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CHAPTER NOTES

How do Organisms Reproduce Class 10 Notes | CBSE Chapter 7 Science

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How do Organisms Reproduce Class 10 Notes | CBSE Chapter 7 Science

How do Organisms Reproduce? is Chapter 7 of CBSE Class 10 Science. Reproduction is a biological process by which organisms produce offspring of their own kind. This chapter covers both asexual and sexual reproduction in plants and animals, the human reproductive system, contraception methods, and sexually transmitted diseases.

This is one of the most important chapters for board exams — expect 8–10 marks. The human reproductive system, modes of asexual reproduction, and pollination/fertilisation in plants are the most frequently tested topics.

Key Concepts

1. Why Do Organisms Reproduce?

Reproduction is not essential for an individual organism's survival — but it is essential for the **survival of the species**. Without reproduction, a species would go extinct.

Reproduction creates new individuals that are similar to but not identical to parents. This **variation** is important for evolution — it helps species adapt to changing environments.

At the most basic level, reproduction involves **copying DNA** (the genetic material). DNA in the cell nucleus carries all the information needed to build and run an organism.

Why Are There Variations?

DNA copying during reproduction is not perfectly accurate — small changes (mutations) occur. These variations may be:

- Beneficial (help survival in new conditions)
- Harmful (reduce survival chances)
- Neutral (no effect)

Over generations, beneficial variations accumulate — this is the basis of evolution.

2. Asexual Reproduction

In **asexual reproduction**, a single parent produces offspring without the involvement of gametes (sex cells). The offspring are genetically identical to the parent — they are **clones**.

Modes of Asexual Reproduction

Mode	Description	Example
Fission	Parent cell divides into two (binary fission) or many (multiple fission) daughter cells	Binary: Amoeba, Leishmania; Multiple: Plasmodium (malaria parasite)
Fragmentation	Body breaks into fragments, each growing into a new organism	Spirogyra (filamentous alga)
Regeneration	Organism can regrow a complete body from a cut piece using specialised cells	Planaria (flatworm), Hydra
Budding	A small bud grows on the parent body, develops, and detaches as a new organism	Hydra, Yeast
Vegetative propagation	New plants grow from vegetative parts (roots, stems, leaves) — not seeds	Potato (tuber/eyes), Bryophyllum (leaf buds), Rose (stem cutting)
Spore formation	Organisms produce spores in sporangia; spores germinate into new organisms	Rhizopus (bread mould), ferns, mosses

Note on Regeneration vs Fragmentation: Regeneration requires **specialised cells** that can differentiate into different cell types. Simply cutting an organism in half (fragmentation) doesn't always lead to regeneration — only organisms with this capability (like Planaria) can regrow from fragments.

Vegetative Propagation — Important Details

Plant	Part used
Potato	Tuber (underground stem) — eyes are buds
Bryophyllum	Leaf margins (buds on leaf edges)
Rose, Jasmine	Stem cuttings
Ginger, Turmeric	Rhizome (underground stem)
Sweet potato	Root tubers
Money plant	Stem cuttings in water

Advantages of vegetative propagation:

- Plants that don't produce seeds (banana, sugarcane, potato) can be propagated
- Genetically identical plants (preserves desirable traits)
- Faster than growing from seeds
- Plants grown are mature enough to bear flowers and fruits earlier

Tissue culture (Artificial vegetative propagation): Growing new plants from a few cells or a small tissue in a nutrient medium in a lab. Used to produce large numbers of genetically identical plants (e.g., ornamental plants, banana).

3. Sexual Reproduction

In **sexual reproduction**, two parents (usually male and female) contribute specialised sex cells called **gametes**. The male gamete fuses with the female gamete (fertilisation) to form a **zygote**, which develops into a new organism.

Key advantage: Sexual reproduction creates genetic variation because offspring receive DNA from two different parents. This variation is important for the survival of the species in changing environments.

4. Sexual Reproduction in Flowering Plants

Parts of a Flower

A flower is the reproductive organ of a plant. A complete flower has four whorls:

Whorl	Part	Function
1st (outermost)	Sepals (Calyx)	Protect the flower bud; usually green
2nd	Petals (Corolla)	Attract insects for pollination; usually colourful
3rd	Stamens (Androecium) — Male part	Produce pollen grains (contain male gametes). Each stamen has: Anther (pollen-producing) + Filament (stalk)
4th (innermost)	Pistil/Carpel (Gynoecium) — Female part	Contains ovules (contain female gametes). Parts: Stigma (sticky tip) + Style (tube) + Ovary (contains ovules)

Unisexual flowers: Have either stamens OR pistil (e.g., papaya, watermelon)

Bisexual flowers: Have both stamens AND pistil (e.g., hibiscus, mustard, rose)

Pollination

Pollination is the transfer of pollen grains from the anther to the stigma of a flower.

Type	Description	Agent
Self-pollination	Pollen from anther lands on stigma of the same flower or another flower of the same plant	No external agent needed
Cross-pollination	Pollen from one flower lands on stigma of a flower on a different plant (of same species)	Wind, insects, water, birds, bats

Fertilisation in Plants

1. Pollen grain lands on the stigma (pollination)
2. Pollen grain germinates — a **pollen tube** grows down through the style towards the ovary
3. The male gamete travels through the pollen tube and fuses with the female gamete (egg cell) inside the ovule
4. This fusion is called **fertilisation** — produces a **zygote**
5. The zygote divides repeatedly to form an **embryo**

Post-Fertilisation Changes

Part	Develops into
Zygote	Embryo (inside the seed)
Ovule	Seed (contains embryo + food store)
Ovary	Fruit (protects seeds, aids dispersal)
Petals, sepals, stamens, style	Usually fall off (wither)

Seed Germination

When conditions are right (water, warmth, air), the seed germinates — the embryo grows into a new plant. The seed coat breaks, and the root (radicle) emerges first, followed by the shoot (plumule).

5. The Human Reproductive System

Male Reproductive System

Organ	Function
Testes (pair, inside scrotum)	Produce sperm (male gametes) and testosterone (male sex hormone). Located outside body in scrotum because sperm need a temperature 2–3°C below body temperature.
Epididymis	Stores and matures sperm
Vas deferens	Tube that carries sperm from testis to urethra
Seminal vesicles and Prostate gland	Produce seminal fluid — nourishes sperm, provides medium for transport. Sperm + seminal fluid = semen
Urethra	Common passage for urine and semen (not at the same time)
Penis	Transfers semen into the female body during mating

Testosterone: Male hormone produced by testes at puberty. Causes: voice deepening, facial hair growth, muscle development, production of sperm.

Female Reproductive System

Organ	Function
Ovaries (pair)	Produce eggs (ova/female gametes) and oestrogen (female sex hormone). One egg is released every ~28 days (ovulation)
Fallopian tubes (Oviducts)	Carry egg from ovary to uterus. Fertilisation occurs here.
Uterus (Womb)	Thick-walled muscular organ where the embryo develops. Inner lining is richly supplied with blood vessels to nourish the embryo.
Cervix	Narrow opening of the uterus that connects to the vagina
Vagina	Receives semen; also the birth canal

Oestrogen: Female hormone produced by ovaries at puberty. Causes: breast development, widening of hips, onset of menstruation, maturation of eggs.

Fertilisation and Development in Humans

1. Sperm are deposited in the vagina during intercourse
2. Sperm swim up through the uterus to the fallopian tube
3. One sperm fuses with the egg in the fallopian tube → **fertilisation** → zygote forms
4. Zygote divides repeatedly as it moves to the uterus
5. The embryo implants in the thick, blood-rich lining of the uterus → **implantation**
6. **Placenta** develops: a disc-shaped tissue connecting embryo to uterine wall. It provides oxygen and nutrients from mother's blood, and removes CO₂ and waste from the embryo. Mother's and baby's blood do NOT mix directly.
7. Pregnancy lasts about **9 months (38–40 weeks)**
8. Baby is delivered through the vagina (birth canal) during childbirth

Menstruation (Periods)

If the egg is NOT fertilised:

- The thick uterine lining (prepared for pregnancy) is no longer needed
- The lining breaks down and is shed — released as blood and tissue through the vagina
- This is called **menstruation** — lasts about 3–5 days
- The menstrual cycle repeats every ~28 days

- Menstruation begins at puberty (**menarche**, around age 10–15) and stops around age 45–55 (**menopause**)

6. Reproductive Health

Contraception (Birth Control Methods)

Methods to prevent unwanted pregnancy:

Type	Method	How it works
Barrier methods	Condom (male/female), Diaphragm	Physically block sperm from reaching egg
Chemical methods	Oral pills (hormonal), Copper-T (IUD)	Pills: prevent ovulation; Copper-T: placed in uterus, prevents implantation
Surgical methods	Vasectomy (male), Tubectomy (female)	Vasectomy: vas deferens cut/blocked; Tubectomy: fallopian tubes cut/blocked

Important: Only condoms protect against **sexually transmitted diseases (STDs)** — also called sexually transmitted infections (STIs). Other methods only prevent pregnancy.

Sexually Transmitted Diseases (STDs)

Disease	Caused by	Type
HIV/AIDS	Human Immunodeficiency Virus	Viral
Gonorrhoea	Bacteria (Neisseria)	Bacterial
Syphilis	Bacteria (Treponema)	Bacterial
Genital warts	Human Papillomavirus (HPV)	Viral

Important Definitions

Term	Definition
Reproduction	Biological process by which organisms produce offspring of their own kind
Asexual reproduction	Reproduction involving a single parent without gamete fusion; offspring are clones
Sexual reproduction	Reproduction involving fusion of male and female gametes from two parents
Gamete	Sex cell (sperm in males, egg/ovum in females) — has half the number of chromosomes
Zygote	Cell formed by fusion of male and female gametes during fertilisation
Fertilisation	Fusion of male and female gametes to form a zygote
Pollination	Transfer of pollen grains from anther to stigma of a flower
Placenta	Special tissue connecting embryo to uterine wall; exchanges nutrients, oxygen, and waste
Menstruation	Monthly shedding of the uterine lining when no fertilisation has occurred
Puberty	Period when reproductive organs mature and secondary sexual characters develop
Ovulation	Release of a mature egg from the ovary (~once every 28 days)
Vegetative propagation	New plants growing from vegetative parts (roots, stems, leaves) without seeds
Tissue culture	Growing new plants from a few cells in a nutrient medium under sterile lab conditions

Solved Examples (NCERT-Based)

Example 1

Why is variation beneficial to the species but not necessarily for the individual?

Answer: Variations arise during DNA copying in reproduction. For an individual, some variations may be harmful (e.g., a mutation that causes disease). However, for the species as a whole, variation is beneficial because it ensures that at least some individuals can survive if the environment changes drastically. For example, if a heat wave kills most bacteria in a population, those with a heat-resistant variation survive and reproduce — saving the species from extinction.

Example 2

Why does the uterine lining become thick and spongy before ovulation?

Answer: The uterine lining thickens and develops a rich blood supply every month in preparation for a possible pregnancy. If the egg is fertilised, the embryo needs to implant itself in this lining and receive nourishment through the blood vessels. If fertilisation doesn't happen, this lining is no longer needed and is shed during menstruation.

Example 3

How does the embryo get nourishment inside the mother's body?

Answer: The embryo gets nourishment through the **placenta** — a disc-shaped tissue embedded in the uterine wall. The placenta has finger-like projections (villi) on the embryo's side, which are surrounded by the mother's blood. Glucose, oxygen, and nutrients pass from the mother's blood to the embryo's blood through the placenta. CO₂ and other wastes pass from the embryo to the mother's blood for removal. Importantly, the mother's and embryo's blood do not mix directly.

Example 4

Why is vegetative propagation practised for growing sugarcane and banana?

Answer: Sugarcane and banana do not produce viable seeds — they cannot be easily grown from seeds. Vegetative propagation (using stem cuttings for sugarcane, suckers/rhizomes for banana) is the practical method. Additionally, plants grown vegetatively are genetically identical to the parent, preserving desirable traits like sweetness, size, and disease resistance. They also mature and produce fruits faster than seed-grown plants.

Important Questions for Board Exams

1-Mark Questions

1. What is the role of seminal vesicles and prostate gland?
2. Name the part of the flower that develops into a fruit.
3. What happens to the egg if it is not fertilised?
4. Name one organism that reproduces by budding.
5. Where does fertilisation occur in the human female body?

2-Mark Questions

1. Differentiate between self-pollination and cross-pollination.
2. Why are testes located outside the body in the scrotum?
3. What is the difference between binary fission and multiple fission? Give one example of each.
4. What is the function of the placenta?
5. Why is DNA copying essential during reproduction?

3-Mark Questions

1. Describe the process of fertilisation in flowering plants starting from pollination.
2. Draw a labelled diagram of the female reproductive system and explain the function of each part.
3. What is menstruation? Why does it occur? At what age does it begin and end?
4. Explain three methods of contraception. Which method also protects against STDs?
5. List three modes of asexual reproduction. Describe any two with diagrams.

5-Mark Questions

1. Draw labelled diagrams of the male and female reproductive systems. Describe how fertilisation and development occur in humans.
 2. What is vegetative propagation? Explain its advantages. Describe tissue culture and its applications.
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Quick Revision Points

- Reproduction ensures species survival; variations help species adapt to changing environments
 - Asexual: one parent, no gametes, offspring are clones. Sexual: two parents, gamete fusion, variation
 - Asexual modes: fission, fragmentation, regeneration, budding, vegetative propagation, spore formation
 - Flower parts: Sepals → Petals → Stamens (male: anther + filament) → Pistil (female: stigma + style + ovary)
 - Pollination → Pollen tube → Fertilisation in ovule → Zygote → Embryo (in seed); Ovary → Fruit
 - Male system: Testes (sperm + testosterone) → Vas deferens → Urethra → Penis
 - Female system: Ovaries (egg + oestrogen) → Fallopian tube (fertilisation here) → Uterus → Vagina
 - Menstruation: ~28-day cycle; uterine lining sheds if egg is not fertilised
 - Placenta: exchanges nutrients/oxygen/waste between mother and embryo (blood doesn't mix)
 - Contraception: Barrier (condom), Chemical (pills, Copper-T), Surgical (vasectomy, tubectomy)
 - Only condoms protect against STDs (HIV/AIDS, gonorrhoea, syphilis)
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Previous Chapter: Chapter 6 — Control and Coordination

Next Chapter: Chapter 8 — Heredity



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