

UNIT 1

DIVERSITY IN THE LIVING WORLD

Biology is a branch of science that deals with the living beings and their functions. There is a great diversity of living beings on this planet. The difference between living beings and non-living matter was perceived by early man. Detailed system of identification, nomenclature began later. This led to the recognition of sharing similarities among organisms. Man could recognize that all the present day living organisms are related to each other and also to those which ever lived on this earth. The chapters of this unit deal with the characteristics of living organisms and their classification.

CHAPTER 1

THE LIVING WORLD

Diverse form of living organisms are found in different types of habitats like ocean, fresh water bodies, forests, cold mountains, deserts, hot water springs etc. This makes us think what is life? The answer requires to differentiate the living and the non- living.

1.1 WHAT IS 'LIVING'?

It is very difficult to define 'living' and conventionally various characteristics common to all living beings are to be identified. Some of them are listed below:-

- a) **Cellular organization**
- b) **Metabolism**
- c) **Growth**
- d) **Reproduction**
- e) **Response to stimuli (Irritability).**

1.2 DIVERSITY IN THE LIVING WORLD

It is estimated that more than 5 millions species are present on earth. Of these about 1.7 million species are known and described. Every year several new species are described and added to the list. Since study of all organisms is nearly impossible, they are classified into groups for the convenient study.

Terminology used in classification:

a) Nomenclature: Often the organisms around us are known by local names which differ from place to place and language to language. Hence there is a need to standardize naming them. Scientists have formulated certain procedures to assign scientific name to each organism. International Code for Botanical Nomenclature (ICBN) and International code for Zoological Nomenclature (ICZN) were evolved to assign scientific names for plants and animals respectively. The scientific name has two components- *Generic name* and the *specific epithet*. This system of naming is called **binomial nomenclature**. It was given by **Carolus Linnaeus** and is used by biologists all over the world.

Examples: *Mangifera indica* (mango); *Homo sapiens* (man)

Here *Mangifera* and *Homo* are generic names; *indica* and *sapiens* are specific epithets.

Rules of Nomenclature:

1. Each biological name has two words- The first word represents genus and the second represents the specific epithet.
2. The words of the name should be separately underlined when hand written and should be in *italics* when printed.

3. The generic name should start with a capital letter and specific epithet should start with a small letter.
4. The names should be either Latin or Latinized.
5. Name of the author appears at the end of the scientific name in an abbreviated form. e.g.: *Homo sapiens* Linn. It indicates that this species is first described by Linnaeus.

b)Classification: It is the arrangement of organisms in specific groups or categories based on certain characters. These categories are called **taxa** (sing. taxon)

c)Taxonomy: It is the study of identification, nomenclature and classification of organisms based on external and internal structure with cell structure, development process and ecological information.

d)Systematics: It is the study of organisms with reference to identification, nomenclature, classification and evolutionary relationship.

1.3 TAXONOMIC CATAGORIES

The classification of organisms involves a sequence of arrangement of taxa in descending order. This is called taxonomic hierarchy or Linnaean hierarchy. The taxa used in classification are – Kingdom, Phylum or Division, Class, Order, Family, Genus and Species.

- a) **Species:** It is the basic unit in classification. The members of a species are closely related, derived from a common ancestor and can interbreed to produce fertile offsprings.
- b) **Genus:** Genus is a group of related species which have co-related characters.
- c) **Family:** Family is a group of related genera.
- d) **Order:** The order includes several related families.
- e) **Class:** Several related orders are included in a class.
- f) **Phylum/ Division:** Phylum in animals and Division in plants includes related classes.
- g) **Kingdom:** Kingdom comprises of various phyla of animals and various divisions of plants.

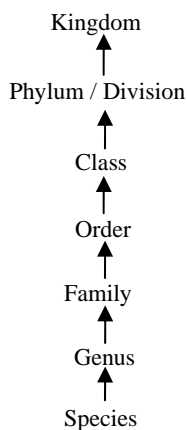


Fig.1.1 Taxonomic categories showing Taxonomic hierarchy in ascending order

Besides the above categories taxonomists developed sub-categories in the hierarchy to help more precise placement of various taxa.

Examples for taxonomic categories:

Man(*Homo sapiens*)

Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Primates
Family: Hominidae
Genus: *Homo*
Species: *sapiens*

Coconut(*Cocos nucifera*)

Kingdom: Plantae
Division: Angiospermae
Class: Monocotyledonae
Order: Principes
Family: Arecaceae
Genus: *Cocos*
Species: *nucifera*

SUMMARY

On this planet Earth diverse forms of life exists. Variations in them are so diverse that they make us to seek the defining the characteristics of living beings. To facilitate the study of diverse forms of life biologists evolved rules for identification, nomenclature and classification. This branch of biology is called as taxonomy. Each organism is identified and assigned scientific name with two words as per binomial system of nomenclature. The organisms are grouped in taxa and the taxa are arranged in taxonomic hierarchy.

EXERCISES

1. Mention any four characteristics of living beings.
2. Why are the living beings given scientific names?
3. Mention the rules of binomial nomenclature.
4. Which is the basic taxon in biological classification?
5. What is taxonomy?
6. What is systematics?
7. Identify the correct statement:-
 - a) The organisms are named scientifically by generic name and specific epithet.
 - b) The specific epithet starts with a capital letter and generic name starts with a small letter.
8. Identify the correct sequence of taxonomic hierarchy:-
 - a) Species → Genus → Family → Order → Class
 - b) Species → Family → Order → Genus → Class
 - c) Genus → Species → Family → Class → Order
 - d) Genus → Class → Species → Family → Order
10. Identify the correct statement:-
 - a) Phylum includes related classes of animals and Division includes related classes of plants.
 - b) Family includes related orders.
10. Give the systematic position of man.

Exercises – Answers

1. Cellular organization, metabolism, growth, reproduction
2. The local names of the organisms vary from place to place and language to language. Hence, to avoid confusion, scientific names are given to them. These names are common throughout the world.
3. Rules of binomial nomenclature are
(a) Each biological name has two words- The first word represents genus and the second represents the specific epithet.
(b) The words of the name should be separately underlined when handwritten and would be in italics when printed
(c) The generic name should start with a capital letter and the specific epithet should start with a small letter.
(d) The names should be either Latin or Latinized.
(e) Name of the author appears at the end of the scientific name in an abbreviated form
4. Species
5. Taxonomy is the study of identification, nomenclature and classification of organisms.
6. Systematics is the study of organisms with reference to identification, nomenclature, classification and evolutionary relationships
7. (a)
8. (a)
9. (a)
10. Kingdom : Animalia
Phylum : Chordata

Class : Mammalia

Order : Primates

Family : Hominidae

Genus : *Homo*

Species : *sapiens*