2 Classification of the Living World

LEARNING OBJECTIVES

After completing this chapter you will be able to

- define the term classification.
- describe the need for classification of living organisms.
- recognise the system of classification.
- appreciate the need for binomial nomenclature over the common names of animals with examples.
- list and describe the salient features of Kingdom Monera.
- list and describe the salient features of Kingdom Protista.
- list and describe the salient features of Kingdom Fungi.
- list and describe the salient features of Kingdom Plantae.
- list and describe the salient features of Kingdom Animalia.

WHAT IS CLASSIFICATION?

There must be thousands of books in your school library. Have you ever noticed the way they are arranged on bookshelves?

Most often the books are grouped subjectwise. Imagine all these books are stacked randomly without keeping in mind their subject. Then, to locate a particular book in such a stack would be difficult for you! Thus, grouping of things according to certain common characteristics is called **classification**.

Fig 2.1 Classification makes study systematic.

There are millions of types of organisms on earth. Is it possible to study and remember the characteristics of all these individual organisms? It will be easier to study about such a vast variety of organisms, if we classify them on certain criteria. Classification could be based on similarities and dissimilarities among different kinds of organisms.

Advantages of classification

There are about 10 million living organisms on the earth. Scientists have identified and classified only about one third of these till date. Millions more would be identified in future. If you can appreciate the necessity of classifying a few thousand books in your school library, you can very well understand the need to classify living beings.

- The character of all members of a group can be studied by studying the characters of a few members only.
- Classification makes the study systematic. It highlights the relationship between different organisms.
- It helps in identifying different organisms and placing them into particular groups.
- It also gives us an idea about the evolution of organisms from simpler to more complex organisms.

Systems of classification

Classification could be done in many ways. For example, plants could be classified into trees, shrubs and herbs based on their size, or autotrophs and heterotrophs based on the mode of nutrition. They can also be classified on some other basis like their habitat, duration of life cycle and so on. Thus, classification of organisms according to some superficial characters are called the artificial system of classification. In this type of classification, many plants which are otherwise very different are put in the same group. For example, a neem plant and a pine plant can be grouped together as trees but they possess a number of different characteristics. Similarly for animals, grouping based on presence or absence of wings can only indicate whether an animal can fly or not.

In the **general system of classification**, all the important related characteristics, such as external structure, internal structure, growth, development, reproduction and many other life processes are considered. This is a more scientific method of classification.

CLASSIFICATION OF LIVING ORGANISMS

Originally all living organisms were broadly divided into two categories depending on some common characteristics. These two categories were plants and animals and they were divided into two kingdoms—**Kingdom Plantae** (the kingdom of plants) and **Kingdom Animalia** (the kingdom of animals). Certain organisms, like bacteria were found to have characteristics of both plants and animals. Therefore, the entire living world is divided into **five kingdoms**. These five kingdoms are **Monera** (the kingdom of bacteria), **Protista** (the kingdom of other unicellular or one-celled organisms), **Fungi** (the kingdom of spore-producing organisms), **Plantae** (the kingdom of plants) and **Animalae** (the kingdom of animals).

Important characteristics of these five kingdoms are discussed here.

Kingdom Monera

This kingdom consists of bacteria made up of a

Did you know?

As per the earlier system of classification a living thing was placed in the plant kingdom if it produced its own food and in the animal kingdom if it could not make its own food.

single cell that lacks a nucleus. Bacteria are found in three different shapes—cocci (spherical-shaped), bacilli (rod-shaped) and spirilla (spiral-shaped). You will read more about bacteria in Chapter 3.

Kingdom Protista

This kingdom consists of unicellular organisms other than bacteria. The nucleus is present in the cell. Some are animal-like since they do not make their own food. They are called protozoa, for example, *Amoeba* and *Paramecium*. Some are plant-like since they have one or more chloroplasts and can make their own food using solar energy, for example, *Euglena* and diatom.

Kingdom Fungi

This kingdom consists of plants like yeast which cannot make their own food. You will read more about fungi in Chapter 3.

Kingdom Plantae

All multicellular green plants which can make food on their own in the presence of sunlight, using water and air are included in the Kingdom Plantae. Because of their ability to make food on their own, these plants are called autotrophs. The plants are found on land, sea, lakes and streams. You will learn more about classification of plants in Chapter 3.

Kingdom Animalae (or Animalia)

All multicellular animals including human beings belong to this kingdom. They are heterotrophic in nature, that is, they cannot make their own food. Animals can be classified into two groups, that is, invertebrates and vertebrates, based on the presence or absence of a backbone. Animals without a backbone are called **invertebrates**. Animals with a backbone are called **vertebrates**. You will learn more about classification of animals in Chapter 4.

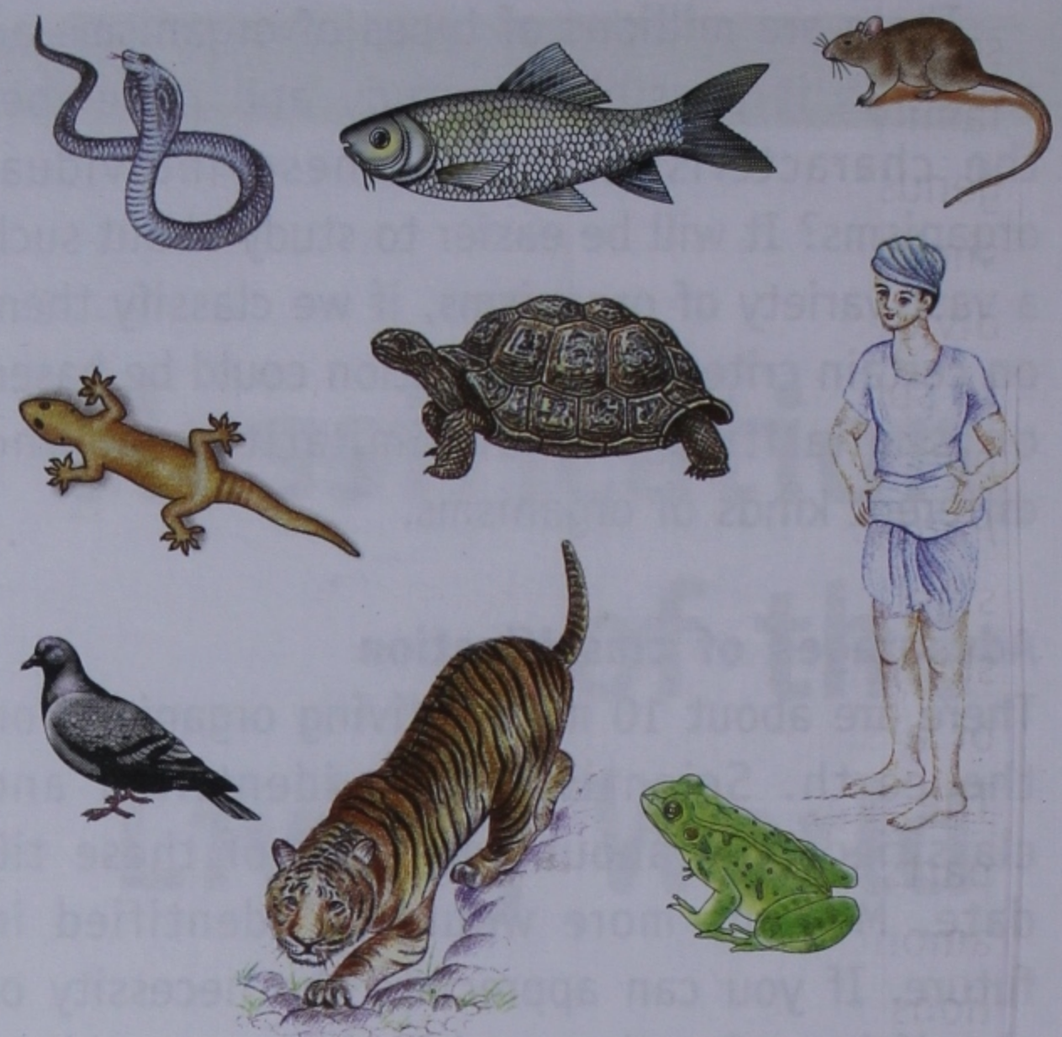

Fig. 2.2 Animals with a backbone are called vertebrates.

CHECK YOUR PROGRESS 1

Fill in the blanks.

1. Carolus Linnaeus is considered as the Father of _____
2. _____ helps in the study of living organisms in a systematic way.
3. _____ belong to the Kingdom Monera.
4. Green plants are called _____ as they make their own food.
5. Animals without a backbone are called _____

GENERAL PLAN OF CLASSIFICATION

Five-kingdom system of classification will be discussed in higher classes. We have seen that in the two-kingdom system, all the living organisms are divided into two **kingdoms**, that is, the plant kingdom and the animal kingdom. A kingdom is divided into **divisions** or **phyla** (singular: phylum). A division is divided further into **classes**. After class comes the **order**. Under order comes **family**. Organisms belonging to the

same family are very similar in structure. Every family is divided into many **genera** (singular: genus). The members of a genus are much more similar than those of a family. Each genus is divided into **species**. For example, tiger belongs to species *tigris* and lion belongs to species *leo* but both of them belong to the same genus *Panthera*. Members of a species are highly similar in various traits (except in some like the skin colour, size, height and so on). Members of a species resemble each other very closely. The members of a species have similar body parts, live in similar habitats and reproduce among themselves. The entire population of lions has certain specific characters. Each kind of animal roughly corresponds to a species only.

So we conclude that organisms having same characters constitute a **species**. All closely-related species are grouped into a **genus**. Groups of similar genera are grouped together into a **family**. Similar families are grouped together into **orders**. Similar orders are grouped into **classes**, similar classes into **phyla**, and similar phyla constitute a **kingdom**.

NAMING LIVING ORGANISMS

There are about millions of species of animals and plants in the world. They have different common names in different languages. In India itself a variety of languages are spoken in different parts of the country. Mango is called *Aam* in Hindi, *Mavu* in Marathi, *Amba* in Oriya and *Mamidi* in Tamil. Common names can create confusion and cannot be used for scientific studies all over the world.

Did you know?

A kingdom is the broadest unit of classification whereas species is the smallest unit of classification.

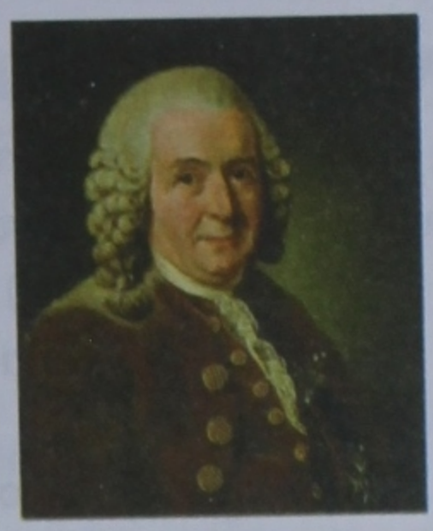

Fig. 2.3 Carolus Linnaeus

To avoid this confusion, a system of naming living organisms was given by Carolus Linnaeus. Carolus Linnaeus (1707–1778), also known as Carl Linnaeus is considered as the Father of taxonomy or the classification of living beings.

According to this system (called binomial nomenclature), each organism is given a two part Latin name. The first part of the name is the name of the **genus** and is called the **generic name**. The second part of the name refers to the **species** and is called the **specific name**. The first letter of the generic name is always written in capitals but the first letter of the specific name is written in small. While printing the scientific name of an organism, it is italicized, and when written it is underlined. Scientific names of a few plants and animals are given in Table 2.1.

Table. 2.1 Scientific names of some plants and animals

ENGLISH NAME	SCIENTIFIC NAME
Banana	*Musa paradisica*
Mango	*Mangifera indica*
Lion	*Panthera leo*
Indian bullfrog	*Hoplobatrachus tigerinus*
Tiger	*Panthera tigris*
Human	*Homo sapiens*
Dog	*Canis familiaris*
Melon	*Cucumis melo*
Cucumber	*Cucumis sativus*

Now you know

- Grouping of organisms according to certain specific common characteristics is called classification.
- Classification helps in (i) studying living organisms in a systematic way; (ii) identifying and grouping organisms; and (iii) establishing the evolutionary linkages between organisms.
- All living organisms are divided into five kingdoms—Monera, Protista, Fungi, Plantae and Animalae or Animalia.
- Kingdom is the largest unit of classification, followed by phylum. These are further divided into class, order, family, genus and species.
- Species is the smallest unit of classification. A species is a group of individuals which resemble each other very closely, have similar types of body parts and can reproduce among themselves.
- Carolus Linnaeus is considered as the Father of taxonomy or classification of living beings.
- In the binomial system of naming organisms, each organism is given a two part Latin name. The first part is the genus and the second part is the species name.

Keywords

PLANTAE	the kingdom of plants
ANIMALAE	the kingdom of animals
BINOMIAL NOMENCLATURE	two-part Latin name
SPECIES	organisms having same characteristics

Exercises

A. Tick the most appropriate answer.

1. Living organisms belonging to Kingdom Monera have
   a. a single cell without nucleus. **b.** a single cell with nucleus.
   c. many cells without nucleus. **d.** many cells with nucleus.
2. All organisms belonging to Kingdom Fungi are
   a. autotrophic. **b.** heterotrophic. **c.** saprophytic. **d.** parasitic.
3. The largest unit of classification is
   a. phylum. **b.** kingdom. **c.** species. **d.** genus.
4. The smallest unit of classification is
   a. phylum. **b.** family. **c.** species. **d.** genus.
5. The binomial system of naming organisms was given by
   a. Carolus Linnaeus. **b.** Charles Darwin. **c.** Gregor Mendel. **d.** Carl Moyer.
6. Which of these represents the correct order of classification?
   a. Phylum → Class → Order → Family → Genus
   b. Phylum → Order → Class → Family → Genus
   c. Phylum → Order → Class → Genus → Family
   d. Phylum → Class → Family → Order → Genus

B. Fill in the blanks.

1. The living world is divided into _____ kingdoms.

2. The Kingdom _____ consists of unicellular organisms other than bacteria.
3. The organisms belonging to Kingdom _____ have chlorophyll.
4. Groups of similar genera are grouped together into a _____
5. Closely-related species resembling each other are grouped into a _____
6. Similar families are grouped together into _____
7. In binomial system, _____ forms the first part while _____ forms the second part of the name.

C. Write true or false for each statement. Rewrite the false statements correctly.

1. Protists are single-celled organisms without a nucleus.
2. Organisms belonging to Kingdom Fungi do not have chlorophyll.
3. Modern scientists have divided the living world into five kingdoms.
4. Species is the largest unit of classification.
5. Members of same family can breed among themselves.

D. Differentiate between

1. Kingdom and species
2. Species and genus
3. Genus and family

E. Find the odd one out. Give reasons.

1. bacteria, *Paramecium*, *Amoeba*, *Euglena*
2. yeast, mushroom, fern, bread mould

F. Write short answers.

1. Define classification.
2. What are protozoa?
3. Write one characteristic feature of Kingdom Plantae.
4. What is a species?

G. Answer in detail.

1. What are the advantages of classification?
2. List the names of the five kingdoms to which all living beings belong. Give one important characteristic of each kingdom.
3. How are organisms of Kingdom Monera different from those belonging to Kingdom Protista?
4. Write one characteristic feature of Kingdom Fungi. Why are they not a part of Kingdom Plantae?
5. What is the advantage of giving scientific names to all living beings?
6. What constitutes a genus?
7. What is a binomial nomenclature? Explain.

Fun to do

Collect pictures of some common plants and animals found in your area. Find out their common names in various regions of our country and the world. Compare the common names with the scientific names of these plants and animals. Is there any similarity between the two?