



CBSE

CLASS-11th

THE CENTRAL BOARD OF SECONDARY EDUCATION

BIOLOGY-I



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CHAPTER 1 – THE LIVING WORLD

CONTENTS

- INTRODUCTION
- TAXONOMIC CATEGORIES
- TAXONOMICAL AIDS
- POINTS TO REMEMBER
- IMPORTANT QUESTIONS

Diversity in the Living World

INTRODUCTION

- The number of species that are studied and described range anywhere between 1.7-1.8 million
- naming of living organisms which is same all over the world. **This process is called nomenclature**
- **ICBN (International Code for Botanical Nomenclature)**
- **ICZN(International Code of Zoological Nomenclature)**

Universal rules of nomenclature are as follows:

1. Biological names are generally in Latin and written in italics
2. The first word in a biological name represents the genus while the second component denotes the specific epithet.
3. Both the words in a biological name, when handwritten, are separately underlined, or printed in italics to indicate their Latin origin.
4. The first word denoting the genus starts with a capital letter while the specific epithet starts with a small letter. Example:- *Mangifera indica*. (scientific name of mango)

Taxonomy and Systematics

- To know about different kinds of organism and their diversities and relation between them this branch of study is termed as systematics
- Systematics takes into account evolutionary relationships between organisms.

Taxonomic Categories

- Classification involves a hierarchy of steps and levels in which every step represents a rank or a category.
- Classification of the organism is not a simple process of one step.
- The category is a part of the overall taxonomic arrangement and it is called the taxonomic category and all categories together constitute the taxonomic hierarchy.
- Each category is referred as a unit of classification that represents a rank, commonly termed as the taxon (pl.: taxa).
- Each rank or taxon, in turn, represents a unit or level of classification.

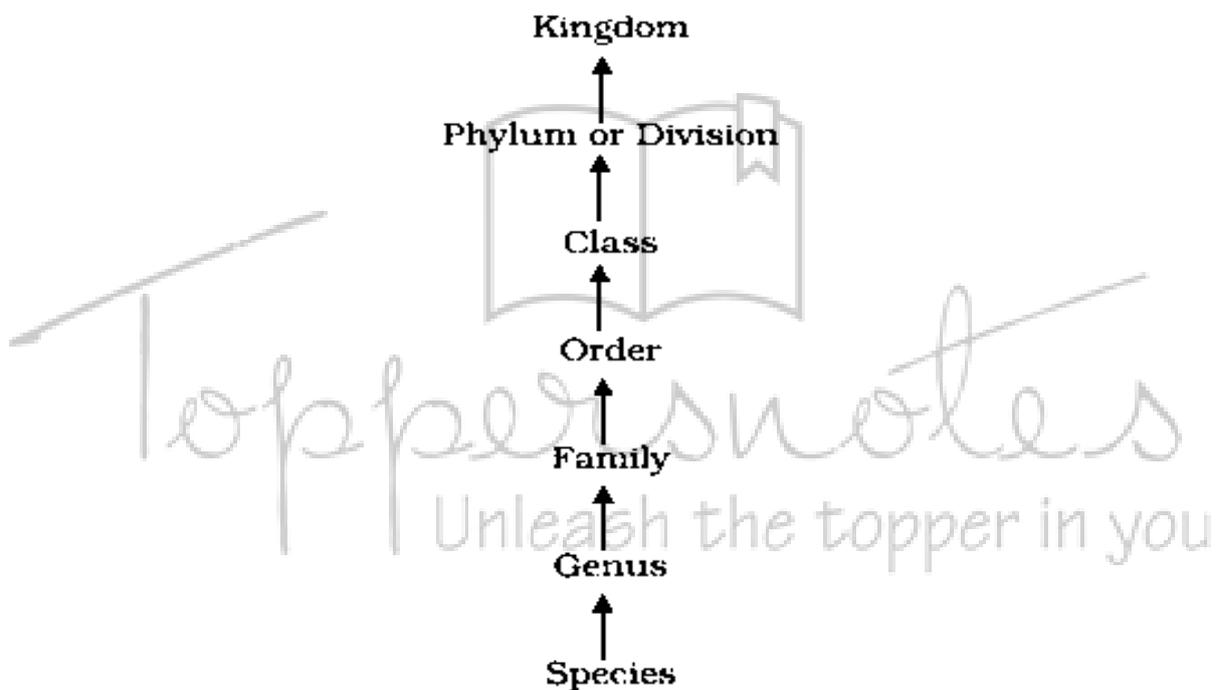


Figure 1.1 Taxonomic categories showing hierarchical arrangement in ascending order

Species

- A group of individual organisms with similar morphological characters which are able to breed among themselves and produce their own kind is termed as a species..
- *Mangifera indica*, *Solanum tuberosum* (potato) and *Panthera leo* (lion). All the three names, *indica*, *tuberosum* and *leo*, represent the specific epithets,
- Human beings belong to the species *sapiens* which is grouped in the genus *Homo*.

Genus

- Genus is a group of closely related species which has more characters in common in comparison to species of other genera.
- For example, potato, tomato and brinjal are three different species but all belong to the genus *Solanum*.

Family

- Family, has a group of related genera with less number of similarities as compared to genus and species. Families are characterised on the basis of both vegetative and reproductive features of plant species.
- For example, three different genera *Solanum*, *Petunia* and *Datura* are placed in the family Solanaceae.

Order

- It is the highest category
- An order is the assemblage of families resembling one another in a few similar characters. The similar characters are less in number as compared to different genera included in a family.
- Plant families like Convolvulaceae, Solanaceae are included in the order Polymoniales mainly based on the floral characters.
- The animal order, Carnivora, includes families like Felidae and Canidae.

Class

- This category includes one or more related orders.
- For example, order Primata comprising monkey, gorilla and gibbon is placed in class Mammalia along with order Carnivora that includes animals like tiger, cat and dog.

Phylum

- Classes comprising animals like fishes, amphibians, reptiles, birds along with mammals constitute the next higher category called Phylum.
- based on the common features like presence of notochord and dorsal hollow neural system, are included in phylum Chordata
- .In case of plants, classes with a few similar characters are assigned to a higher category called Division.

Kingdom

- It includes all organisms that share a set of distinguishing common characters.

- Plants are INCLUDED in the Plant Kingdom and animals are included in the animal kingdom. It is the highest taxonomic category.
- The number of similar character to the members of a group decreases from species to kingdom, i.e.,. Higher the category, greater is the difficulty of determining the relationship to other taxa at the same level

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

TABLE 1.1 Organisms with their Taxonomic Categories

Taxonomic Aids

- Techniques, procedures and stored information that are useful in identification and classification of organisms are called taxonomic aids.

Some of the important taxonomic aids are:

Herbarium:

- Herbarium is a store house of collected plant specimens that are dried pressed and preserved on sheets.
- These sheets are arranged according to a universally accepted system of classification.
- The herbarium sheets also carry a label providing information about date and place of collection, English, local and botanical names, family, collector's name, etc.
- Herbaria also serve as quick referral systems in taxonomical studies.

Botanical Garden:

- These specialised gardens have collections of living plants for reference.

- Plant species in these gardens are grown for identification purposes and each plant is labelled indicating its botanical/scientific name and its family.
- The famous botanical gardens are at Kew (England), Indian Botanical Garden, Howrah (India) and at National Botanical Research Institute,

Zoological Parks:

- These are the places where wild animals are kept in protected environments under human care and which enable us to learn about their food habits and behaviour
- Natural habitat is maintained.

Museum:

- Museums have collections of preserved plant and animal specimens for study and reference.
- Specimens are preserved in the containers or jars in preservative solutions
- Insects are preserved in insect boxes after collecting, killing and pinning.

Keys:

- Key is another taxonomical aid used for identification of plants and animals based on the similarities and dissimilarities.
- The keys are based on the contrasting characters generally in a pair called couplet. It represents the choice made between two opposite options
- Each statement in the key is called lead.

POINTS TO REMEMBER

GROWTH :- Increase in mass and increase in number of individuals are characteristics of growth

- Reproduction, likewise, is a characteristic of living organisms. In multicellular organisms, reproduction refers to the production of progeny possessing features more or less similar to those of parents
- Fungi produce asexual spores which spread nearby and give rise to new fungi.
- Yeast and Hydra multiply by separation of their new bud from themselves which grows into a new organism called as budding.
- Planaria (flatworms) have special characteristics of regenerating lost parts of the body by fragmentation and the process is called as true regeneration.
- The fungi, the filamentous algae, the protonema of mosses, use fragmentation as a reproductive feature.

- Unicellular organisms like bacteria, algae or Amoeba reproduce and grow by increasing their cell numbers . An indication of growth as well as reproduction..
- The sum total of all the chemical reactions occurring in our body is **metabolism**.
- Properties of cellular organelles are not present in the molecular constituents of the organelle but arise as a result of interactions among the molecular components comprising the organelle. These interactions result in emergent properties at a higher level of organisation. **This phenomenon is true in the hierarchy of organisational complexity at all levels**. Therefore living organisms are self-replicating, evolving and self-regulating
- **Each name has two components – the Generic name and the specific epithet. This system of providing a name with two components is called Binomial nomenclature. This naming system given by Carolus Linnaeus**
- **Classification** is the process by which anything is grouped into convenient categories based on some easily observable characters
- Based on characteristics, all living organisms can be classified into different taxa. This process of classification is **taxonomy**
- **Monographs (information on any one taxon), manuals (information for identifying species in an area), flora (account of habitat and distribution of plants of a given area) and catalogues are some useful taxonomic aids.**

1 Marks Question

1. Name the three fields of systematics.

Ans. Nomenclature, classification & taxonomy.

2. Give the two name system of organisms?

Ans. Binomial Nomenclature.

3. Give the unit of classification?

Ans. category

4. Who gave binomial name of classification?

Ans. Carolus Linnaeus

5. Which branch takes account of evolutionary relationships?

Ans. systematics

6. Give names of two botanical gardens.

Ans. Kew (England) and National Botanical Research Institute (Lucknow)

2 Marks Question

1. Write the rules for nomenclature ?

1. Biological names are generally in Latin and written in italics
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3. Both the words in a biological name, when handwritten, are separately underlined, or printed in italics to indicate their Latin origin.
4. The first word denoting the genus starts with a capital letter while the specific epithet starts with a small letter.

2. Write short note on key ?

- Key is taxonomical aid used for identification of plants and animals based on the similarities and dissimilarities.
- The keys are based on the contrasting characters generally in a pair called couplet. It represents the choice made between two opposite options.
- Each statement in the key is called lead.

3. Write the scientific name of mango? Writes the species and genera of mango

Mangifera indica.(scientific name of mango)

Mangifera - genus

Indica – species

3 Marks Question

1. Explain taxonomical aids?

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CHAPTER 2 – BIOLOGICAL CLASSIFICATION

CONTENTS

- INTRODUCTION
- KINGDOM MONERA
- KINGDOM PROTISTA
- KINDOM FUNGI
- KINGDOM PLANTAE
- KINGDOM ANIMALIA
- VIRUS VIRIIDS AND LICHENS
- POINTS TO REMEMBER
- IMPORTANT QUESTIONS

Introduction

- In Linnaeus time a Two Kingdom system of classification with Plantae and Animalia kingdoms was developed that included all plants
- **Limitations of Linnaeus two kingdom system** This system did not distinguish between the eukaryotes and prokaryotes unicellular and multicellular organisms and photosynthetic (green algae) and non-photosynthetic (fungi) organisms.
- R.H. Whittaker (1969) proposed a **Five Kingdom Classification. Monera, Protista, Fungi, Plantae and Animalia.**
- The main criteria for classification used -**cell structure, thallus organisation, mode of nutrition, reproduction and phylogenetic relationships**

CHARACTERISTICS OF KINGDOM

Monera

- Bacteria are the sole members of the Kingdom Monera.
- Bacteria are grouped under **four** categories based on their shape: the spherical Coccus (pl.: cocci), the rod-shaped Bacillus (pl.: bacilli), the comma-shaped Vibrium (pl.: vibrio) and the spiral Spirillum (pl.: spirilla)
- Some of the bacteria are autotrophic, i.e., they synthesise their own food from inorganic substrates.

- They may be photosynthetic autotrophic or chemosynthetic autotrophic. The vast majority of bacteria are heterotrophs, i.e., they do not synthesise their own food but depend on other organisms or on dead organic matter for food.

Archaeobacteria

- These bacteria live in some of the most harsh habitats such as extreme salty areas (halophiles), hot springs (thermoacidophiles) and marshy areas (methanogens).
- Archaeobacteria differ from other bacteria in having a different cell wall structure and this feature is responsible for their survival in extreme conditions.
- Methanogens are present in the guts of several ruminant animals such as cows and buffaloes and they are responsible for the production of methane (biogas) from the dung of these animals
- example algae – *Nostoc*

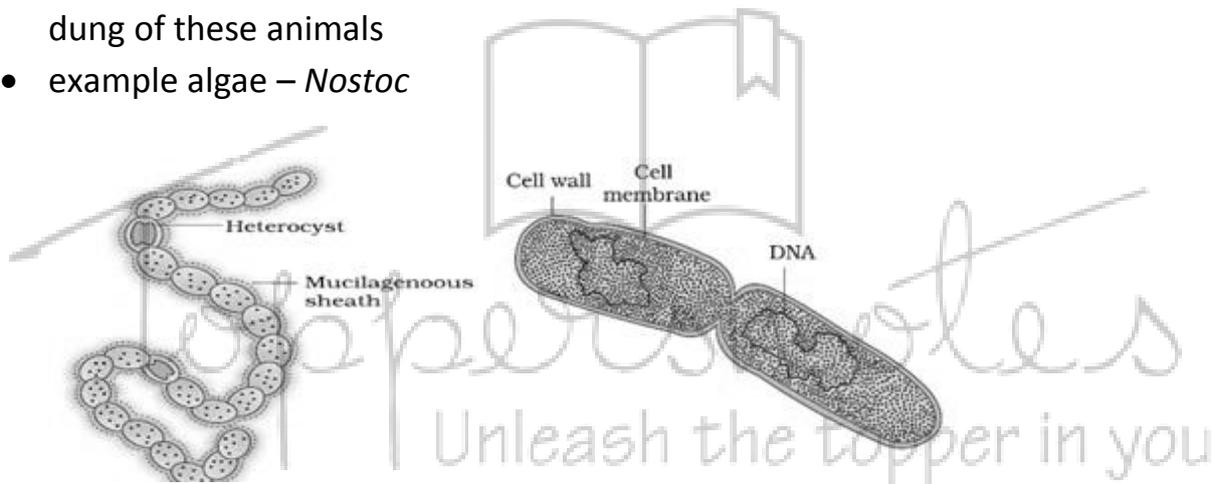


Figure 2.2 (a) A filamentous blue-green algae – *Nostoc* (b) a dividing bacteria

Eubacteria

- Known as ‘true bacteria’.
- They are characterised by the presence of a rigid cell wall, and if motile, a flagellum.
- The **cyanobacteria** (also referred to as blue-green algae) have chlorophyll *a* similar to green plants and are **photosynthetic autotrophs**
- The cyanobacteria are unicellular, colonial or filamentous, marine or terrestrial algae.
- The colonies are generally surrounded by gelatinous sheath. They form blooms in polluted water bodies.
- these organisms can fix atmospheric nitrogen in specialised cells called **heterocysts**, e.g., *Nostoc* and *Anabaena*.
- **Chemosynthetic autotrophic** bacteria oxidise various inorganic substances such as nitrates, nitrites and ammonia and use the released energy for their ATP

production. They play a great role in recycling nutrients like nitrogen, phosphorous, iron and sulphur.

Heterotrophic bacteria

- The majority are important decomposers.
- . They are helpful in making curd from milk, production of antibiotics, fixing nitrogen in legumeroots, etc.
- Some are pathogens causing damage , crops, farm animals and pets.
- Causes disease like Cholera, typhoid, tetanus, citrus cancer
- **The Mycoplasmas are organisms that completely lack a cell wall. They are the smallest living cells known and can survive without oxygen. Many mycoplasma are pathogenic in animals and plants**

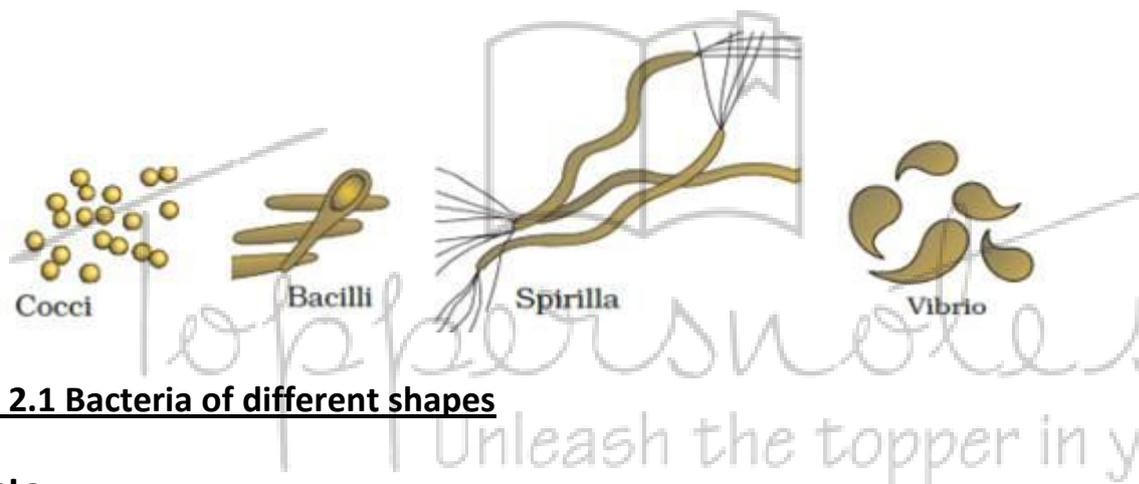


Figure 2.1 Bacteria of different shapes

Protista

Kingdom Protista includes Chrysophytes, Dinoflagellates, Eugleoids, slime mould and Protozoans.

- All single-celled eukaryotes are placed under **Protista**
- Members of Protista are primarily aquatic.
- Protists reproduce asexually and sexually by a process involving cell fusion and zygote formation.

Chrysophytes

- This group includes diatoms and golden algae (desmids).
- They are found in fresh water as well as in marine environments. They are microscopic and float passively in water currents (plankton).
- Most of them are photosynthetic.

- In diatoms the cell walls form two thin overlapping shells, The walls are embedded with silica and are indestructible.
- diatoms have left behind large amount of cell wall deposits in their habitat; this accumulation over billions of years is referred to as 'diatomaceous earth'.
- soil is used in polishing, filtration of oils and syrups. Diatoms are the chief 'producers' in the oceans.

Dianoflagellates

- These organisms are mostly marine and photosynthetic.
- They appear yellow, green, brown, blue or red
- The cell wall has stiff cellulose plates on the outer surface.
- Most of them have two flagella; one lies longitudinally and the other transversely in a furrow between the wall plates.
- red dianoflagellates (Example: *Gonyaulax*) undergo such rapid multiplication that they make the sea appear red (red tides).
- Releases toxin that kill large marine animals

Euglenoids

- Majority of them are fresh water organisms found in stagnant water.
- have a protein rich layer called pellicle which makes their body flexible.
- They have two flagella, a short and a long one.
- They act as both phototropic(in presence of sunlight) and heterotrophic(in absence of sunlight)
- . Example: *Euglena*

Slime Moulds

- Slime moulds are saprophytic protists.
- Under suitable conditions, they form an aggregation called During unfavourable conditions, the plasmodium differentiates and forms fruiting bodies bearing spores at their tips. The spores possess true walls. They are extremely resistant and survive for many years, under adverse conditions.
- The spores are dispersed by air currents.

Protozoans

- All protozoans are heterotrophs and live as predators or parasites.

There are four major groups of protozoans.

1. **Amoeboid protozoans:** These organisms live in fresh water, sea water or moist soil. They move and capture their prey by putting out pseudopodia (false feet) as in *Amoeba*.
 - Marine forms have silica shells on their surface. Some of them such as *Entamoeba* are parasites.
2. **Flagellated protozoans:** The members of this group are either free-living or parasitic.
 - they have flagella.
 - The parasitic forms cause diseases such as sleeping sickness. Example: *Trypanosoma*.
3. **Ciliated protozoans:** These are aquatic, actively moving organisms because of the presence of thousands of cilia.
 - They have a cavity (gullet) that opens to the outside of the cell surface. Example: *Paramecium*
4. **Sporozoans:** This includes diverse organisms that have an infectious spore-like stage in their life cycle.
 - Example *Plasmodium* (malarial parasite) which causes malaria

Kingdom Fungi –

- The fungi constitute a unique kingdom of heterotrophic organisms.
- Fungi are cosmopolitan and occur in air, water, soil and on animals and plants.
- Grows in warm and humid places
- Fungi (except unicellular yeast) are filamentous.
- Their bodies consist of long, slender thread-like structures called hyphae. The network of hyphae is known as mycelium. Some hyphae are continuous tubes filled with multinucleated cytoplasm – these are called **coenocytic hyphae**.
- Others have septae or cross walls in their hyphae. The cell walls of fungi are composed of chitin and polysaccharides.
- Most fungi are heterotrophic and absorb soluble organic matter from substrates and hence are called saprophytes.
- They live as symbionts – in association with algae as lichens and with roots of higher plants as mycorrhiza.
- Reproduction in fungi can take place by vegetative means – fragmentation, fission and budding
- . Asexual reproduction is by spores called conidia or sporangiospores or zoospores,
- sexual reproduction is by oospores, ascospores and basidiospores.