

Tree and Character Terminology

Tree/Phylogeny: The history of descent of a group of taxa (such as species) from their common ancestor, including the order of branching and sometimes also the absolute or relative times of divergence.

Terminal taxon: taxon (species or monophyletic group of species) that occurs at the tip of a phylogenetic tree

Node: position on a tree where one ancestral lineage divides into two or more descendant lineages; branchpoint.

Branch: connection between terminal taxon and a node or between two nodes of a tree.

Common ancestor of taxa P and Q: A lineage that is ancestral to both taxon P and taxon Q. The **most recent common ancestor of P and Q** corresponds to the node at which the lineages leading to P and Q split.

Sister groups: two groups that are more closely related to each other than either is to any other group.

Monophyletic group (also called a clade): a group of taxa containing an ancestor and all of its descendants but nothing else

Ancestral or primitive state: state of trait that was present earlier in evolutionary history

Derived state: state of trait that originated later (by transformation of the ancestral state)

Synapomorphy: shared derived character

Only monophyletic groups have synapomorphies.

Synapomorphies are traits that originate along the branch leading to the most recent common ancestor of all members of the group.

The Anatomy of a Phylogenetic Tree

A-E are terminal taxa; these can be either individual species or **monophyletic groups**. All of the higher taxa that we give formal scientific names to in this class are monophyletic groups.

Black lines represent ancestors. They also show evolutionary relationships.

Green triangles mark the nodes; nodes correspond to the **most recent common ancestor** of the taxa that are descended from the node. For example, node 1 is the most recent common ancestor of B and C. The two lineages that descend from a node are **sister groups** (each other's closest relatives). What are the sister groups descended from node 2?

Evolutionary changes in traits are often shown by bars like this. A label is used to indicate what the new trait is. What group is antennae a synapomorphy for?

