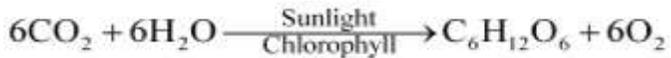


3. Diversity in Living Things and their Classification

- **Autotrophic Nutrition**

- Synthesis of food by photosynthesis, Photosynthesis equation



- Leaves are the sites for the synthesis of food.
- The green pigment called chlorophyll is present in leaves.
- Chlorophyll traps solar energy, which is used to prepare food from CO₂ and water. Sun is the ultimate source of energy.
- Green plants absorb CO₂ from atmosphere through tiny pores called stomata.
- Stomata are present on the surface of leaves.
- Water and minerals are absorbed from soil and are transported to leaves via tiny vessel-like structures present in roots.
- Chlorophyll, sunlight, CO₂, and water are essential raw materials for photosynthesis.
- Carbohydrates such as starch and oxygen are the product of photosynthesis.
- All green plants including green algae show autotrophic nutrition.
- Since the autotrophs manufacture their own food, they are called producers.
- They form the first link in the food chain and all organisms on the earth obtain the energy directly or indirectly from them.

- **Heterotrophic Nutrition**

- Generally derive energy from plants and animal sources.
- The heterotrophs that derive their energy directly from plants are called herbivores and those who derive their energy indirectly i.e. by eating herbivores are called carnivores.
- **Omnivores-** feed on both plants and animals e.g. bear, rat, man etc.
- **Decomposers-** obtain nutrients by breaking down remains of dead plants and animals, includes some bacteria and fungi.
- **Mainly of three types**—holozoic, parasitic, and saprophytic.
- **Digestion-** mechanical and chemical reduction of ingested nutrients.
- **Human digestive system-** consists of the long alimentary canal.
- **Alimentary canal includes-** mouth, pharynx, oesophagus, stomach, small intestine, and large intestine
- **Accessory organs-** pancreas, liver.

- **Morphology**

- It is the branch of biology which deals with the study of external structures of plants and animals.
- A plant consists of a root system (underground part) and a shoot system (above the ground parts).
- Roots are the parts of the root system; and stem, leaves, flowers, and fruits are parts of the shoot system.

- **Roots**

- It helps in anchoring plant and absorbing water and minerals.
- Developed from the radicle part of a cotyledon

- It consists of a region of meristematic activity covered by a root cap, a region of elongation, and a region of maturation having root hairs.
- **Types of roots system:**
 1. **Tap root system**
 - It consists of a primary root that grows deep inside the soil.
 - It also bears lateral roots referred to as secondary and tertiary roots.
 - Example- Dicotyledons (mustard)
 2. **Fibrous root system**
 - Primary root is short-lived and is replaced by a large number of secondary roots.
 - Example- Monocotyledons (wheat)
 3. **Adventitious roots**
 - Roots arise from parts other than the radicle.
 - Example- Banyan tree
- **Root modifications**
 - **Prop roots** – Example: banyan tree
 - **Stilt roots** – Example: maize and sugarcane
 - **Pneumatophores** (that helps in respiration) – Example: Rhizophora
- **Characteristics of Root for Absorbing Water**
 - Enormous surface area
 - Root hairs containing cell sap at higher concentration
 - Thin walled root hairs

Stem

- Bears branches, leaves, flowers, and fruits
- Conducts water and minerals to all parts of the plant body
- Bears nodes and internodes

Stem modifications

- For storage – Example: Potato, ginger, turmeric.
- For support – Tendrils in cucumber, pumpkins, watermelon.
- For protection – Thorns in *Citrus*, *Bougainvillea*.
- For vegetative propagation – Tubers and rhizomes in potato and ginger respectively.

Leaf

- A leaf has a petiole and a lamina.
- Leaves prepare their food in the presence of sunlight and chlorophyll by a process known as photosynthesis.
- The leaves lose water by the process of transpiration.
- The design made by leaf veins is known as leaf venation.

- Leaf venation is of two types - reticulate venation and parallel venation.

Leaf Modifications

- Tendrils- Example: peas
- Spines- Example: cactus
- Fleshy leaves for storage- Example: onion and garlic

- Those plants that have flowers are called **flowering plants** while those that do not contain flower, seeds are called **non-flowering plants**.

- **Parts of flower**

- Calyx, Corolla, Androecium and Gynoecium are the parts of a flower.
- Sepals, petals, stamens, and pistil are their subparts.
- Collection of sepals is known as calyx
- Collection of petals is known as corolla.
- Ovary contains one to numerous ovules.
- Anther and filament are the parts of a stamen and collection of stamen is known as androecium
- Stigma, style, and ovary are the parts of a pistil and collection of pistils are known as gynoecium.

- **Types of flower**

- Bisexual flowers: Contain both male and female parts
- Unisexual flowers: Contain either male or female part

- **Types of plants**

- Plants are usually grouped into herbs, shrubs, and trees.
- Herbs are plants with green and tender stems. They are usually short. E.g. Wheat, rice.
- Shrubs are plants with hard but not very thick stems. Their stem branches near the base. E.g. Rose plant
- Trees are very tall plants with hard and thick brown stem. E.g. Mango, Apple.

- **Classification of plants depending upon the time required to complete their life cycle**

- Annuals - They complete their life cycle in one growing season. e.g., paddy, wheat, maize, etc.
- Biennials - They complete their life cycle in two years e.g., cabbage, turnip, etc.
- Perennials - They complete their life cycle in several years. e.g., mango

- Plants that spread on ground are known as creepers.

- E.g. of creepers are Pumpkin, watermelon.

- Plants that take support of neighbouring structures to climb up are known as climbers.

- E.g. of climbers are Pea, Money plant.

- The animals that live in water are known as **aquatic animals**. Few examples - fish, crabs, octopus.

- The animals that live on land are called **terrestrial animals**. Few examples - dogs, cats, elephants.

- The animals that live both on land and in water are called **amphibians**. Few examples - crocodile, frog, tortoise.

- The animals that naturally fly in the air are called **aerial animals**. Few examples - pigeons, vultures.

- The animals that possess a vertebral column and a fully developed brain covered by a skull are called **vertebrates**. Few examples - humans, dogs, cats.

- The animals that do not possess a vertebral column and are slow moving are called **invertebrates**. Few examples - cockroach, snail, star fish.
- **Oviparous animals**
 - The animals that lay eggs are called **oviparous animals**. The examples include all kinds of birds, lizards, snakes, and frogs.
- **Viviparous animals**
 - The animals that give birth to young ones are called **viviparous animals**. The examples include cows, dogs, and humans.