

# Chapter – 7

## Diversity in Living Organisms

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### Basis of Classification

#### ◆ *Biodiversity:*

Biodiversity means different forms of living organisms (which differ from one another in external appearance, size, colour, nutrition, internal structure and habitat) found in a particular region. The term biodiversity was coined by Walter G. Rosen in 1986.

#### ◆ *Basis of Classification*

- The method of arranging organisms into groups or sets on the basis of similarities and differences is called classification.
- The system of naming plants and animals in their scientific names is known as nomenclature.
- The science of nomenclature, identification and classification is called taxonomy.
- Carolus Linnaeus is called the "Father of taxonomy".

### Classification and Evolution

⇒ Most life forms have arisen by an accumulation of changes in body design that allow the organisms possessing them to survive better. This is called evolution.

⇒ The idea of evolution was first described by Charles Darwin in his book "the origin of species" in 1859.

⇒ Two kingdom classifications were given by Linnaeus in 1758. According to this, all organisms are grouped into two broad categories: Kingdom Plantae and Kingdom Animalia.

⇒ Later this classification was failed because some organisms like Euglena possess characteristics of both plant and animal.

⇒ Whittaker five kingdoms are the most commonly used classification. These are:

- Monera
- Protista
- Fungi
- Plantae
- Animalia

### Hierarchy of Classification

⇒ In the hierarchical system of classification, organisms are arranged in a definite order, from higher to lower categories.

⇒ Each category is called a taxon. The correct order of classification is

Kingdom – Phylum/Division – Class – Order – Family – Genus – Species

⇒ If two organisms are in the same order, they must be in the same class, phylum, and kingdom.

\*Note: Species is the basic unit of taxonomy.

#### ◆ Monera:

The organisms belonging to the kingdom Monera are simple, unicellular, and do not have a well-defined nucleus. These are prokaryotic organisms. The organisms in this group are either autotrophic (prepare their own food) or heterotrophic (get their food from the environment). Ex: bacteria, cyanobacteria or blue-green algae, and mycoplasma.

#### ◆ Protista:

Kingdom Protista includes unicellular eukaryotic organisms. Some organisms belonging to Kingdom Protista are autotrophic. Ex: algae and diatoms. Some organisms are heterotrophic Ex: protozoans.

In Protists locomotion occur with the help of filamentous structures called cilia (eg: Paramecium), whip-like structures called flagella (eg: Euglena).

#### ◆ Fungi:

Kingdom Fungi are non-green plants that are unable to synthesize their own food. They are heterotrophic and eukaryotic. They obtain their food either from dead organic matter (saprophytic) or from other living organisms (parasitic).

They have a cell wall made up of chitin which is complex sugar. Example: Yeast, molds, and mushrooms.



### **Symbiotic relationships between algae and fungi**

Blue green algae or cyanobacteria and fungi live in symbiosis for their mutual benefit. This association is called lichens. Cyanobacteria are photosynthetic and they release carbon dioxide and this carbon dioxide is used by the fungi. So, both the organisms are benefited.

## **Plantae**

Kingdom plantae is divided into five categories:

### ◆ Thallophyta:

The plant body is not differentiated into stem, root, and leaves. They are in the form of thallus. The plants in this group are commonly called algae. These plants are mostly aquatic. Ex: Spirogyra, Ulothrix, Cladophora.

### ◆ Bryophyta:

Bryophyta is a multicellular, autotrophic plant. Their body is differentiated into stem and leaf-like structures. They do not have specialized tissue for the conduction of water and other substances. So, they do not have a true vascular system. Ex: Moss.

### ◆ Pteridophyta:

In pteridophytes, the plant body is made up of root, stem, and leaves. They have well developed vascular system (xylem and phloem) for the conduction of water and other substances. Ex: Marsilea and Fern. Pteridophyta has a well-developed vascular system. So, Pteridophyta is called vascular cryptogams.



**Cryptogams** are the plants which do not produce external flowers or seed. The means of reproduction of cryptogam is by spores. They are also known as flowerless, seedless or lower plants. Thallophyta, Bryophyta and Pteridophyta belong to this group.

**Phanerogams** are higher plants that bear flowers and seeds. Gymnosperm and Angiosperm belong to this group.

◆ *Gymnosperm:*

Gymnospermae is the most primitive and simple seed plant. They bear naked seeds (seeds are not enclosed within the fruits). Ex: Cycas, pinus and cedrus(deodar).

◆ *Angiosperm:*

Angiosperms are the most highly evolved plants. They have seeds that are enclosed within the fruit. The reproductive organs are aggregated in a flower. They are also called flowering plants. They have well-developed vascular tissue (xylem and phloem). The seed contains cotyledons (fleshy embryonic leaves). On the basis of cotyledons, angiosperms are divided into two groups: monocotyledons (monocot) and dicotyledons (dicot).

## Animalia

The organisms belonging to this group are eukaryotic, multicellular, and heterotrophic. They are further classified into ten categories:

◆ *Porifera:*

Porifera have perforated (numerous holes) body. These are non-motile animals attached to some solid support. There are holes (pores) all over the body which helps in circulating water throughout the body to bring in food and oxygen. They are mostly found in marine habitats. They are commonly called sponges.

◆ *Coelenterata:*

They are aquatic and have cavities in their body. Ex: Hydrilla and Sea anemone.

◆ Platyhelminthes:

They have a soft thin and ribbon-like bilaterally symmetrical body. They are generally parasitic. Ex: Tapeworm, liver fluke.

◆ Nematoda:

They have bilaterally symmetrical bodies. They are generally parasitic and cause disease. Ex: Ascaris.

◆ Annelida:

They have a cylindrical, bilaterally symmetrical, and metamerically segmented body. They have a true body cavity Ex: Earthworm and leech.

◆ Arthropoda:

Jointed legs or appendages are the most common feature of phylum arthropods. They have an open circulatory system which means their blood flows through large space. Their body cavity is filled with blood which is called hemocoel. Ex: Cockroach, scorpion, spider, prawns, etc.

◆ Mollusca:

They have bilateral symmetry. The soft body of the animal is covered with a hard shell. Eg: Pila and Unio.

◆ Echinodermata:

Organisms of Echinodermata have unsegmented bodies, exoskeleton, spiny surface, and tube feet. The body cavity is modified into a unique water vascular system that moves respiratory and locomotory organs. Ex: Sea urchin.

◆ Protochordata:

They are marine animals having a bilaterally symmetrical body with coelom.

◆ Vertebrata:

They are vertebral column and internal skeleton. They are grouped into six classes:

- Cyclostomata

- Pisces
- Amphibia
- Reptilia
- Aves
- Mammalia

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