BIOL 471 – Methods in Systematics Topic 03—Phylogenetics

I. Phylogenetic terms and concepts.

A. Phylogeny
1. Defined
2. Phylogeny vs. tokogeny
3. Clade and monophyletic group
4. Sister group

B. Cladogram
1. Defined
2. Styles
3. Branches and nodes; Internal branches vs. external branches

C. Characters and homology
1. Cladogram as a framework for studying the origin of variation among species.
2. Characters and character states
3. Apomorphies vs. Plesiomorphies
    Autapomorphy vs. synapomorphy
    Synapomorphy vs. symplesiomorphy
    Hashmarks
4. Homology, analogy, and homoplasy

II. Cladistics basics

A. The taxon-by-character matrix

B. Synapomorphies as evidence of recency of common ancestry
1. Ingroup vs. outgroup
2. Parsimony and Ockham's Razor
3. Parsimony the optimality criterion

C. Minimizing "steps" is the practical application of parsimony

III. Sources of variation for characters

A. Morphological and anatomical variation.

B. Genetic (e.g., DNA sequence variation).
1. Source of genetic data
2. Alignment of DNA sequences