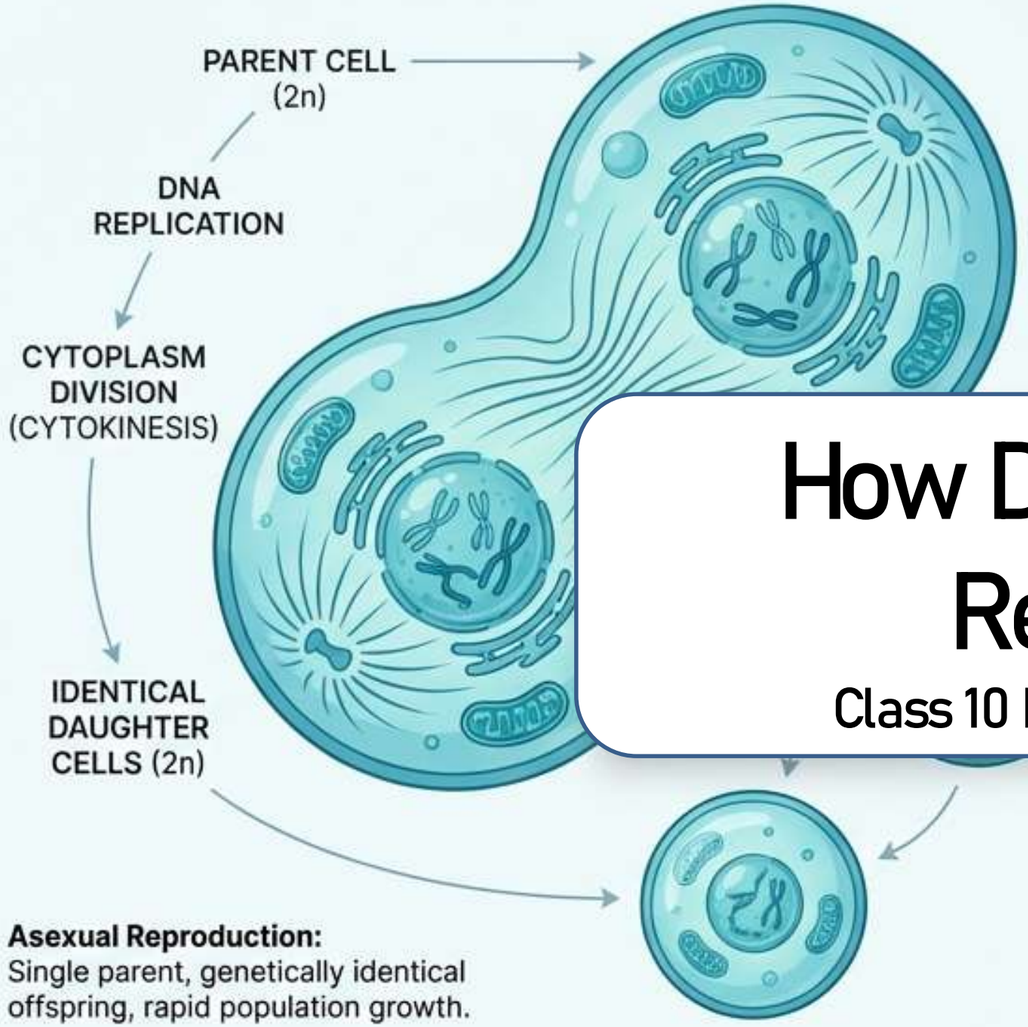
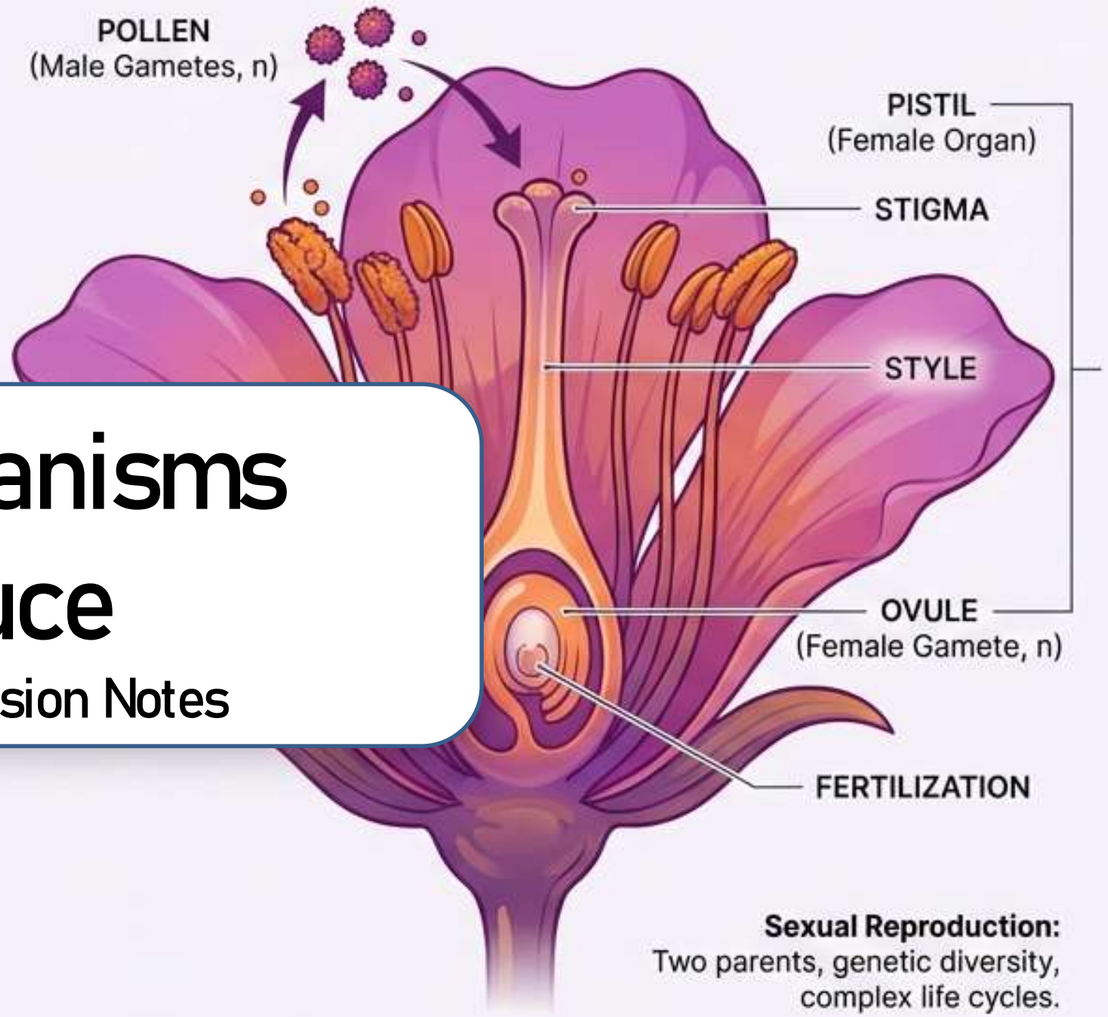
How Do Organisms Reproduce

Class 10 Biology Revision Notes



Asexual Reproduction:
Single parent, genetically identical offspring, rapid population growth.



Sexual Reproduction:
Two parents, genetic diversity, complex life cycles.

Reproduction ensures the continuity of life on Earth, passing a species' basic characteristics from one generation to the next.

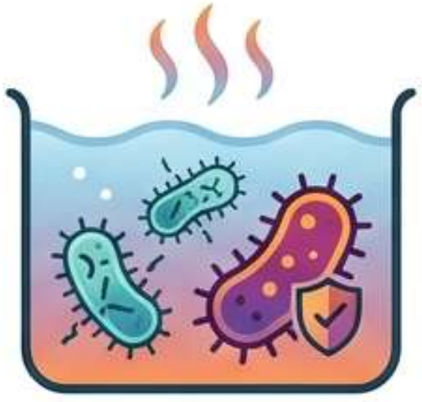
The Blueprint: DNA Copying & Variation

Cellular Duplication:
DNA in the nucleus, cytoplasm, and organelles duplicate.

Protein Alteration:
Changes in DNA sequence alter proteins, leading to variation.

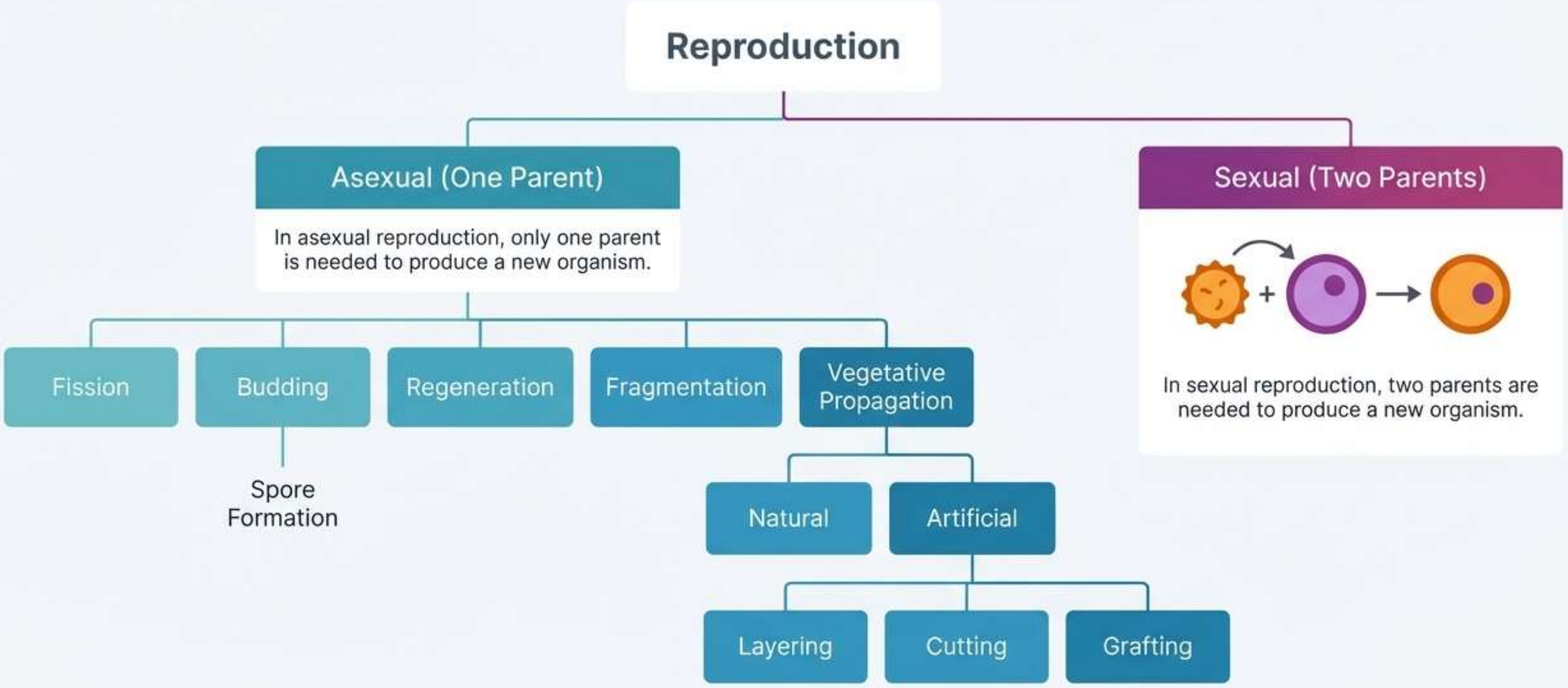
Niche Adaptation:
Body design consistency allows organisms to utilize specific ecological niches.

The Global Warming Survival Test



If temperate water bacteria face rising temperatures, most die. However, a few heat-resistant variants survive. Variations are the basis of evolution and genetic diversity.

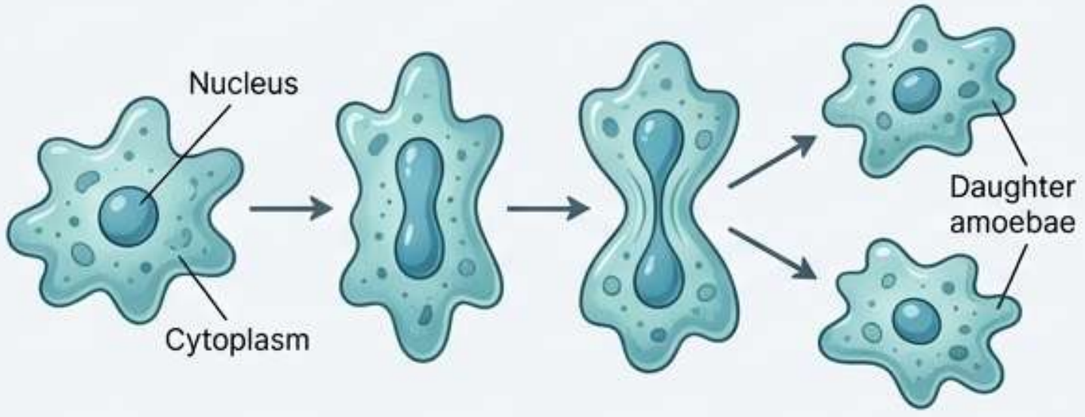
The Reproductive Divide



Asexual Fission: Binary vs. Multiple

Binary Fission

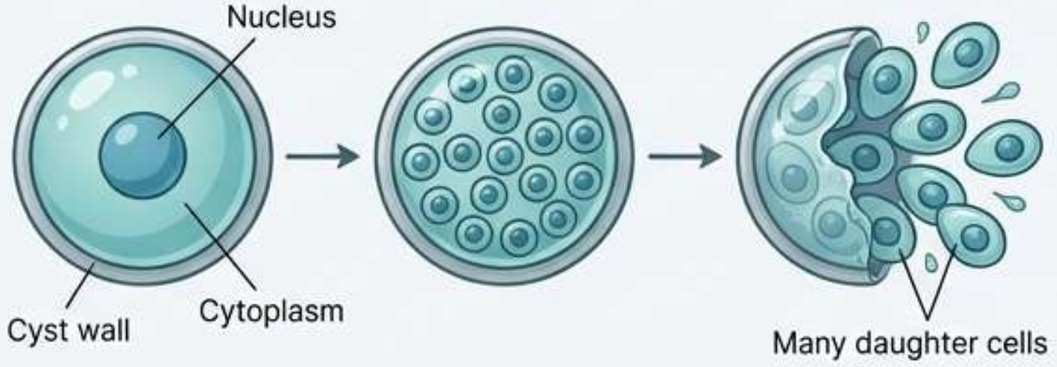
- One cell splits into two equal halves.
- Occurs under favorable conditions.



Amoeba:	Divides in any plane (irregular shape).
Paramecium:	Divides at horizontal axis.
Leishmania:	Divides longitudinally (whip-like pathogen).

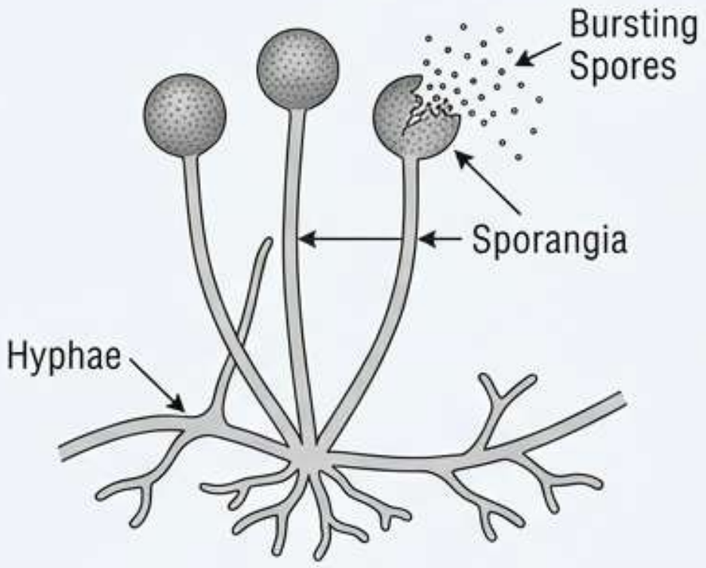
Multiple Fission

- One cell divides repeatedly to form many daughter cells simultaneously.
- Occurs in favorable and unfavorable conditions.



Examples: Plasmodium (malarial parasite); Amoeba (forming protective cysts).

Asexual Outgrowths: Budding & Spore Formation



- **Mechanism:** Nucleus divides inside sporangium, cyst bursts when damp/warm.
- **Advantage:** Thick walls for survival; light weight for wind dispersal.
- **Organisms:** Rhizopus, Mucor, Penicillium.

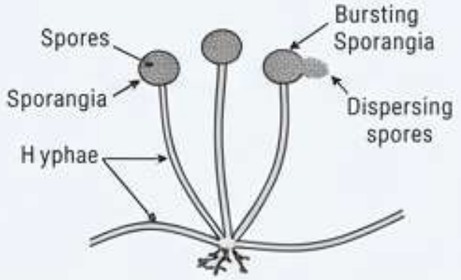
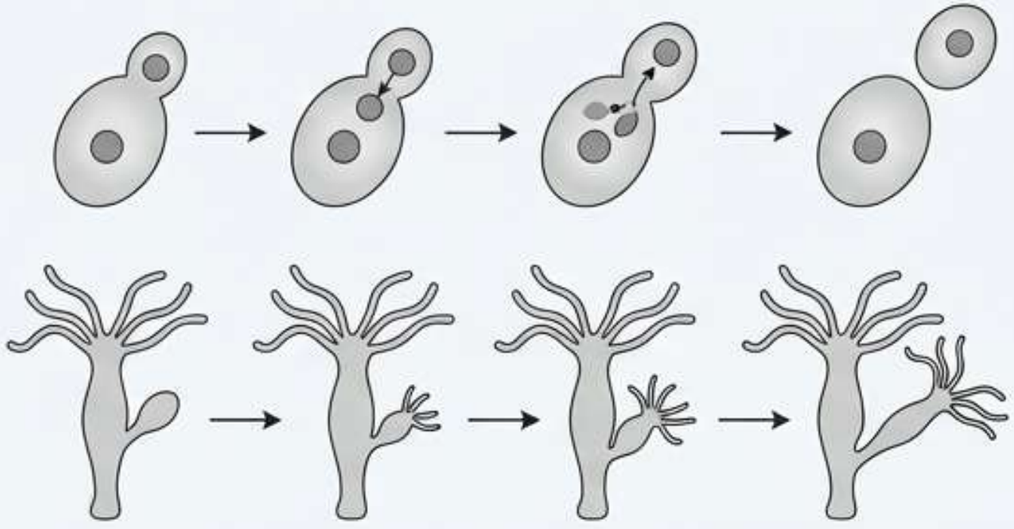


***Figure** : Formation of Sporangia and Spores in a fungus (Rhizopus)*



- **Mechanism:** An outgrowth (bud) forms on the parent body, matures, detaches, and becomes a new organism.
- **Organisms:** Yeast and Hydra.

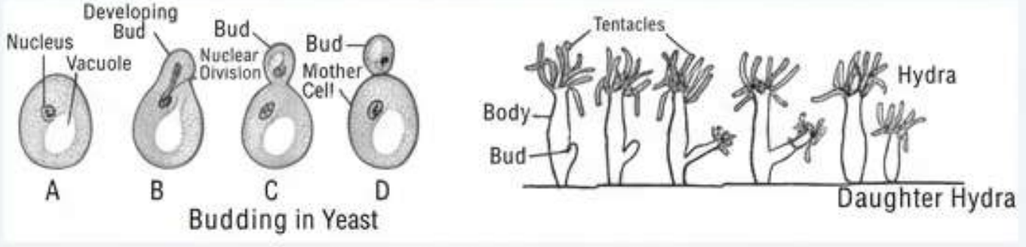
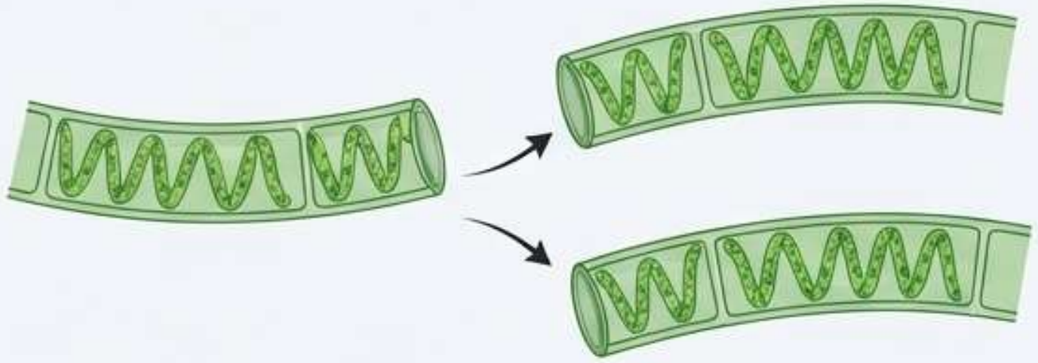


***Figure** : Budding in Yeast and Hydra*

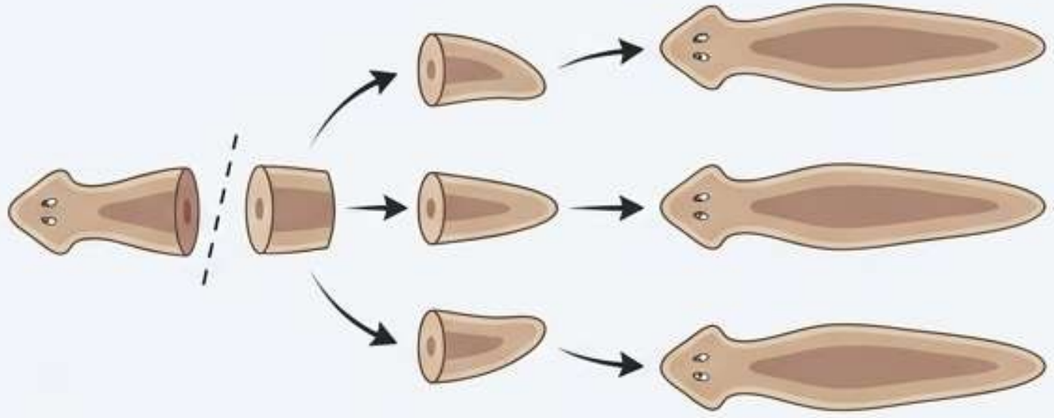
Rebuilding the Body: Regeneration vs. Fragmentation

Fragmentation



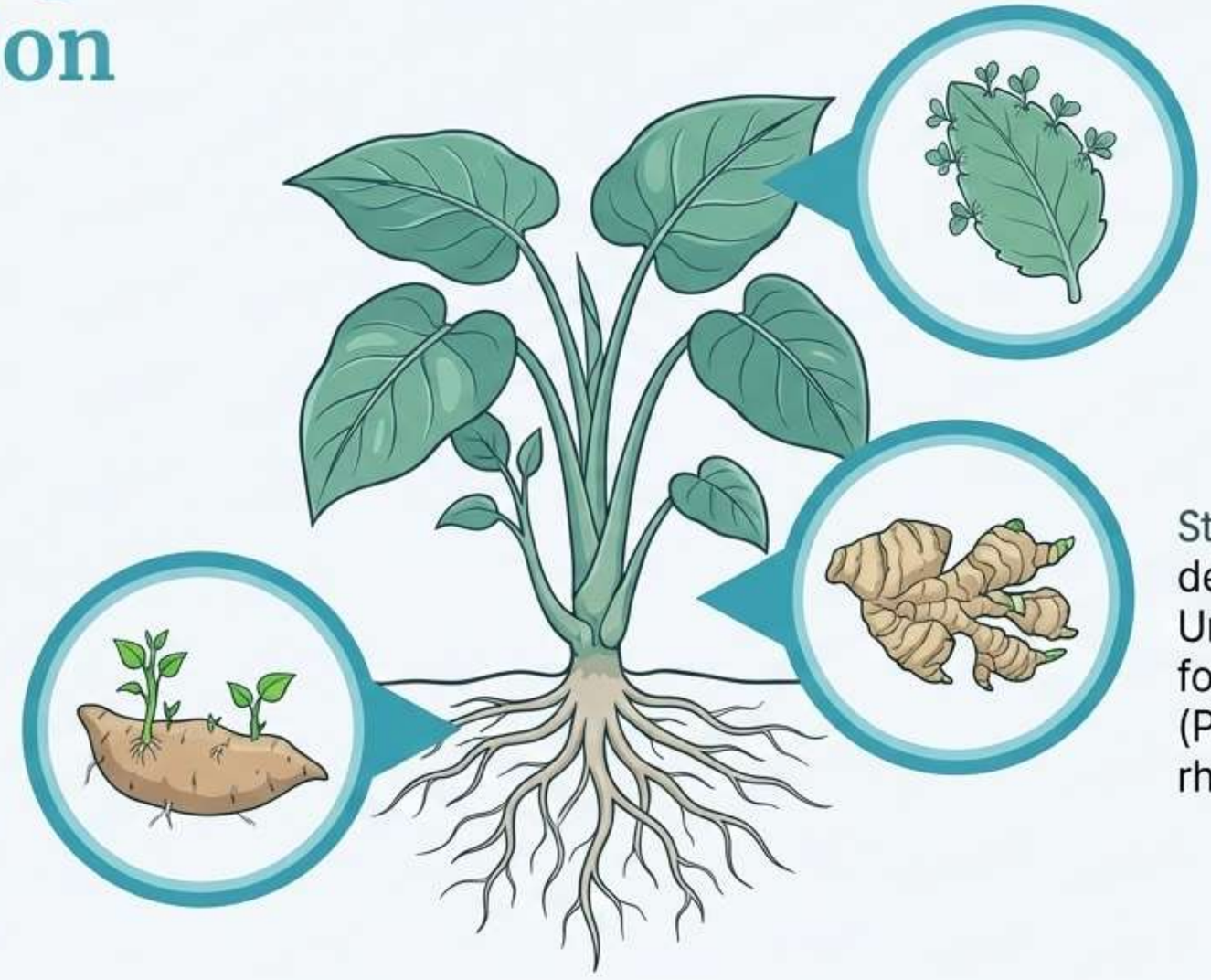
Organisms: Simple multicellular (Spirogyra, Sea Anemones).
Process: Organism breaks into pieces on maturing; each piece simply grows into a new individual. No specialized cells involved.

Regeneration



Organisms: Fully differentiated complex organisms (Hydra, Planaria).
Process: Injured/cut parts grow back. Requires specialized stem cells that proliferate and differentiate.
Note: Higher animals have limited power (e.g., lizard tail, human liver), but it is not considered a true primary mode of reproduction.

Natural Vegetative Propagation



Leaves: Fleshy leaves bear adventitious buds in the margin notches that fall and root (e.g., Bryophyllum).

Stems: Subaerial branches detach (Grasses). Underground modified for food storage with ‘eyes’ (Potato tuber, Ginger rhizome).

Roots: Adventitious roots become swollen/tuberous (e.g., Sweet potato, Dahlia).

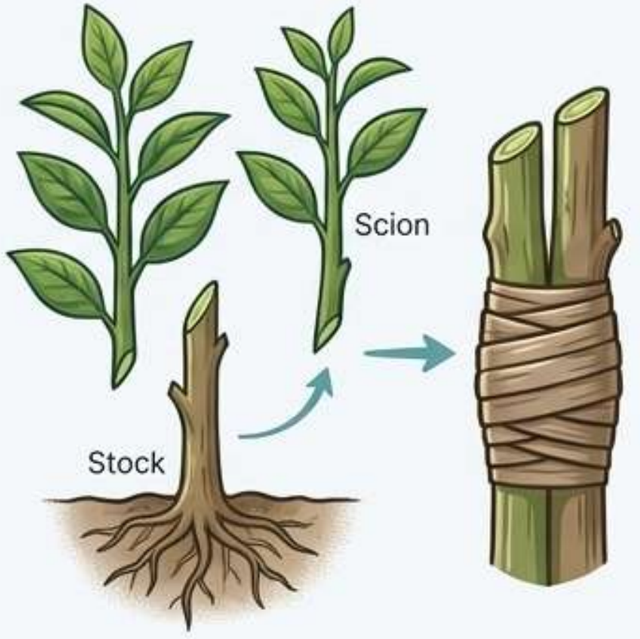
Artificial Vegetative Propagation

1. Cutting

Removing a piece of stem/root/leaf with a sharp knife to plant directly (e.g., Sugarcane, Rose, Grapes).

2. Layering

Mound: Pulling a flexible branch underground to root (Jasmine).
Air: Wrapping a scraped branch with damp moss (Rubber).



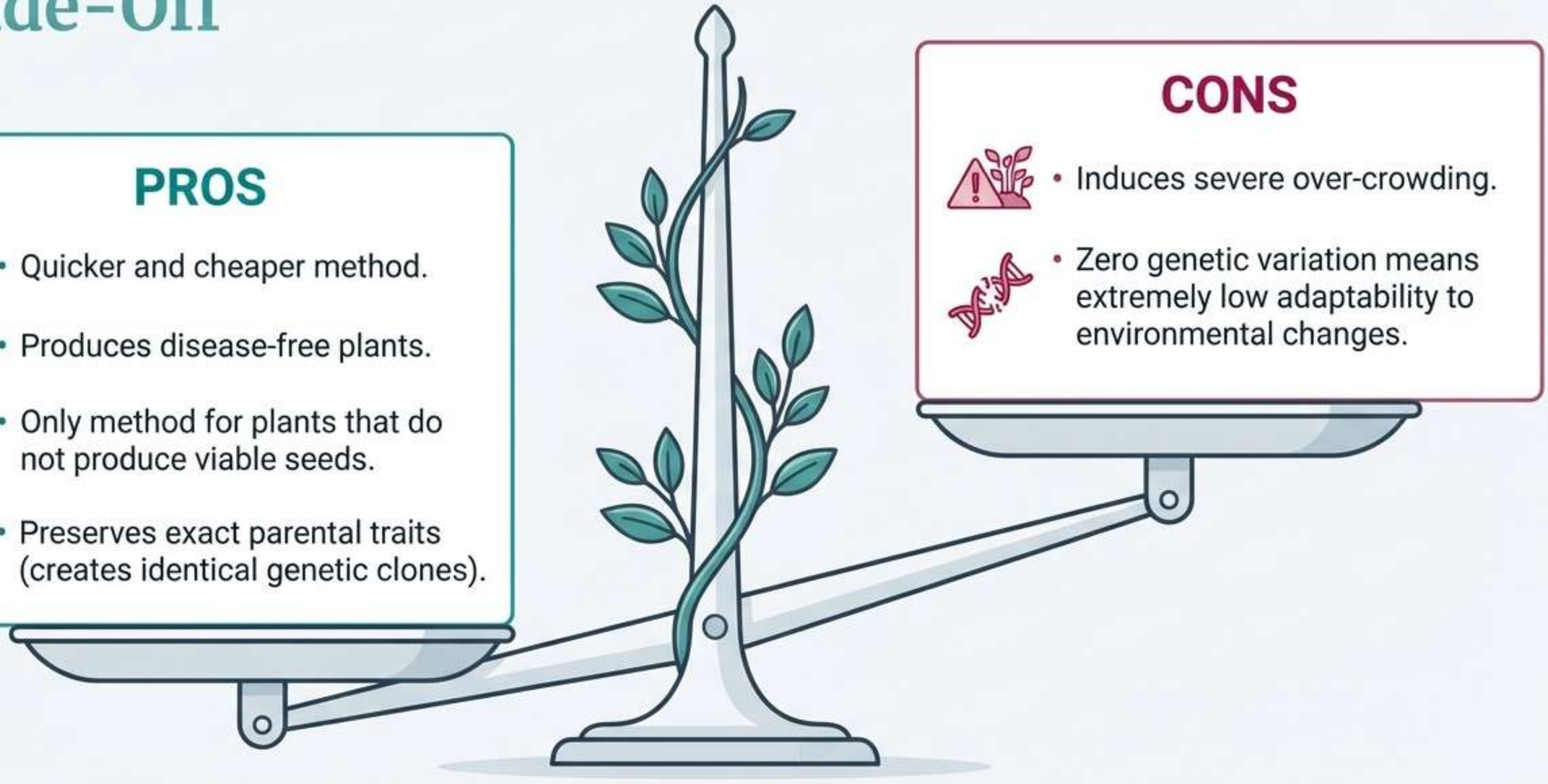
3. Grafting

Joining two related plants. The Stock (rooted base) is joined with the Scion (grafted top). Enables a single stock to support multiple scions (e.g., Citrus).

The Propagation Trade-Off

PROS

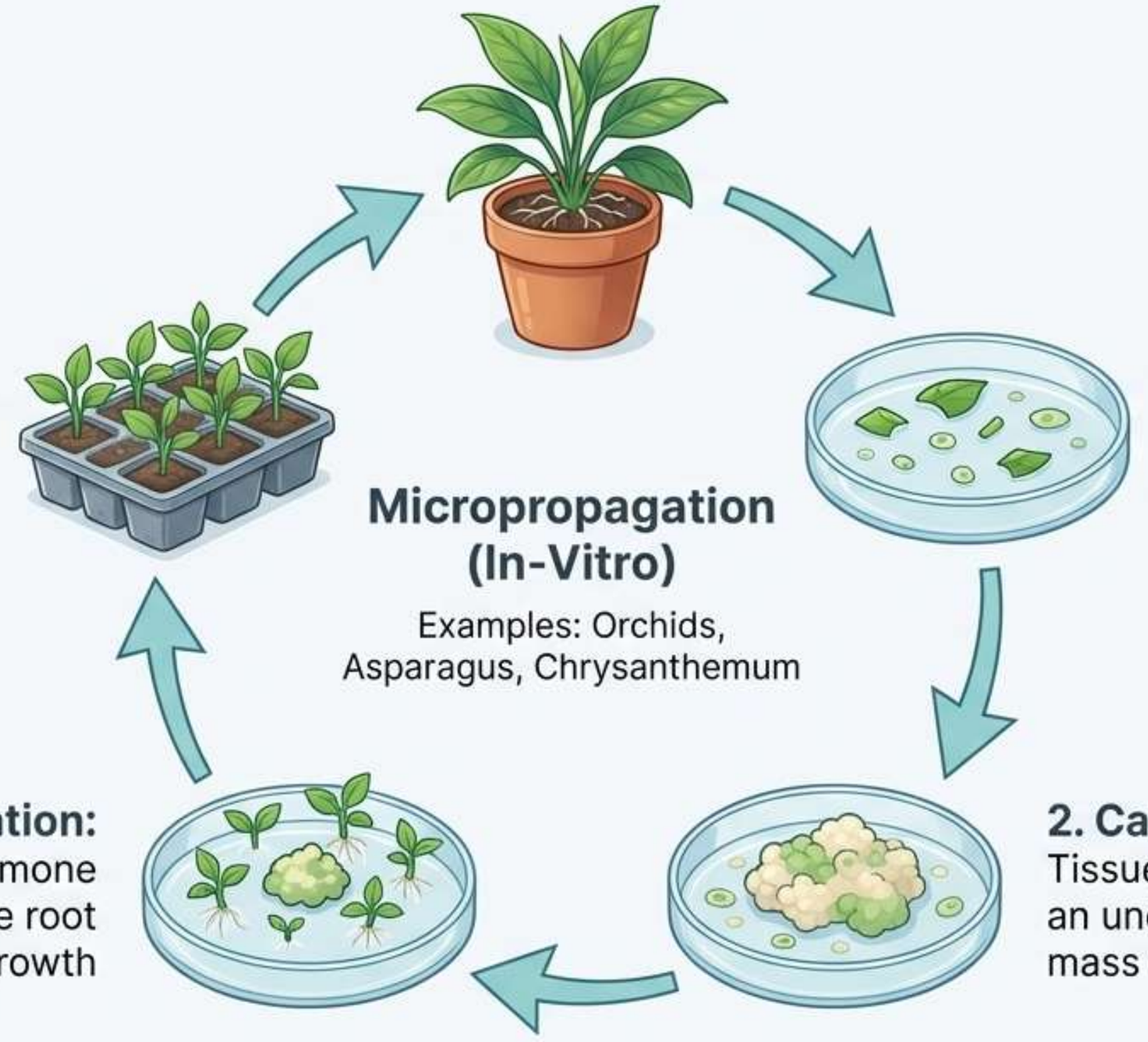
- Quicker and cheaper method.
- Produces disease-free plants.
- Only method for plants that do not produce viable seeds.
- Preserves exact parental traits (creates identical genetic clones).



CONS

- Induces severe over-crowding.
- Zero genetic variation means extremely low adaptability to environmental changes.

Modern Techniques: Tissue Culture



Micropropagation (In-Vitro)

Examples: Orchids, Asparagus, Chrysanthemum

1. Excision & Culture:
Remove tissue and grow in artificial nutrient medium under aseptic conditions.

2. Callus Formation:
Tissue proliferates into an undifferentiated cell mass (callus).

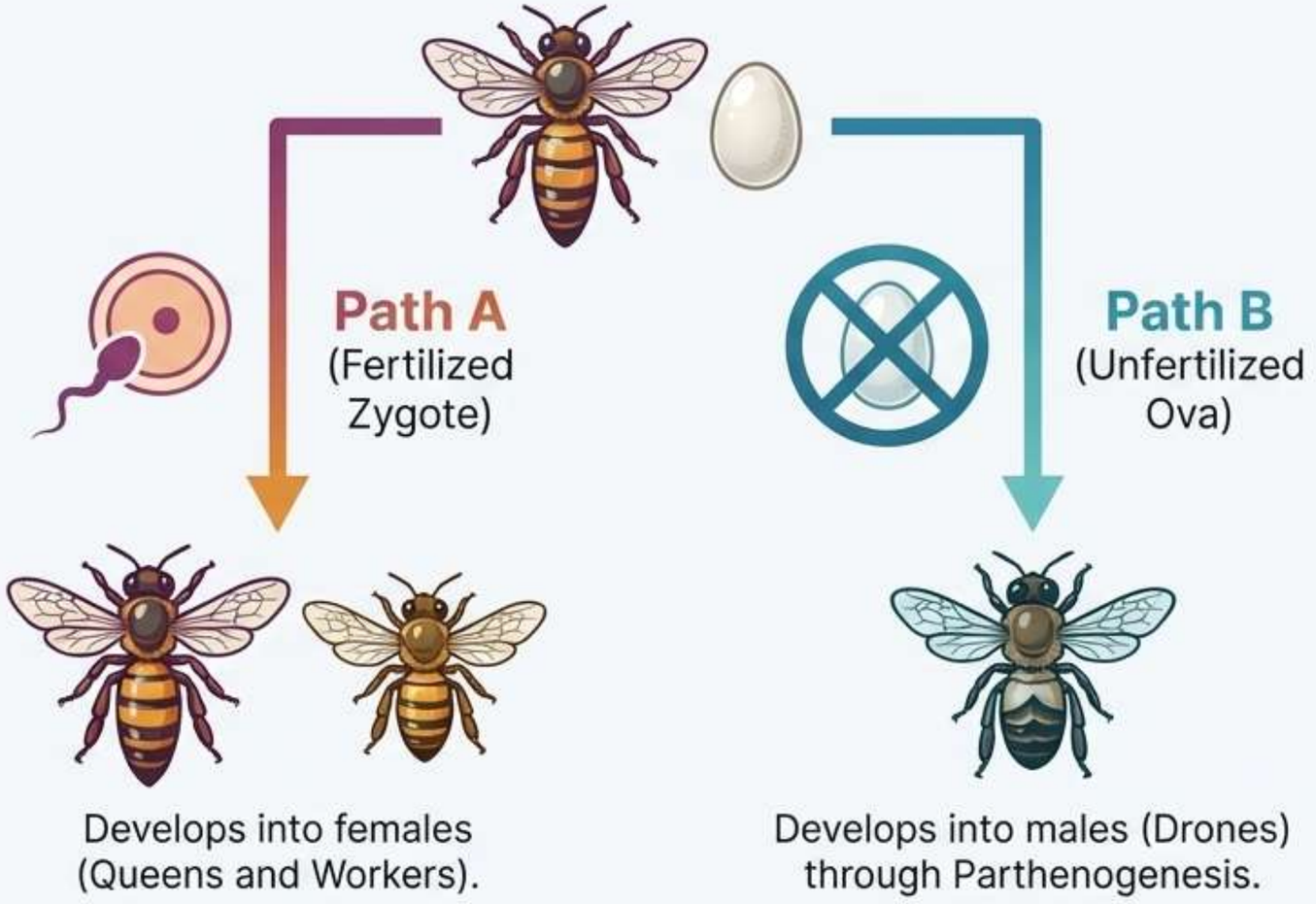
3. Differentiation:
Transfer to a hormone medium to induce root and shoot growth

4. Transplantation:
Plantlets moved to soil to mature

The Outlier: Parthenogenesis

Parthenogenesis (“Virgin Produce”) is the development of an organism from an unfertilized egg.

Discovered by Charles Bonnet in 1745.



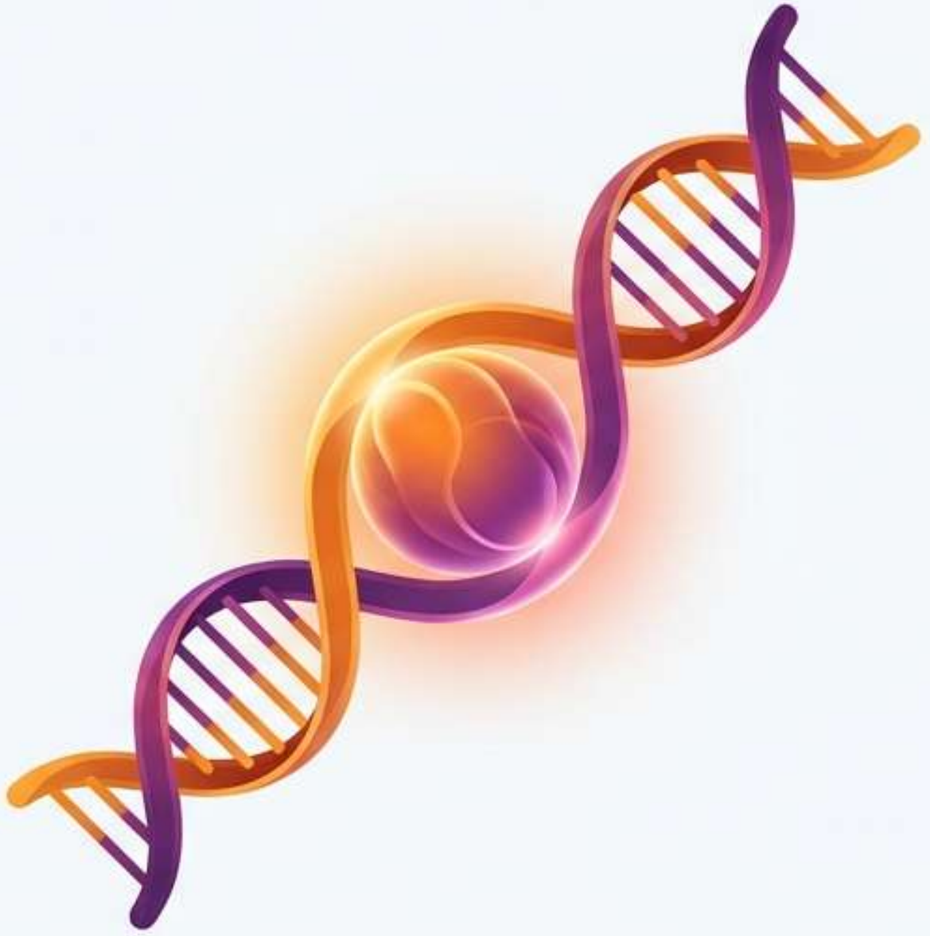
Also occurs in: Wasps, beetles, spiders, turkeys.

The Evolutionary Engine: Sexual Reproduction

Core Mechanics

- Production of offspring by the fusion of two gametes.

- The act of fusion is called called Fertilisation.



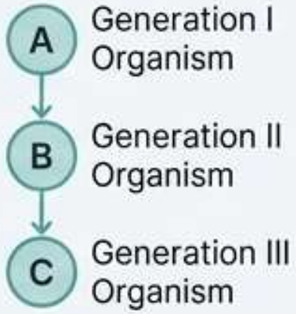
Significance & Power

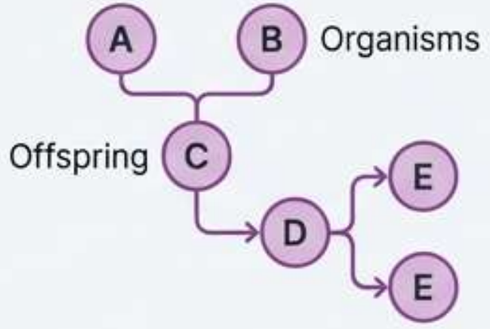
- Meiosis: Gametogenesis provides opportunities for new gene combinations.

- Diversity: Promotes distinct characteristics and reshuffling in offspring.

- Evolution: Plays a prominent role in the origin of new species.

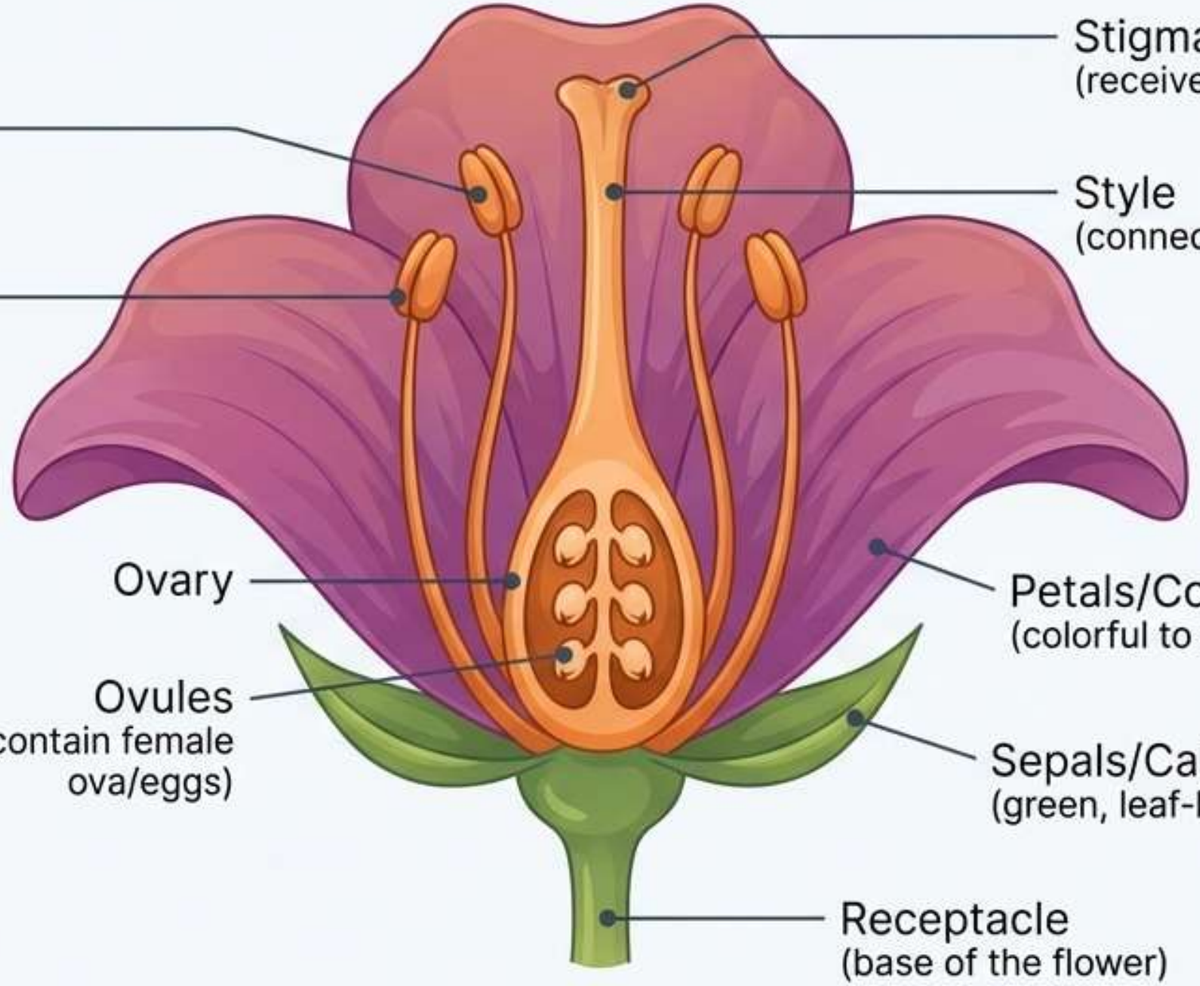
Comparing the Systems: Asexual vs. Sexual





	Asexual Reproduction	Sexual Reproduction
Parents	Monoparental (One)	Biparental (Two)
Anatomy	No sex organs	Specialised sex organs
Gametes & Fertilisation	Absent	Present (Fusion occurs)
Cell Division	Mitotic only	Involves Meiosis
Genetics	Identical clones to parent	Genetically distinct offspring
Evolutionary Impact	Primitive / No evolutionary importance	Higher organisms / Drives evolution

Plant Sexual Anatomy: Deconstructing the Flower



Male (Stamen / Androecium)

- **Anther** (produces and splits to release pollen grains)
- **Filament**

Female (Carpel/Pistil / Gynoecium)

- **Ovary**
- **Ovules** (contain female ova/eggs)

- **Stigma** (receives pollen)
- **Style** (connecting tube)
- **Petals/Corolla** (colorful to attract insects)
- **Sepals/Calyx** (green, leaf-like protection)
- **Receptacle** (base of the flower)

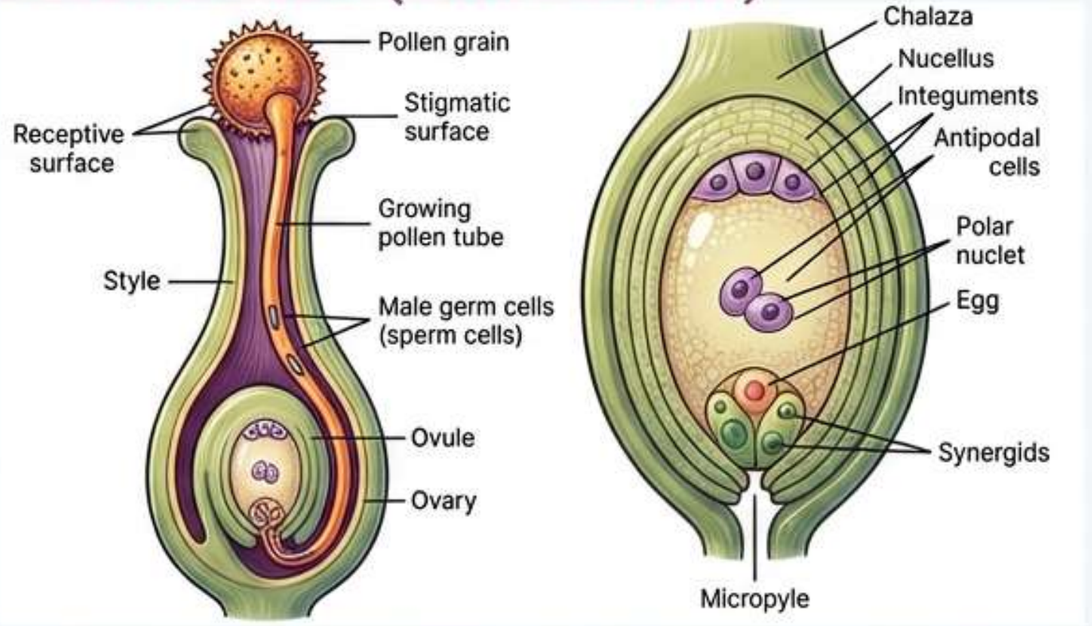
Note: Flowers can be Unisexual (Papaya) or Bisexual (Hibiscus).

The Final Step: Pollination & Fertilisation

Pollination (The Transfer)

- Transfer of pollen grains from ripe anther to stigma.
- Self-Pollination: Same flower (Autogamy, e.g., Pea) or same plant (Geitonogamy, e.g., Oxalis).
- Agents: Animals (Zoophily), Bats (Chiropterophily), Wind, etc.

Fertilisation (The Fusion)



Visual track of the male germ cell traveling down the pollen tube into the ovary to fuse with the female germ cell in the ovule, creating the next generation.