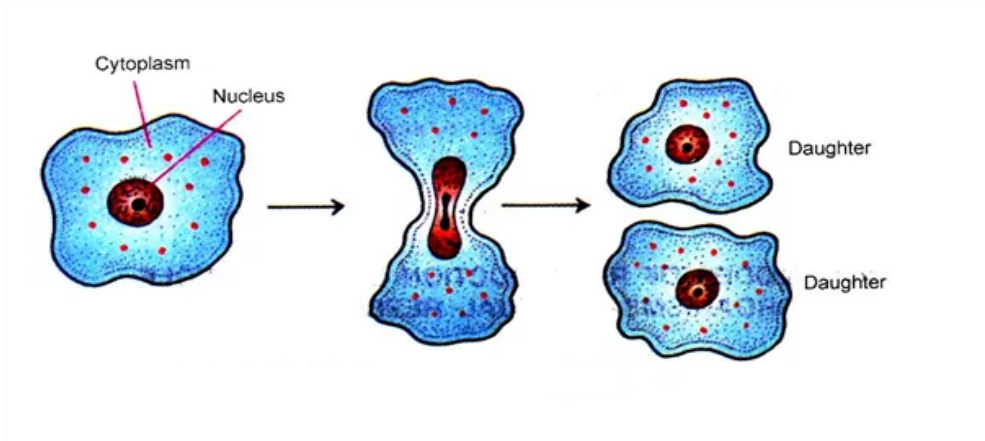


Fig 1: Binary Fission in Amoeba

2. MULTIPLE FISSION

The parent cell divides into many daughter cell simultaneously. In this during unfavourable conditions, the parent cell develops a thick resistant wall around itself forming a cyst. Within the wall, the cytoplasm divides many times to form many plasmodia. When the conditions become favourable, the cyst wall breaks and the Plasmodium are released.

E.g. *Plasmodium*

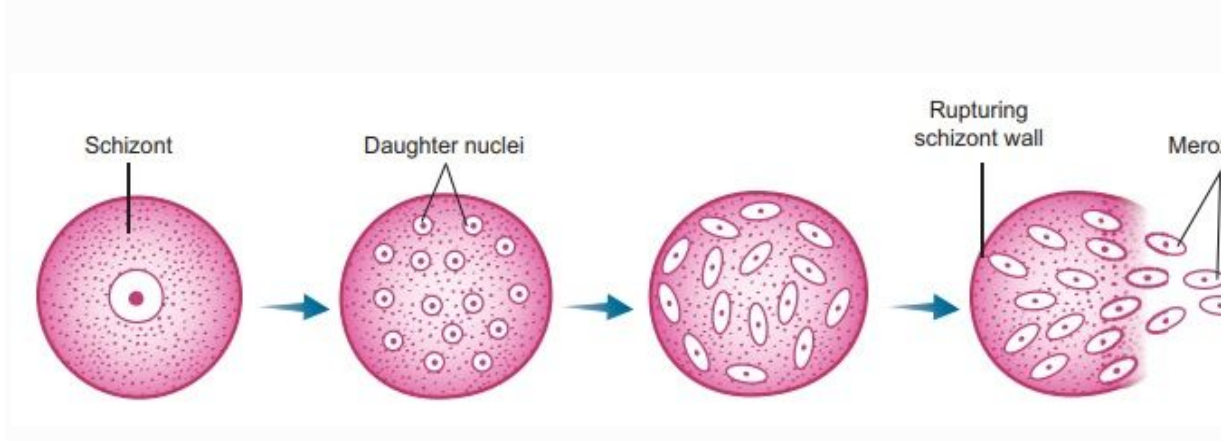


Fig 2: Multiple Fission in Plasmodium

3. BUDDING:

A bud develops as an outgrowth on parent body due to repeated cell division at a specific site. The nucleus of the parent cell divides and one of them moves into the outgrowth which grows bigger and finally separates from the parent cell when they mature.

E.g. Hydra, yeast.

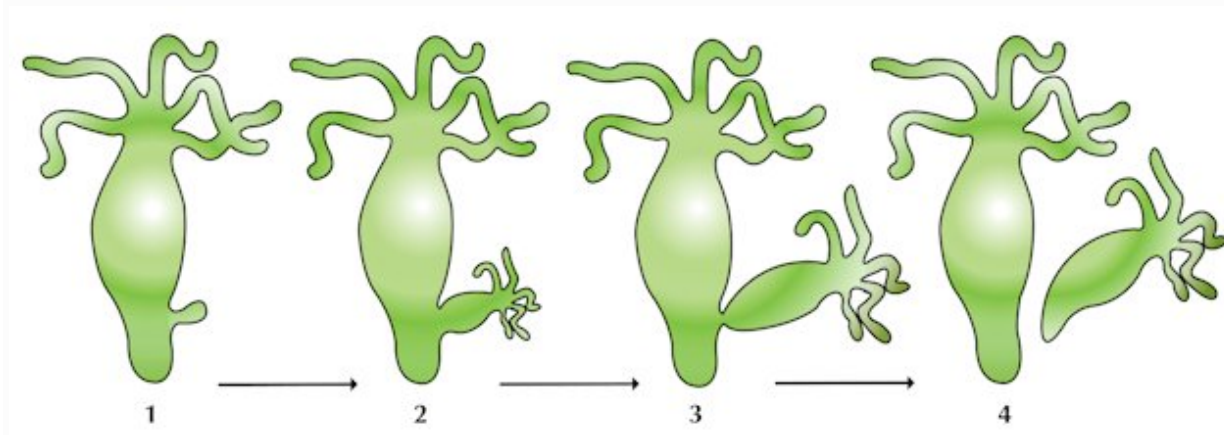


Fig 3: Budding in Hydra

4. FRAGMENTATION

It takes place in multicellular organism with simple body organisation. It is the accidental process in which an organism breaks into pieces and each piece give rise to a new organism.

E.g. - *Spirogyra*

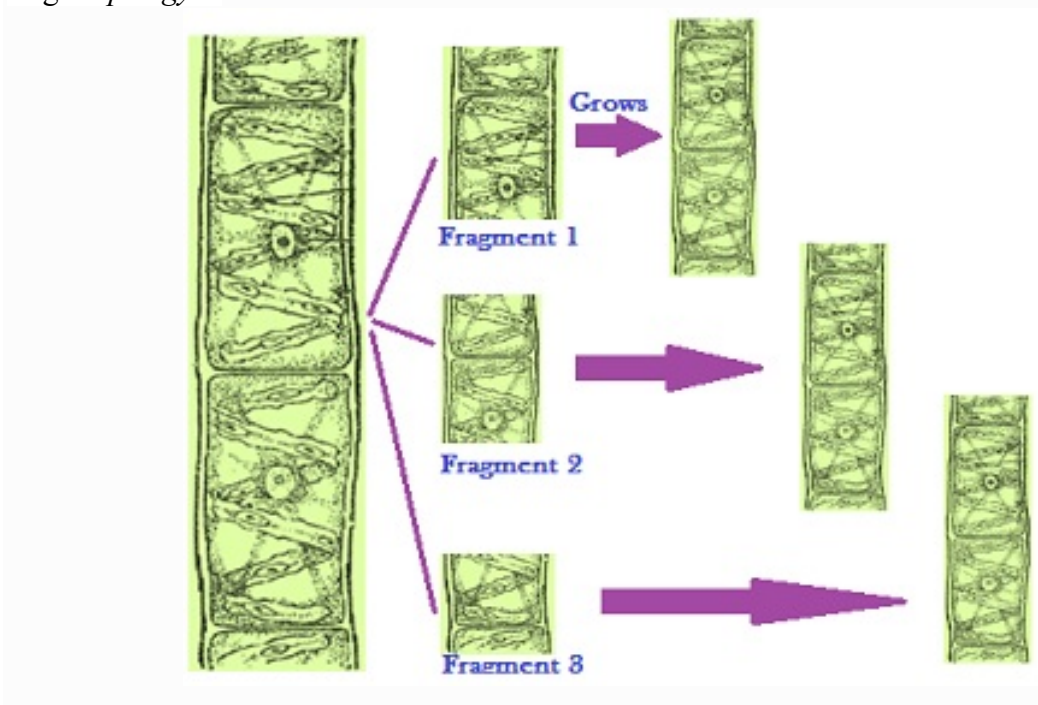


Fig 4: Fragmentation in *Spirogyra*

5. REGENERATION:

When the simple animals develop a new individual from their broken older part it is known as regeneration. It is carried out by specialized cells which divide and differentiate to form the complete individual. These cells multiply and from this mass of cells other parts are generated. Regeneration follows an organized sequence referred to as 'development'.

E.g.-Hydra, Planarians

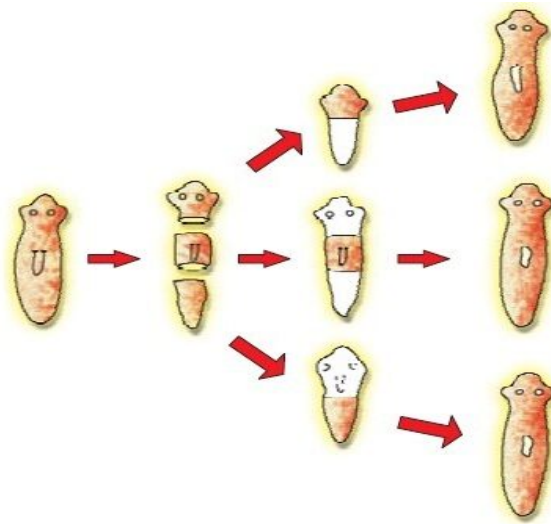


Fig 5: Regeneration in Planaria

6. SPORE FORMATION:

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.

The body of *Rhizopus* is made up of thread like structures called hyphae. The erect hyphae bear sporangia inside which the reproductive structures called spores are formed. Spores which are present in sporangia, are small, bulb like structure which are covered by thick walls that protect them until they come in contact with suitable condition. Under favourable conditions, they germinate and produce new individuals.

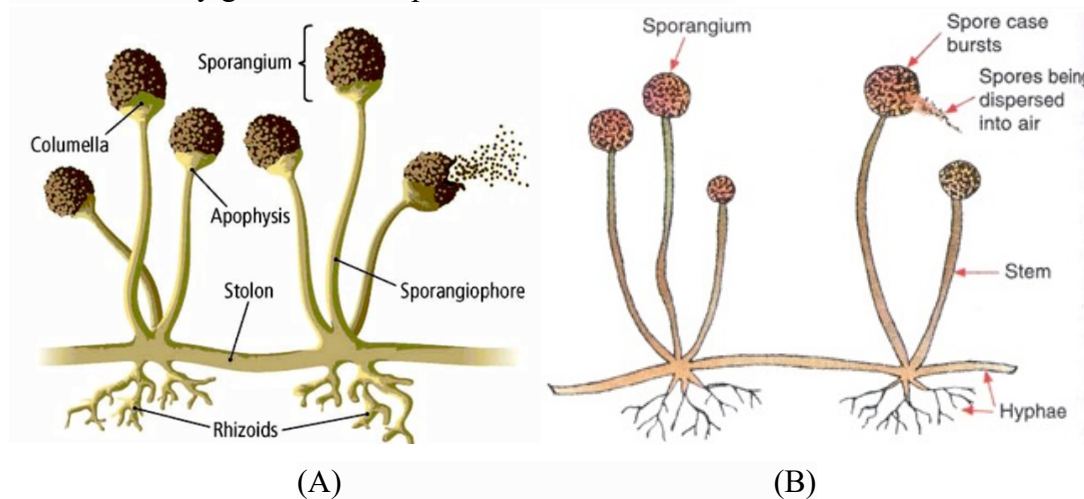


Fig 6: (A) Parts of *Rhizopus*

Fig 6: (B) Spore formation and release in *Rhizopus*

7. VEGETATIVE PROPAGATION:

A mode of reproduction in which reproduction takes place from the vegetative parts like the stem, root, leaves.

Methods of Vegetative Propagation:

NATURAL

1. **By Roots:** E.g. adventitious roots of Dahlias
2. **By Stems:** E.g. Potato (tuber), ginger (rhizome)

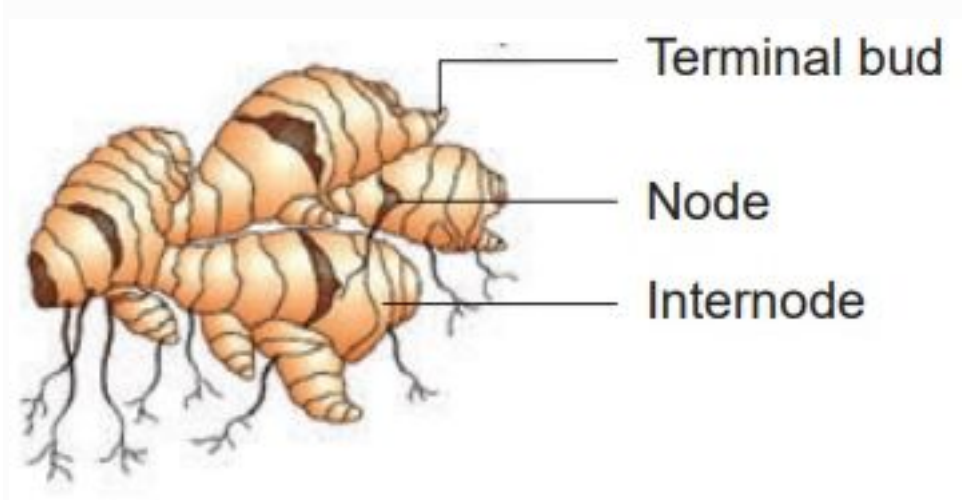


Fig 7: Rhizome of Ginger

3. **By Leaves:** E.g. leaves of *Bryophyllum* bear adventitious buds (in the notches of leaf margin) which develop into new plants.



Fig 8: Vegetative propagation through leaf in *Bryophyllum*

ARTIFICIAL

1. **Grafting:** E.g. Mango.
2. **Cutting:** E.g. Rose
3. **Layering:** E.g. Jasmine
4. **Tissue culture:** E.g. Orchids, Ornamental Plants.



Fig 9: Plant tissue culture

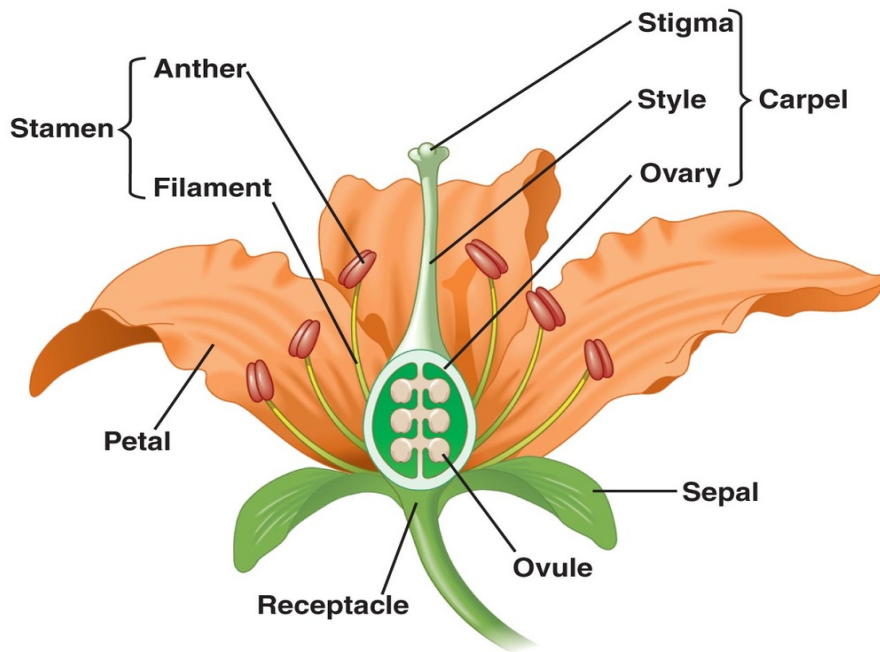
Benefits of Vegetative Propagation:

1. Plants can bear flowers, fruits earlier than those produced from seeds.
2. Growing plants like Banana, orange, rose, jasmine that have lost the capacity to produce seeds.
3. Genetic similarity is maintained in the plants.
4. Helps in growing seedless fruits.
5. Cheaper and easier method of growing plants.

REPRODUCTION IN PLANTS

Sexual reproduction in flowering plants

- Sexual reproduction in plants happens through the flowers.
- Essential whorls of the flowers such as androecium and the gynoecium help in the sexual reproduction of plants.



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Fig 10: Parts of a flower

Non-essential parts of flowers

- The typical structure of flower contains essential whorls and non-essential whorls.
- Sepals and Petals are called non-essential whorls as they do not directly take part in reproduction.
- Sepals protect the inner delicate whorl during bud condition and also perform photosynthesis if they are green in colour.
- Petals, when they are coloured, attract insects for pollination.

Essential whorls of flowers

- Androecium and gynoecium are called as essential/reproductive whorls of a flower.
- Androecium produces pollen grains containing male gametes and gynoecium produces ovules which are female gametes.
- Bisexual flowers contain both the whorls while unisexual flowers contain either of them.
- Each individual member of androecium is called as stamen and consists of anther and filament.
- Anther produces haploid pollen grains.
- Each individual member of gynoecium is called pistil and consists of stigma, style and ovary.

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