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CHAPTER NOTES

Reproduction in Organisms Class 12 Notes — CBSE Biology Chapter 1

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Reproduction in Organisms Class 12 Notes — CBSE Biology Chapter 1

Chapter 1 of Class 12 Biology introduces the fundamental concepts of **reproduction** — the biological process by which organisms produce offspring. Reproduction ensures the continuity of species and is one of the most important characteristics of living organisms. This chapter covers both asexual and sexual reproduction across organisms, carrying **3-4 marks** in Board exams.

Key Concepts

Types of Reproduction

Feature	Asexual Reproduction	Sexual Reproduction
Parents involved	Single parent	Usually two parents
Gametes	Not formed	Formed (male & female)
Meiosis	Not involved	Essential for gamete formation
Offspring	Genetically identical (clones)	Genetically unique
Variation	No/minimal variation	Significant variation
Rate	Rapid	Slower
Evolutionary advantage	Useful in stable environments	Provides adaptability

Asexual Reproduction

Methods of Asexual Reproduction

Method	Description	Examples
Binary Fission	Parent divides into two equal halves	Amoeba, Paramecium, bacteria
Budding	Outgrowth (bud) develops into new organism	Yeast, Hydra
Sporulation	Spores produced that germinate into new organisms	Fungi (Rhizopus, Penicillium), algae
Fragmentation	Body breaks into pieces, each grows into new organism	Spirogyra, Planaria
Vegetative Propagation	New plant from vegetative parts (root, stem, leaf)	Potato (tuber), Rose (stem cutting)
Gemmule Formation	Internal buds survive harsh conditions	Sponges

Vegetative Propagation in Plants

Vegetative Part	Example
Runner	Grass, Cynodon
Rhizome	Ginger, Turmeric
Sucker	Chrysanthemum, Mint
Tuber	Potato (eyes = buds)
Offset	Water hyacinth (Eichhornia)
Bulb	Onion, Garlic, Lily
Leaf buds	Bryophyllum (adventitious buds on leaf margins)

Exam Favourite: Bryophyllum reproduces vegetatively through adventitious buds on leaf margins — a very commonly asked example!

Sexual Reproduction

Phases of Sexual Reproduction

1. **Pre-fertilisation:** Gametogenesis (gamete formation) + Gamete transfer

2. **Fertilisation (Syngamy):** Fusion of male and female gametes → Zygote

3. **Post-fertilisation:** Zygote → Embryo development → New organism

Gametes — Types

Feature	Homogametes (Isogametes)	Heterogametes
Morphology	Similar in size and shape	Different (male smaller, female larger)
Examples	Cladophora, Ulothrix	Most animals and plants

Fertilisation Types

- **External fertilisation:** Outside the body, in water (frogs, bony fish, algae). Requires aquatic medium.
- **Internal fertilisation:** Inside the female body (reptiles, birds, mammals, flowering plants). More protection for zygote.

Development of Zygote

Type	Description	Examples
Oviparous	Lay eggs; development outside body	Birds, reptiles, frogs, insects
Viviparous	Give birth to young ones; development inside body	Most mammals, humans

Remember: Platypus and Echidna are egg-laying mammals (oviparous mammals) — a favourite exam trick question!

Special Concepts

- **Parthenogenesis:** Development of organism from unfertilised egg. Example: honeybee drones (males) develop from unfertilised eggs.
- **Meiocytes:** Cells that undergo meiosis to form gametes. In humans: spermatocytes and oocytes.
- **Chromosome number:** Gametes are haploid (n), zygote is diploid ($2n$). Meiosis halves the chromosome number.

Important Definitions

Term	Definition
Reproduction	Biological process of producing offspring for continuity of species
Clone	Genetically identical offspring produced by asexual reproduction
Gamete	Haploid reproductive cell (sperm/egg) that fuses during fertilisation
Zygote	Diploid cell formed by fusion of male and female gametes
Syngamy	Fusion of male and female gametes
Parthenogenesis	Development of organism from unfertilised egg
Juvenile Phase	Period of growth before sexual maturity
Senescence	Old age period leading to death

Solved Examples — NCERT Based

Example 1

Q: Why is sexual reproduction considered superior to asexual reproduction?

Solution: Sexual reproduction involves meiosis and fusion of gametes from two parents, creating **genetic variation** in offspring. This variation allows populations to adapt to changing environments through natural selection. Asexual reproduction produces clones with no variation, making the population vulnerable to environmental changes or diseases.

Example 2

Q: Differentiate between external and internal fertilisation.

Solution:

External: Fusion occurs outside the body in aquatic medium. Large number of gametes released (to compensate for loss). Example: frogs, bony fish.

Internal: Fusion occurs inside the female body. Fewer gametes needed (better protection). Male transfers sperm through copulation. Example: mammals, birds, reptiles.

Example 3

Q: A plant reproduces through both vegetative propagation and seeds. What advantage does seed formation provide?

Solution: Seeds provide: (1) **Genetic variation** through sexual reproduction (2) **Dispersal** to new locations (3) **Dormancy** — seeds can survive unfavourable conditions (4) **Stored food** for the developing embryo. Vegetative propagation only produces clones near the parent plant.

Example 4

Q: In honeybees, drones are haploid. How is this possible?

Solution: Drones (male honeybees) develop from **unfertilised eggs** through **parthenogenesis**. Since no fertilisation occurs, they remain haploid ($n = 16$). Worker bees and the queen develop from fertilised eggs and are diploid ($2n = 32$).

Important Questions for Board Exams

1 Mark Questions

1. What is a clone?
2. Name one organism that reproduces by budding.
3. What is the difference between oviparous and viviparous animals?
4. What is parthenogenesis?

2 Mark Questions

1. Distinguish between binary fission and budding.
2. Why is vegetative reproduction also considered asexual reproduction?
3. What happens during the juvenile phase and senescent phase?
4. Why is meiosis essential in sexually reproducing organisms?

3 Mark Questions

1. Describe the different types of asexual reproduction with examples.
2. Explain the three phases of sexual reproduction in organisms.
3. Why are the offspring of asexual reproduction called clones? How is this different from sexual reproduction?

Quick Revision Points

- Asexual: single parent, no gametes, clones (no variation)
- Methods: binary fission, budding, sporulation, fragmentation, vegetative propagation
- Sexual: two parents (usually), gametes, meiosis, genetic variation
- Phases: pre-fertilisation → fertilisation (syngamy) → post-fertilisation
- External fertilisation: aquatic medium (frog, fish); Internal: inside body (mammals)
- Oviparous: eggs (birds); Viviparous: live birth (mammals)
- Parthenogenesis: unfertilised egg → organism (honeybee drones)
- Bryophyllum: vegetative propagation from leaf buds
- Gametes: haploid (n); Zygote: diploid ($2n$)

Next: Sexual Reproduction in Flowering Plants →



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