

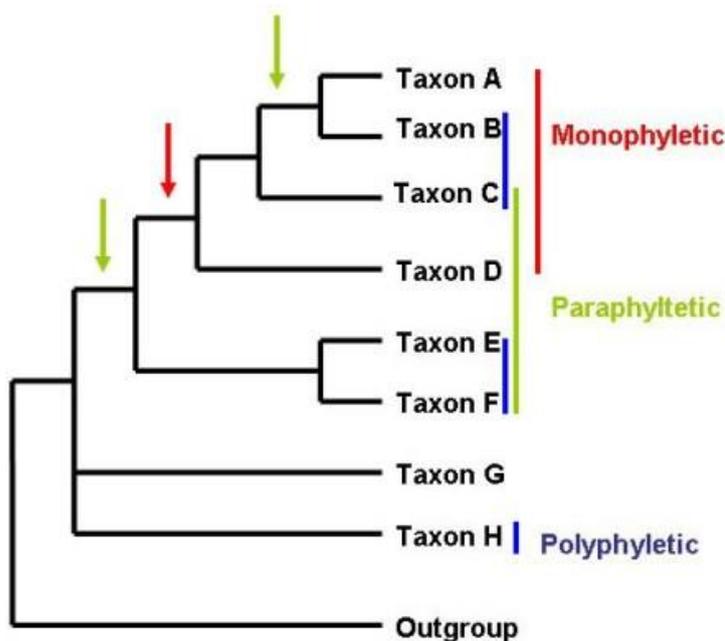
Topic: Monophyly, Paraphyly, Polyphyly:

Part II:

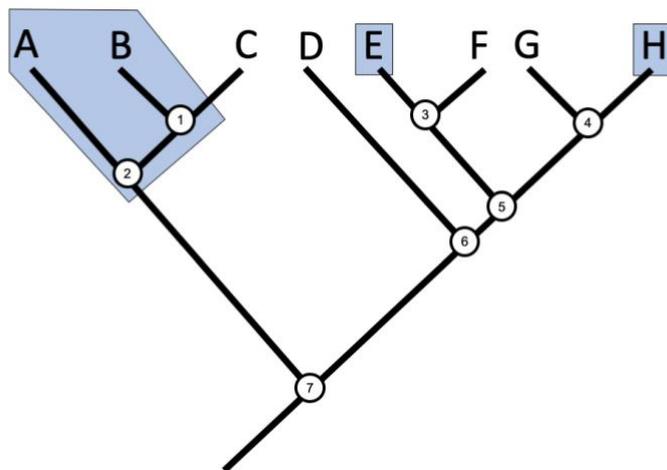
3. Polyphyletic Group/ Polyphyly:

A **polyphyletic** group contains some of the descendants of a common ancestor but not the common ancestor itself. This group is not defined by a single common ancestor. Such groups are characterized by the possession of convergent characters. (A group is polyphyletic if its group membership character appears non-uniquely derived).

Polyphyletic groups are those which have multiple origins and thus do not share a common ancestor or indeed much in common at all aside from whatever trait holds them together. Here the various blue highlighted taxa have been pulled together into a polyphyletic group, and again one could do this in a great many ways on even this small tree.



Taxon B & C, Taxon E & F and Taxon H (shown in Blue line) are polyphyletic (without considering common ancestor)



In this phylogenetic tree, Taxa A, B, E, and H collectively represent a polyphyletic group (Image by Jonathan R. Hendricks)

A genus is with four assigned species, Taxon A, Taxon B, Taxon E, and Taxon H. Tree would render this genus polyphyletic because the common ancestor of the four species (Node 7) is not part of the group. Additionally, it is clear to see that the polyphyletic grouping is widely dispersed across the tree. Even if the common ancestor were included in the definition, Taxa C, D, F, and G would need to be included to make the group monophyletic.

What are the Similarities Between Monophyletic Paraphyletic and Polyphyletic? (APA 2018)

- All these terms are used to define taxa of organisms.
- All terms are used to define a group of organisms.
- When defining, the most recent common ancestor is considered in all groups.
- All these groups explain the relatedness of the organisms.

What is the Difference Between Monophyletic Paraphyletic and Polyphyletic?

Definition

- Monophyletic group is a taxon that consists of a most recent common ancestor and all its descendants.
- Paraphyletic group is a taxon that consists of a most recent common ancestor and some of its descendants.
- Polyphyletic group is a taxon that consists of unrelated organisms who are from a different recent common ancestor. This group lacks a most recent common ancestor.

Descendants of a Common Ancestor

- Monophyletic group includes all descendants of the ancestor.
- Paraphyletic group does not include all the descendants of the ancestor.
- Polyphyletic group does not include all the descendants of the ancestor.

Common Ancestor

- Monophyletic group has a common ancestor.
- Paraphyletic group has a common ancestor.
- Polyphyletic group lacks a common ancestor.

Based On

- Monophyletic is a group based in **synapomorphy**.
- Paraphyletic is a group based in **symplesiomorphy**.
- Polyphyletic is a group based on **convergence**.

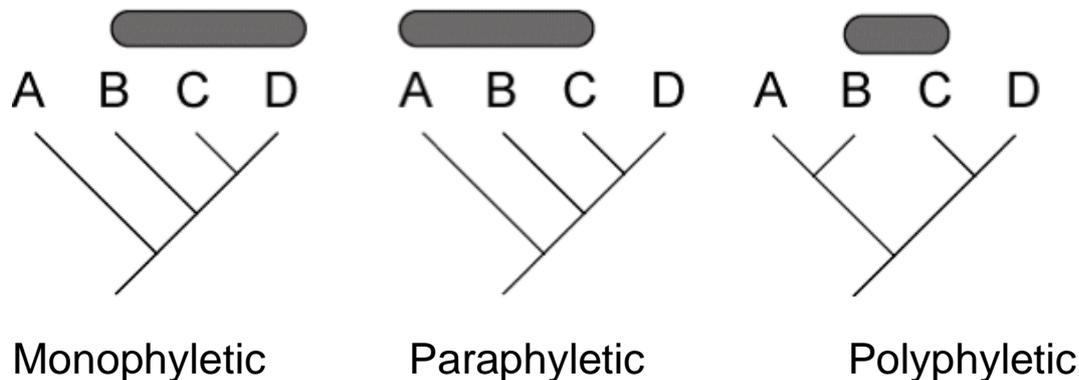
Nature

- Monophyletic group is a natural taxon.
- Paraphyletic group is a natural taxon.
- Polyphyletic group is an unnatural assemblage of organisms.

Summary -

Organisms are classified based on their different characteristics such as morphological and molecular level characteristics. They are grouped for the purpose of identification and phylogenetic analysis. Monophyletic, paraphyletic and polyphyletic are three groups that can be identified in phylogenetic trees. The monophyletic group consists of a most recent

common ancestor and its entire descendants. It is a natural group that uses in phylogeny. The paraphyletic group consists of a most recent common ancestor and some of its descendants. The polyphyletic group is an unnatural assemblage of unrelated organisms which lack a most recent common ancestor. This is the difference between monophyletic, paraphyletic and polyphyletic.



Reference and important links:

APA: Difference Between Monophyletic Paraphyletic and Polyphyletic. (2018 January 19). Retrieved (date), from <http://differencebetween.com/difference-between-monophyletic-paraphyletic-and-vs-polyphyletic/>

<https://archosaurmusings.wordpress.com/2008/12/19/monophyletic-paraphyletic-and-polyphyletic/>

<https://www.digitalatlasofancientlife.org/learn/systematics/phylogenetics/trees-classification/>