

SCIENCE

(Biology)

Chapter 3: How Do Organisms Reproduce?



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How Do Organisms Reproduce?

Reproduction

Reproduction is the ability of living organisms to produce living beings similar to themselves.

The two modes of reproduction, i.e. asexual reproduction and sexual reproduction can be seen in animals.

Importance of Variation

- Sexual reproduction provides great scope for variation.
- Variation is important for the survival of a species.
- Variation helps a species to adapt to different environmental changes.

Reproduction and its Kinds

Sexual Reproduction	Asexual Reproduction
<ul style="list-style-type: none"> • It involves the formation of special reproductive cells called gametes. 	<ul style="list-style-type: none"> • It does not involve the formation of gametes.
<ul style="list-style-type: none"> • Male and female gametes fuse to form the zygote which develops into a new individual. 	<ul style="list-style-type: none"> • New organisms are formed either by the division of the parent body or by the differentiation of the parent body.

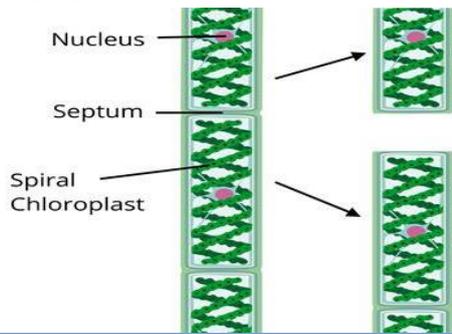
Modes of Asexual Reproduction

Plants and animals from lower classes reproduce by asexual methods.

Method	Description	Example
<p>Binary Fission</p> <p>① Parent amoeba → ② Elongation of nucleus → ③ Division of nucleus and cytoplasm → ④ Two daughter cells</p>	<ul style="list-style-type: none"> • Most common method in unicellular organisms. • It is division of the parent cell into two identical daughter organisms. 	Amoeba, Paramecium, bacterium
<p>Multiple Fission</p> <p>Parent cell → Cyst (Many nuclei contained in cyst) → Cyst breaks and daughter cells are released</p>	<ul style="list-style-type: none"> • Parent cell divides to produce many identical new individuals. 	<i>Plasmodium vivax</i> , <i>Leishmania</i>



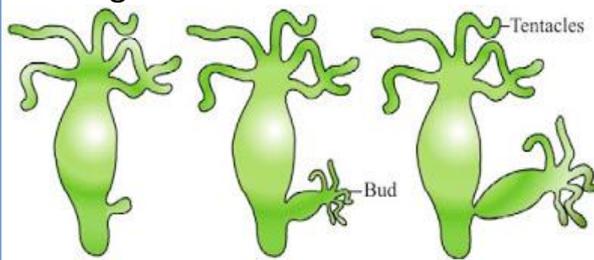
Fragmentation



- Adult organisms, on maturation, break up into smaller fragments. Each fragment develops into a new individual.

Spirogyra

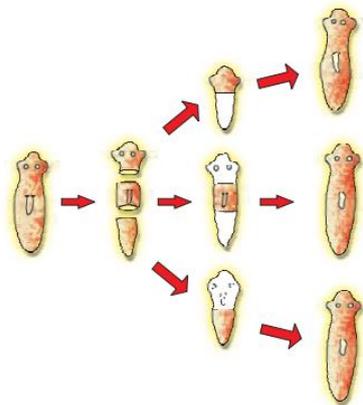
Budding



- A small outgrowth called a bud arises on the parent body.
- The bud grows by repeated cell divisions.
- It then breaks off from the parent body and develops into a new individual.

Hydra, sponges, corals, yeast

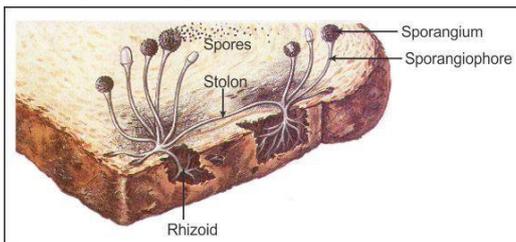
Regeneration



- Regeneration is the ability of organisms to generate lost or damaged body parts.
- Regeneration is carried out by specialised cells.
- These form a mass of cells which undergo changes to form cells specialised in different functions.
- If planaria is cut into small pieces, then each piece develops into a new planaria.

Lizard, starfish, planaria, hydra

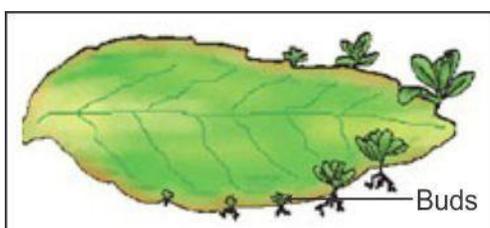
Spore Formation



- Spores are special structures produced in sacs called sporangia.
- When spores mature, sporangia burst and spores are carried by air or water to different places.
- When spores fall on a suitable ground, they germinate and give rise to new plants.

Moss, Fern, Fungi

Vegetative Propagation



Vegetative propagation in *Bryophyllum*

- Several plants are capable of producing naturally through their roots, stems and leaves. Such type of reproduction is called vegetative propagation.

Sweet potato (by roots)
Bryophyllum (by leaves)
Ginger (by stem)



Different methods used to develop plants which can bears fruits and flowers by vegetative propagation are as follows:

- **Stem cutting:** This involves cutting a part of the stem and planting it in the soil to allow the growth of roots and buds into shoots.
Examples: sugarcane, pear, china rose
- **Grafting:** In grafting, the stem or bud of two best quality plants is combined to form a new plant. Examples: guava, apple, mango
- **Layering:** In this, the lower branch of a plant is bent and covered with soil. Once new roots start developing on the branch, it is cut from the parent plant and allowed to grow as an individual plant. Examples: rose, jasmine

Tissue Culture

- Cells from the growing tip of a plant are separated and are grown on a nutrient medium containing all nutrients and hormones necessary for plant growth.
- These cells form a mass called callus.
- The callus develops plantlets.
- These plantlets are transferred to the soil and grow as new individuals.

Advantages of Vegetative Reproduction

New plants show the exact characteristics as those of the parent plant.

This method is faster and certain.

Plants not capable of producing sexually can be produced by this method.

Examples: Seedless bananas and grapes

Disadvantages of Vegetative Reproduction

There is no possibility of variation.

The new plant grows in the same area as the parent plant which leads to competition for resources.

Sexual Reproduction

- The sexual mode of reproduction involves two organisms, a male and a female to create a new organism or offspring.
- The sexual reproduction allows greater variations in a species as the two individuals involved in producing the offspring would have different patterns of variations. This process includes the combination of DNA of two different individuals and the resultant combination and variation would be unique.
- Hence this ensures a mixing of the gene pool of the species within a population and it

