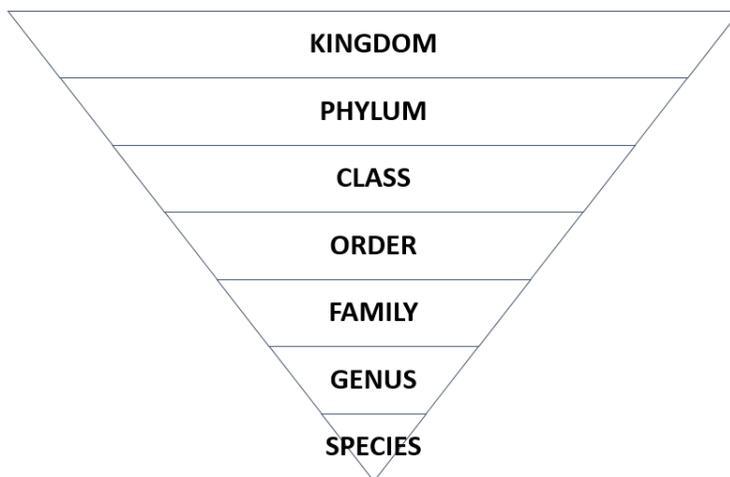
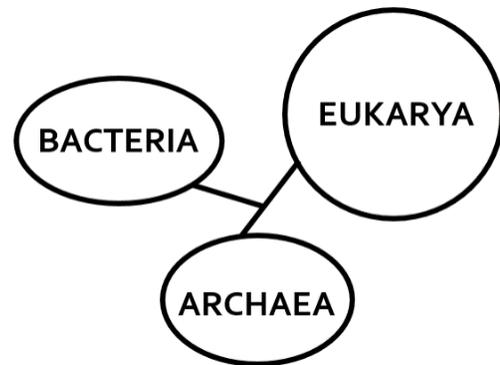


## Classification of Life

Living things are categorized into groups, called **taxa**, which share similar properties or characteristics. This classification is called **taxonomy**. Examples of characteristics are body morphology (shape), symmetry and development.

The broadest category of biological taxonomy is called a **domain**. Three domains exist: **Archaea** and **Bacteria**, which are both prokaryotic (single-celled organisms without a nucleus) and **Eukarya** (organisms which can be unicellular or multicellular, with cells which have a nucleus and membrane-bound organelles).

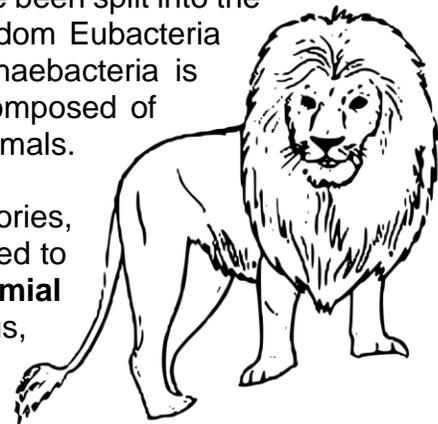


Within the context of its domain, a species can be classified using a hierarchical system consisting of seven levels, from largest to smallest. These are: **Kingdom, Phylum, Class, Order, Family, Genus, and Species**.

The biggest and most general level is called a **kingdom**. There are six kingdoms in total: **Protista, Eubacteria, Archaeobacteria, Fungi, Plantae and Animalia**. In older textbooks, you might come

across the kingdom name **Monera**; this kingdom has since been split into the two kingdoms Eubacteria and Archaeobacteria. The kingdom Eubacteria belongs to the domain Bacteria, and the kingdom Archaeobacteria is covered by the domain Archaea. Domain Eukarya is composed of four kingdoms, consisting of protists, fungi, plants and animals.

The levels range from kingdoms to the smallest categories, **genus** and **species**. These two lowest categories are used to give a specific species a unique name using **binomial nomenclature**. The species is referred to first by the genus, then the species (e.g. the scientific name for the African lion is *Panthera leo*; the genus is *panthera* and *leo* is the species).

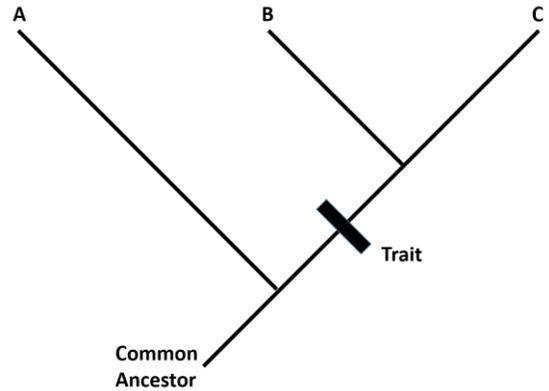


Authored by Rachel Gysbers



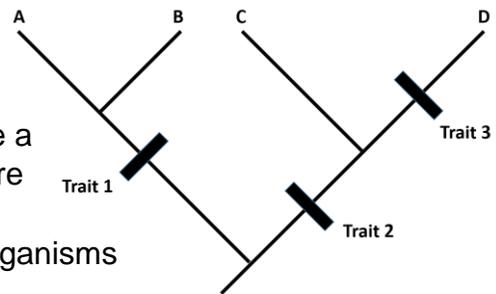
## How are animals classified?

- Historically, organisms were classified according to shared physical characteristics – visible similarities. However, this method is not reliable – just because organisms look the same does not necessarily mean that they are related.
- Phylogeny**, the study of evolutionary relationships, allows organisms to be classified according to their common ancestors.
- Cladistic analysis uses **cladograms** like the one in the figure above to examine new characteristics, called **derived characters**, which arise in a lineage. As new traits appear on the cladogram, only the organisms further down the branch possess these traits. In this example, while organisms A, B and C all share a common ancestor, only organisms B and C share the trait indicated, which would be considered a derived character. Organisms B and C share a common ancestor that they do not share with A, and so they are considered more closely related.
- All organisms possess **genes** which encode information. Similarities between the DNA of different organisms can be used to determine the closeness of their relationship.



## PRACTICE PROBLEMS

- What domain are humans in? What kingdom?
- You are told that pigeons and crocodiles share a common ancestor. Are they more likely to share a class or a phylum?
- Consider the cladogram on the right. Which organisms share Trait 1? Trait 2? Trait 3?



---

## SOLUTIONS

- Domain Eukarya; Kingdom Animalia
- Since a phylum is a broader category than a class, any two organisms are more likely to share a phylum than a class. In fact, pigeons and crocodiles share the phylum *Chordata*, while they are in different classes; pigeons belong to class *Aves* while crocodiles belong to class *Reptilia*.
- Organisms A and B share Trait 1, Organisms C and D share Trait 2, and only Organism D possesses Trait 3.

