L1

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CLASS X - SCIENCE

HOW DO ORGANISMS REPRODUCE-I

PRASHANT KIRAD

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PK HITS🔥

- Asexual Reproduction → Example
- Budding (Diagram)
- Vegetative Propagation → A D V
- Fertilization in plants (Diagram + Functions)
- Reproduction (diagram) - Male & female
- STDs (MCQs)

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REPRODUCTION

Reproduction is the biological process by which organisms produce new individuals of the same species, ensuring the continuation of their species.

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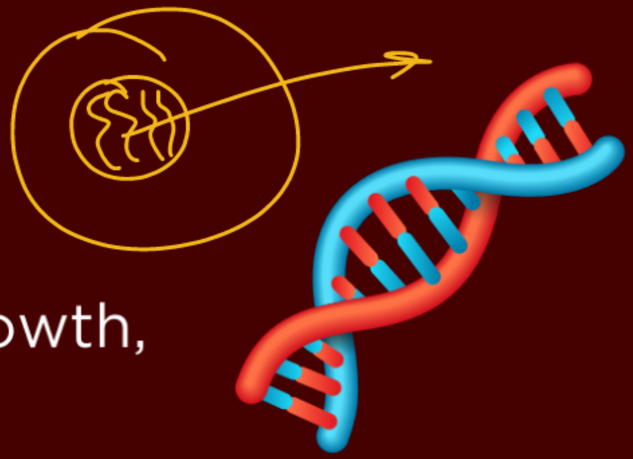
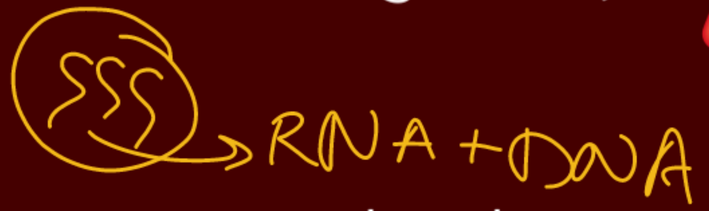
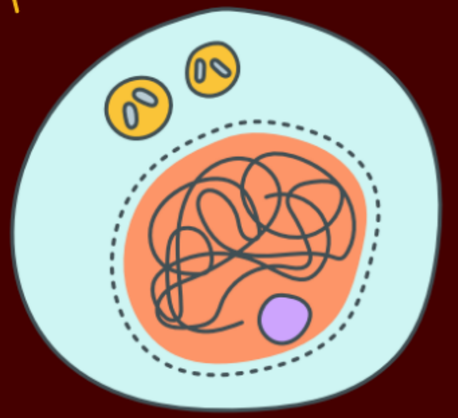
IMPORTANT TERMS TO KNOW



- **DNA (Deoxyribonucleic Acid)** - A molecule that carries genetic information in organisms. It determines inherited traits and is essential for growth, development, and reproduction.



- **Chromatin** - A genetic material or a macromolecule comprising DNA, RNA, and associated proteins, which constitute chromosomes in the nucleus of a eukaryotic cell.



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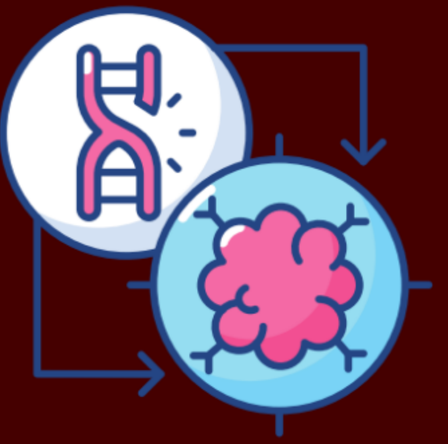
IMPORTANT TERMS TO KNOW

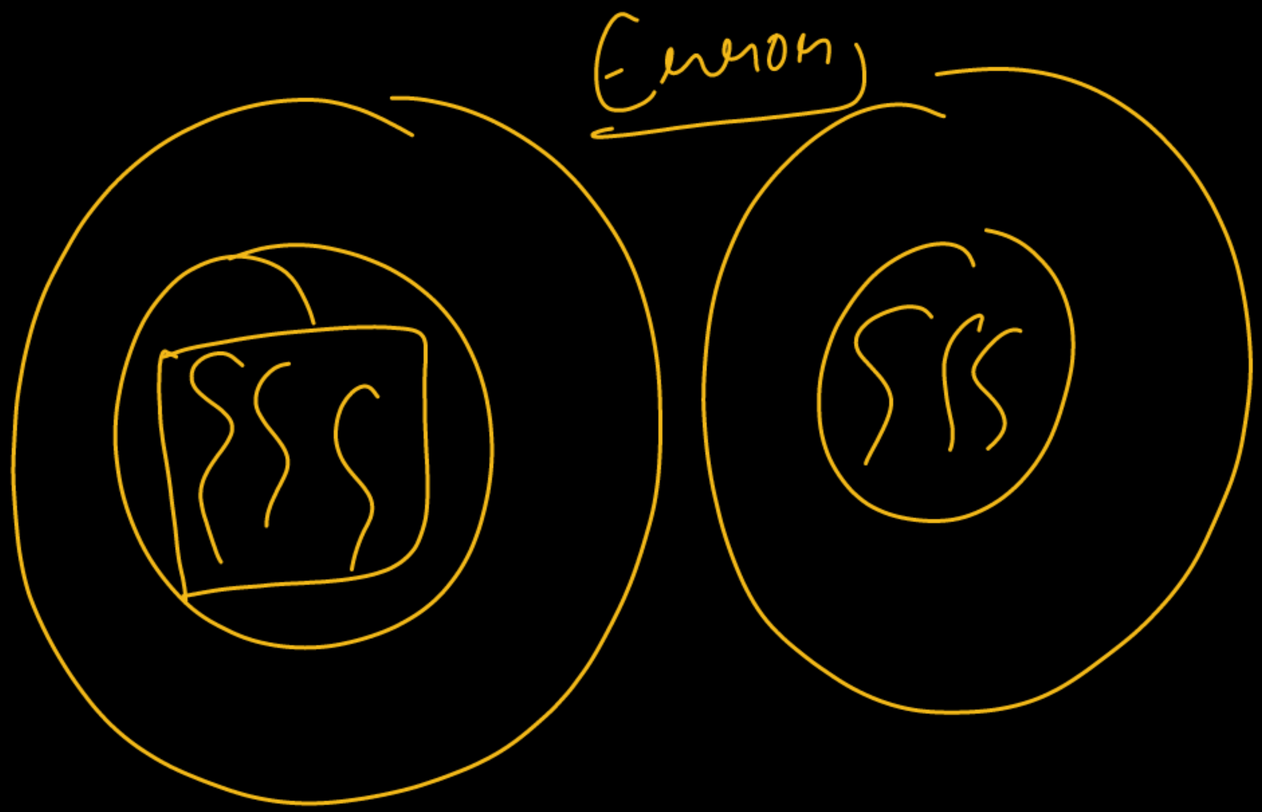
Coiled

- **Chromosomes** - A DNA molecule that consists of a part or all of the genetic material of an organism.

- **Genes** - It is a segment of DNA containing information for a particular character.



- **Genome** - All the genetic material of an organism. The genome includes both nuclear DNA as well as the mitochondria DNA & chloroplast DNA.


Errors

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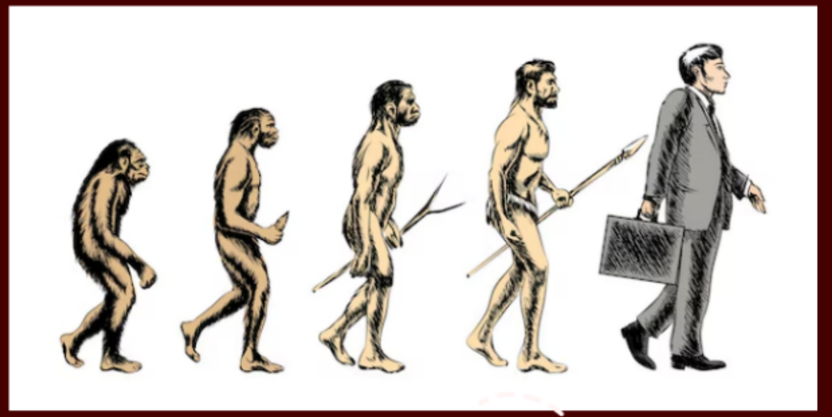
VARIATIONS

Variations are differences in traits among individuals of the same species. They occur due to genetic changes and are important for ***adaptation and evolution.***

Not a useful variation

Moth Ki Maut



Useful variation

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VARIATION AND ITS IMPORTANCE

- **Adapting to change:** Variations make the population diverse, meaning some individuals might have traits that help them survive if the environment changes.

- **Helping evolution:** Over time, helpful variations can build up in the population, leading to new species that are better suited to their environment.

Although variation helps the species, some changes might not be good for an individual in their specific environment, which could make it harder for them to survive.

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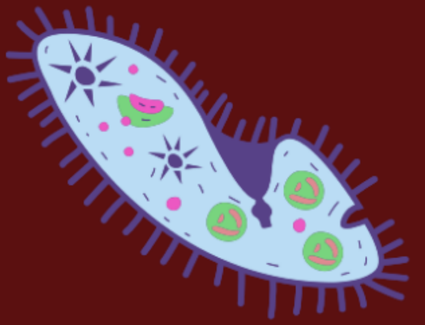
ASEXUAL REPRODUCTION

A mode of reproduction where a single parent produces offspring without the involvement of gametes. The offspring are genetically identical to the parent.

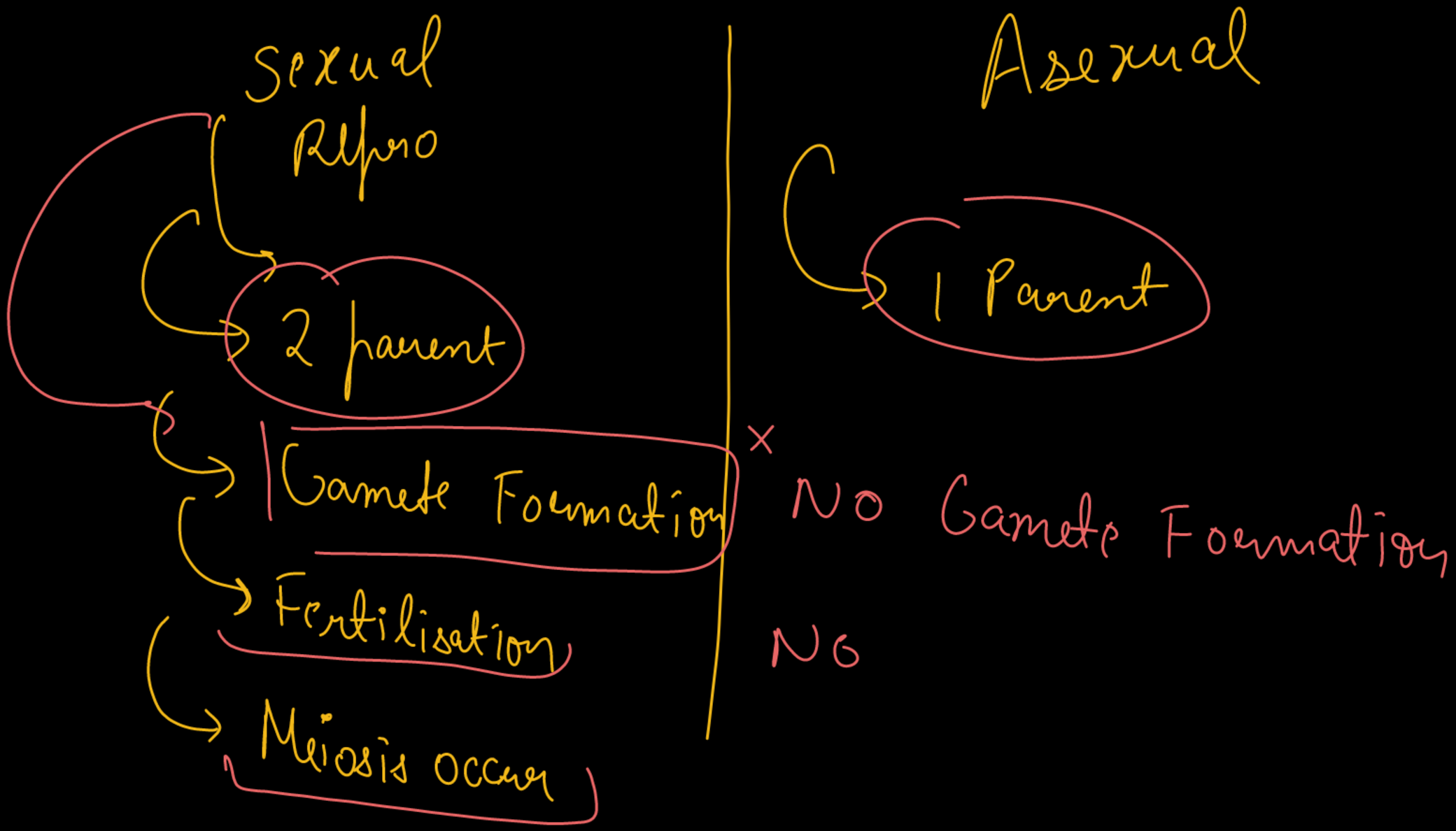
Asexual reproduction is observed in the following organisms:

Bacteria

Yeast



Protozoa


Sexual Repro
Asexual
2 parent
1 Parent
Gamete Formation
×
No Gamete Formation
Fertilisation
No
Meiosis occur

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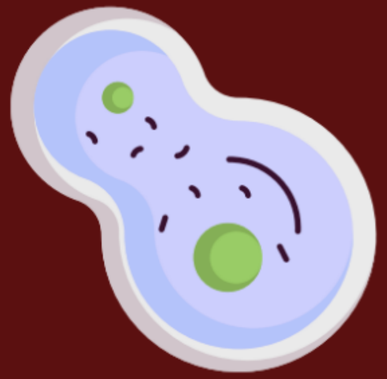
TYPES OF ASEXUAL REPRODUCTION

FISSION



FRAGMENTATION

BUDDING

VEGETATIVE PROPAGATION

REGENERATION

SPORE FORMATION

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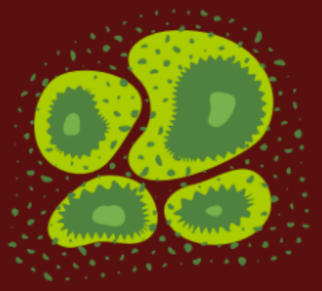
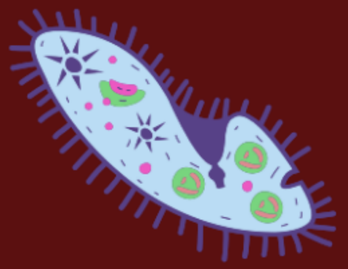
FISSION

- Unicellular organisms such as protozoans (Amoeba, Paramecium, Euglena, Plasmodium) reproduce by this mode of asexual reproduction.
- In fission, parent body divides into two or more daughter cells and each one then grows into an adult organism.

Bacteria

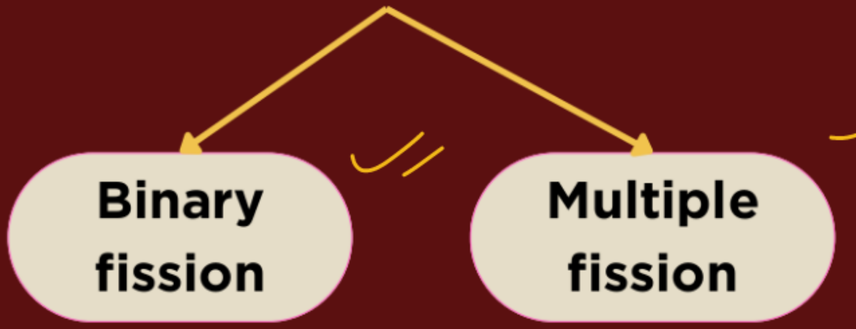


Yeast



Protozoa

TYPES OF FISSION



BINARY FISSION

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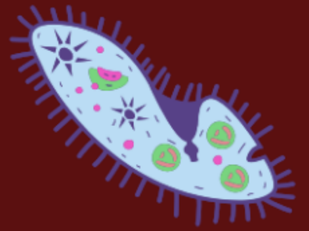
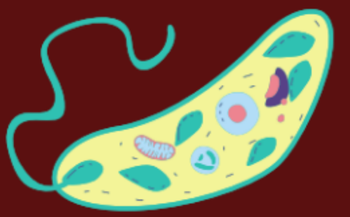
- Binary fission is a process where the *parent organism divides into two nearly equal-sized daughter cells.*
- It *begins with nuclear division*, followed by the division of the cytoplasm, resulting in two daughter organisms.
- Leishmania is a unicellular organism which also shows binary fission, but in a definite structure.
- KALA-AZAR disease is caused by Leishmania.

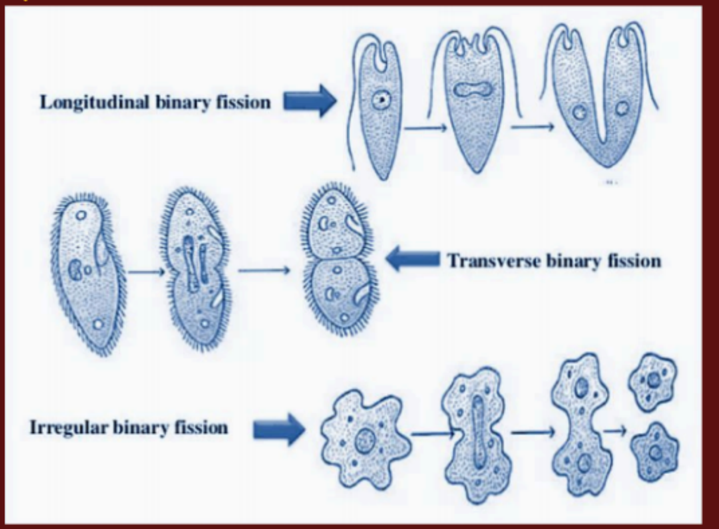
Amoeba



Paramecium



Euglena



MULTIPLE FISSION

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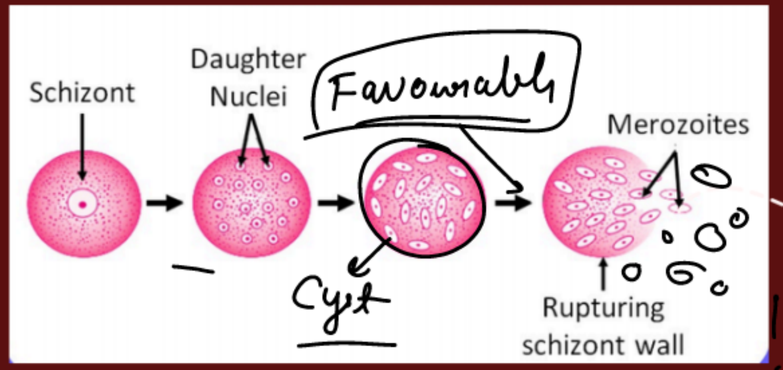
- Multiple fission is a process where the *parent organism divides into many small daughter cells.*
- The *nucleus divides repeatedly to form multiple daughter nuclei* without cytoplasmic division.
- For example, in Plasmodium, during unfavorable conditions, a tough cyst forms around the cell.
- When favorable conditions return, the cyst wall breaks, releasing the daughter cells.



Multiple fission in Plasmodium

BINARY V/S MULTIPLE FISSION

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Aspect	Binary Fission	Multiple Fission
Number of Daughter Cells	Two daughter cells are formed.	Many daughter cells are formed.
Conditions	Occurs under normal conditions.	Occurs under ~~unfavorable~~ Special conditions.
Cytoplasmic Division	Cytoplasm divides after one nuclear division (karyokinesis).	Cytoplasm divides after multiple nuclear divisions.
Process	Nucleus divides into two nuclei, followed by cytoplasmic division.	Nucleus divides repeatedly, forming multiple nuclei before cytoplasm divides.
Examples	Amoeba, Paramecium, Euglena, Leishmania.	Plasmodium.
Special Note	In Leishmania, binary fission occurs along a definite plane.	A tough cyst is formed during unfavorable conditions, which later breaks to release daughter cells.

BUDDING

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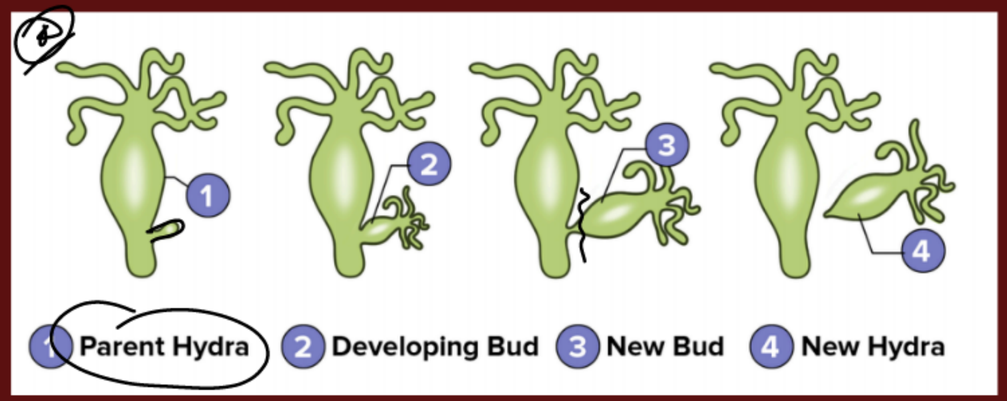
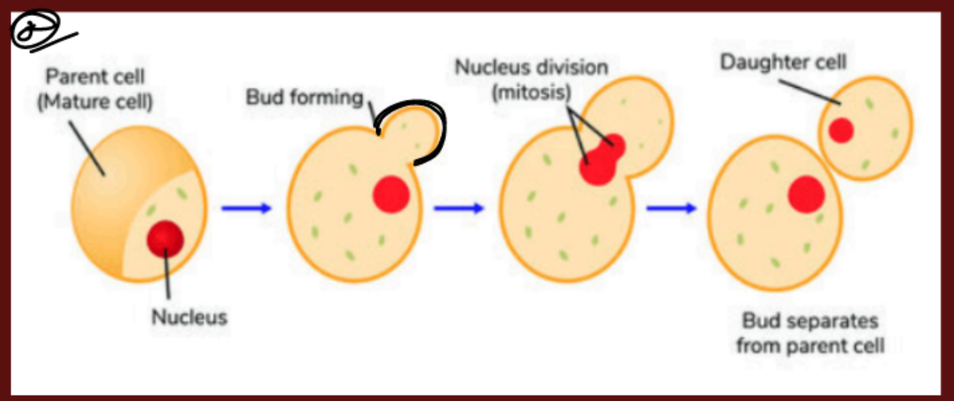
A new organism develops from a small outgrowth or bud on the parent. The bud eventually detaches to form an independent organism. *Example:* ***Yeast***.



Budding in hydra



Budding in yeast

FRAGMENTATION

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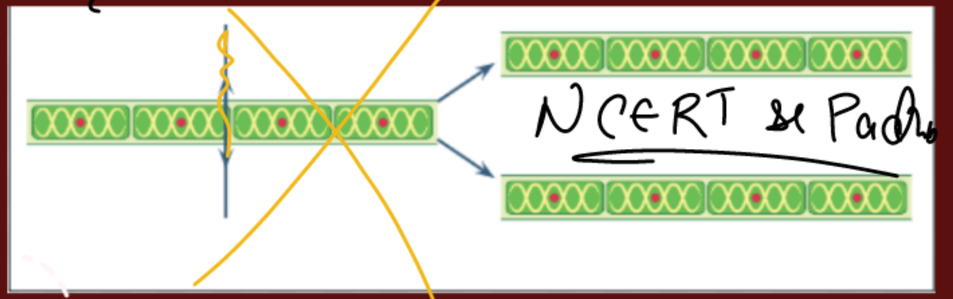
The organism breaks-up into smaller pieces upon maturation, each piece develops into new individual. E.g. Hydra, Spirogyra

Spirogyra, for example, simply breaks up into smaller pieces upon maturation. These pieces or fragments grow into new individuals.



Fragmentation in Spirogyra

REGENERATION

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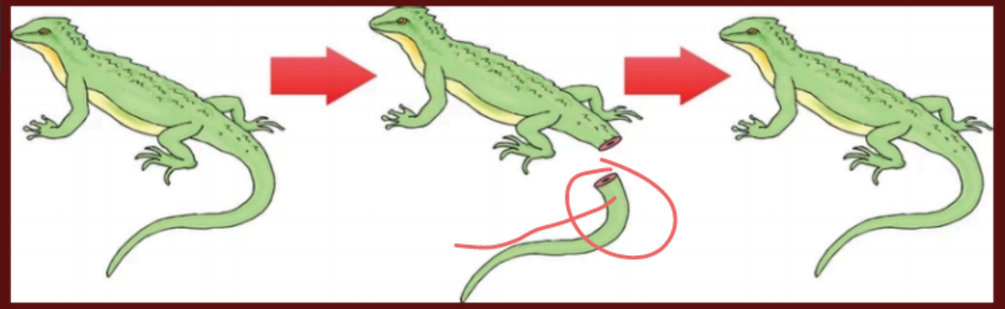
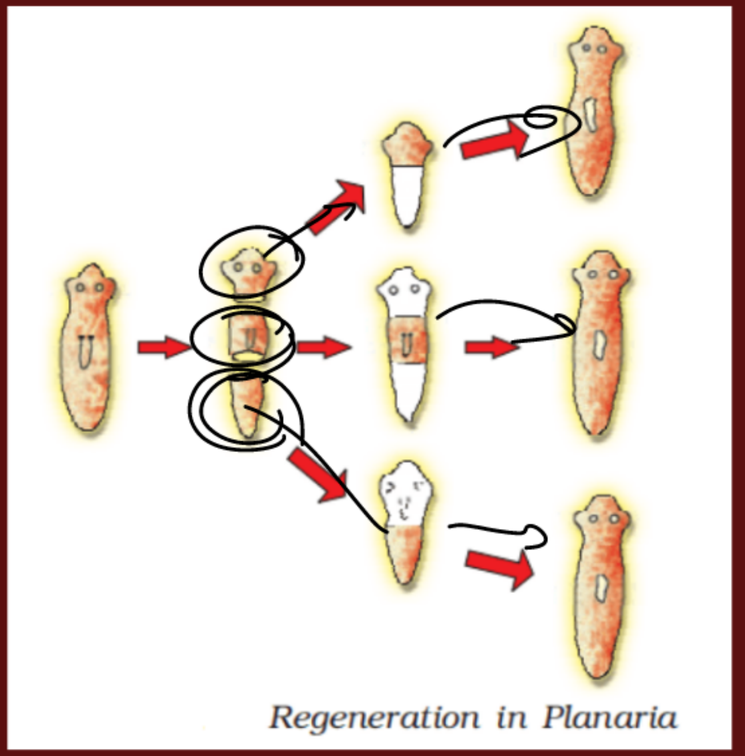
A process by which organisms regrow their lost or damaged body parts. In some cases, it also allows them to form new individuals from body fragments. Example: ***Planaria***.

DID YOU KNOW?



Lizards can regrow their tail.



Regeneration in Planaria

SPORE FORMATION

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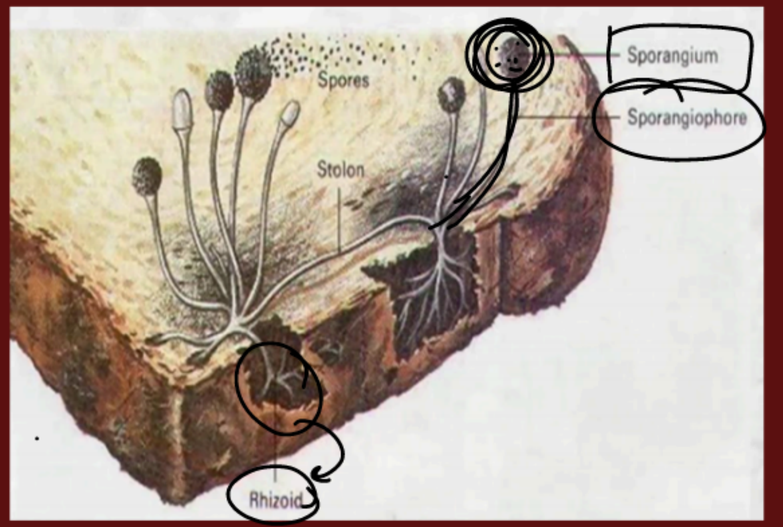
- The thread-like structures that develop on bread are the hyphae of the bread mould (*Rhizopus*).
- They are non-reproductive parts.
- The tiny blob-on-a-stick structures are involved in reproduction.
- The blobs are *sporangia*, which contain cells, or spores, that can eventually develop into new Rhizopus individuals.



Advantages of Spore formation

- **Survival in Harsh Conditions:** Spores are resistant to extreme heat, cold, and drought, aiding survival in unfavorable environments.
- **Wide Dispersal:** Lightweight spores are carried by wind, water, or animals, helping colonize new areas.
- **Rapid Population Increase:** Produced in large numbers, ensuring survival and growth despite losses.

VEGETATIVE PROPAGATION

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The method of producing new plants from vegetative parts like roots, stems, and leaves are called vegetative propagation.

PARTS OF A PLANT

Reproductive part

This part of the plant (flower) which is involved in the process of sexual reproduction.

Vegetative part

These parts of the plant (stem, leaf, root) are not involved in the process of sexual reproduction.

NATURAL VEGETATION

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- Plants can grow naturally without human intervention.
- New plants develop from the leaves, roots, or stems of the parent plant.

By underground stem

- Tubers: Swollen and fleshy. Example - Potato
- Buds (eyes) are present on potato, which grows into new plant.

By Root

- Plants like sweet potato (Tuberous roots), Dahlia, Tulip have fleshy roots.
- Roots have buds which detach & give rise to new plants.

By leaves

- **Bryophyllum and Kalanchoe:** Produce adventitious buds on leaf margins; buds fall and grow into plantlets.
- **Tuberous roots (e.g., Potato, Dahlia, Tulip):** Have fleshy roots with buds that detach and develop into new plants.

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CUTTING VEGETATION PROPAGATION

A propagation is cut from the parent plant & put into the soil, which will form new plant.

Stem cutting

Example: Rose, Grapes, Sugarcane, Banana, Cactus, etc.

Root cutting

Example: Raspberry, Blackberry, Dahlia, Fig, Lilac.

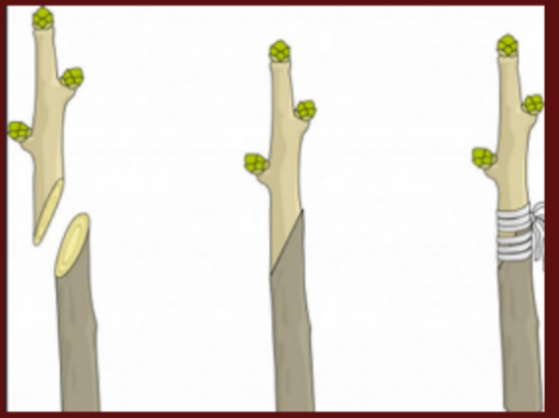
LAYERING AND GRAFTING

Layering

A stem is bent to the ground, covered with soil, and allowed to form roots while still attached to the parent plant. Once rooted, it is separated to grow independently. E.g. rose, lemon, etc.

Grafting

The stem of a plant is cut and then fitted on another strong plant and covered with grafting wax. E.g., apples, oranges, water melon, ornamental plants.




M
Stem
A
M
Scion
A
Stock

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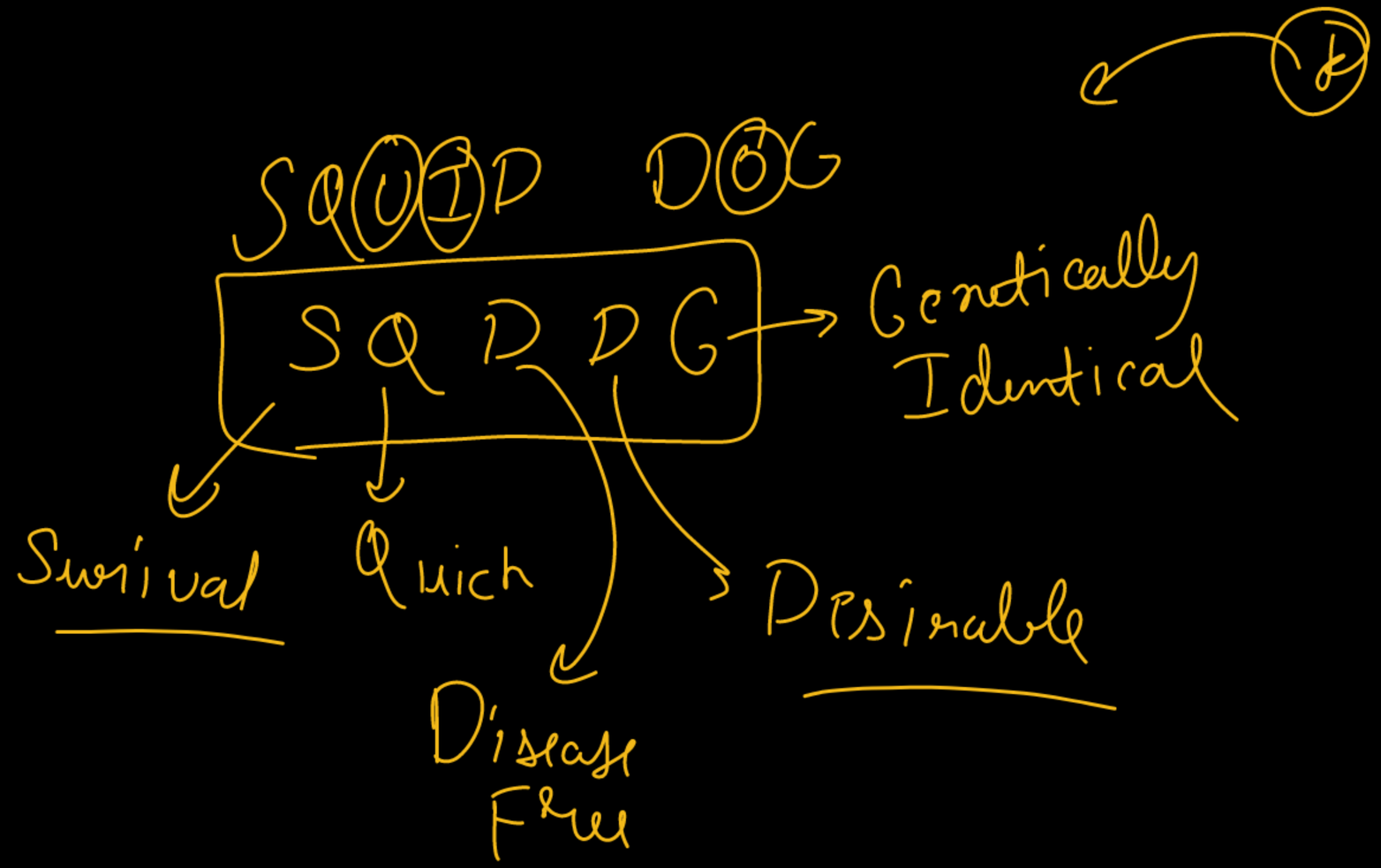
ADVANTAGES OF VEGETATIVE PROPAGATION

- Faster growth and earlier flowering and fruiting.
- Preservation of desired traits.
- Propagation of seedless varieties.

DISADVANTAGES OF VEGETATIVE PROPAGATION

- Such plants are genetically similar to parent plants and are vulnerable to infections and diseases.
- They do not have variations, therefore, do not adapt well to changing environments, and the plant species do not evolve.


SQUID
DOG
SQDDG
Genetically Identical
Survival
Quick
Disease Free
Desirable

TISSUE CULTURE

A technique of growing plant cells or tissues in a controlled environment on a nutrient medium to produce new plants. It allows mass production of plants with desirable traits.

SEXUAL REPRODUCTION

It is a mode of reproduction that depends on the involvement of two individuals before a new generation can be created.

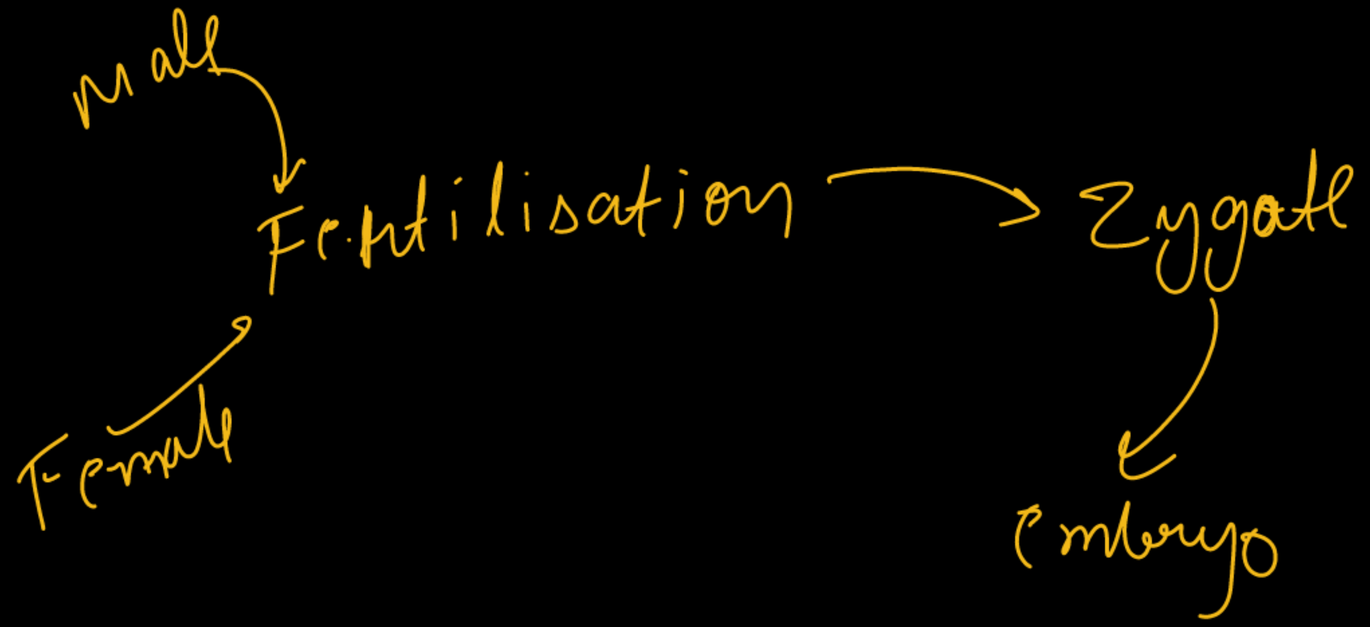
Steps in sexual reproduction

- Formation of gametes in the sex organs.
- Transfer of male gamete to female gamete.
- Fusion of gametes, either inside or outside the female parent's body.
- Development of the zygote to embryo and then complete individual.

Advantages of sexual reproduction

Next gen

- Variations are produced among the progeny.
- Such populations are able to adapt well to changing environment and thus evolves faster.


Male
Fertilisation
Zygote
Female
Embryo

SEXUAL REPRODUCTION IN FLOWERING PLANTS

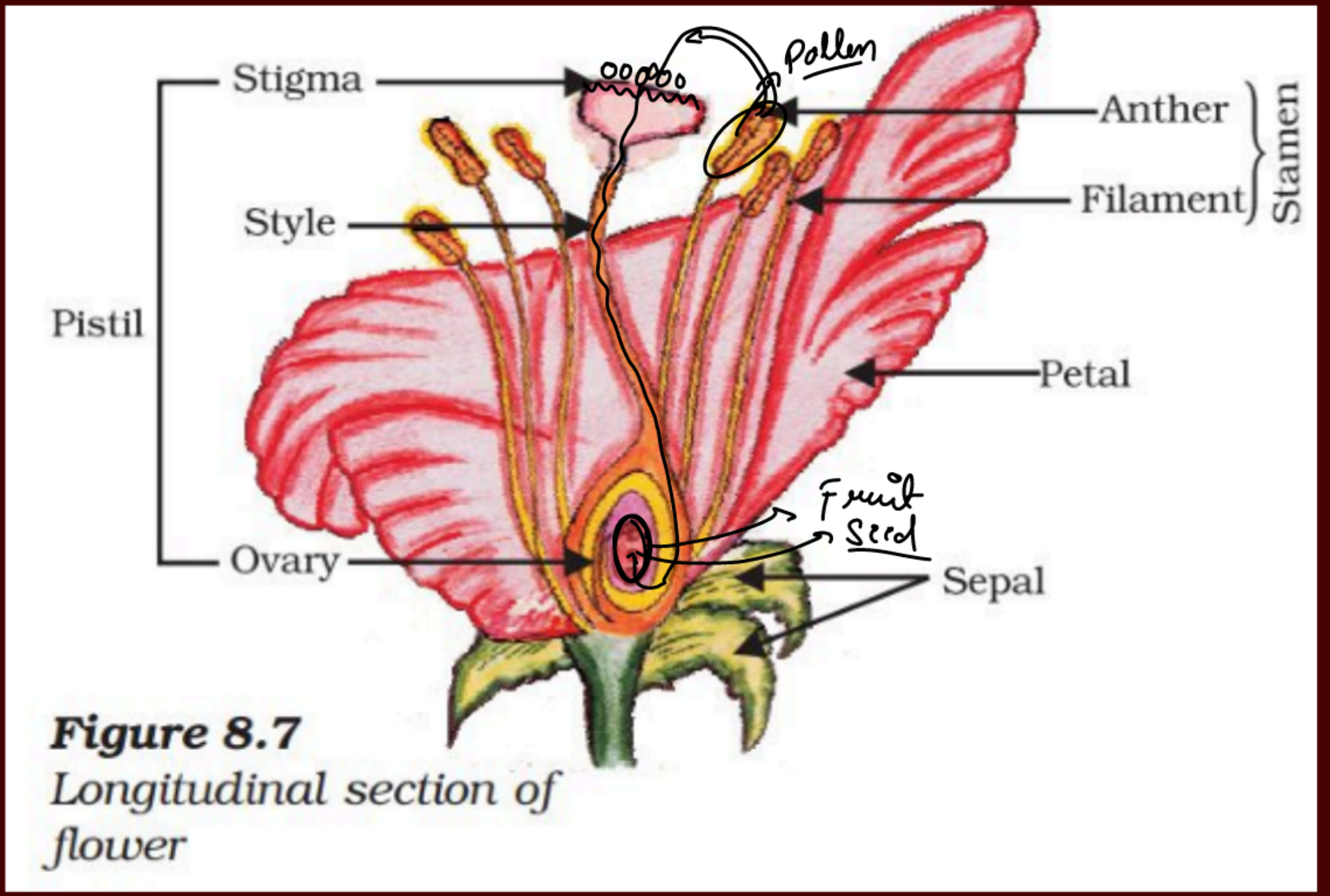


Figure 8.7
Longitudinal section of flower

SEXUAL REPRODUCTION IN FLOWERING PLANTS

Part	About
Stamen	The male reproductive part that produces yellowish pollen grains.
Pistil	The central, female reproductive part of the flower.
Sepals	Usually green; protect the flower during the bud stage.
Petals	Brightly colored and fragrant, attracting pollinators.
Anther	Produces pollen grains containing male gametes.
Filament	The stalk that supports and bears the anther.
Style	An elongated structure connecting the stigma and ovary; allows the pollen tube to reach the ovule.
Ovary	The basal, swollen part of the pistil that becomes the fruit after fertilization; contains ovules with egg cells.

SEXUAL REPRODUCTION IN PLANTS
TYPES OF FLOWERS

Bisexual flower

Both stamen and pistil are present in a same flower

E.g., Papaya

Unisexual flower

Either stamen or pistil is present.

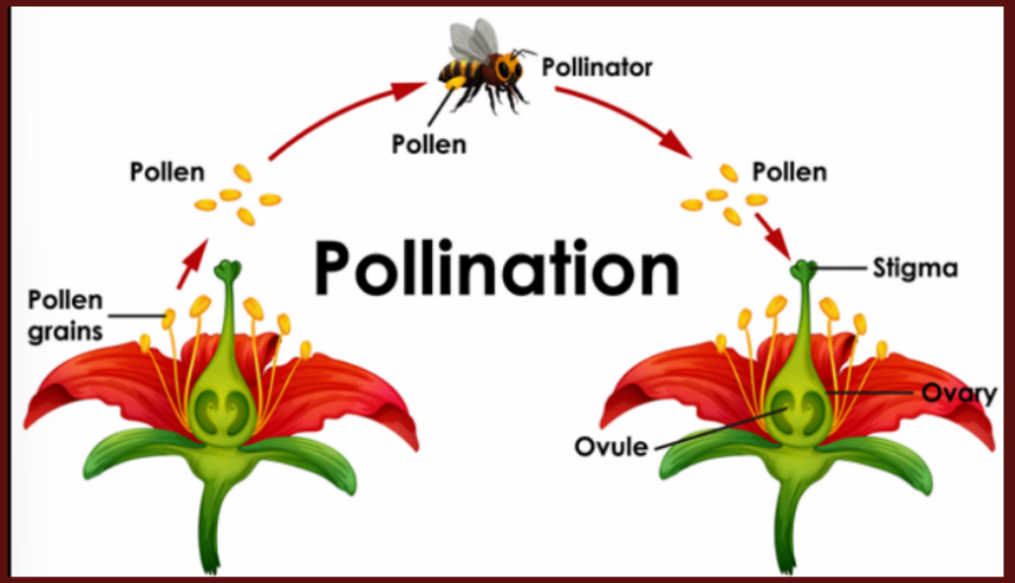
E.g., Hibiscus

Anther → Stigma

POLLINATION

It is the transfer of pollen grains from the anther of the stamen to the stigma of the carpel is called Pollination.

Some agents of pollination are Wind, Water, Animals, Insects, etc.



AGENTS OF POLLINATION

Abiotic

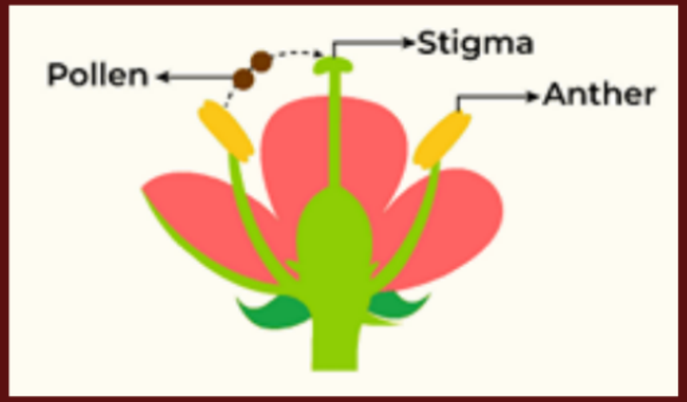
Example - Wind and water

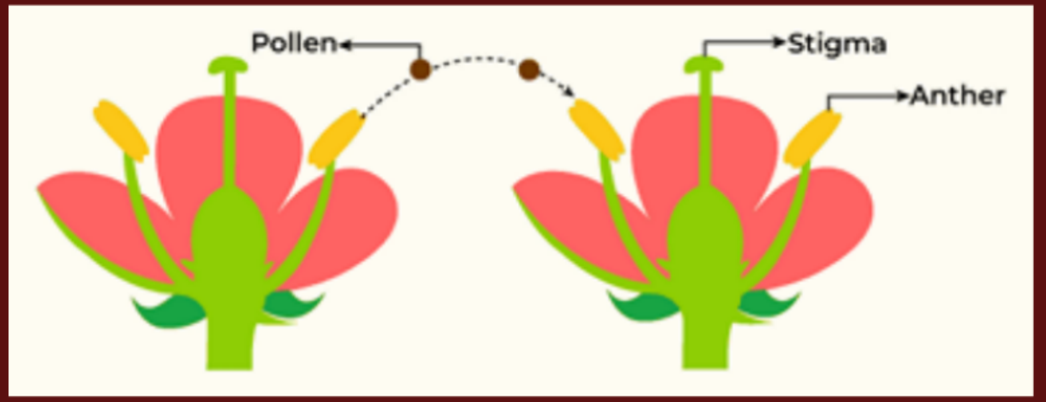
Biotic

Example - Birds, Insects, Bats, and snails

TYPES OF POLLINATION

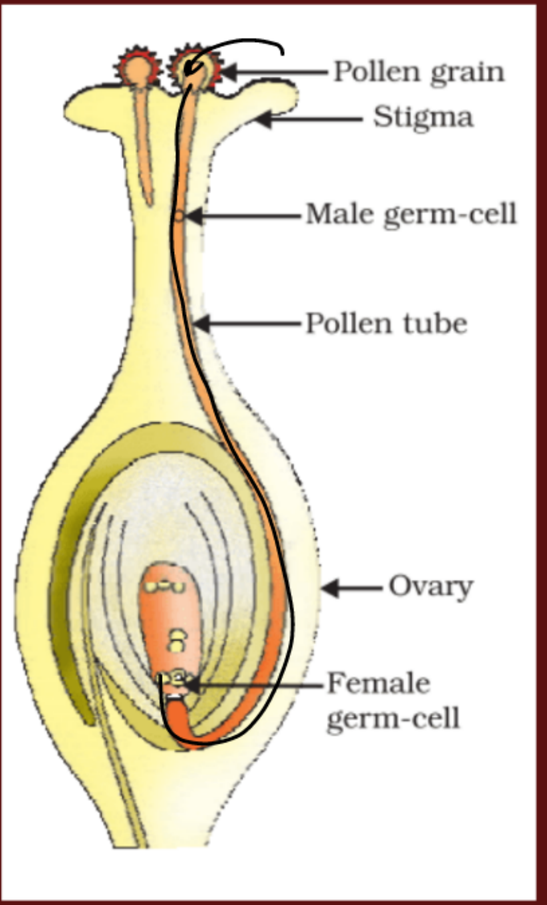
Self-Pollination	Cross-Pollination
The pollen grains from a flower are caried to the stigma of the same flower.	The pollen grains from a flower are carried to the stigma of the different flower on other plant.
Such flowers do not need any pollinating agent.	Such flowers need pollinating agents.
It is less preferable from the genetic point of view since there is no mixing of genes.	It is more preferable from the genetic point of view since new characters can't be produced.





FERTILIZATION

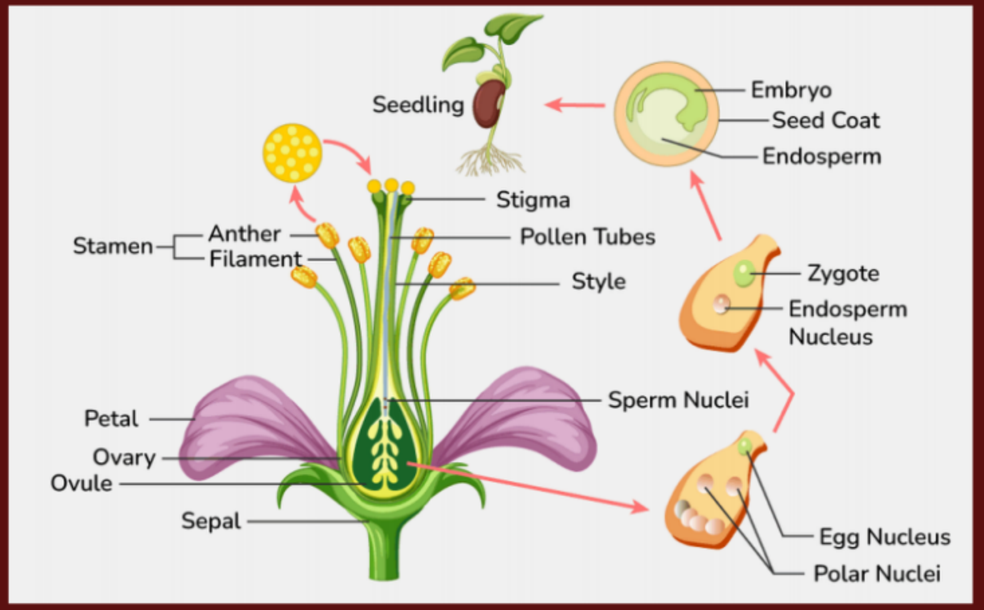
- Pollen grain containing male germ cell lands on the surface of stigma after pollination.
- It germinates and starts forming pollen tube towards the ovule.
- Pollen grain discharge male gamete into pollen tube.
- Pollen tube reaches ovary and enters into ovule from micropyle where it finally releases male gametes.
- Male gamete fuses with female gamete (fertilization) inside ovule and zygote is formed.



POST-FERTILIZATION

- Petals, sepals, stamens, style, and stigma shrivel and fall off.
- Development of Endosperm and Embryo.
- Maturation of ovules into seeds and ovary into fruits.

Ovule → Seed
Ovary → Fruit

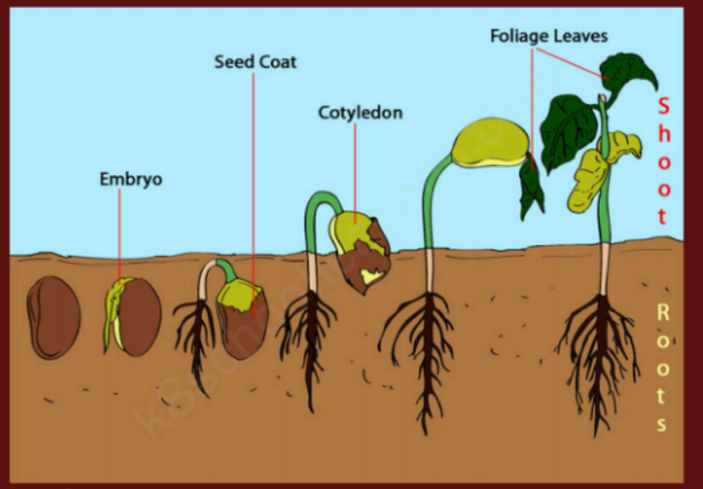


POLLINATION V/S FERTILIZATION

Pollination	Fertilization
It is the transfer of pollen grain from the anther to the stigma of a flower.	It is the fusion of the male gamete with the female gamete.
It is achieved by agents like wind, water, or animals.	It is achieved by the growth of the pollen tube so that the male gamete reaches the female germ cells.
It leads to fertilization.	It leads to the formation of seeds.
It is an external process.	It is an internal process

PARTS OF A SEED

- Seed coat - It is the protective layer.
- Cotyledon - Food storage & provides nourishment to growing embryo.
- Embryo
  - Plumule - Shoot system
  - Radicle - Root system



Monocot plants

- Have seeds with only one cotyledon. (Monocotyledonous).
- Have long and narrow leaves with parallel venation. Have fibrous roots.
- E.g., Rice, wheat, maize, onion, sugarcane, bamboo, etc.

Dicot seed

- Have seeds with two cotyledons (Dicotyledonous).
- Have broad leaves with reticulate venation. Have tap roots.
- E.g., Gram, Peanut, Apple, Mango, Pea, Beans, Rose, etc.

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Q.A feature of reproduction that is common to Amoeba, Yeast and Spirogyra is that (2019)

(a) they reproduce asexually

(b) they are all unicellular

(c) they reproduce only sexually

(d) they are all multicellular

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Q.In a list of organisms given below which is reproduced by asexual method ?

(a) Banana

(b) Yeast

(c) Dog

(d) lion

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Q. Part(s) of a flower which attracts insects for pollination is (are) (2024)

(a) Petals and Sepals

(b) Anther and Stigma

(c) Petals only

(d) Sepals only

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Q. Identify the mode of asexual reproduction in the following organisms: (2024)

(a) Fragmentation
(b) Multiple Fission
(c) Budding
(d) Binary Fission

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Q.Vegetative propagation refers to formation of new plants from

(a) stem, flowers and fruits

(b) stem, leaves and flowers

(c) stem, roots and flowers

(d) stem, roots and leaves

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Q.The ability of a cell to divide into several cells during reproduction in Plasmodium is called (2021)

(a) budding

~~(b)~~ multiple fission

(c) binary fission

(d) reduction division

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अभय

Q.Reason for the greater similarities among the offsprings produced by asexual reproduction, is: (2023)

(i) Asexual reproduction involves only one parent

(ii) Asexual reproduction involves two parents

(iii) Asexual reproduction involves gametes

(iv) Asexual reproduction does not involve gametes

(a) (i) and (ii)

(b) (i) and (iii)

(c) (ii) and (iv)

(d) (i) and (iv)

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अभय

Q.Name the method by which Spirogyra reproduces under favourable conditions. Is this method sexual or asexual? (2021)

Answer:

The method by which Spirogyra reproduces under favorable conditions is fragmentation. This is an asexual mode of reproduction.

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अभय

Q.Name an organism which reproduces by spore formation. List three conditions favourable for spores to germinate and grow.

Answer:

Rhizopus reproduce by the method of spore formation.

The three conditions favourable for spores to germinate and grow are moisture, suitable temperature and food (nutrition).

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Q.Write one main difference between asexual and sexual mode of reproduction. Which species is likely to have comparatively better chances of survival – the one reproducing asexually or the one reproducing sexually? Give reason to justify your answer (2024)

Answer:

Difference between asexual and sexual mode of reproduction is as follows :

Asexual reproduction: Gametes are not formed hence fertilisation does not take place.

Sexual reproduction: Gametes are always formed and fertilisation takes place to form a zygote. Species reproducing sexually has a better chance of survival as variations occur only during the sexual reproduction. Variations increase the chances of survival of an individual by making them more fit. Selection of variations by environmental factors forms the basis of evolution

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अभय

Q. How are the modes for reproduction different in unicellular and multicellular organisms? (2023)

The different modes of reproduction in unicellular organisms are fission, budding, etc. Here, the cell divides into two daughter cells and this process of cell division continues.
Whereas, in multicellular organisms there is a different organ system for reproduction.
The different modes of reproduction in multicellular organisms are vegetative propagation, spore formation, etc.
In more complex organisms like humans and animals, reproduction is through sexual reproduction.

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अभय

Q.What happens when

(a) accidently, Planaria gets cut into many pieces-

(b) Bryophyllum leaf falls on the wet soil

(c) on maturation sporangia of Rhizopus bursts? (2024)

Answer:

(a) When Planaria accidently gets cut into many pieces then its each piece grows into a complete organism. This is known as regeneration.

(b) When the Bryophyllum leaf falls on the wet soil, the buds present in the notches along the leaf margin develop into new plants. This is known as vegetative propagation.

(c) The sporangia of Rhizopus contain cells or spores that can eventually develop into new Rhizopus individuals when it bursts on maturation.

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अभय

Q.What is vegetative propagation? State two advantages and two disadvantages of this method.

Answer:

Vegetative propagation is a type of asexual reproduction in which the plant parts other than seeds are used as a propagule.

Advantages of vegetative propagation :

Desirable character of the plant can be preserved through generation.

Seedless plants can be grown through this method.

Disadvantages of vegetative propagation :

Plants produced by this method posses less vigour and are more prone to diseases.

Plants produced by this method show no genetic variation.

See you in next one