

The living world

Introduction:

- Some of the extraordinary habitats where the organisms live are:-
 - 1 Cold mountains
 - 2 Acidulous forests
 - 3 oceans
 - 4 Fresh water lakes
 - 5 Deserts / Hot springs
- The beauty of living world are:-
 - 1 Galloping horses
 - 2 Migrating birds
 - 3 Valley of flowers
 - 4 Attacking shark evokes awe
- The living involves
 - 1 Ecological conflict
 - 2 Cooperation among the members of population
 - 3 Cooperation among the member population of community
 - 4 Molecular traffic level in the cell.
- The above features reflect on what indeed is life.
- The above ~~quest~~ question is the implicit of 2 questions
 - i Technical one
 - ii Philosophical one.
- i Technical one:-
 - What is the difference between living and non living?
- ii Philosophical one:-
 - What is the purpose of life?
 - The definition of living is known by technical one but not by philosophical one.

1. Diversity in the living world

- 1 Plants, animals & organisms present in our surrounding seen in our daily life are termed as species.
- 2 Number of species known and described are in the range between 1.7 to 1.8 million.
- 3 These all can refer as biodiversity
 - Number of plants & animals present on earth is called biodiversity.

- 4 Plants, animals at their places called with local names but as these local names differ from place to place in a country and leads to confusion.
- 5 To overcome this situation the biologists need to standardise the organism names commonly all over the world.
 - Naming the organism is called nomenclature.
- 6 For ~~the~~ nomenclature the organism need to be described correctly is called identification.
- 7 Based on agreed principles and criteria biologists have given the common names are :-
 - For plants, names given by **ICBN** [International code for botanical nomenclature].
 - For animals, the names given by **ICZN** [International code for zoological nomenclature]
- 8 Ensure that each organism was given with only one name
 - Ensure that the same name is not repeated for another organism.
- 9 Each name has 2 components namely
 - i Genus [Generic name]
 - ii Species [specific epithet]
 - It is called binomial nomenclature given by **Carolus**
 - **Linnaeus**.
 - Examples for mango :- mangifera indica

↓
Genus
↓
Species

Rules followed for Nomenclature

- 1 Biological or scientific name derived from Latin.
- 2 Written in italics
- 3 First word is Genus and second component is Species
- 4 While hand written bond words should underlined ~~sp~~ separately.
- 5 The first letter of genus should be Capital and first letter of species in small letter
- 6 After species name the Author name should be written in Abbreviated form

Eg mangifera indica linn
 ↓ ↓ ↓
 Genus Species Author

- This indicates that this species was discovered by Linnaeus.

- It is impossible to study all living organisms
- ∴ we need to classify
- Grouping of organisms into convenient categories based on observable characters is called classification.
- When we think about dogs we imagine dogs [Eg. Bhatia]
- When we think about mammals we imagine animals with body hair and external ears.
- When we think about wheat we imagine wheat plants but not rice plants.
- All these dogs, mammals and wheat plant, rice plant are convenient categories to classify organisms.
- The scientific term given for category is taxa.
- ∴ All these dogs, mammals, wheat, rice are different taxa.
- Dog is mammal and mammal is animal. It means all these dogs, mammals and animals will come at different levels of taxa.
- Based on characters all the living organisms are classified into different taxa is called Taxonomy.

- 1 External and internal structure
 - 2 Structure of the cell
 - 3 Developmental processes
 - 4 Ecological information of organism
- These 4 features form basis of modern taxonomy

- 1 Characterisation
 - 2 Identification
 - 3 Classification
 - 4 Nomenclature
- These 4 processes are the basis of taxonomy

1 Do you think that the word taxonomy is something new?

Ans older classifications are based on uses of organisms

- food
- clothing
- shelter

Systematics :-

- Taxonomy + Phylogeny
- Phylogeny deals with evolutionary history of organisms.

- Systematics is derived from latin word systema which means systematic arrangement.
- carolus linnaeus used systemae naturalae as a title for his publication.

1.2 Taxonomy categories:-

- Classification is not a single step process. It is with several hierarchy of steps.
- These steps are called as Taxa or category or Rank.
- ~~mammals~~
- Groups represent category
- category further denotes rank
- Each rank or taxa is a unit of classification
- These taxonomic group categories are distinct biological entities and not merely morphological aggregates.

Species	leo , tigris, pardus
Genus	Panthera, Felis
Family	Felidae, Canidae
Order	Carnivore, Primata
Class	Mammals, Pica, Amphibians, Reptiles, Aves
Phylum	Chordata
Kingdom	Animalia

→ Lowest category

→ Highest category

- As we move from kingdom to species, similarities among organisms increases
- As we move from species to kingdom similarities among organisms decreases.
- mammals, ~~which~~ ^{pica} is amphibians, reptiles, aves of classes are included in the phylum chordata due to presence of notochord
- Dorsal hollow neural system
- Carnivora (tiger, cat, dog) & Primata (monkey, gorilla, gibbon) are included in the class mammalia.
- Kingdom, phylum, class, order are based on characters

of characters.

- Family, genus and species are based on number of similar characters.
- Species can be differentiated with other related species based on distinct morphological differences.
- In animals the suffix of family is 'ae'

Species	tuberosum, nigrum, melongina
Genus	Solanum, petunia, Portulaca
family	Solanaceae, Convolvulaceae
order	Polymoniales, Sapindales
Class	Dicolydonae, monocotyledonae
Division	Angiosperms
Kingdom	Plantae.

- The families like solanaceae and convolvulaceae are based on both vegetative and reproductive characters of plants.
- The families like solanaceae and convolvulaceae are included in the order polymoniales based on floral character.
- In plants the suffix for the ^{family} plants is 'aceae'.
- In plants, the suffix of the order is 'ales'.

Common Name	Biological name	Genus	Family	Order	Class	Phylum/ Division
man	Homo sapiens	Homo	Hominidae	Primate	mammalia	chordata
Housefly	Musca domestica	Musca	Muscidae	Diptera	Insecta	Arthropoda
mango	Mangifera Indica	Mangifera	Anacardiaceae	Sapindales	Dicotyledonae	Angiosperms
wheat	Triticum aestivum	Triticum	Poaceae	Poales	monocotyledonae	Angiosperms