KINGDOM SYSTEM OF CLASSIFICATION OF LIVING ORGANISM

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THE CONCEPT

- <u>Carl Linnaeus</u> introduced the rank-based system of <u>nomenclature</u> into biology in 1735, the highest rank was given the name "kingdom"
- In 1990, the rank of <u>domain</u> was introduced above kingdom.
- In biology, Kingdoms are the second highest taxonomic groups of living organisms

The hierarchy of <u>biological classification</u>'s eight major <u>taxonomic ranks</u>.



Historical development

- Aristotle (384-322 BC) Scientific classification of living beings was first done by him. He used morphological characters as the basis of classification. He classified the living beings into plants and animals. He further classified the plant into trees, shrubs and herbs. He further classified the animals on the basis of presence of absence of red blood
- Linnaeus (1735) for the first time established two kingdoms of organisms in his classification system: Plantae (the plant kingdom) and Animalia (the animal kingdom).
- Since then, scientists have repeatedly revised the Linnaean system. They have added several new kingdoms and other taxa. These changes were necessary as scientists learned more about life on Earth

Linnaeus (1735) created his taxonomy

Two kingdom system

Kingdom Plantae

 single-celled organisms, some of which make their own food. They were classified as plants.

Kingdom Animalia

 single-celled organisms that can move on their own. They were classified as **animals**, which are organisms that have independent movement.



Three kingdom system: The German biologist Earnst Haeckel (1866)

Kingdom Protista	Kingdom Plantae	Kingdom Animalia
Single-celled organisms	 Multicelled-celled organisms, some of 	Multicelled-celled organisms that
Didn't coom to	which make their own food.	have independent movement.
Didn't seem to fit in either the	■Included all	∎Included all
plant or the animal kingdom	chlorophyll	vertebrates,
	organisms	human
Included both		
bacteria and		
protozoa		

Diversity in Protistae

When you compare the three cells, i.e the bacteria, the protozoa and the multicelled plants and the animal, what differences do you see?

The major difference is that, unlike the protozoan and animal cells:

The bacterial cell does not contain a nucleus surrounded by a nuclear membrane. Instead, its DNA is found in the cytoplasm of the cell.

 Organelles in the bacterial cell also lack surrounding membranes.



In the 1920s, microbiologist Edouard Chatton gave the term Prokaryote and Eukaryote Cells

Prokaryote

- An organism whose cells lack nuclei and the
- Organelles lack membrane.
- Unicellular organisms.

Eukaryote

- An organism whose cells have nuclei.
- Membrane bound cell organelles.
- Unicellular and multicellular both.



Over the next several decades, scientists learned more about the tremendous number and diversity of bacteria. They started to see a need for a separate bacteria kingdom Four Kingdom system: Proposed by Herbert Copeland (1956)

Kingdom Monera	Kingdom Protista	Kingdom Plantae	KingdomAnimalia
 Elevating the Protist classes of bacteria (Monera) and blue-green algae. 	EukaryotesUnicellular, organisms	 Eukryotic chlorophyll containing organisms 	Eukaryotic multicelled arthopods, vertebrates and human.
 Prokaryotes, Unicellular organisms 	 Slime moulds, Protozoans 	 Includes Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms 	

Five Kingdom System of Classification

R.H. Whittaker (1969), an American Taxonomist, classified all organisms into five kingdoms:

- 1. Monera
- 2. Protista
- 3. Fungi
- 4. Plantae
- 5. Animalia



Criteria used for classification by Whittaker

- 1. Complexity of body organization
- 2. The mode of nutrition
- 3. Life style (ecological role) and
- 4. Phylogenetic relationship.
- 5. Complexity of cell structure

Kingdom Monera

Bacteria occur everywhere and they are microscopic in nature.

They possess cell wall and are prokaryotic. The cell wall is formed of amino acids and polysaccharides.

- ➢ Bacteria can be heterotrophic and autotrophic.
- > The heterotrophic bacteria can be parasitic or saprophytic.
- The autotrophic bacteria can be chemosynthetic or photosynthetic

Bacteria can be classified into four types based on their shape:

Coccus (pl.: cocci)- These are spherical in shape. Bacillus (pl.: bacilli) – These are Rod-shaped, Vibrium (pl.: vibrio) – These Comma-shaped bacteria Spirillum (pl.: spirilla)- These are Spiral shaped bacteria

Monera has since been divided into Archaebacteria and Eubacteria



Kingdom Monera Bacteria, Cyanobacteria or Blue green algae

Kingdom Protista

Unicellular and eukaryotes. Have cilia or flagella for mobility. <u>Sexual reproduction</u> cell fusion and zygote formation. Categorized into subsequent groups:

Chrysophytes: The golden algae (desmids) and diatoms are fall under this group. They are found in marine and freshwater habitats.

Diano flagellates: They are usually photosynthetic and marine. The colour they appear is dependent on the key pigments in their cells; they appear red, blue, brown, green or yellow.

Euglenoids: Most of them live in freshwater habitation in motionless water. Cell wall is absent in them and instead there is a protein rich layer; called pellicle.

Slime Moulds: These are saprophytic. They body moves along putrefying leaves and twigs and nourishes itself on organic material. Under favorable surroundings, they form an accumulation called plasmodium. **Protozoans**: They are heterotrophs and survive either as parasites or predators



Kingdom Protista

Protozoans, Phytoplanktons and

Zooplanktons

Kingdom Fungi

➢The fungi are filamentous; excluding yeast (single celled).

Their thallus comprises of slender, long thread-like constructions; called hyphae

➤The cell wall of fungi is composed of polysaccharides and chitin.

➢ Most of the fungi are saprophytes and are heterotrophic.



Kingdom Fungi

Unicelluler Yeast, Molds and Mushrooms

Kingdom Plantae

> Eukaryotes which have chloroplast.

Most of them are autotrophic in nature, but some are heterotrophic as well.

> The Cell wall mainly comprises of cellulose.

➢ Plants have two distinctive phases in their lifecycle.

These phases alternate with each other. The diploid saprophytic and the haploid gametophytic phase.



Kingdom Plantae

Algae, Bryaophytes, Ferns, Gymnosperms Muticelled Eukaryotes

Kingdom Animalaia

All multicellular eukaryotes which are heterotrophs and lack cell wall.

>Their mode of nutrition is holozoic.

Sexual reproduction is by copulation of male and female which is followed by embryological development.



Kingdom Animalia

Sponges, Invertebrates, Vertebrates and Multicelled eukaryotes

Sl.No.	Kingdom I	Kingdom II	Kingdom III	Kingdom IV	Kingdom V
Characters	Monera	Protista	Fungi	Plantae	Animalia
Complexity of cell structure	Prokaryote	Eukaryote	Eukaryote	Eukaryote	Eukaryote
Cplexity of cell organisation	Unicellular	Unicellular	Unicellular And Multicelled	Multicelled	Multicelled
Mode of nutrition	Absorptive /Photosynt hetic	Absorptive /Photosynt hetic	Heterotrop hic, Saprobic	Auto- trophic	Hetero- trophic
Movement	By flagella	By flagella Celia	Non-motile	Non-motile	Highly motile
Mode of Reproduction	Asexual	Both asexual, sexual	Both asexual, sexual	Both asexual, sexual	Both asexual, sexual