

Taxonomy and Classification Notes

Classification

Classification is the grouping of objects or organisms based on a set of criteria.

taxonomy – the discipline of identifying, naming, and classifying organisms.

binomial nomenclature, gives each species a scientific name with two parts.

The first part is the genus name, and the second part is the specific epithet, or specific name, that identifies the species.

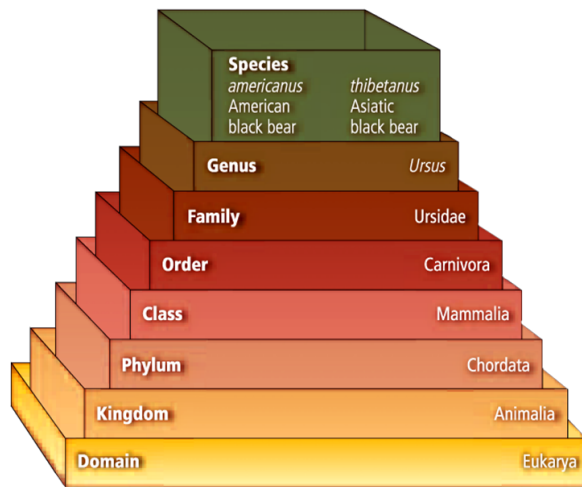
When writing a scientific name, scientists use these rules:

- The first letter of the genus name always is capitalized, but the rest of the genus name and all letters of the specific epithet are lowercase.
- For example *Crotalus atrox*
- After the scientific name has been written completely, the genus name will be abbreviated to the first letter in later appearances (e.g., *C. atrox* Western Diamondback rattlesnake).

Taxonomic Categories

The taxonomic categories used by scientists are part of a nested-hierarchical system.

Each category is contained within another, and they are arranged from broadest to most specific.



Higher taxa

An **order** contains related families.

A **class** contains related orders.

A **phylum** or **division** contains related classes.

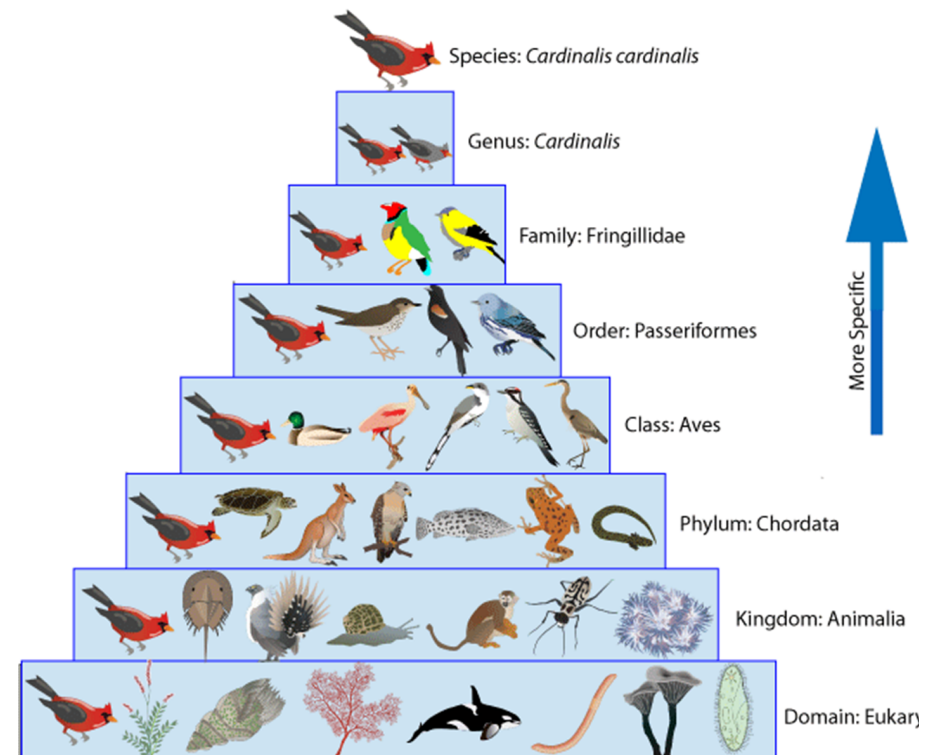
A **kingdom** contains related phyla.

The **domain** is the broadest of all the taxa and contains one or more kingdoms.

A named group of organisms is called a **taxon**.

A **genus** is a group of species that are closely related and share a common ancestor.

A **family** is the next higher taxon, consisting of similar, related genera



Systematics applications

Taxonomy is part of a larger branch of biology called systematics.

Systematics is the study of biological diversity with an emphasis on evolutionary history.

The broadest category in the classification used by most biologists is the domain.

• **Three domains: Bacteria, Archaea, Eukarya**

- Organisms are classified into domains based on cell type and structure

• **Six kingdoms: Bacteria, Archaea, Protists, Fungi, Plantae, and Animalia**

- Organisms are classified into kingdoms based on cell type, structure, and nutrition

Domain Bacteria

- Bacteria are members of both Domain and Kingdom Bacteria
 - Prokaryotes
 - Cell walls contain peptidoglycan
- Diverse group that can survive many different environments
- Most bacteria are heterotrophs that get their energy from other organisms
- Most abundant organism on the planet



Prokaryote Characteristics

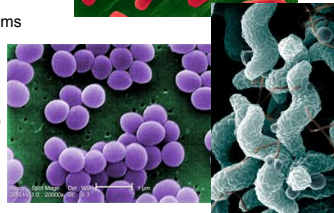
Shapes- Cocci (spherical or round), Bacilli (rod-shaped), Spirilli (spiral-shaped)

Movement

Some prokaryotes are stationary, others move with flagella.

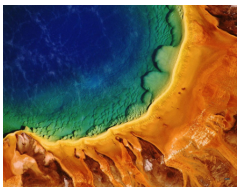
Flagella help prokaryotes to move toward materials that they need to survive – light, oxygen, chemicals.

Other prokaryotes move by gliding over a layer of secreted slime



Domain Archaea

- **Archaea** are thought to be more ancient than bacteria and yet more closely related to our eukaryote ancestors.
- Lack peptidoglycan in their cell walls, and have some of the same proteins as eukaryotes.
- Archaea are diverse in shape and nutrition requirements.
- Most are heterotrophs, some are **extremophiles** that can survive extreme conditions (e.g. high temperature, salinity)

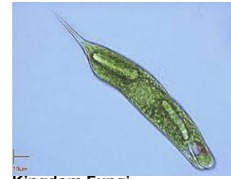


Domain Eukarya

- All eukaryotes have a membrane-bound nucleus and other membrane-bound organelles.
- Domain Eukarya contains Kingdoms Protista, Fungi, Plantae, and Animalia.

Kingdom Protista

- Protists are eukaryotic organisms that can be unicellular, colonial, or multicellular.
- Protists are classified into three different groups – plantlike, animal-like, and fungus-like.



Kingdom Fungi

- A **fungus** is a unicellular or multicellular eukaryote that absorbs nutrients from organic materials in its environment.
- Heterotrophic, lack motility, have cell walls containing chitin.
- Have threadlike structures called hyphae for feeding, growth, and reproduction



Kingdom Animalia – Animals that have cells and tissues, and are mobile.

Kingdom Plantae – mostly multicellular, have cell wall, and chloroplast.

