

Chapter 7: *How Do Organisms Reproduce?*

Reproduction: What & Why?

Reproduction is the **biological process** by which organisms produce new individuals, ensuring the continuity of life. It's essential because all living things have a limited lifespan.

□ Types of Reproduction

1. Asexual Reproduction

- Involves just **one parent**.
- Offspring are genetically **identical** to the parent (clones).
- Common in simpler organisms like bacteria, fungi, and some plants. **Examples:**
 - *Binary fission* in amoeba
 - *Budding* in yeast
 - *Spore formation* in bread mould
 - *Vegetative propagation* in plants (like potato eyes or rose cuttings)

2. Sexual Reproduction

- Involves **two parents** (male and female).
- Fusion of gametes (sperm + egg) leads to genetically **diverse offspring**.
- Found in humans, animals, and most plants.

1. Asexual Reproduction

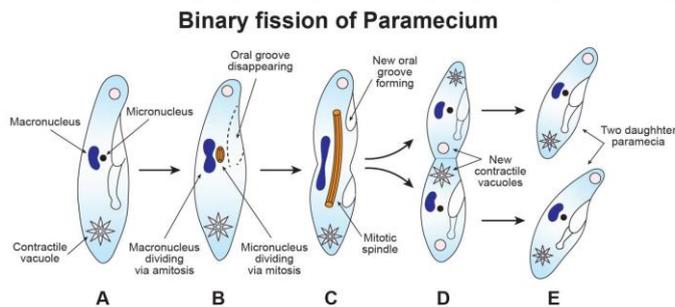
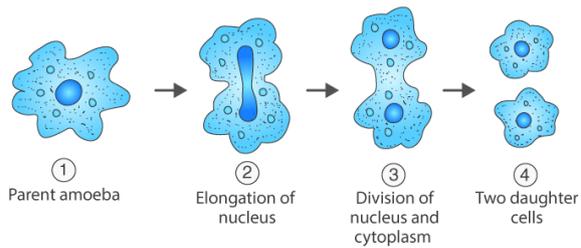
Asexual reproduction is the process by which a **single parent** organism reproduces to produce **offspring that are genetically identical** (clones). It's common in simple organisms like bacteria, fungi, and some plants.

There's **no fusion of gametes** and no change in chromosome number. Since the genetic material doesn't mix, the offspring are true replicas of the parent.

Types of Asexual Reproduction:

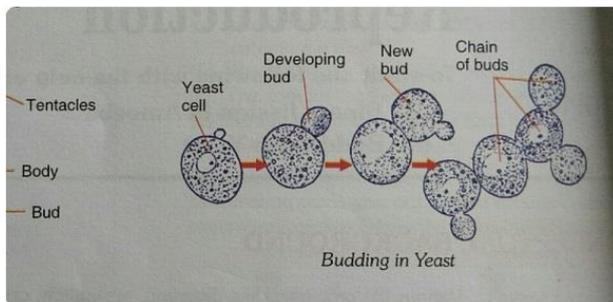
1. Binary Fission (common in bacteria, amoeba)

- The cell simply divides into two equal parts.
- *Example:* Amoeba splits to form two identical amoebas.
- *Amoeba*
- *Paramecium*
- *Euglena*
- *Bacteria* (like *E. coli*)



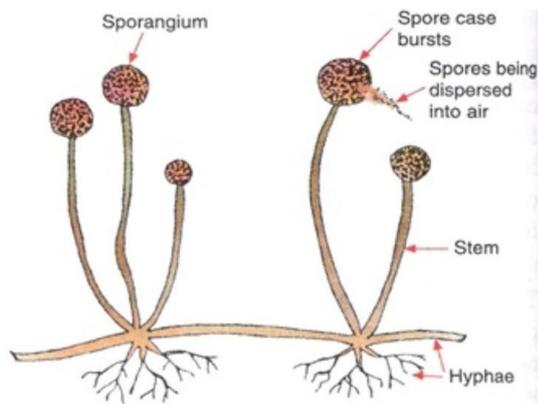
2. Budding (seen in yeast and hydra)

- A small outgrowth (bud) forms on the body, grows, and detaches as a new organism.
- *Example:* Yeast cell budding off a smaller yeast.
- *Hydra*



3. Spore Formation (common in fungi, like bread mould)

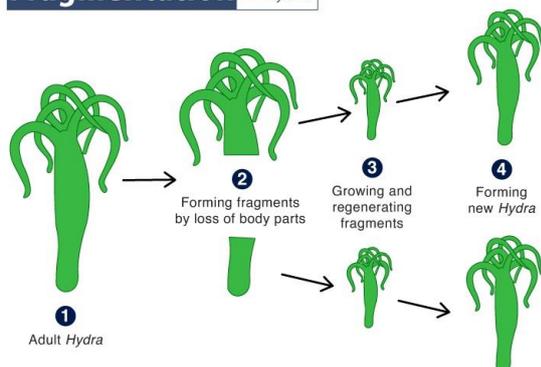
- Organisms produce **spores**—tiny cells with protective walls that can grow into new individuals under suitable conditions.
- *Example:* *Rhizopus* (bread mould) forms black spores.
- *Rhizopus* (bread mould)
- *Penicillium*
- *Ferns*
- *Mosses*



4. Fragmentation (in simple multicellular organisms like Spirogyra)

- The body breaks into pieces, and each piece grows into a new individual.
- *Example:* Spirogyra filament breaking into fragments.

Fragmentation In Hydra



5. Regeneration (seen in organisms like planaria, starfish)

- If the organism is cut, the pieces can regrow into complete organisms.
- *Example:* Planaria regenerates from a tiny body part.

6. (in plants)

- New plants grow from parts like roots, stems, or leaves.
- *Examples:*
- Potato tubers (with “eyes”)
- Bryophyllum leaves (with plantlets at the edges)
- Sugarcane and money plant through stem cuttings
- *Potato* (tubers)
- *Onion* (bulbs)
- *Ginger* (rhizomes)
- *Bryophyllum* (leaf buds)
- *Sugarcane* (stem cuttings)
- *Money plant* (stem cutting)



□ Why Asexual Reproduction?

- **Quick reproduction:** Good in stable environments
- **No need for a mate**
- **But: No genetic variation**, so it's harder to adapt if the environment changes

2. Sexual Reproduction in Plants

Plant Reproduction (Detailed)

1. Flower Structure

- **Stamen (male):** Anther (produces pollen) + Filament
- **Carpel (female):** Stigma (receives pollen) + Style + Ovary (contains ovules)

2. Pollination

- **Self-pollination:** Pollen lands on the same flower.
- **Cross-pollination:** Pollen moves to a different flower (via wind, insects, etc.)

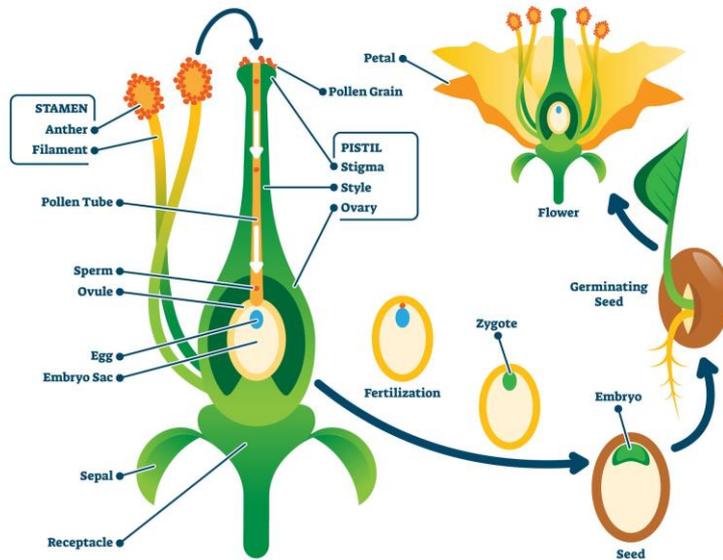
3. Fertilization

- Pollen grain grows a tube to the ovule → sperm travels down → fertilizes egg → **seed** forms.

4. Seed Formation & Germination

- Ovule becomes seed, ovary becomes fruit.
- Under right conditions, seed germinates into a new plant.

FLOWER REPRODUCTION



Sexual Reproduction in Humans

1. Male Reproductive System

- **Testes:** Produce sperm and testosterone.
- **Vas deferens:** Transports sperm.
- **Penis:** Delivers sperm into the female body.
- **Seminal vesicles & prostate gland:** Add fluids to sperm to form semen.

2. Female Reproductive System

- **Ovaries:** Release eggs (ova) and hormones.
- **Fallopian tubes:** Site of fertilization.
- **Uterus:** Where the embryo implants and grows.
- **Vagina:** Birth canal and receives sperm.

3. Fertilization & Development

- Sperm meets egg in the fallopian tube → **zygote** forms.
- Zygote divides and implants in uterus → becomes **embryo** → develops into **fetus**.

Reproduction

1. Gamete Formation (Gameteogenesis)

- **Males** produce *sperm cells* in the testes through a process called **spermatogenesis**.
- **Females** produce *egg cells (ova)* in the ovaries through **oogenesis**.
- Both processes involve *meiosis*, so gametes carry **half the number of chromosomes** (23 in humans).

2. Fertilization

- Happens when a **sperm cell fuses with an egg cell**—usually in the **fallopian tube** of the female.
- The result is a **zygote**, a single cell with a complete set of 46 chromosomes.
- The zygote is the **first cell of a new individual**.

3. Zygote Development & Embryogenesis

- The zygote divides repeatedly (**cleavage**) and becomes a **blastocyst**.
- The blastocyst travels down the fallopian tube and **implants in the uterine wall**.
- Cells begin to specialize, forming an **embryo**—this stage lasts from fertilization to about **8 weeks**.

4. Fetal Development

- From 9 weeks onward, the embryo is called a **fetus**.
- All major organs develop and mature during this time.
- The **placenta** forms, allowing nutrient and waste exchange between mother and fetus.
- This stage lasts until **birth**, around 38–40 weeks from fertilization.

5. Birth (Parturition)

- Hormonal changes trigger **labor**.
- **Uterine contractions** push the baby out through the **vagina (birth canal)**.
- The baby is born, and the **umbilical cord** is cut—separating the newborn from the placenta.

