

Difference Between Synapomorphy and Sympleiomorphy

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Key Difference - Synapomorphy vs Sympleiomorphy

Evolution is considered as the change in heritable characteristics of different biological populations over time and the successive generations. It is an important aspect that develops the diversity of different biological systems. It also helps to trace and identify common ancestors from whom these organisms descend. Synapomorphy and sympleiomorphy are two such characteristic traits that are utilized by researchers in the field of phylogenetics. **Synapomorphy is a common property that is demonstrated by two or more groups of organisms that can be utilized as a property to trace and detect the most recent ancestor from whom they (both groups of organisms) descended while sympleiomorphy refers to an ancestral character or a trait that is shared by different one, two or more taxa.** This is the **key difference** between Synapomorphy and Sympleiomorphy.

What is Synapomorphy?

In the context of the term synapomorphy, it is a common property that is demonstrated by two or more groups of organisms which can be utilized as a property to trace and detect the most recent ancestor from whom they (both groups of organisms) descend. The synapomorphic character may not be present in closely related organisms due to the fact that these organisms may have lost the synapomorphic trait during their evolution or they could be evolved more in a different pathway that causes the loss of the characteristic feature. Synapomorphic traits lay a major role in the context of the system known as 'cladistics' meaning that 'grouping of organisms into different categories'. These categories are known as 'clades'. Organisms are grouped into different categories based on their common ancestors.

Synapomorphic traits can be used as links to detect the relationships of different groups to provide the basic idea that, a property shared by organisms belonging to different groups is not ancient but they share a trait that is common from a recent ancestor who originally developed it.

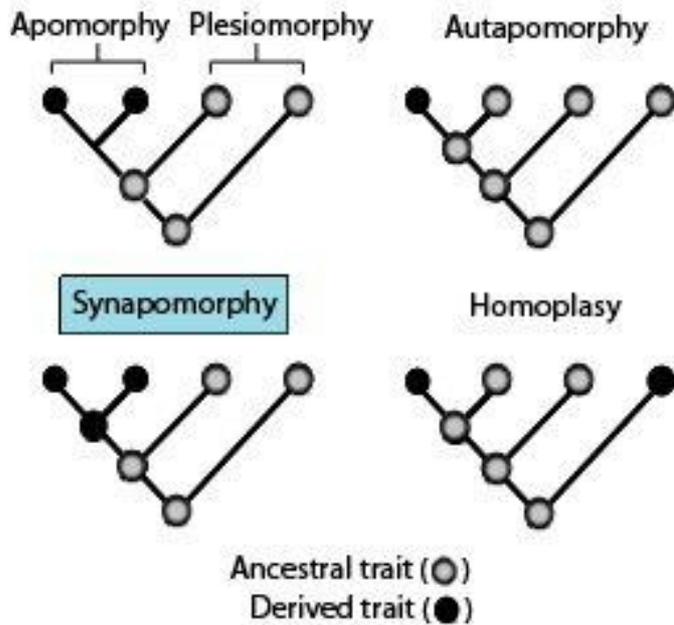


Figure 01: Synapomorphy

Synapomorphic traits in other terms could be defined as a property that appeared for the first time in the last common ancestor but is not present in primitive organisms. In the context of phylogenetics, this is considered as an important aspect. This property of synapomorphic trait greatly assists the researchers to trace and identify the ancestral organism that developed a particular characteristic for the first time and how it is present in different species and populations. This aspect is currently used by researchers to establish different evolutionary relationships between species. This includes groups of organisms such as mammals, reptiles, and birds. Examples include human and gorilla skeleton, forearm bones human, bat and cat.

What is Sympleiomorphy?

A German scientist named Will Hennig first introduced the term sympleiomorphy. In the context of phylogenetics, the term sympleiomorphy refers to an ancestral character or a trait that is shared by different two or more taxa. In other terms, a sympleiomorphy is a characteristic property that is developed and presented by different groups of organisms, resulted due to the presence of a common ancestry between the groups. The groups of organisms that evolved in the particular trait of sympleiomorphy, is from a primitive ancestor and is not considered as a recent one. Therefore, sympleiomorphies could also be defined as primitive shared characters but not a derived character that is evolved by an ancestor in the recent. These properties are considered to be homologous. Even though they have different roles in a biological system, they are considered to be similar in both structure and position.

Sympleiomorphies are not used in the classification of organisms. Therefore, the use of sympleiomorphies is very narrow in the context of deciding the difference among different groups or species and how they could be related to each other. Even though the trait is present, it does not reveals that it is present in the most recent

common ancestor or it has appeared in the descendents for the first time. Rather it only proves the presence of a common ancestry.

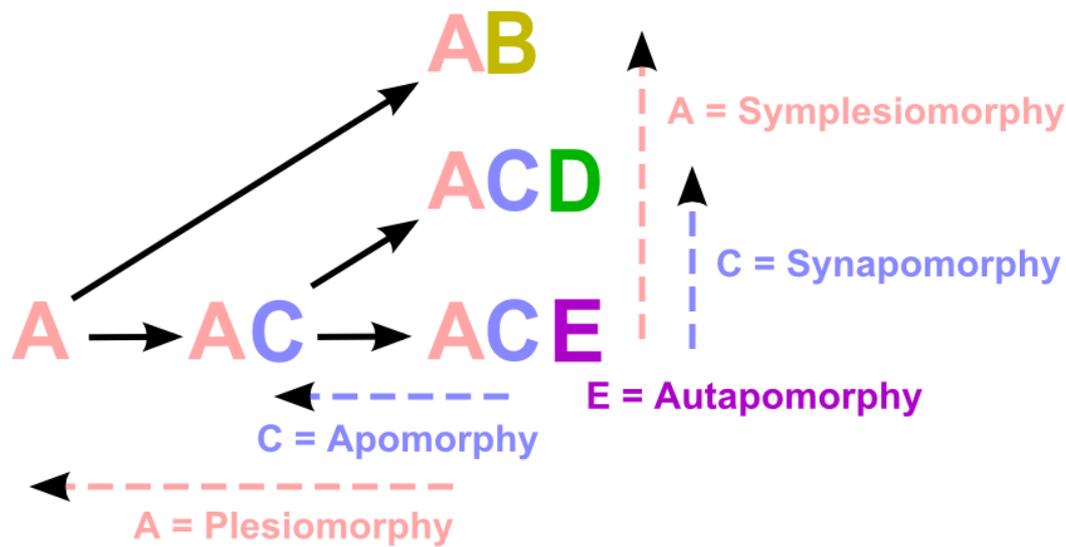


Figure 02: Symplelesiomorphy

The presence of a group of organisms may also show the common trait. Therefore, symplelesiomorphic traits could not be used in the classification system. With regards to the above-discussed factors, symplelesiomorphies could only be utilized to develop and establish evolutionary relationships. Examples of symplelesiomorphic traits are quadrupedalism (all mammals having four limbs), mitochondria of both plant cells and animal cells and sporophytes etc.

What is the Similarity Between Synapomorphy and Symplelesiomorphy?

- They are evolutionary characteristics/traits.

What is the Difference Between Synapomorphy and Symplelesiomorphy?

Synapomorphy vs Symplelesiomorphy	
Synapomorphy is a common property that is demonstrated by two or more groups of organisms which can be utilized as a property to trace and detect the most recent ancestor whom they descend from.	Symplelesiomorphy is a characteristic property that is developed and presented by different groups of organisms resulting due to the presence of a common ancestry between the groups.
Examples	
Human and gorilla skeleton, forearm bones human, bat and cat are examples for synapomorphy.	Quadrupedalism (all mammals having four limbs), mitochondria of both plant cells and animal cells and sporophytes are examples for symplelesiomorphy.

Summary - Synapomorphy vs Symplelesiomorphy

The term synapomorphy refers to a common property that is demonstrated by two or more groups of organisms which can be utilized as a property to trace and detect the most recent ancestor which they (both groups of organisms) descend from. Synapomorphic traits in other terms could be defined as a property that appeared for the first time in the last common ancestor but is not present in primitive organisms. Synapomorphic traits can be used as links to detect the relationships between different groups. In the context of phylogenetics, the term symplelesiomorphy refers to an ancestral character or a trait which is shared by different taxa, two or more. Symplelesiomorphies are not used in the classification of organisms. Symplelesiomorphies could be only utilized to develop and establish evolutionary relationships. This is the difference between synapomorphy and symplelesiomorphy.

Reference:

1. "Symplelesiomorphy." A Dictionary of Biology, Encyclopedia.com. [Available here](#)
2. "An In-Depth Explanation of Symplelesiomorphy in Biology." BiologyWise. [Available here](#)

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