CHAPTER

1 The Living World

- **Growth, reproduction, metabolism,** and **the ability to sense their environment** are thought to be the distinguishing characteristics of living things.

Growth

- Increase in mass and number of individuals are twin characteristics of growth and can be exhibited by both living (intrinsic growth) as well as non-living things (extrinsic growth). Therefore, growth cannot be considered a defining characteristic of living things.
- Growth in plant is localised & indefinite (throughout life).
- Growth in animal is diffused and definite (up to a limit).

Reproduction

- It is not a characteristic feature of organisms, like mules, sterile worker bees etc., are unable to reproduce. Therefore, reproduction is also not a defining property of living things.

Metabolism and Cellular Organization

- Metabolism → Catabolism + Anabolism. Metabolism is the some of all catabolic and anabolic reactions in our body.
- Metabolic reaction occur inside the cell, it means cellular organization is strictly required for metabolism to define the feature.
- No non-living thing exhibits metabolism, though metabolic reactions can be demonstrated *in - vitro*.
- These isolated metabolic reactions are not living entities but definitely living reactions.
- Therefore, metabolism and cellular organization is a characteristic and defining feature of all living organisms.

Consciousness

- The state of being aware of what is around you and able to sense environment.
- From prokaryotes to the most complex eukaryotes, all organisms can sense environmental stimuli and react to them.
- Therefore, consciousness becomes the defining feature of living things.

Diversity in the Living World

- Basis of modern taxonomic studies; external & internal structure, ecological information, cell structure and development process.
- Biologists have developed a set of rules and principles for the identification, classification, nomenclature, and characterization of the vast diversity of organisms. This field of study is referred to as **taxonomy**.
- **Identification**: Correct description of organism.
- **Nomenclature**: Scientific naming → Binomial nomenclature.
- **Classification**: Give a particular position of an organism in a particular taxa.
- **ICBN** → International Code for Botanical Nomenclature.
- **ICZN** → International Code for Zoological Nomenclature.
- Binomial nomenclature was given by **Carolus Linnaeus**. It contains name with two components : **Generic name** and **Specific epithet**.
- **Systematics** : This branch of study focussed on determining the evolutionary relationships between organisms.

Taxonomic Categories

- To form a taxonomic category, the basic requirement is the knowledge of characters of an organism or group of organisms.
- Taxonomic categories include, kingdom, phylum or division (for plants), class, order, family, genus and species.
- All categories together constitute the taxonomic hierarchy.
- Each category referred to as a unit of classification, infact, represent a rank and as commonly called as **taxon**.
  - **Species:** Group of individual with fundamental similarities e.g., *nigrum*, *tigris*.
  - **Genus:** Group of closely related species e.g., *Mangifera.*
  - **Family:** Group of less related genus e.g., Solanaceae.
  - **Order:** Assemblage of families which exhibit a few similar characteristics e.g., Order Polymoniales includes families like Convolvulaceae and Solanaceae.
  - **Class:** Group of related orders e.g., Dicotyledonae, mammalia.
  - **Phylum/Division:** In division, related plant classes come in a division but in case of animals, related classes become a part of phylum e.g., Chordata.

- **Kingdom:** Group of similar phyla or divisions e.g., Animalia and Plantae.

Taxonomical Aids

- To keep and preserve both the information and the specimens and for further studies, biologists have developed certain methods and techniques, which altogether are known as taxonomical aids.
  - **Herbarium:** It is a store house of collected plant specimens that are dried, pressed and preserved on sheets.
  - **Botanical Gardens:** Collection of living plant for reference in specialised gardens e.g., Kew (England), Indian Botanical Garden, Howrah (India).
  - **Museum:** Collection of preserved plants and animal specimens in colleges for study purpose and reference.
  - **Zoological Parks:** A place where wild animals are kept under human care to learn about their food habits and behaviour.
  - **Key:** Keys are analytical in nature. Keys are based on contrasting characters generally in a pair called couplet. Each statement in the key is called lead.
  - For more taxonomic research, biologists have also developed and disseminated knowledge through **manuals, monographs** and **flora**.