



Fig 4.1 All animals

Inba and Valli are going to their uncle's house in their village. Their uncle takes them around his farm. They see number of animals neatly kept in coops and paddocks. They asked their uncle how he had arranged them. Uncle replied that he classified them according to their kind, the food they eat etc. There are many varieties of living things in the world. Are they also arranged in a similar way?.

Yes, we call the arrangement as classification.



There is great diversity among living organisms found on the planet earth. They differ in their size, shape, habitat, mode of nutrition, and other ways of life. The biodiversity of the earth is enormous.

We call such a variety among living organisms as biodiversity. Even though there is such a variety and diversity among them, the living organisms show a lot of similarities and common features so that they can be arranged into many groups. In order to understand and study them systematically, these living organisms, mainly the plants and animals are grouped under different categories.

The system of sorting living organisms into various groups based on similarities and dissimilarities is called classification.

4.1. NEED FOR CLASSIFICATION

It is not possible for anyone to study all the organisms. But if they are grouped in some convenient way, the study would become easier. Classification allows us to understand diversity better.

Necessity for classification

1. Classification helps us to identify the living organisms easily.
2. It helps us to learn about different kinds of plants and animals, their features, similarities and differences.
3. It enables us to understand how complex organisms evolve from simple ones.

ACTIVITY 4.1

Shall we name some common vegetables and find out if they have any other name...

Common name	Other name
1. Brinjal	Egg plant
2.	
3.	

4.2. THE FIVE KINGDOM CLASSIFICATION



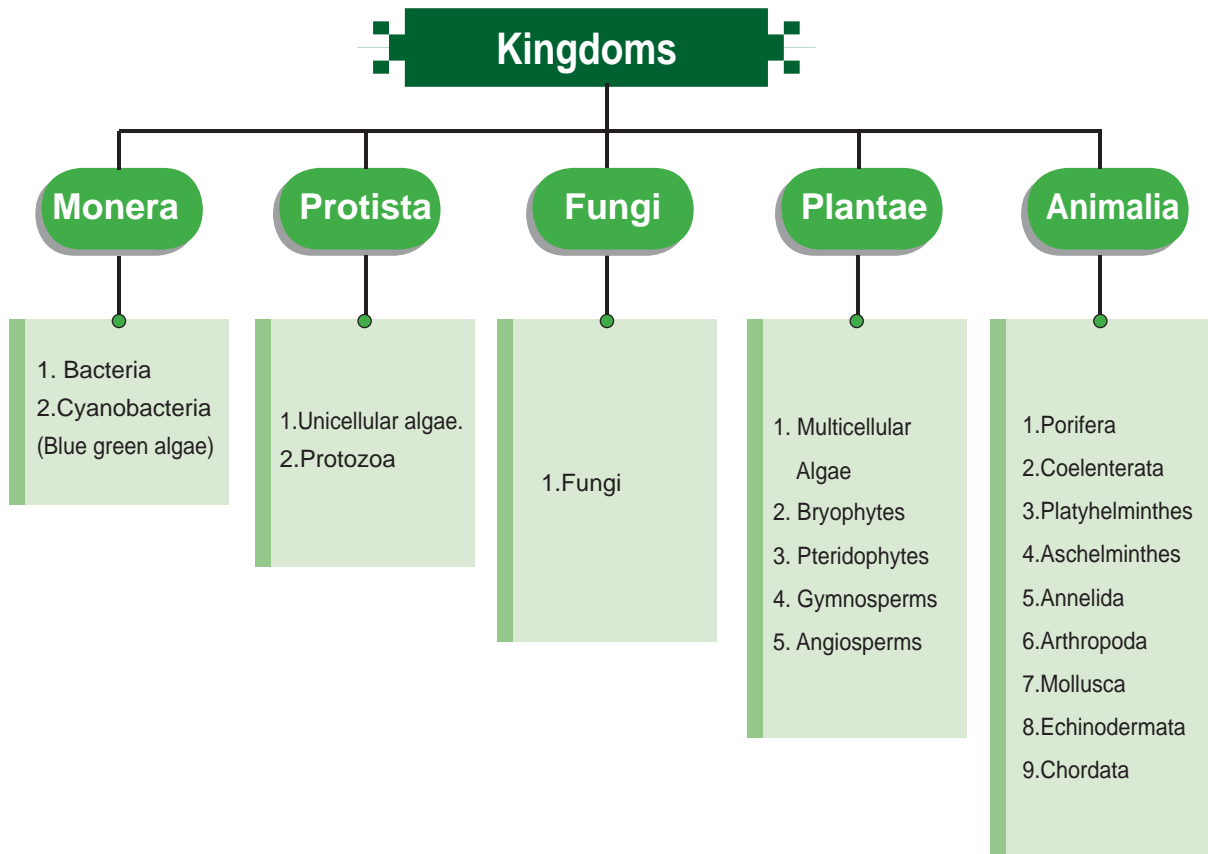
Robert Harding Whittaker (1920–1980)

R.H.Whittaker (1920–1980) was an American plant ecologist. He was the first to propose the five-kingdom classification of the world's biota, based on their evolutionary relationships. In 1969 he classified the organisms into five kingdoms. This classification has been accepted by all scientists.

MORE TO KNOW

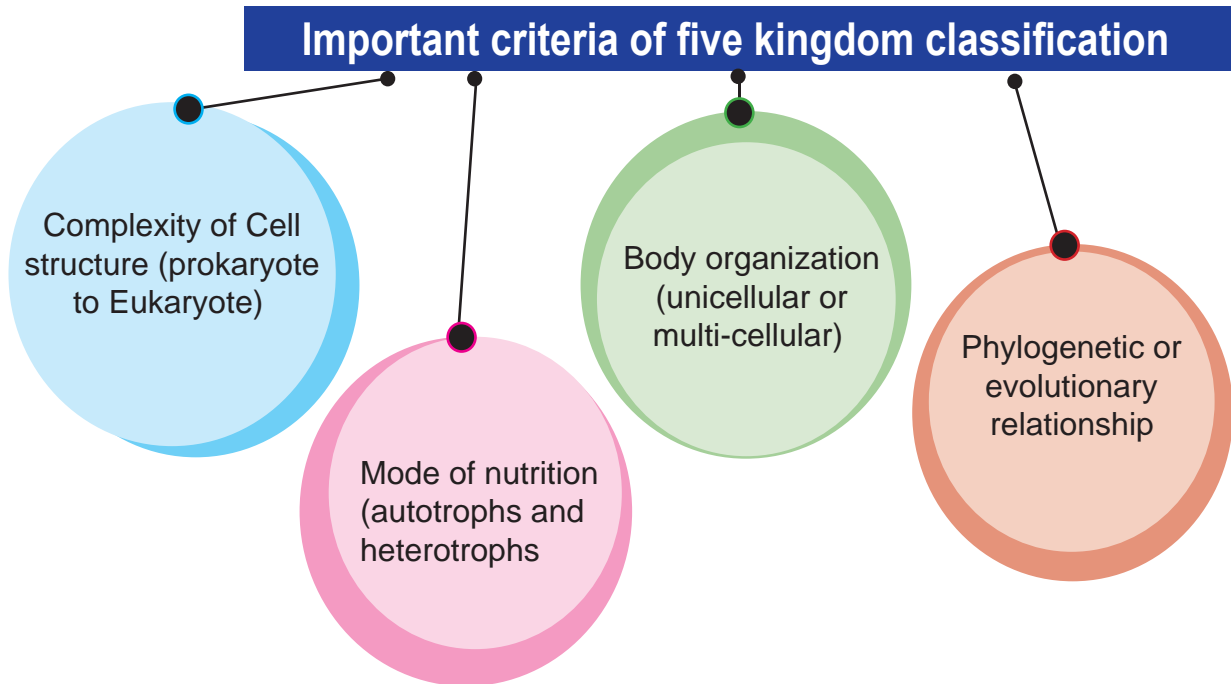
About **9,000** species are identified under Kingdom Monera. The number of species in Kingdom Protista is about **59,950**. The number of species under Fungi is about **100,000**. The number of species identified under the Kingdom Plantae is about **289,640**. The total number of species identified under Animalia is about **1,170,000**.

The Five Kingdoms are Monera, Protista, Fungi, Plantae and Animalia.



SCIENCE

This classification takes into account the following important criteria.





4.2.1. KINGDOM OF MONERA

General features

- The kingdom Monera comprises all bacteria and the cyanobacteria.
- They are Primitive unicellular. (single celled organisms).
- They do not have a true nucleus (prokaryotic).
- Their mode of nutrition is autotrophic or heterotrophic.
- They cause diseases like diphtheria, pneumonia, tuberculosis, leprosy etc.
- They are also used in manufacture of antibiotics to cure many diseases.

ACTIVITY 4.2

Children, shall we find out what converts milk into curd, ferments idli batter, causes disease like cholera, and produces medicines

Yes. The organism is bacteria.

Discovery of Bacteria

In 1675 Anton Von Leewvenhoek, a Dutch scientist, discovered bacteria. He called the bacteria as 'animalcules'. Anton Von Leewvenhoek is called as the father of bacteriology. Bacteria are considered as the first formed organisms in the world.

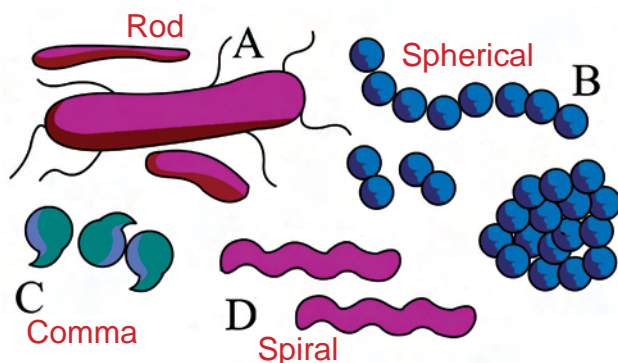


Fig 4.2 Bacteria shapes

Shape of Bacteria

The shape of bacteria varies in different species. The important shapes are

- (A) rod
- (B) spherical
- (C) comma
- (D) spiral.

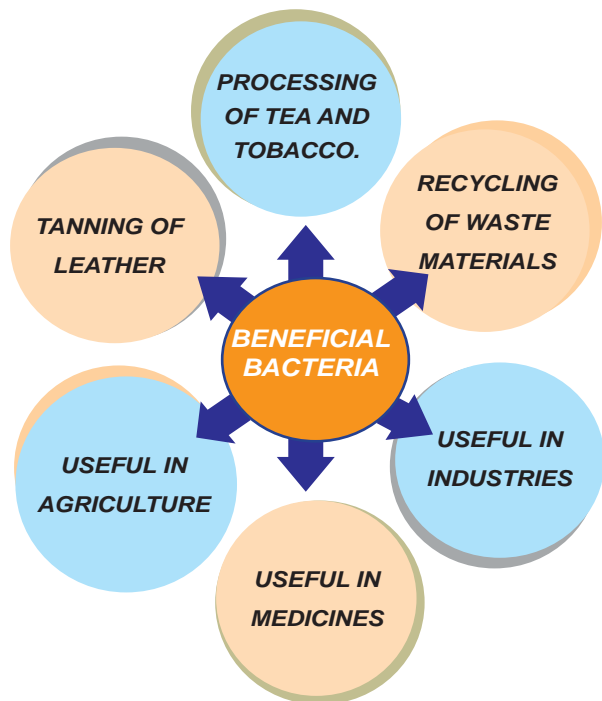
ACTIVITY 4.3

Children, shall we keep a drop of curd on clean glass slide and observe under microscope. We can see rod shaped Lacto bacillus.

MORE TO KNOW

The average human gut contains about 1kg of bacteria. Their presence is essential for normal health.

Beneficial bacteria



Harmful Bacteria

Bacteria cause many diseases in plants and human beings.

Diseases in Plant

- Canker disease (Lemon)
- Ring rot disease (Potato)
- Fire blight disease (Apple)
- Wilt disease (Tomato)

DISEASES IN MAN

Tuberculosis

Cholera

Leprosy

Plague

SCIENCE

4.2.2. KINGDOM OF PROTISTA

General features

- The kingdom Protista includes unicellular eukaryotes.
- Animals and plants of Protista live in sea as well as in fresh water. Some are parasites. Though they are single celled, they have the capacity of performing all the body activities.
- They have nucleus enclosed by a nuclear membrane (eukaryotic).
- Some of them possess chloroplast and make their food by photosynthesis. e.g. Euglena
- There are two main groups of protista.

1. Plant like protista called

photosynthetic and are commonly known as Micro-algae. They can be seen only under microscope. They occur as single cells or filaments or colonies. eg. Chlamydomonas, Volvox etc. Algae are autotrophs.

2. Animal like Protista are often called Protozoans. Protozoans include Amoeba and Paramecium like animals. The Paramecium, which consists of cilia, belongs to class Ciliata. Amoeba which consists of pseudopodia belongs to class Sarcodina.

- All unicellular plants are collectively called phytoplanktons and unicellular animals as zooplanktons.

Euglena, a protozoan possesses chloroplast and make their food by photosynthesis. It has two modes of nutrition. In the presence of sunlight it is autotrophic and in the absence of sunlight it is heterotrophic. This mode of nutrition is known as myxotrophic and hence they form a border line between plants and animals.

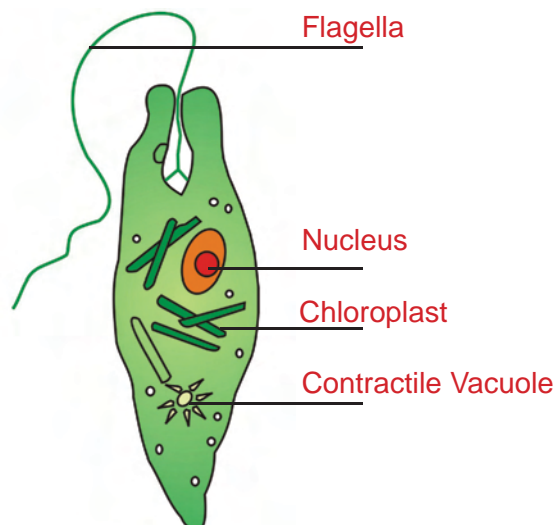


Fig 4.3 Euglena



4.2.3. KINGDOM OF FUNGI

General features

- This kingdom Fungi includes Yeast, Moulds, Mushrooms (Kaalaan), Toadstools, Puffballs and Penicillium
- Fungi are eukaryotic, and mostly multicellular. The body is made up of filamentous hyphae.
- Their mode of nutrition is heterotrophic (obtain their nutrients from other organisms) since they lack the green pigment chlorophyll.
- They have cell walls, made of a tough complex sugar called chitin.
- Fungi act either as decomposers (decay-causing organisms) or as parasites (live in other organisms) in nature.
- Mould fungi grows on stale bread, cheese, fruit or other food.



Fig 4.4. Mushroom (Kaalaan)

Penicillium is a fungus. It lacks chlorophyll. It lives as saprophyte. The body consists of filamentous structures. The antibiotic penicillin is extracted from it. The

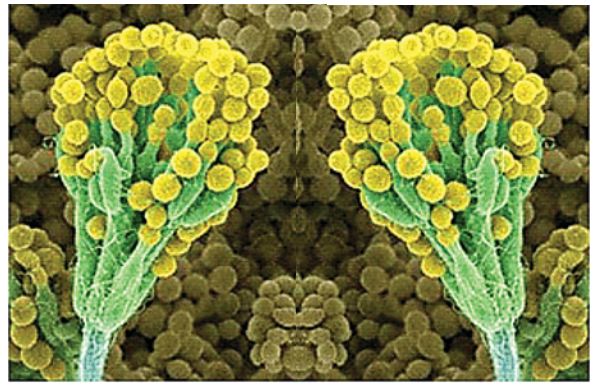


Fig 4.5 Penicillium

Penicillin is also known as “**the queen of drugs**”.

Yeast is an unicellular organism and oval in shape. It is a saprophytic fungus. It is useful for the preparation of alcohol by fermentation process. Conversion of sugar solution into alcohol with the release of carbon dioxide by yeast is called fermentation. It is also used in bakery.

ACTIVITY 4.4

Let us mix the yeast powder with the sugar solution. After a few days you can see the formation of whitish layer on the surface of the extract. When it is observed under the microscope, yeasts can be seen.

MORE TO KNOW



Children, some fungi are extremely poisonous. Never touch or eat wild fungi without asking an adult first.

4.2.4. KINGDOM OF PLANTAE



Moss

Ferns (perani)

Pinus

Sunflower
(Suryakanthi)

Fig 4.6.

General features

- ☛ It includes all multicellular plants of land and water.
- ☛ Kingdom Plantae includes.
 1. Algae (Multicellular)
eg. Laminaria, Spirogyra, Chara
 2. Bryophytes
eg. Riccia, Moss
 3. Pteridophytes
eg. Ferns
 4. Gymnosperms
eg. Cycas, Pinus
 5. Angiosperms
eg. Grass, Coconut Mango, Neem (veppa maram)
- ☛ Plantae are multicellular eukaryotes.

- ☛ The plant cells have an outside cell wall that contain cellulose.
- ☛ They show various modes of nutrition. Most of them are autotrophs since they have chlorophyll.
- ☛ Some plants are heterotrophs.
eg. Cuscuta is a parasite.
- ☛ Nepenthes and Drosera are insectivorous plants.

MORE TO KNOW

Kingdom Plantae includes

Bryophyta - 24,000 species

Pteridophyta - 10,000 species

Gymnosperms - 640 species

Angiosperms - 255,000 species



4.2.5 KINGDOM OF ANIMALIA

General features

- ☛ This kingdom includes all multicellular eukaryotic animals.
- ☛ All animals show heterotrophic mode of nutrition. They directly or indirectly depend on plants for their basic requirements particularly the food.
- ☛ They form the consumers of an ecosystem.
- ☛ The cells have plasma membrane.
- ☛ They have contractibility of the muscle cells.
- ☛ They have well-developed control and coordination mechanisms.
- ☛ They can transmit impulses due to the presence of nerve cells
- ☛ Some groups of animals are parasites e.g. tapeworms and roundworms.
- ☛ Most members of the animal kingdom can move from place to place. However, some animals, such as adult sponges and corals are permanently attached to a surface.
- ☛ Kingdom Animalia includes the following phyla.

S.N	PHYLUM	CHARACTERS	EXAMPLES
1.	Porifera	Pore bearers	eg. Sponges
2.	Coelenterata	Common body cavity and digestive cavity	eg. Hydra, Jelly fish
3.	Platyhelminthes	Flatworms	eg. Tape worm (Taenia)
4.	Aschelminthes	Thread-like worms	eg. Round worm (Ascaris)
5.	Annelida	Body is segmented	eg. Nereis, Earthworm
6.	Arthropoda (insect group)	Have jointed legs	eg. Centepede, Cockroach, Scorpion
7.	Mollusca	Soft bodied with shells	eg. Snail, Octopus, Sepia.
8.	Echinodermata	Spiny skinned	eg. Star fish, Sea-cucumber.
9.	Chordata	Have backbone	eg. Fish, Frog, Man.

MORE TO KNOW

Tamil Nadu ranks first among all states in the country to have endemic animals.

4.3. BINOMIAL NOMENCLATURE

History of classification

- ☛ Aristotle categorized organisms into plants and animals.
- ☛ Hippocrates, the Father of Medicine, listed organisms with medicinal value.
- ☛ Aristotle and Theophrastus classified the plants and animals on the basis of their form and habitat.
- ☛ John Ray introduced the term species.
- ☛ Carolus Linnaeus organized a simple naming system for plants. So, he is known as Father of Taxonomy. He developed the Binomial System of nomenclature, which is the current scientific system of naming the species.



Carolus Linnaeus

- ☛ In order to avoid this confusion, a scientific system of naming organism which is universally followed was evolved. So Linnaeus devised a system of naming animals and plants with two names. This is called binomial nomenclature.

Basic Principles of Binomial Nomenclature

1. Scientific names must be either Latin or Latinized.
2. The name of the genus begins with a capital letter.
3. The name of the species begins with a small letter.
4. When printed, the scientific name is given in italics.
5. When written by hand, name should be underlined.

Necessity for Binomial Nomenclature

- ☛ In the earlier period, organisms were referred by their common names. Since common names or vernacular names were in the local languages, they differed at different places resulting in total confusion. They were not universally applicable.

ACTIVITY 4.5

Shall we observe some plants and animals and find their binomials.

ZOOLOGICAL NAME

Cockroach *Periplaneta americana*
(Karapan Poochi)

Housefly *Musca domestica*
(Ee)

Frog *Rana hexadactyla*
(Thavalai)

Pigeon *Columba livia*
(Pura)

Man *Homo sapiens*
(Manithan)

BOTANICAL NAME

Hibiscus *Hibiscus rosasinensis*
(Chemparuthi)

Tomato *Lycopersicon esculentum*
(Thakkali)

Potato *Solanum tuberosum*
(Urulai)

Mango *Mangifera indica*
(Maankai)

Rice *Oryza sativa*
(Nel)



EVALUATION

1. Pick out the correct answer:-

- a) The five kingdom system of classification was proposed by _____
(R.H.Whittaker / Carl Linnaeus)
- b) Kingdom Monera includes _____ organisms.
(multicellular / unicellular)
- c) The queen of drugs is _____
(yeast / penicillin)
- d) Plant cells have it. Animal cells do not have it. What is it? _____
(Nucleus / cell wall)
- e) *Oryza sativa* is a binomial of _____
(rice / wheat)

2. Place the following animals in their phylum.

tapeworm, sponges, hydra, ascaris, scorpion, human, snail, starfish, earth-worm.

Tape worm - Platyhelminthes

- a) _____ - _____ e) _____ - _____
- b) _____ - _____ f) _____ - _____
- c) _____ - _____ g) _____ - _____
- d) _____ - _____ h) _____ - _____

3. Some beneficial and harmful effects of bacteria are given below. Write (B) for BENEFICIAL and (H) for HARMFUL.

- a) Leprosy - Beneficial / Harmful
- b) Ring rot of potato - Beneficial / Harmful
- c) Recycling of waste - Beneficial / Harmful
- d) Tuberculosis in man - Beneficial / Harmful
- e) Tanning of leather - Beneficial / Harmful
- f) Wilt of tomato - Beneficial / Harmful
- g) Processing of tea - Beneficial / Harmful

4. Draw different shapes of bacteria.
5. Euglena possess chloroplast. In the absence of sunlight it is heterotrophic. In which kingdom will you place it? Animal or plant?
6. Find out the names of the following in as many languages as you can with help of your teachers and parents.

1. Lion 2. Mango 3. Dog 4. Potato 5. Hibiscus 6. Groundnut



Sl.No	English Name	Tamil Name	Binomial Name
1.	Lion	Singam	Panthera leo
2.	Mango		
3.	Dog		
4.	Potato		
5.	Hibiscus		
6.	Groundnut		

FURTHER REFERENCE

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