

Brain Builders Coaching Center

Class - XII

Chapter 1: Reproduction In Organisms

1. Modes of reproduction

Reproduction is the process by which living organisms produce offspring to ensure the continuity of their species.

A. Asexual Reproduction

Offspring are produced by a single parent without the involvement of gametes.

Cell division involved: Only mitosis → offspring are clones (genetically identical to parent).

Occurrence: Common in single-celled organisms, plants, and lower animals.

Key features:

- Rapid multiplication.
- Requires less energy
- No genetic variation (less adaptability).

Types:

1. Binary Fission – The parent divides into two equal halves.

Amoeba → irregular fission.

Leishmania → longitudinal fission.

Paramecium → transverse fission.

2. Budding – A small bud grows on the parent body, detaches to form a new organism.

Hydra, yeast.

3. Fragmentation – The parent breaks into fragments, each capable of developing into a complete organism.

Spirogyra, sea stars.

4. Spore Formation – Spores produced in sporangia disperse and germinate.

Rhizopus (bread mould), ferns, mosses.

5. Regeneration – Lost body parts regrow, sometimes forming complete organisms.

Planaria, Hydra.

B. Vegetative Propagation in Plants

Formation of new plants from vegetative parts like roots, stems, or leaves.

Types:

Natural Methods:

By roots → Sweet potato, Dahlia.

By stems → Potato (tuber), Ginger (rhizome), Onion (bulb), Strawberry (runner).

By leaves → Bryophyllum (leaf buds).

Artificial Methods:

Artificial vegetative propagation is carried out by humans to produce plants with desirable qualities, speed up multiplication, and overcome limitations of natural propagation.

1. Cutting

Method: A portion of root, stem, or leaf is cut from the parent plant and placed in soil or water to grow into a new plant.

Examples:

- Stem cuttings: Rose, sugarcane, hibiscus.
- Root cuttings: Lemon, tamarind.
- Leaf cuttings: Bryophyllum, begonia.

Advantages:

- Simple and cheap.
- Maintains exact traits of the parent.

Disadvantages:

- Lower survival rate if conditions are not favorable.

2. Grafting

Method: The stem (scion) of one plant is joined with the rooted portion (stock) of another plant so they unite and grow as one.

Examples: Mango, apple, pear, guava.

Advantages:

- Combines the best features of two plants (e.g., disease resistance from stock + quality fruit from scion).

Disadvantages:

- Requires skill.
- Not suitable for all plant species.

3. Layering

Method: A branch of the plant is bent and partially buried in soil so that roots develop before detaching it from the parent.

Examples: Jasmine, guava, lemon.

Advantages:

- High survival rate as the branch is nourished by the parent during rooting.

Disadvantages:

- Slower than cuttings.

4. Tissue Culture (Micropropagation)

Method: A small piece of plant tissue (explant) is grown in sterile nutrient medium under controlled conditions to produce many identical plants.

Examples: Orchid, banana, dahlia, ornamental plants.

Advantages:

- Very rapid multiplication.
- Disease-free plants.
- Year-round production possible.

Disadvantages:

- Requires laboratory facilities and skilled workers.
- More expensive than traditional methods.

2. SEXUAL REPRODUCTION

Formation of offspring by the fusion of male and female gametes.

Cell divisions involved: Meiosis (gamete formation) + Mitosis (growth).

Advantages: Produces genetic variation, increasing adaptability and survival chances.

Events in Sexual Reproduction

1. Pre-fertilization Events

Gametogenesis: Formation of gametes.

Isogametes → Similar morphology (e.g., algae).

Heterogametes → Different morphology (sperm & egg in humans).

Gamete Transfer:

In plants → by wind, water, insects.

In animals → direct transfer during copulation.

2. Fertilization (Syngamy)

External Fertilization: Gametes fuse outside body (fish, frogs).

Internal Fertilization: Gametes fuse inside body (reptiles, birds, mammals).

3. Post-fertilization Events

Zygote formation: Diploid cell.

Embryogenesis: Zygote develops into embryo.

Sexuality in Plants

Monoecious: Male and female flowers on same plant (maize, cucumber).

Dioecious: Male and female flowers on separate plants (papaya, date palm).

Sexuality in Animals

Unisexual (Dioecious): Male and female sexes separate (humans, birds).

Bisexual (Hermaphrodite): Both reproductive organs in one individual (earthworm, tapeworm)

Oviparous vs. Viviparous

Oviparous: Egg-laying (birds, reptiles).

Viviparous: Give birth to live young (mammals).

Parthenogenesis

Development of an unfertilized egg into an organism.

Examples: Honeybee drones (haploid males), some lizards.

Oestrus & Menstrual Cycles

Oestrus cycle: In non-primates (dogs, cows); females receptive only during heat period.

Menstrual cycle: In primates (monkeys, apes, humans); occurs monthly.