

Chapter -2

1. Introduction to Classification

Classification is the systematic grouping of living organisms based on their similarities and differences. It is essential for:

- Understanding the diversity of life
- Identifying and naming organisms (taxonomy)
- Studying evolutionary relationships

- Classification was first attempted by **Aristotle**, and later developed more scientific ally by **Carolus Linnaeus**.
- The modern system of classification uses **binomial nomenclature**, where each organism is named using **Genus + species**.

Interesting Fact: The binomial system is universally accepted and written in Latin, ensuring a common scientific language across regions.

2. Five Kingdom System of Classification

Proposed by **R.H. Whittaker** in 1969, this system classifies all organisms into five distinct kingdoms based on cellular organization, nutrition, and reproduction.

Kingdom	Cell Type	Cell Number	Nutrition	Examples
Monera	Prokaryotic	Unicellular	Autotroph or Heterotroph	Bacteria, Cyanobacteria
Protista	Eukaryotic	Mostly unicellular	Both types	Amoeba, Paramecium
Fungi	Eukaryotic	Multicellular	Heterotroph (saprophytic)	Yeast, Mushroom
Plantae	Eukaryotic	Multicellular	Autotroph	Ferns, Algae, Flowering plants
Animalia	Eukaryotic	Multicellular	Heterotroph	Humans, Fish, Insects

Mnemonic for recall: My Papa Found Pizza Amazing!

3. Kingdom Plantae

Composed of **multicellular, eukaryotic, autotrophic** organisms containing chlorophyll. This kingdom is classified into several divisions:

Division: Algae

- Aquatic, simple non-vascular plants
- Do not possess true roots, stems, or leaves
- Can be unicellular (e.g., Chlamydomonas) or multicellular (e.g., Spirogyra)

Key Features of Algae

- Contain chlorophyll → capable of photosynthesis
- Reproduce through vegetative and sexual methods
- Typically inhabit freshwater and marine environments

Importance of Algae

- Major producers of oxygen in aquatic ecosystems
- Form the base of many aquatic food chains
- Utilized in the production of agar, iodine, and biofuels

Interesting Fact: Algae are responsible for producing **over 70% of Earth's oxygen**, more than all forests combined.

Division: Bryophyta

- Non-vascular plants (lack xylem and phloem)
- Typically grow in moist environments like damp soil, rocks, and shaded walls

Key Features of Bryophyta

- Lack true roots, stems, and leaves
- Possess rhizoids for attachment and limited absorption
- Reproduce through spores

Why Are Bryophyta Called Amphibian Plants?

= Because they require water for fertilization but live on land.

Interesting Fact: Bryophytes are often the first plants to colonize barren rocks in ecological succession.

What is Alternation of Generation?

A life cycle involving two distinct stages:

- **Gametophyte (haploid)** – produces gametes (sex cells)
- **Sporophyte (diploid)** – produces spores

These two stages alternate in many plant groups, especially **bryophytes** and **ferns**, ensuring both sexual and asexual reproduction.

Division: Tracheophyta (Vascular Plants)

- Contain **xylem and phloem** for water and nutrient transport
- Have well-developed roots, stems, and leaves

Sub-division: Pteridophyta

- Non-flowering and seedless
- Reproduce by spores
- Examples: **Ferns, Marsilea**

Sub-division: Gymnospermae

- Produce **naked seeds** (not enclosed in fruit)
- Mostly evergreen and woody
- Examples: **Pine, Cycas**

Sub-division: Angiospermae

- Produce **flowers** and **fruits containing seeds**
- Most diverse group of plants

Comparison: Monocot vs Dicot

Feature	Monocot	Dicot
Cotyledons	One	Two
Leaf venation	Parallel	Reticulate (net-like)
Root type	Fibrous	Tap root
Examples	Wheat, Maize, Rice	Mustard, Pea, Sunflower

4. Kingdom Animalia

- Multicellular, **eukaryotic, heterotrophic** organisms
- Do not have a cell wall
- Most exhibit movement and are highly specialized

Key Features

- Primarily reproduce sexually
- Have well-organized tissues and organ systems
- Show high mobility and sensory coordination

Division into 9 Animal Phyla

Phylum	Key Features	Example
Porifera	Pores all over body, no true organs	Sponge
Cnidaria	Stinging cells, radial symmetry	Hydra, Jellyfish
Platyhelminthes	Flatworms, bilateral symmetry	Tapeworm
Nematoda	Roundworms, cylindrical body	Ascaris
Annelida	Segmented body	Earthworm
Arthropoda	Jointed legs, exoskeleton	Insects, Spider
Mollusca	Soft body, often with shell	Snail, Octopus
Echinodermata	Spiny skin, radial symmetry (adults)	Starfish, Sea Urchin
Chordata	Notochord present during embryonic stage	Humans, Fish

Interesting Fact: Arthropoda is the largest phylum, accounting for over 80% of all known species.

Subphylum Vertebrata – Five Main Classes

Class	Key Features	Example
Pisces	Aquatic, gills, fins, cold-blooded	Fish
Amphibia	Moist skin, live both in water and on land	Frog
Reptilia	Dry scaly skin, lay eggs on land, cold-blooded	Snake, Lizard
Aves	Feathers, beak, lay eggs, warm-blooded	Crow, Pigeon
Mammalia	Hair or fur, give birth, have mammary glands, warm-blooded	Cow, Human

Relation Between Classification and Evolution

- Classification helps understand **evolutionary relationships** among organisms
- Organisms with similar features likely share a **common ancestor**
- Enables scientists to **trace lineage and species divergence**

Example: Both **monkeys** and **humans** belong to the class **Mammalia**, indicating a close evolutionary link.

Interesting Facts about the Chapter

- An estimated **8.7 million species** exist on Earth
- **Arthropoda** is the largest animal phylum
- **Whales and dolphins**, though aquatic, are mammals—not fish
- **Algae** produce nearly **70% of the oxygen** in Earth's atmosphere

Quick Revision Summary

- Classification organizes the diversity of life
- **Five Kingdoms:** Monera, Protista, Fungi, Plantae, Animalia
- **Plantae Divisions:** Algae, Bryophyta, Pteridophyta, Gymnospermae, Angiospermae
- **Angiosperms:** Classified into Monocots and Dicots
- **Animalia:** 9 Phyla + Vertebrates with 5 classes
- Classification is tied closely to **evolutionary theory**

Common Mistakes to Avoid

- Mixing up monocot and dicot characteristics
- Forgetting key examples of each phylum or class
- Assuming all aquatic animals are fish (e.g., dolphins are mammals)
- Overlooking **alternation of generation** in plant life cycles