

Name _____

Date _____

Examining the Fossil Record

Objectives

1. analyze characteristics of fossils
2. compare placement of fossils and determine relative ages
3. develop a model evolutionary tree based on the morphology and age of fossils

Background

Fossils are traces of organisms that lived in the past. When fossils are found, they are assigned an estimated age of the fossil. The absolute age of the fossil can be determined through radiometric dating and determining the layer of rock in which the fossil was found. Other organisms found deeper within the earth than some fossils. The age and morphology (appearance) of fossils can be used to place fossils in sequence that show their patterns of changes that have occurred over time. This traditionally was the approach to an evolutionary tree, also known as a phylogenetic tree. There are two major hypotheses to how evolution came about: gradualism and punctuated equilibrium. Gradualism suggests that evolution occurs through a process of slow continuous change. The fossil record suggests that there is a fossil record of gradually increased size in small steps, as an organism that shows a gradual loss of a structure. Punctuated equilibrium suggests that species evolve very rapidly and then stay the same for a long period of time. This rapid change is attributed to a relatively brief time period. The sudden appearance of new structures could be explained by punctuated equilibrium.



Gradualism: smaller fossils (age), larger fossils (age)



Punctuated equilibrium: long time periods (age), rapid change (age)

Speciation

The fossil record cannot accurately determine when one species becomes another species. However, two hypotheses regarding speciation also exist. Punctuated speciation suggests that change maintains in a few regulatory genes over a long period of time. This situation involves the entire species shifting to a new species. Punctuated speciation could also relate to the Punctuated Equilibrium hypothesis regarding evolution. Gradual speciation suggests that a gradual accumulation of small genetic changes results in a population of a species, that eventually accumulates so many changes that the subpopulations become different species. This hypothesis would