CONCEPT: PHYLOGENETIC TREES

- Phylogenetic trees are ______ representations of phylogeny
 - □ **Phylogeny** is the evolutionary relationship among a group of organisms
 - ☐ A phylogenetic tree consists of multiple structures
 - Nodes represent different organisms being compared
 - **Terminal nodes** are organisms for which we have data (usually present-day organisms)
 - Internal nodes are common ancestors that existed before divergence
 - Branches represent evolutionary connections between organisms
 - Often, the length of the branch represents the amount of time between divergence
 - □ Rooted trees are trees with an internal node that represents a common ancestor to all other nodes on the tree

EXAMPLE:

Phylogenetic Tree of Life Bacteria Archaea Eukaryota Green **Filamentous** Slime bacteria Entamoebae Animals **Spirochetes** molds Fungi Gram Methanosarcina positives Halophiles Methanobacterium Proteobacteria **Plants** Methanococcus Cyanobacteria Ciliates T. celei **Planctomyces** Thermoproteus Flagellates Pyrodicticum **Bacteroides** Trichomonads Cytophaga Microsporidia Thermotoga Diplomonads Aquifex -

- Phylogenetic trees are often constructed using ______
 - □ **Homology** refers to similarities among various species that are due to a common shared ancestor
 - Can have homologous DNA sequences and phenotypic traits
 - □ A monophyletic group (clade) is a group of species all descended from the groups most common ancestor
 - □ The **cladistics approach** reconstructs phylogenetic tree by comparing all possible pathways of evolution
 - Principle of parsimony states that the preferred hypothesis (tree) is the simplest one

EXAMPLE: Homologous Structures





PRACTICE:

- 1. Which of the following structures on a phylogenetic tree represents the evolutionary connections between organisms?
 - a. Internal node
 - b. Terminal node
 - c. Branches
 - d. Roots

- 2. Which principle is NOT used to construct a phylogenetic tree?
 - a. Principle of parsimony
 - b. Cladistics approach
 - c. Principle of speciation
 - d. Homology