Asexual Reproduction

B15.1.1: Definition Asexual reproduction is a type of reproduction that involves a single parent organism. The offspring produced are genetically identical to the parent.

B15.1.2: Examples

- **Binary Fission:** A single-celled organism divides into two identical daughter cells. (e.g., bacteria, amoeba)
- **Budding:** A new organism grows from a bud on the parent organism. (e.g., hydra, yeast)
- **Fragmentation:** A piece of the parent organism breaks off and grows into a new individual. (e.g., starfish, planarians)
- **Vegetative Propagation:** New plants grow from vegetative parts of the parent plant, such as roots, stems, or leaves. (e.g., potato, strawberry)

B15.1.3: Advantages and Disadvantages

- **Advantages:**
  - Rapid population growth
  - No need for a mate
  - Well-adapted offspring in stable environments
- **Disadvantages:**
  - Lack of genetic variation
  - Vulnerable to environmental changes

Sexual Reproduction

B15.2.1: Definition Sexual reproduction involves the fusion of two gametes (sex cells) from different parents. The resulting zygote develops into an offspring that is genetically different from both parents.

B15.2.2: Species Definition A species is a group of organisms that can interbreed to produce fertile offspring.

B15.2.3: Ploidy Levels

- **Haploid:** Cells with a single set of chromosomes (e.g., gametes)
- **Diploid:** Cells with two sets of chromosomes (e.g., zygote, somatic cells)

B15.2.4: Advantages and Disadvantages

- **Advantages:**
  - Genetic variation
  - Increased adaptability to changing environments

    - Reduced risk of extinction
- **Disadvantages:**
    - Slower reproductive rate
    - Requires energy for finding a mate and courtship
    - Offspring may not be well-adapted to a stable environment

In summary, asexual reproduction is a quick and efficient way to produce offspring, but it can limit a species' ability to adapt to changing conditions. Sexual reproduction, while slower, provides genetic diversity, which is essential for long-term survival.

B15.3.1: Flower Structure

A typical insect-pollinated flower consists of the following parts:

- **Sepals:** Outermost layer, often green, that protects the flower bud.
- **Petals:** Colorful and often scented, attracting pollinators.
- **Stamens:** Male reproductive parts.
    - **Filament:** Stalk that supports the anther.
    - **Anther:** Produces pollen grains.
- **Carpels:** Female reproductive parts.
    - **Stigma:** Sticky tip that receives pollen grains.
    - **Style:** Slender stalk connecting the stigma to the ovary.
    - **Ovary:** Contains ovules, which develop into seeds after fertilization.

B15.3.2: Functions of Flower Parts

- **Sepals:** Protect the flower bud.
- **Petals:** Attract pollinators.
- **Stamens:** Produce pollen grains.
- **Carpels:** Receive pollen grains and produce seeds.

B15.3.3: Pollination

Pollination is the transfer of pollen grains from the anther to the stigma. This can be achieved by various agents, including insects, wind, water, and birds.

B15.3.4: Fertilization

Fertilization occurs when a pollen grain lands on the stigma and germinates, forming a pollen tube. The pollen tube grows down the style and reaches the ovule. A sperm cell from the pollen grain fuses with an egg cell in the ovule, forming a zygote.

B15.3.5: Adaptations of Insect-Pollinated and Wind-Pollinated Flowers

- **Insect-Pollinated Flowers:**
    - Colorful petals to attract pollinators.
    - Strong scent to attract pollinators.
    - Nectar to reward pollinators.

    - Sticky pollen grains to adhere to pollinators.
- **Wind-Pollinated Flowers:**
    - Small, inconspicuous flowers.
    - Lack of bright colors and strong scents.
    - Large, feathery stigmas to catch pollen grains.
    - Abundant, lightweight pollen grains.

B15.3.6: Seed Germination

For seed germination, the following conditions are essential:

- **Water:** To soften the seed coat and activate enzymes.
- **Oxygen:** For cellular respiration, providing energy for growth.
- **Suitable Temperature:** Optimal temperature for enzyme activity and metabolic processes.

B15.3.7: Wind-Pollinated Flowers: Anthers and Stigmas

Wind-pollinated flowers have:

- **Large, feathery stigmas:** To catch pollen grains carried by the wind.
- **Long, dangling anthers:** To release pollen grains into the wind.