Difference Between Taxonomy and Phylogeny

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Key Difference – Taxonomy vs Phylogeny

Taxonomy and phylogeny are two concepts involved in the classification of organisms. Taxonomy is a branch of biology that concerns the naming and classifying organisms based on their similarities and dissimilarities in their characteristics. Phylogeny is the branch of science which concerns the evolutionary relationship of a species or a group of species with a common ancestor. Thus, the key difference between taxonomy and phylogeny is that **taxonomy involves naming and classifying organisms while phylogeny involves the evolution of the species or groups of species.** Phylogeny is important in taxonomy.

What is Taxonomy?

Taxonomy is a branch of biology that names and classifies organisms based on their similarities and dissimilarities. Living as well as extinct organisms are grouped according to a set of rules in taxonomy. Organisms are included into groups by accounting their shared characteristics such as morphological characteristics, phylogenetic characteristics, DNA data, etc. Defined groups of organisms are known as taxa (singular: taxon). Taxa are given a taxonomic rank and are aggregated into super groups of higher rank to create a taxonomic hierarchy.

Classification of organisms was first introduced by the Swedish botanist Carl Linnaeus. Hence, Carl Linnaeus is regarded as the father of taxonomy. He developed a system known as Linnaean taxonomy and binomial nomenclature for categorizing and naming organisms. Another American evolutionist, Ernst Mayr has stated that 'taxonomy is the theory and practice of classifying organisms'.

Taxonomy includes methodologies and principles of systematic botany and zoology. It allows the rearrangement of plants and animals in the taxonomic hierarchy. Taxonomic hierarchy includes eight levels. They are domain, kingdom, phylum, class, order, family, genus and species. Domain is considered as the highest level of the organisms' classification. There are three domains. They are Bacteria, Achaea and Eukaryota. There are five major kingdoms: monera, protista, fungi, plantae and animalia.

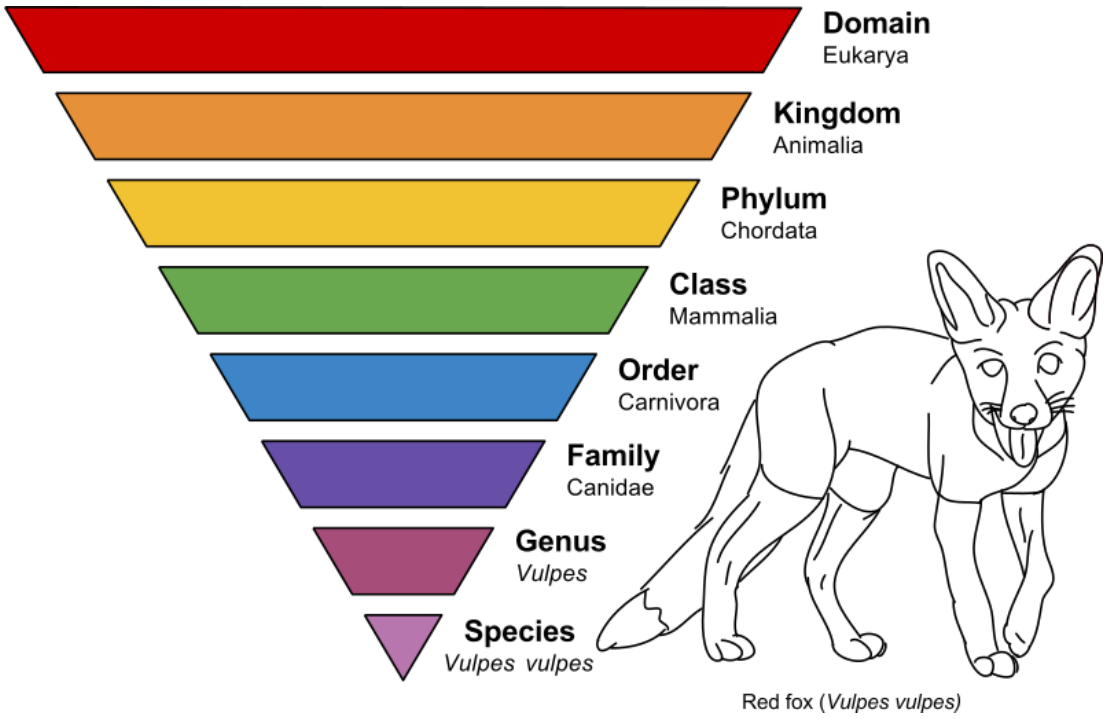

Figure 01: Taxonomy

When new species are found, they are assigned into taxa in the taxonomic hierarchy. Hence, taxonomy is a field which never ends. Taxonomic work progresses every day with finding new organisms.

What is Phylogeny?

Phylogeny is the evolutionary history of a species or a group of species. In this field, organisms are separated based on the evolutionary relationships. It considers comparative cytology, comparison of DNA, morphological characters, shared ancestral and derived characters. These evolutionary relationships are important when building taxonomic groups. Phylogenic trees are generated to show the evolutionary relationships among the groups of organisms. A phylogenetic tree or evolutionary tree can be defined as a branching diagram or a tree like structure which shows the evolutionary relationships among various biological species or other entities. The branches of the tree indicate the divergence of new species from a common ancestor. The branching pattern of the tree explains how the species in the tree evolved from a series of common ancestors. At the end of the each horizontal line of the evolutionary tree, species are included. However, these phylogenetic trees are hypothetic. They are built based on morphological or genetic homology. Anatomical traits reveal the evolutionary relationships while genetic differences reveal the ancestral genes.

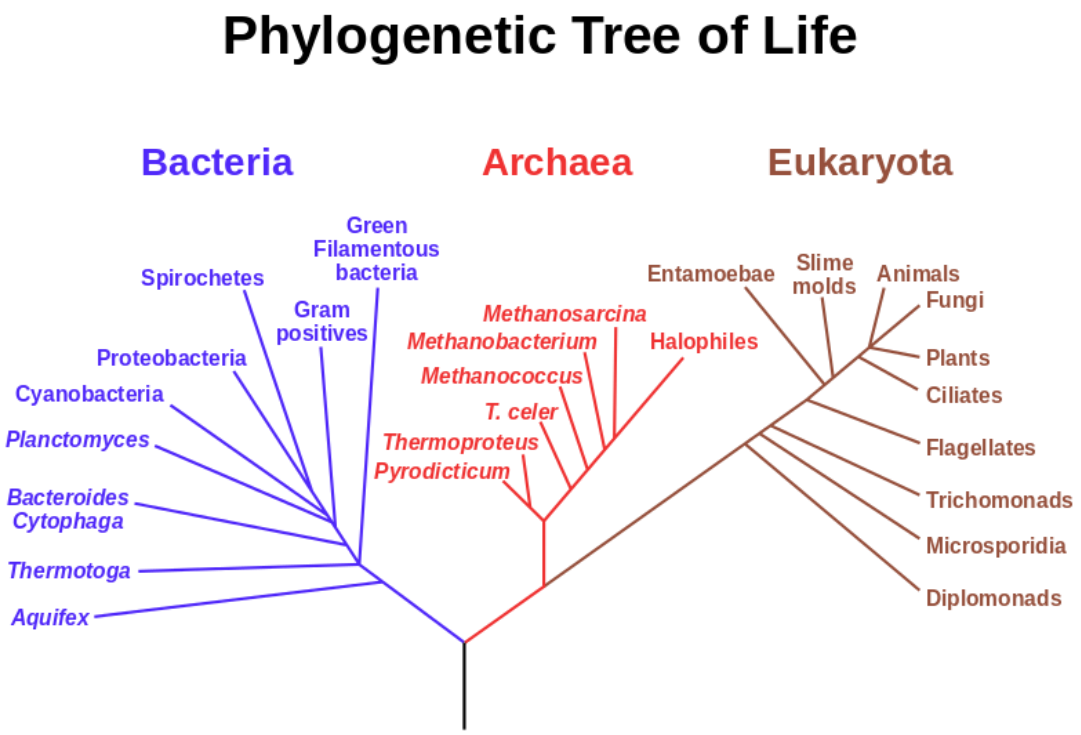

Figure 02: Phylogenetic tree

What are the similarities between Taxonomy and Phylogeny?

- Taxonomy and phylogeny are branches of biology
- Both branches are important for classification of organisms.

What is the difference between Taxonomy and Phylogeny?

Taxonomy vs Phylogeny	
Taxonomy is the field of biology that classifies living and extinct organisms according to a set of rules.	Phylogeny is the evolutionary history of a species or group of species.
Main Concern	
Taxonomy concerns naming and classifying organisms.	Phylogeny concerns evolutionary relationships of organisms.
Shared Evolutionary History	

Taxonomy does not reveal anything about the shared evolutionary history of organisms.	Phylogeny reveals about the shared evolutionary history.

Summary – Taxonomy vs Phylogeny

Taxonomy and phylogeny are two terms related to the classification of organisms. Taxonomy describes the activities related to classifying and naming living organisms. Phylogeny describes the evolutionary history of a species or a group of species. This is the difference between taxonomy and phylogeny. Phylogenetic trees are constructed considering the evolutionary history and relationships. Although these trees are hypothesized constructions, phylogeny is a useful tool in taxonomy when classifying organisms.

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Image Courtesy:

1. "Taxonomic Rank Graph" By Annina Breen – Own work (CC BY-SA 4.0) via Commons Wikimedia
2. "Phylogenetic tree" By This vector version: Eric Gaba (Sting – fr:Sting) – NASA Astrobiology Institute, found in an article (Public Domain) via Commons Wikimedia

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