

## Definitions

**classification** - arrangement of objects according to some *systematic* division into classes or groups

- to arrange or group in classes according to some *system* or principle (e.g., cladistic (phylogenetic), evolutionary/traditional, etc.

**taxon/taxa** (pl) - any named grouping within a classification of organisms (e.g., species, genus, order)

- can be phenetic, traditional or cladistic

**systematics** - the study of the diversity of organisms [and their classification] (Mayr, Pough Simpson); field of biology that deals with the evolution and historical relations of organisms (UCMP)

- systematics is usually divided into the two areas of (1) phylogenetics and (2) taxonomy (UCMP)

**taxonomy** - practical aspect of naming and classifying organisms (Moore, UCMP)

- e.g., Linnean taxonomy (binominal nomenclature)

**phylogeny** - (Gr., phyla > tribe, genesis > origin) - the evolutionary relationships among organisms (UCMP)

- connections between all groups of organisms as understood by ancestor/descendant relationships

- depicted in a dendrogram (cladistics) or evolutionary tree (evolutionary/traditional)

- in cladistics, phylogeny and classification are synonymous; not so in evolutionary/traditional

## Phylogenetic Systematic (Cladistic) Terms

**apomorphy** - (Gr., apo > separation, morphe > shape) a derived or advanced character

**synapomorphy** - (Gr., syn > together + away + shape) a shared derived characteristic; used to infer ancestry and thus construct clades

**autapomorphy** - (Gr., autos > self + away + shape) - a unique derived characteristic (not shared with any other taxon)

**plesiomorphy** - (Gr., plesio > near (close to the ancestor) + morphe > shape) a primitive (ancestral) character state for the taxa under consideration

**symplesiomorphy** - shared primitive (ancestral) characteristic

**cladogram** - (Gr., branch (twig)) - a genealogical dendrogram (diagram illustrating taxonomic relationships in manner of a family tree) based on shared derived characteristics; a hypothesis of genealogical relationships

- a diagram, resulting from a cladistic analysis, which depicts a hypothetical branching sequence of lineages leading to the taxa under consideration; the points of branching within a cladogram are called nodes; all taxa occur at the endpoints of the cladogram (UCMP)

**monophyletic taxon (clade)** - group (taxon) comprised of all individuals (species) derived from common ancestor; a group that includes a common ancestor and all of its descendants (Farris 1974)

**paraphyletic taxon** - a group that includes a common ancestor and some but not all of its descendants (Farris 1974)

**polarity** - the states of characters used in a cladistic analysis; either original (primitive) or derived; original characters are those acquired by an ancestor deeper in the phylogeny than the most recent common ancestor of the taxa under consideration; derived characters are those acquired by the most recent common ancestor of the taxa under consideration (UCMP)

**polyphyletic taxon** - a group in which the most recent common ancestor is assigned to some other group and not to the group (Farris 1974)

- term applied to a group of organisms which does not include the most recent common ancestor of those organisms; the ancestor does not possess the character shared by members of the group (UCMP)
- group of organisms derived from more than one source, i.e., not a single lineage (Dictionary of Biology)

**out-group** - in cladistic analysis, any taxon used to help resolve the polarity of characters, and which is hypothesized to be less closely related to each of the taxa under consideration than any are to each other (UCMP); often but not necessarily the closest relatives to the in-groups being analyzed

**sister group** - monophyletic taxon most closely related to a monophyletic lineage (e.g., amphibians are the sister group of amniotes)

- the two clades resulting from the splitting of a single lineage (UCMP)

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