

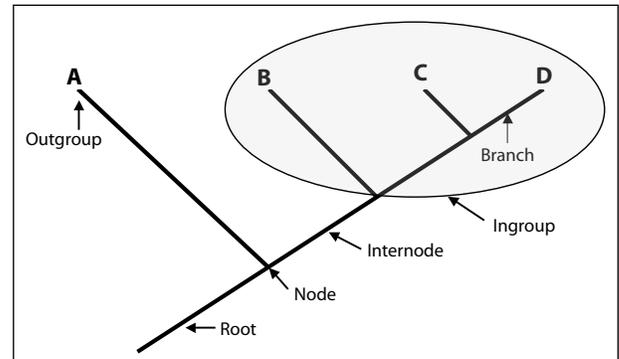
Cladistics: Definition of Terms

Amniotic egg: includes several extensive membranes, the amnion, chorion, and allantois. The egg is contained in an amniotic sac, as, for example, in the human fetus.

Clade: a group of organisms including their common ancestor and all descendants that have evolved from that common ancestor.

Cladistics: a system of classification based on shared derived characters that arranges organisms only by their branching in an evolutionary tree.

Cladogram: a tree-shaped diagram used to illustrate evolutionary relationships among species by analyzing certain kinds of characters, or physical features, in the organisms. A cladogram starts with the root, which then splits several times. As you follow along on a cladogram, it will split at nodes into two or more internodes. The node represents a speciation event (the formation of a new species). The line between two speciation events, the internode, represents at least one hypothetical ancestor. Described species (either from the present or from the fossil record), known as terminal taxa, appear at the tips or ends of the branches.



Characters that are used to define a group or clade (shared derived characters) can be drawn on the internode leading to the node defining the clade.

Characters: physical features shared by a group of organisms. These characters correspond to the specific traits of an organism. For example, if the character is vertebrae, then one of the traits of a particular species is the presence or absence of vertebrae. Characters that are new, and not present in an outgroup or ancestor, are called *derived*. Characters that are present in an ancestor of a studied group are called *ancestral*.

Common ancestor: an organism from whom other organisms are directly descended.

Evolution: Biological evolution is descent with modification. It includes both small-scale evolution (the cumulative changes that occur in a population over time) and large-scale evolution (the descent of different species from a common ancestor over many generations). Evolution is a scientific theory, supported by a great deal of evidence, facts, inferences, and tested hypotheses.

Internode: a line connecting at least two speciation events that represents at least one ancestral species.

Node: the branching point on a cladogram representing a speciation event.

Outgroup: a group of organisms outside the group being studied that is used to determine which of the studied groups' characters is ancestral and which is derived.

Tetrapod: vertebrate animals having four limbs or limb-like appendages. Includes amphibians, lizards, snakes, crocodilians, turtles, birds, mammals, and their extinct relatives.

Transitional form: fossils or organisms that show the transformation from an ancestral form to descendant species' form.

Vertebrae: the individual bones that make up the spinal column.