

## **Why numeric taxonomy is often treated as synonym phonetics**

- Numerical taxonomy is a classification system in biological systematics which deals with the grouping by numerical methods of taxonomic units based on their character states
- It aims to create a taxonomy using numeric algorithms like cluster analysis rather than using subjective evaluation of their properties
- The concept was first developed by Robert R. Sokal and Peter H. A. Sneath in 1963
- They divided the field into phenetics in which classifications are formed based on the patterns of overall similarities and cladistics in which classifications are based on the branching patterns of the estimated evolutionary history of the taxa

## **Difference between cladogram and phylogenetic tree**

Evolution and phylogeny are closely related two words which help to describe relationships and characteristics of different organisms. Evolution explains how a particular group of organism has been evolved, developed and selected through the timeline. Phylogeny explains the historical development of an organism. There are different diagrams constructed by the biologists to show the relationships between organisms. Phylogenetic tree and cladogram are two such diagrams developed to show the relatedness between different organisms.

The key difference between cladogram and phylogenetic tree is that cladogram shows only the relationship between different organisms with respect to a common ancestor while phylogenetic tree shows the relationship between different organisms with respect to the evolutionary time and the amount of change with time.

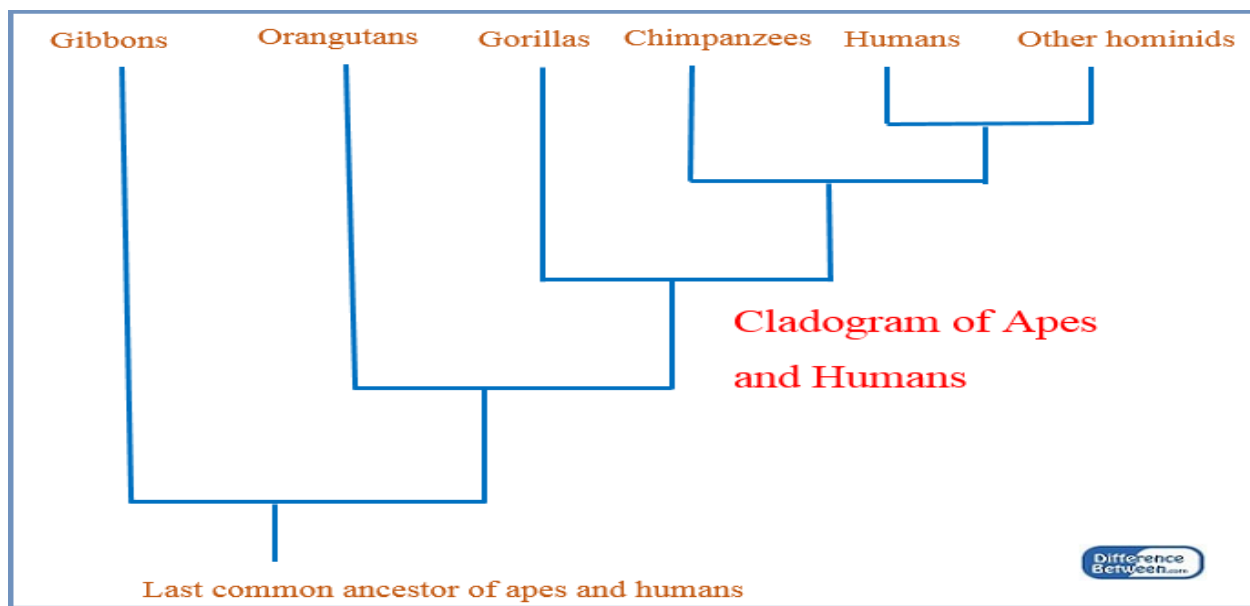
## **What is a Cladogram?**

A cladogram is a diagrammatic representation which shows the relationship of the closely related organisms.

It is a type of a phylogenetic tree. But it only shows the relationships between clades with the common ancestor. As an example, a cladogram shows human are more loosely related

with chimpanzees than gorilla, but it does not show the evolutionary time and the exact distance from the common ancestor.

Cladogram is a tree-like diagram which is drawn using lines. The nodes of a cladogram represent the splitting of two groups from a common ancestor. Clades are summarized at the ends of the lines and the members of a particular clade share similar characteristics. Clades are built using molecular differences instead of morphological characteristics. However, cladograms can be constructed using the correct morphological and behavioral data as well.



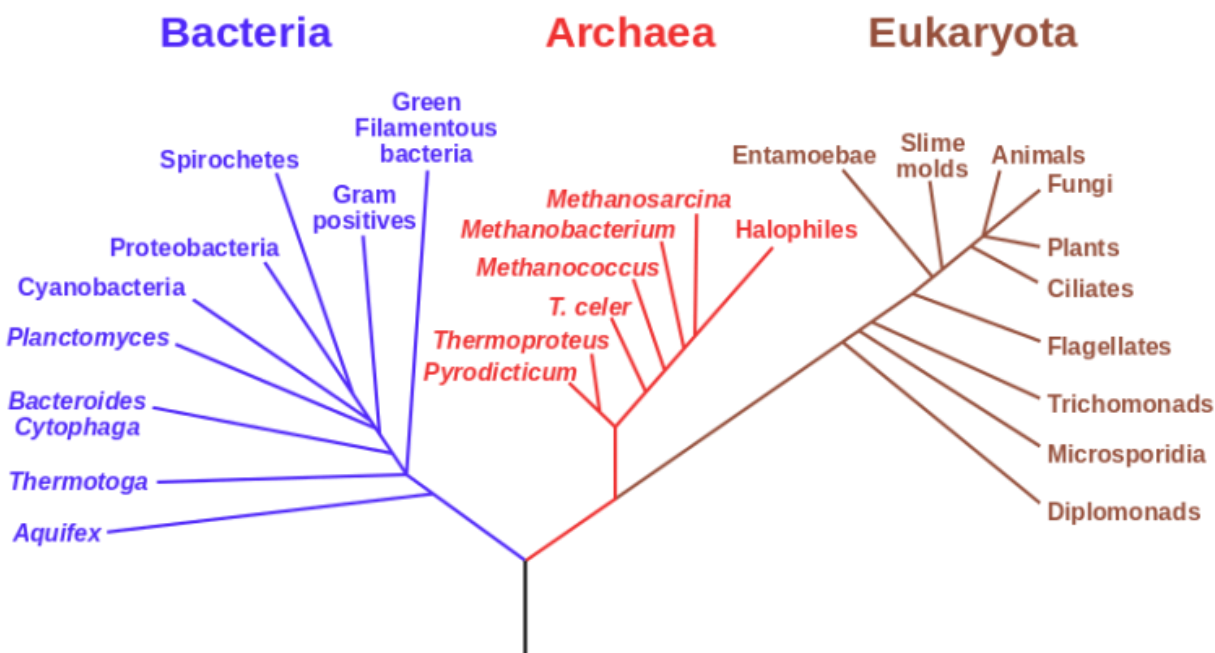
**Fig. A Primate Cladogram**

### **What is a Phylogenetic Tree?**

Phylogenetic studies are useful for finding answers to different problems in evolutionary biology such as the relationship between species and their origin, spread of viral infections, migration patterns of species, etc. Advanced molecular biological techniques have helped biologists to evaluate phylogenetic relationships between organisms in relation to the evolutionary changes of the organisms.

A phylogenetic tree is a diagram which shows the relationship between organisms based on their characteristics, genetic background, and evolutionary relationships. Compared to a cladogram, phylogenetic tree has more value when discussing the relationships of organisms in a meaningful way with respect to their ancestors and evolution. Phylogenetic tree is drawn like a branching tree diagram in which branch length is proportional to the evolutionary distance, unlike a cladogram.

## Phylogenetic Tree of Life



Cladogram	Phylogenetic tree
Cladogram is not an evolutionary tree. Therefore, it doesn't show evolutionary relationships.	Phylogenetic tree is an evolutionary tree. It shows evolutionary relationships.
Cladogram represents a hypothesis about the actual evolutionary history of a group.	Phylogenetic tree represents the true evolutionary history of organisms.
Cladogram is drawn with equal-length. The length of the branch does not represent an	Branch length of a phylogenetic tree indicates the evolutionary distance.

evolutionary distance.	
Cladogram does not indicate the amount of evolutionary time when separating the organisms' taxa.	Phylogenetic tree indicates the amount of evolutionary time when separating the organisms' taxa.

**\*A cladogram is a diagram which shows the relationship between different organisms based on their different similarities. A phylogenetic tree is a diagram which shows the phylogenetic history of organisms with respect to the geological time scale. It represents possible relationships among organisms and the evolutionary history. This is the difference between a cladogram and a phylogenetic tree.**

#### **Cluster analysis:**

A large number of numerical techniques can be used to analyze the groups of related OTUs based on high similarity coefficients. These techniques include elementary cluster analysis, clustering by single, complete or average linkage, central or nodal clustering, etc. The groups of similar organisms organized in this manner are termed phenons, which are arbitrary and relative groups.

#### **Taxonomy Codes**

Taxonomy codes are administrative codes set for identifying the provider type and area of specialization for health care providers. Each taxonomy code is a unique ten character alphanumeric code that enables providers to identify their specialty at the claim level. Taxonomy codes are assigned at both the individual provider and organizational provider level.

Taxonomy codes have three distinct levels: Level I is the provider type, Level II is Classification, and Level III is the Area of Specialization. A complete list of taxonomy codes can be found within the Health Insurance Portability and Accountability Act (HIPAA) related code list section of the Washington Publishing Company (WPC) web site, at <http://www.wpc-edi.com/products/codelists/alert> service. If you do not have internet access, you may contact the WPC at 1-425-562-2245 to find out how to purchase a printed code list. Taxonomy codes are self-reported, both by registering with the National Plan and Provider Enumeration System (NPPES) and by electronic and paper claims submission. Taxonomy Codes registered with NPPES at the time of NPI application are reflected on the confirmation notice document received from NPPES with the provider's assigned NPI number. Current taxonomy codes registered,

including any subsequent changes, may be obtained on an inquiry basis by visiting the NPI Registry Website at <https://nppes.cms.hhs.gov/NPPES/NPIRegistry>.

### Some MCQs

- 1. The group with unknown evolutionary relationship is:**
  - A. Monophyletic
  - B. Polyphyletic
  - C. Paraphyletic**
  - D. None
- 2. Which of the following is an correct example of coevolution**
  - A. Acacia ants and lodgepole pines
  - B. Acacia ants and Acacia plant**
  - C. Acacia plant and lizard
  - D. None
- 3. Which of the following is an correct example of symbiosis association**
  - A. Lichen**
  - B. Algae
  - C. Rhizobium
  - D. None
- 4. The ----- of a phylogeny represents the common ancestor of all the descendants in the tree**
  - A. Root**
  - B. Phylogeny
  - C. Node
  - D. None
- 5. Is phenogram equal Cladogram**
  - A. Yes
  - B. No**
  - C. May be
  - D. None