Difference Between Homoplasy and Homology

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Key Difference – Homoplasy vs Homology

Evolution is defined as the change in the heritable characteristics of a biological population upon a period of time. Evolutionary patterns suggest the developmental history of a certain species and depict phenotypic characteristics or traits which indicate relationships between species. These lead scientists towards formulating hypotheses regarding the ancestral lineage of a particular species and developing relationships between species with regards to its ancestors. Based on the phenotypic traits of different organisms, the ancestral heritance pattern can be predicted. **Homology refers to an inheritance pattern where species showing similar traits are derived from a common ancestor** while **homoplasy refers to an inheritance pattern where the species depict common characteristics but are not derived from a common ancestor**. Thus the key difference between homoplasy and homology lies in its ancestor.

What is Homoplasy?

Homoplasy is an inheritance pattern where two or more organisms portray similar phenotypic characteristics but are not derived from a common ancestor. As a result, they do not or have a very minute genetic similarity. However, these species tend to have common/similar characteristics as a result of environmental and other physical adaptations. This pattern is often observed as a result of convergent evolution, where two species which are not closely related develop similar characteristics as a result of adaptation to similar environmental conditions. Homoplasy suggests the need for adaptation in an organism.

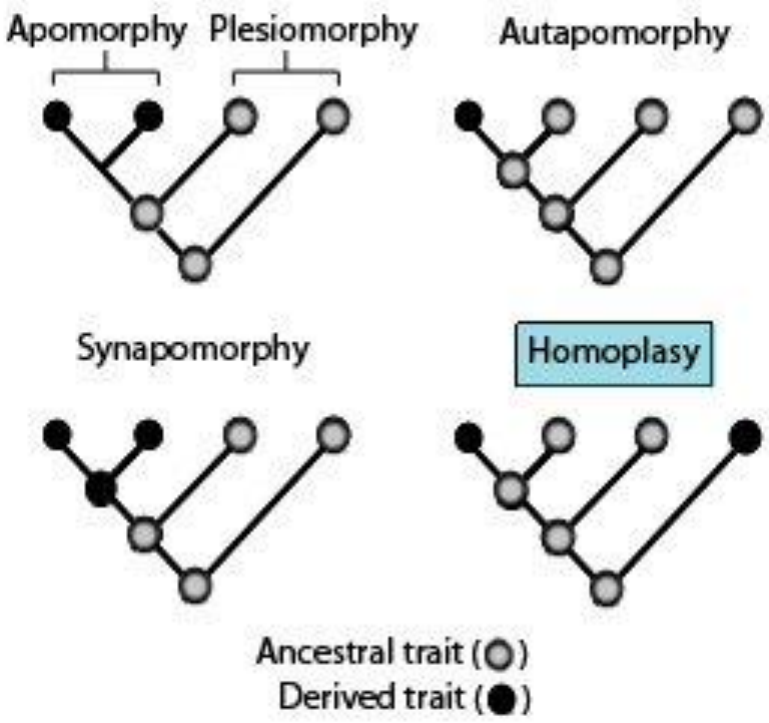

Figure 01: Homoplasy

Homoplasy can be explained with the physical characteristic of 'streamlined body shape' which is shared by birds, fish and some mammals (whale, bat); this an adaptation to facilitate their locomotion in air or water, and is an adaptation to survive in its preferred habitats. This is a convergent homoplasious feature as all mammals do not possess this feature and are not derived from a common ancestor.

What is Homology?

Homology is the inheritance pattern where the phenotypic traits of two or more organisms show common features and are also derived from the same ancestor. Thus, these organisms share a close resemblance in terms of genetic composition. This pattern is characterized as a divergent evolution as these characteristics diverge from a common junction which is the initial ancestor of the lineage.

The physiology of wings in bats and birds which belong to classes of mammals and birds show a common ancestral property where the bones of the structure are homologous in nature. This proves the fact that they have a long history of evolution where they once belong to a common ancestor.

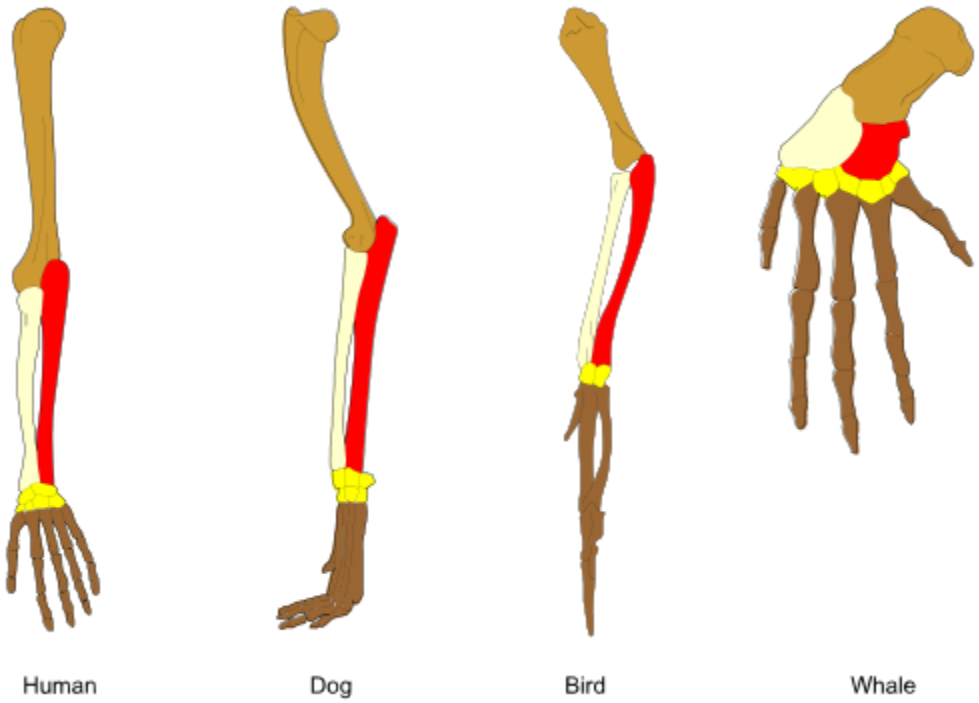

Figure 02: Homology

What are the similarities between Homoplasy and Homology?

- Homology and homoplasy are characterized by the similarity between physical traits between species.
- Both inheritance patterns occur as a result of evolution.

What is the difference between Homoplasy and Homology?

Nitrifying vs Denitrifying Bacteria	
Homoplasy is an inheritance pattern where two or more species have similar physical characteristics or traits but are derived from a different ancestor.	Homology is an inheritance pattern where two or more species have similar physical characteristics or traits and are derived from a common ancestor.
Evolution	
Homoplasy is a result of convergence evolution pattern.	Homology is a result of divergent evolution pattern.

Lineage	
Homoplasy is not derived from a common ancestor.	Homology is derived from a common ancestor.
Genetic Similarity	
Homoplasy shows minute genetic similarity or does not show genetic similarity.	Homology shows a high degree of genetic similarity when analyzed by genetic studies for the particular trait.
Evolutionary Relationship	
In homoplasy, one cannot determine any evolutionary relationships as it is derived from different ancestors but can assess the degree of adaptability of species with regards to environmental changes.	Homology can be used as a tool to assess evolutionary relationships but not the adaptability of species for different conditions.

Summary – Homoplasy vs Homology

Behavioral patterns and the survival of an organism is directly dependent on the physiological characteristics they possess, and scientists constantly conduct research on the relationships between these organisms in order to elucidate evolutionary relationships. During the course of this research, scientists have come across two patterns named homoplasy and homology. Homoplasy is a character shared by a set of species that is not present in their common ancestor. Homology is any similarity between characters that is due to their shared ancestry. This is the difference between homoplasy and homology. Based on these observations, genetic analyses should be performed in order to confirm these inheritance patterns among organisms.

Reference:

1. “Homology and homoplasy:: features and relationships.” John hawks weblog. N.p., n.d. Web. Available here. 04 Aug. 2017.
2. Rendall, D., and A. Difiore. “Homoplasy, homology, and the perceived special status of behavior in evolution.” Journal of Human Evolution52.5 (2007): 504-21. Web. Available here. 4 Aug. 2017.

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