1. The Living World - Adaptations and Classifications

Adaptative features in aquatic plants

- Roots fixed in the soil, deep below the surface of the water
- Long, hollow and thin stems
- Narrow ribbon-like leaves which allow them to float

Adaptative features in desert plants

- Thorn-like leaves to prevent water loss
- Thick stem to store water
- Long roots to search for deep underground water

Adaptative features in snowy regions

- Structure to prevent them from snowfall as it would allow the snow to fall from it
- Thick waxy coating to protect them from extreme cold

Adaptative features in forest regions

- Leaves with drip tip to shed excess water
- Thick bark to prevent moisture

Adaptative features in grasslands

- Long and narrow leaves to prevent water loss
- Deep roots to get to the underground water

How plants consume food

- Some plants are parasitic in nature
- Plants like pitcher plants trap insects to consume food

Different animals possess different features that help them survive in the climate of their respective habitats. The special features and habits that help an animal survive in its environment are known as **adaptations**.

- Climatic conditions of the **polar region** and the **tropical rainforest.**
- **Polar region**
  - It is marked by extreme climatic conditions.
  - It is very cold for maximum part of the year.
  - In this region, sun does not set for six months and does not rise for the remaining six months.
  - The animals found in Polar Regions are polar bear and penguins.

- **Adaptive features of polar bear to overcome climatic conditions**
  - White fur to escape predator
  - Strong sense of smell to locate and catch its prey
  - Two thick layers of fur and a layer of fat to keep the body warm in cold conditions
  - Wide and large paws for swimming and walking

- **Adaptive features of penguin**
  - White fur
  - Thick skin and layer of fat under skin
  - Streamlined body
  - Webbed feet for swimming

- **Tropical rainforest**
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  - The climate of tropical rainforest is generally hot and wet with continuous rain.
  - Tropical rainforests are found in the Western Ghats and Assam in India, Southeast Asia, Central America and Central Africa.
  - The hospitable climatic condition supports huge populations of plants and animals.
  - Intense competition for food and shelter is found in Tropical rainforests.

- **Adaptive features of animals found in tropical regions**
  - Red-eyed frog has sticky pads on its feet to climb trees.
  - Monkeys have long and sturdy tail (for grasping branches), loud voice, etc.
  - Bird Toucan has a long and large beak to reach fruits present on the branches.
  - Lions and tigers have sensitive hearing to locate their prey and camouflaging skin colour to merge in their environment.
  - An elephant uses its trunk as nose and tusk to tear the bark of trees. The soles of their feet are covered with thick pads to handle their enormous weight and they have large ears for hearing.
  - Animals living in tropical regions have the ability to camouflage to protect themselves from predators.
- **Adaptive features of animals found underwater**
  - They have fins and tail that helps in swimming
  - They have a streamlined body
  - They have a swim bladder that helps them in floating.
- **Adaptive features of duck**
  - They have webbed feet to paddle through the water.
  - A flat beak to catch their food.
- **Adaptive features of animals found in deserts**
  - Thick skin to prevent water loss
  - Hump to store food and energy
  - Thick eyelashes and stretchy nostrils to prevent from dust.
- **Adaptations for food**
  - Some birds have Short beaks to open nutshells.
  - Some birds have long pointed beaks for hunting prey.
  - Frogs and lizards have a long sticky tongue to catch insects.
- Some animals like the chameleon, **change their colour** according to the surrounding to hide from any danger.

- **Diversity**: It refers to the variety and variability among living organisms from all sources including land, water, and other ecosystems.
- **Classification**
  - It refers to the identification, naming, and grouping of organisms into a formal system based on similarities in internal and external structures or evolutionary history
  - It helps in organising the diversity of life forms in detail.
  - Characteristic - A feature that helps identify or describe a person or a thing
  - There are certain characteristics that are considered more fundamental than others. These fundamental characteristics make broad divisions in living organisms.

- **Principles of classification**

- **Nature of cell (Fundamental characteristic):** On the basis of the nature of cell, living organisms are classified as: **prokaryotes and eukaryotes**
- **Cellularity:** On the basis of cellularity, organisms are classified as: **unicellular and multicellular**
- **Mode of nutrition**: On the basis of mode of nutrition, organisms are classified as: **Autotrophs and heterotrophs**

- **Classification and evolution**
  - **Primitive organism** or lower organism has a simple body structure and ancient body design
  - **Advanced organism** or higher organism has a complex body structure and organisation
  - **Evolution -** The process of gradual and continuous change in primitive or simple organisms to give rise to advanced organisms
  - **Biodiversity -** The variety of life forms present in various ecosystems

- **Hierarchy of classification**
  - The hierarchical arrangement of various taxonomical categories in descending order is**: Kingdom → Phylum (for animals)/ Division (for plants) → Class → Order → Family → Genus →Species.**
  - Mnemonic to learn this hierarchy**: K**ids **P**refer **C**heese **O**ver **F**ried **G**reen **S**pinach
  - **Species** is the basic unit of classification
  - **Carolus Linnaeus** developed the hierarchy of classification. He also brought out the famous book *Systema Naturae*
  - Linnaeus also developed the concept of binomial nomenclature
  - Binomial nomenclature refers to the naming of species. In this system, the name of a species is made up of two words: the genus name and the species name. E.g. *Rosa indica*