

# Phylogenetic relationships of a group of organisms



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Phylogenetic Relationship of a Group of Organisms During the of evolution, life forms have evolved from the most primitive protozoa to the highly organized plant and animal species which possess certain features and characteristics which point towards a common basis for the origin of life. The basic physiological mechanisms follow similar patterns in all life forms but the morphological as well as genetic uniqueness of each species show how differentiation occurred over the span of history. The common traits and characteristics within species, genera and phyla can be related and studied through phylogenetic studies and by cladistics which is a measurement tool for comparing the evolutionary changes and differences between different species. Phylogenetic analysis by means of cladistics uses shared and derived characteristics as the only criteria for grouping within a genus or species. A shared character is the common feature for all the species being evaluated and a derived character is a feature that evolved only within the group being studied.

#### Construction of a Cladogram

The hypothetical cladistic analysis will include an organism which is distantly related to the organisms within the group being studied. In the example, this organism is known as the out-group and serves as the starting point for comparison with the other organisms being evaluated. In our example, the earthworm represents this out-group. The other organisms in the group are an eel, a salmon fish, a Lizard, a Turtle and a Lion. In the character table, the organisms are placed sequentially in a row and their characteristics are listed in a column on the left (Table). A character lacking in an organism is scored as ' 0' and the presence of a particular trait is scored as ' 1' as shown in the Table.

Table: Character Table

Trait No.

Earthworm (Out-Group)

Eel

Salmon Fish

Lizard

Tortoise

Lion

1

Hair

0

0

0

0

0

1

2

Amniotic Egg

0

0

0

0

1

1

3

Four walking legs

0

0

0

1

1

1

4

Jaws

0

0

1

1

1

1

5

Vertebral Column

0

1

1

1

1

1

When the characters or traits are displayed in the form of a tree, it represents the cladistic hypothesis of the evolutionary relationship between the organisms under study. The tree showing the above cladistic analysis is <https://assignbuster.com/phylogenetic-relationships-of-a-group-of-organisms/>

as follows:

Earthworm Eel Salmon Fish Lizard Tortoise Lion

5

4

3

2

1

Cladogram

Although a cladogram does not indicate the strength of a derived character or even its evolutionary importance, it does emphasize the sequence in which the derived characters arise from a central phylogenetic tree. In the above example, the earthworm lacks all the listed characteristics while the lion which is at the top of the evolutionary ladder in this analysis possesses all.

References:

Basics of Cladistic Analysis, Available online at: <http://www.gwu.edu/~clade/faculty/lipscomb/Cladistics.pdf>

Clos L. M., What is Cladistics?, Online article available at: <http://www.fossilnews.com/1996/cladistics.html>

Reconstructing trees: A simple example, Educational material available at: [http://evolution.berkeley.edu/evolibrary/article/0\\_0\\_0/phylogenetics\\_07](http://evolution.berkeley.edu/evolibrary/article/0_0_0/phylogenetics_07)