

Key Concept 1: Patterns of Evolution

Learning Objectives

Students will be able to ...

Essential Knowledge

Students need to know that ...

Theory of Evolution

EVO 1.1(a) Use scientific evidence to justify a claim of an evolutionary relationship between species.

EVO 1.1(b) Describe shared characteristics (homologies) among organisms that provide evidence for common ancestry.

EVO 1.1.1 The theory of evolution states that the unity and diversity of life we see today is the result of more than 3.5 billion years of evolutionary processes on Earth.

EVO 1.1.2 Scientists use various sources of evidence to establish evolutionary relationships between organisms.

- a. Fossil evidence, in conjunction with relative and radiometric dating, provides insight into geographic and temporal distribution of species throughout Earth's history.
- b. Comparisons of anatomical and molecular homologies are used to determine the degree of divergence from a common ancestor.
 1. The structure and function of DNA is a homology that links all living organisms across the three domains of life—Archaea, Bacteria, and Eukarya.
 2. Cellular structures across all living organisms are strikingly similar.

Classifying Evolutionary Relationships

EVO 1.2(a) Create or modify models to illustrate evolutionary relationships.

EVO 1.2(b) Use models of evolutionary relationships to describe and/or analyze how different species are related.

EVO 1.2.1 Evolutionary relationships between organisms can be modeled using phylogenetic trees, which show inferred evolutionary relationships among living things.

- a. Phylogenetic trees can illustrate speciation events.
- b. These models of evolutionary relationships show tree-like lineages that correlate to levels of complexity or advancement.

Content Boundary: The intent is not for students to memorize a list of characteristics that show descent from a common ancestor. Instead, the *focus* here is on a few powerful examples of this evidence—such as DNA and cellular structures—that will help make discussion in genetics and cellular systems more meaningful for students.

Cross Connection: Revisit these topics to *connect key concepts* of shared characteristics across all living organisms as students explore structure and function of DNA and cellular components in Unit 3: Cellular Systems and Unit 4: Genetics.