

THE LIVING WORLD

- FATHER OF BIOLOGY = **ARISTOTEL**
- FATHER OF BOTANY = **THIOPHRUSTUS**

1.1 WHAT IS LIVING ?

Growth , Reproduction , ability to response to environment and to get a suitable response to our mind senses are some features defines living.

I. GROWTH

- All living organisms grow and increase in size and number
- Both plants and animals grow by cell division
- Cell division in plants are continuous throughout their life span while in animals it can be seen only upto a certain age
- All over increased in body mass is considered as growth
- Non living organism also grow their body mass

Therefore, growth is not a defining property.

II. REPRODUCTION

- Multicellular organisms reproduce through sexual means of reproduction.
- Unicellular organisms reproduce through asexual form
For example :
 - (1) fungi, filamentous algae and protonema of mosses through fragmentation.
 - (2) Bacteria, unicellular algae and amoeba through multiple division.
- It too defines increase in size and number likewise growth

Therefore, reproduction is not a defining property.

III. Metabolism

- All living organisms are made up of chemicals
- Chemicals are small, big, belongs to different class, size and function further form into biomolecules.
- These chemicals help in biochemical reaction being performed in our body.
- The sum total of all the reaction performed in our body is metabolism

Therefore, it is a defining property.

➤ Isolated metabolic reactions in vitro are not living things but living reaction.

IV. Consciousness

- Ability to sense their surrounding and to response the stimuli which could be physical, chemical and biological
- Photoperiod affects reproduction in seasonal breeders both in plants and animals
- Humana have self consciousness.

Therefore, it is a defining property.

1.2 Diversity in living organisms

- ❖ The number and type of species known and described on earth is called biodiversity.
- ❖ Total 1.7 to 1.8 million of species are known till now.

I. Nomenclature

- To solve the possible dispute

- It is only possible when animals are described correctly
 - ✦ For plants = ICBN (International Code of Botanical Nomenclature)
 - ✦ For animals = ICZN (International Code of Zoological Nomenclature)

Binomial nomenclature

Given by Carolus Linnaeus

Contains generic names and specific epithet.

Universal rules :

- Latinised, written in italics.
- First word is genus and next is species
- When handwritten separately underlined which denote latin origin
- Genus starts with capital letters and species start with small letters
- Example *Mangifera indica linn.*

II. Systematics

- Branch of study including different organism, their diversity and relationship between them.
- Latin word *systema* means systematic arrangement of organisms.
- *Systema nature* is the publication of Linnaeus.
- The scope of systematics was later enlarged to include identification, nomenclature and classification.
- Systematics takes into account evolutionary relationship between organisms.

III. Classification

- Grouping into convenient categories based on easily observable characters

- We use these categories to study organisms and **these categories is TAXA.**
- Based on characters all living organisms can be classified into different taxa which is called **Taxonomy.**
- ◆ **Process that are basic to taxonomy:**
Character, identification, classification and nomenclature
Earlier classification were based on the uses of various organisms.
- ◆ **Modern taxonomic studies:**
External, internal structures, cell structures, developmental process, ecological information.

1.3 Taxonomic categories

- Each step in classification represents a rank or category called **taxonomic categories** and all of them make **taxonomic hierarchy**
- Each category is referred as unit of classification represents and is commonly known as **taxon**
- Group represents categories and it further represents rank/taxon
- **They are biological entities not morphological aggregates**

➤ Species

- **Smallest unit**
- Group of organisms with fundamental similarities and who can inbreed.
- Example: indica, tuberosum, leo, sapiens
- One genus may have one or more species representing different organisms but having morphological similarities.
- Example: *P. tigris* and *P. leo*

➤ Genus

- Group of related species
- Example : *solanum* (potato and brinjal)
Felis (cats)
Panther (leo, tigris and pardus)

➤ Family

- Closely related genera with less number of similarities
- Characterize on both vegetative and reproductive features of plants
- *solanum, ptenuia and dathura* are in solanaceae family
panthera and felis are in felidae family
canidae is dog family

➤ Order

- **assemblage of families**
- These are identified on the basis of aggregates of characters
- In higher taxonomic categories similarities in characters decreases
- Carnivore include felidae and canidae

➤ Class

- Mammalia include order primata(monkey, gorilla, gibbon) and carnivora(tiger, cat, dog)

➤ Phylum

- **Divisions in plant**
- Classes like amphibia, reptilia, aves, mammals are included in chordata phylum

➤ Kingdom

- **Highest category with no similarities**
- Example: plantae

1.4 Taxonomical Aids

Actual specimen for primary source of taxonomic studies and training in systematics

➤ Herbarium

Some famous botanical gardens are New (England), Madison
**Botanical Garden (Howrah, India) at national research
institute Lucknow, India**

➤ Zoological parks

- Wild animals under human care by which we can learn their food, habitats and behavior
- They are provided under similar conditions with natural habitats

➤ Key

- Used for identification of plants and animals based on affinity
- Contrasting characters generally in pairs called **couplet**
- Result is acceptance of one and rejection of other
- Each statement in key is called **lead**

- **Separate taxonomic keys are required for each taxonomic category such family, genus and species for identification purposes**
- Keys are generally analytical in nature

The end



- Collection of dried, pressed and preserved plant specimen and then the sheets are arranged according to classification
- Information on herbarium sheet is **date and place of collection; English, local, and botanical name; family; collector name**
- They are the quick referral system and became store house and repository for future use

➤ **Biological museum**

- Set up in schools, colleges and include collection of preserved plants and animals specimens in jars in solution formaline
- Insects are preserved in insects boxes after collecting, killing and pinning
- Larger animals are stuffed for preservation and they also contain collection of skeleton

➤ **Botanical garden**

- Collection of living plants grown for identification
- Each plant is labeled with botanical name and its family
- Some famous botanical gardens are Kew(England), Indian Botanical Garden(Howrah, India) at national research institute Lucknow, India