Three Important Features of Phylogenetic Trees

1.) Trees are dichotomously branched, meaning that a single lineage branches into two evolutionarily separate lineages at speciation events.

2.) Trees lack reticulation, meaning that separate branches don't come back together and fuse into a single lineage(branch). Once lineages are evolutionarily independent, they remain so.

3.) All species trace back to a shared ancestor, meaning that there is a single common ancestor of all life on the planet.

The Utility of Phylogenetic Trees

1.) Trees tell us about patterns of speciation. This allows identification of closest relatives. This can have application in medical issues, legal issues, and conservation issues (among other applications). Examples from class:

      a.) Evidence based on a phylogenetic tree cleared a HIV infected surgeon from charges of malpractice.

      b.) Evidence based on a phylogenetic tree helped scientists determine that the HIV virus was transferred to humans from chimps.

      c.) A phylogenetic tree allowed conservation biologists to make informed decisions about where to find a mate for Lonesome George, the last giant tortoise of Pinta island.

The Utility of Phylogenetic Trees

2.) Trees tell us the evolutionary history of particular traits. It is often assumed that very common traits are ancestral or that more complex traits are derived. Phylogenetic trees allow scientists to test these predictions.

example from class: It was often assumed that the complex orb web of some spider species was a derived characteristic with sheet webs and gumfoot webs representing progressively more ancestral states. However, a phylogenetic tree showed that in reality the complex orb web is the ancestral state!

Things to think about:

1.) Don't forget to study the Tree and Character Terminology handout.

2.) You definitely need to be able to determine degrees of relationship between taxa on a tree. If we ask, who is more closely related to taxon A, Taxon B or Taxon C, everyone should get this question right.

3.) There are different ways to draw trees, but nodes always depict the place where lineages share a common ancestor.

4.) You can rotate any part of a tree at a node without changing the relationships depicted by the tree.