



## Chapter 1 : Introduction to the Animal Kingdom

- 1.1. Fundamentals of Classification
- 1.2. Zoological Nomenclature
- 1.3. Evolution and Phylogeny
- 1.4. Numerical Importance of the Animal Kingdom

### 1.1. Fundamentals of Classification:

- **Classification** (Biological classification, or taxonomy) In biology, classification is the process of arranging organisms, both living and extinct, into groups based on similar characteristics. The science of naming and classifying organisms is called taxonomy. Taxonomists classify organisms into a structural hierarchy a multi-level system in which each group is nested, or contained, within a larger group. Each group in biological classification—that is, each level in the hierarchy—is called a taxon (plural: taxa).The most basic taxon is the species".

#### - Historical overview of the Classification:

- In Linneaus's time, scientists characterized organisms as either plants or animals. Linnaeus followed this general rule, dividing all living things into two kingdoms **the Kingdom Plantae** (plants) **and the Kingdom Animalia** (animals)). Other scientists later modified his system, especially as advances in microscopy revealed key differences among organisms at the cellular level.

- Over time, the Linnean classification system was expanded, first to three kingdoms and then to four. By the 1960s, scientists had organized living things into **five kingdoms** the Monera (bacteria), Protista (protozoa and algae), Fungi (mushrooms, yeasts, and molds), Plantae (plants), and Animalia (animals). The five-kingdom system was widely accepted and used for many years.

- Later, Willi Hennig (1913-1976) expanded on the concept of phylogeny by developing **cladistics**, a method of classification that organizes species based on their shared evolutionary characteristics. Based on the Ernst Haeckel (1834-1919) idea, who introduced the term **phylogeny** in 1866 to describe the evolutionary history and development of groups of organisms, or **phyla**. His work was pivotal in emphasizing **the evolutionary relationships** between species, The term **phylogeny** comes from the Greek words "phylo" (tribe, group) and "genesis" (origin), reflecting the origin and branching of species through evolutionary processes.

- The American microbiologist Carl Woese used **ribosomal RNA** (rRNA) to propose a new classification of living organisms, including animals, into three domains: **Bacteria, Archaea, and Eukaryotes**.

#### -Taxonomic Ranks :

In the classical taxonomic classification system, organisms are categorized into a hierarchical structure. from the highest to the most specific are:

1. **Kingdom**: The broadest category that groups organisms based on fundamental characteristics (e.g., animals, plants, fungi, etc.).
2. **Phylum / Division** : Groups organisms within a kingdom based on major body plans or structural features.
3. **Class**: Subdivides phyla/divisions into groups of organisms with shared characteristics

4. **Order:** Organizes classes into smaller, related groups
5. **Family:** Groups orders into more specific related categories (e.g., Felidae for cats).
6. **Genus:** A more specific grouping within a family, identifying closely related species (e.g., *Panthera* for big cats like lions and tigers).
7. **Species:** The most specific level of classification, defining **individual organisms that can interbreed and produce fertile offspring** (e.g., *Panthera leo* for lions).

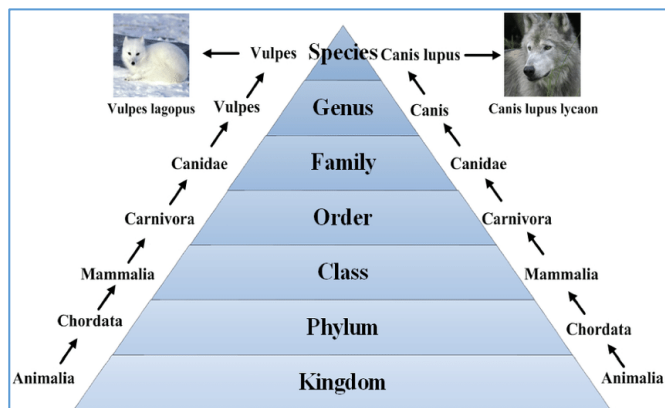
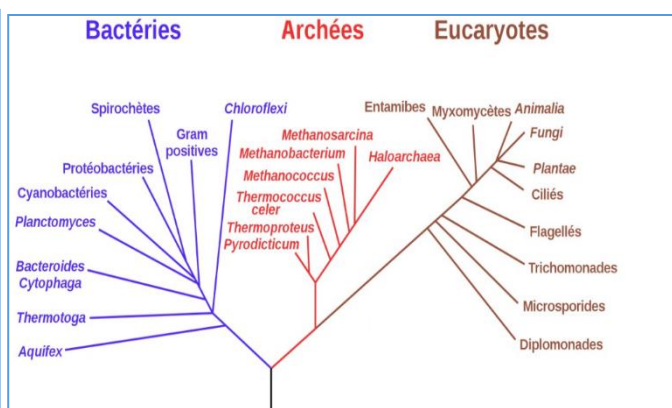


Fig: Taxonomy ranks



Carl Woese's classification of the living world

## 1.2. Binomial Nomenclature:

Binomial nomenclature is a system for naming species in biology that was developed by Carl Linnaeus. The fundamental principles of binomial nomenclature are as follows:

- **Binomial Name:** Each living species is designated by a scientific name composed of two parts: the genus name (capitalized) followed by the species name (in lowercase). For example, *Panthera leo* for the lion.
- **Italics or Underlining:** Binomial names are usually written in italics (or underlined) to distinguish them from normal text. For example, *Panthera leo* or *Homo sapiens*.
- **No Capitalization for Species Name:** The species name is always written in lowercase letter, while the genus name starts with a capital letter.
- **Universality:** Binomial nomenclature is international and universally accepted. It allows scientists worldwide to communicate consistently about species, regardless of language.
- **Stability:** Once a binomial name has been officially assigned to a species, it should not be changed unless there is a major taxonomic revision based on new scientific data.
- **The Importance of Citation:** When a binomial name is used for the first time in a text, it must be followed by the name of the author who described it and the year of the original publication. For example, (*Panthera leo*; Linnaeus, 1758). This citation allows for tracing the original source of the species description.