

Key Concept 3: Speciation

Learning Objectives

Students will be able to ...

Essential Knowledge

Students need to know that ...

Mechanisms of Speciation

EVO 3.1(a) Explain how geographic isolation events can lead to the formation of new species.

EVO 3.1(b) Describe mechanisms that contribute to reproductive isolation that could lead to speciation.

EVO 3.1.1 Speciation occurs when a reproductive barrier results in a lineage splitting into separate species.

- a. Geographic isolation occurs when individuals in a population face a physical barrier to mating (e.g., continental drift, rivers changing course, glacial movement).
- b. Reproductive isolation leads to increased accumulation of genetic differences and may result in the following:
 1. Behavioral isolation: Species evolve different mating habits, times, or locations.
 2. Mechanical isolation: Species evolve structural differences in their sex organs that make them incompatible.
- c. Reduced gene flow within a population may lead to speciation.

Rates of Speciation

EVO 3.2(a) Describe factors that affect the rate of speciation.

EVO 3.2(b) Use evidence to support the claim that rates of speciation have varied throughout Earth's history.

EVO 3.2(c) Explain how environmental change can result in the extinction of a species.

EVO 3.2.1 Rates of speciation and extinction have fluctuated throughout Earth's history in response to changing environmental conditions.

- a. Gradualism is a model of evolution whereby lineages accumulate small genetic changes over time.
- b. Punctuated equilibrium indicates that periods of stability for species can be punctuated with periods of rapid speciation, or splitting of lineages.
- c. Extinction events that occur simultaneously across numerous species, within a relatively short period of geologic time, are known as mass extinctions.
- d. There have also been human-induced extinctions due to overharvesting and/or changes in habitat (e.g., great auk, passenger pigeon).

Content Boundary: Assessments will not require students to recall dates of major mass extinction events. Instead, the *focus* here should be on a few diverse examples of evidence that illustrate scientists' current understanding of the rate of speciation and extinction and how that shapes biodiversity.