The Living World

1 WHAT IS LIVING?

When we try to define living we simply understand that what living is as opposed to the non-living

- There are some unique features of living organisms such as growth, reproduction, ability to sense environment, metabolism, ability to self replicate, self organise and interact.

FEATURES	DEFINING OR CHARACTERISTICS	SEEN IN
GROWTH Increase in mass and increase in number	Characteristic	Both living (Intrinsic) and non living objects (Extrinsic)
REPRODUCTION Production of progeny of same kind	Characteristic	Living organisms but some exceptions are seen such as infertile human couples, mules and sterile worker bees
METABOLISM Sum total of all the chemical reactions occuring in body.	Defining	Seen in all unicellular as well as multicellular organisms.
CONSCIOUSNESS Ability to respond to external stimulus	Defining	Seen in all unicellular as well as multicellular organisms. Only human is self-conscious
CELLULAR ORGANISATION	Defining	Seen in all unicellular and multicellular organisms

- Reproduction is synonymous with growth in unicellular organisms but not in multicellular organisms.
- A reaction in test tube is neither living nor non-living.
- Photoperiod affects reproduction in seasonal breeders, both plants and animals.
- In *Planaria* (flat-worms), we observe true regeneration.
- Properties of tissues are not present in constituent cells similarly properties of cell organelles are not present in the molecular constituents of the organelles but arise due to interactions.
- The patient lying in coma has no self-consciousness.
- All living organisms – Present, past and future are linked to one another by the sharing of the common genetic material but to varying degrees.
- Living organisms are self-replicating, evolving and self regulating interactive system capable of responding to external stimuli.

2 DIVERSITY IN THE LIVING WORLD

- Biodiversity is number and types of organisms present on earth.
- The number of species that are known and described range between 1.7-1.8 million.
- As local names vary from place to place, there is need to standardise the naming of living organisms. This process is NOMENCLATURE.
- Before nomenclature identification should be done.
- Scientific names are based on agreed principles and criteria which are provided in ICBN (International Code of Botanical Nomenclature) - for plants and ICZN (International Code for Zoological Nomenclature) - for animals.
- The most accepted system for naming of organisms is binomial nomenclature, given by **Carolus Linnaeus**
- According to this, each scientific name has two names, the generic name and specific epithet and are generally in Latin.
  Ex. Mango → *Mangifera indica* Linn.
  Genus Species
- Genus starts with capital letter and species starts with small letter.
- Scientific name should be printed in italics, if handwritten should be underlined separately.
- Name of the author should be at the end of the biological name in abbreviated form.

CLASSIFICATION :

- Classification is process by which anything is grouped into convenient categories. The scientific terms for these categories is taxa. (Dogs, cats, mammals, plants etc.)
- Hence, based on characteristics, all living organisms can be classified into different taxa. This process is called taxonomy.
- Taxa can indicate categories at very different levels. e.g. animals , mammals and dogs represent taxa at different levels.
- Taxonomy and evolutionary relationships = systematics.
- Morphology, anatomy, cell structure, development process and ecological informations are basis of modern taxonomic studies.
- Characterisation, identification, classification and nomenclature are basics of taxonomy.

3 TAXONOMIC CATEGORIES

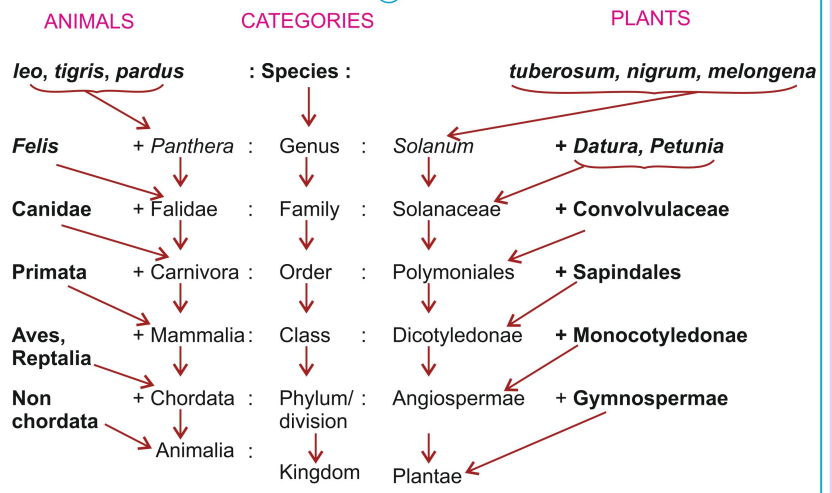
- Each step in classification is called **category or rank**.
- As it is a part of taxonomy hence called taxonomic category and all categories constitute **taxonomic hierarchy**.
- There are seven obligate categories.
- Sub categories are also developed by scientists.
- The number of common characteristics goes on decreasing from species to kingdom.
- Each rank or taxon infact, represents a unit of classification.

4

ASCENDING ORDER

- Kingdom
- Phylum/division — For plants division is used, has related classes
- Class — Has assemblage of related orders
- Order — Has related families characterised mainly on floral characters
- Family — Comprises a group of related genera. Characterised on the basis of both vegetative and floral characters
- Genus — Comprises a group of related species
- Species (Basic and lowest category)

5



- The word systematics is derived from Latin word 'systema' which means systematic arrangement of organisms.
- Higher the category, greater is the difficulty of determining the relationship to other taxa at the same level. Hence, the problem of classification becomes more complex.

6 ORGANISMS WITH THEIR TAXONOMIC CATEGORIES

Common Name	Biological Name	Genus	Family	Order	Class	Phylum/ Division
Man	*Homo sapiens*	*Homo*	Hominidae	Primata	Mammalia	Chordata
Housefly	*Musca domestica*	*Musca*	Muscidae	Diptera	Insecta	Arthropoda
Mango	*Mangifera indica*	*Mangifera*	Anacardiaceae	Sapindales	Dicotyledonae	Angiospermae
Wheat	*Triticum aestivum*	*Triticum*	Poaceae	Poales	Monocotyledonae	Angiospermae

7 TAXONOMICAL AIDS

- These aids are prime source of taxonomical studies.

Herbarium
- Store house of dried, presses and preserved plant specimens pasted on sheets
- Each sheet carries a label which has information of specimen

Monograph — Monograph contains information of any one taxon

Museum
- Generally setup in schools and educational institutes
- Has preserved plant and animal specimens, large animals are usually stuffed
- Insects are preserved in insect boxes

Taxonomical aids

Manual
- Are useful in providing information for identification of names of species found in an area.

Flora
- Provides the index to the plant species found in a particular area.

Botanical Gardens
- Have collection of living plants for reference
- Each plant is labelled
- Largest Botanical garden at Kew (England) Indian Botanical Garden in Howrah.

Keys
- Analytical in nature
- Based on contrasting characters generally in pair, couplet
- Based on similarities and dissimilarities
- Each statement is called a lead

Zoological parks
- Wild animals are kept in their natural environment