



UNIT I

Chapter...1

THE LIVING WORLD

1.1 INTRODUCTION

World is full of living and non-living things. But biology deals with the living beings and their functions. There is a great diversity of living beings. The difference between living beings and non-living matter was perceived by early human being. Detailed system of identification, nomenclature began later. This led to the recognition of sharing similarities among organisms. Man could recognize that living organisms are related to each other.

Various forms of living organisms are found in different types of habitats in the world like ocean, air, fresh water, forests, cold mountains, deserts, hot water springs etc. which make us to think about the vividness of living organisms and makes us to differentiate between the living and the non-living organisms.

It is very difficult to define 'living organisms' and to characterise them, few of these characteristics are as under:

- (1) Living things have **cellular** organization.
- (2) They undertake **metabolism** of food.
- (3) Living organisms can **grow**.
- (4) Living organisms give rise to next **progeny** (Generation).
- (5) Living organisms response to **stimuli** (Irritability)

It is estimated that more than 5 million 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. Study of all these organisms is nearly impossible, they are classified into groups for the convenience.

1.2 DIVERSITY IN THE LIVING WORLD

It is known that more than 5 million living species exists on earth out of these approximately 1.5 million species are known and are described. Every year several new living species are reported by the scientists in the world and are added to the list.

They are coming from all corners of all sources and to study all of them is nearly impossible.

For convenience, depending upon their occurrence and physical forms they are classified. Their diversified sources like deserts, oceans, forests and cold zones etc. make their study very difficult, but without their detailed study.

We may not be able to utilise them suitably for our proper survival.

1.3 BINOMIAL NOMENCLATURE

It is universally accepted that plants and animals around us are known various local names for convenience, it is also agreed that they should be known by titles uniform through out so that there is no confusion about their identity. Scientists have finalised the procedure to assign their names ICBN (International Code for Botanical Nomenclature) and ICZN (International Code for Zoological Nomenclature) were entrusted to name the plants and animals respectively. The scientific name the scientist entrusted has two components i.e. Generic name and specific epithet.

Examples: *Saraca indica* (Ashok);

Here, *Saraca* is generic name; and *indica* is specific epithet.

Rules of Nomenclature:

1. Each scientific name has two parts. The first word represents genus and the second represents the specific epithet.
2. The words of the name should be separately underlined when handwritten 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. *Saraca indica* Linn. It indicates that this species is first described by **Linnaeus**.

1.4 CLASSIFICATION

It is the arrangement of organisms in specific group or categories based on certain characters. These categories are called **taxa**.

Taxonomy:

It is the science of identification, nomenclature and classification of organisms based on external and internal structure with cell structure, development process and ecological information.

**Systematics:**

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

The descending order of taxa used in classification are – Kingdom, Phylum or Division, Class, Order, Family, Genus and Species.

1. **Kingdom:** Kingdom comprises of various phyla of animals and various divisions of plants.
2. **Phylum/Division:** Phylum in animals and Division in plants includes related classes.
3. **Class:** Several related orders are induced in a class.
4. **Order:** The order includes several related families.
5. **Family:** Family is a group of related families.
6. **Genus:** Genus is a group of related species which have co-related characters.
7. **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.

This system was finalized by *Carolus Linnaeus* and is known as *Binomila nomenclature*. It is followed by all biologists of the world.

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

1.5 FIVE KINDOMS OF LIFE

Five kingdoms of life and their salient features are as follows, namely Monera, Protista, Fungi, Animalia, Plantae, and Viruses.

(1) Monera:

The monerans are the simplest form of the entire living organisms. They are extremely small.

These organisms are prokaryotic. The organisms are simple unicellular and microscopic.

Cell wall is present in some organisms and absent in others. Their cell wall is not made up of cellulose. They do not possess definite nucleus and lack cell organelles.

Some organisms can synthesize their food while others show heterotrophic mode of nutrition. Examples: Bacteria, mycoplasma, blue green algae, etc.

(2) Protista:

A kingdom or large grouping that comprises mostly single-celled organisms such as the

protozoa, simple algae and fungi, slime moulds, and the bacteria. They are now divided into thirty phyla, and some have both plant and animal characteristics. This group consists of many types of unicellular eukaryotic organisms. Salient features of protista are as under:

They are simple and unicellular eukaryotic organisms.

- They have a defined nucleus and membrane bound organelles.
- Locomotion occurs with the help of hair like structures called cilia e.g. *Paramecium*, whip like structures called flagella e.g. *Euglena* or Pseudopodia e.g. *Amoeba*.
- Few protists synthesize their own food i.e. they are autotrophic, while others show heterotrophic mode of nutrition.

(3) Fungi:

Fungi are simple eukaryotic, lacking chlorophyll with salient features such as:

- Cell wall is present. It is made up of tough complex sugar called chitin.
- They are non-photosynthetic. Their mode of nutrition is heterotrophic. Most of them are saprophytes.
- Most fungi are multicellular (exceptionally yeast is unicellular fungus).
- The body of multicellular filamentous fungus is called mycelium, which is composed of several thread like structures called **hyphae**.
- Few fungi live in symbiotic relationship with blue green algae as Lichens.
Examples: *Mucor*, *Aspergillus*, *Penicillium*, *Rhizopus*. etc.

(4) Animalia:

This group consists of all multicellular eukaryotes which do not possess cell wall. Their salient features are:

- These are heterotrophic they do not prepare their own food.
- They are multicellular eukaryotes.
- Cell wall is absent.
- They show very limited growth which stops after maturity.
- Kingdom animalia is further classified into Vertebrates and Invertebrates.

(5) Plantae:

This group consists of multicellular Eukaryotic organisms,

- They are autotrophic i.e. they prepare their own food in presence of sunlight, Chlorophyll, water and carbon dioxide by photosynthesis.
- They possess cell wall made up of cellulose.

- Kingdom plantae are further classified into Thallophyta, Bryophytes, Pteridophyta, Gymnosperm and Angiosperm.

(6) Viruses:

Viruses are ultra-microscopic, non-cellular living particles, composed solely of a nucleic acid (DNA or RNA) core, surrounded by a protein envelope called capsid.

Viruses are devoid of the sophisticated enzymatic and biosynthetic machinery essential for independent activities of cellular life. Therefore, they can grow only inside suitable living cells. That is why; they are cultivated in the laboratory only inside living cells.

Viruses do not increase in size. They can pass through filters, through which bacteria cannot pass.

A virus is called either 'DNA virus' or 'RNA virus' depending on whether it contains the nucleic acid DNA or RNA. A virus cannot have both DNA and RNA.

Structure of Viruses:

The viruses, which infect bacteria, are called 'bacteriophages' or 'phages'. The bacteriophages were first described Twort and d'Herelle in 1915.

The term bacteriophage, (means to eat bacteria), was coined by d'Herelle because of the ability of these viruses to destroy the infected bacteria cells through lysis. Bacteriophages exhibit notable variability in their size, shape and complexity of structure.

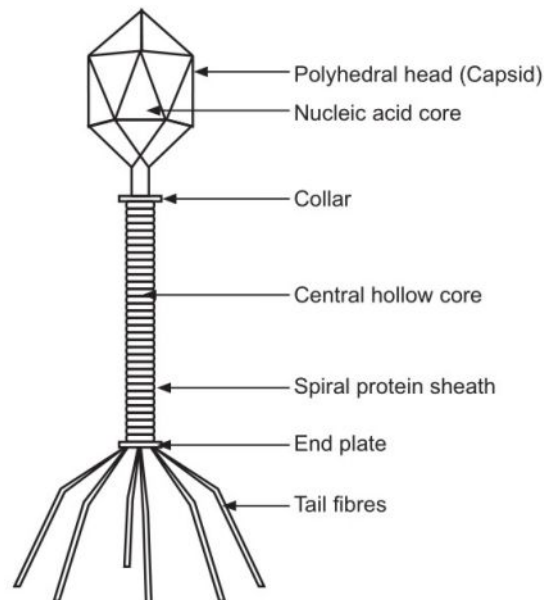


Fig. 1.1: Structure of T-even bacteriophage