Name Period Date

SECTION 11.6

PATTERNS IN EVOLUTION

Reinforcement

KEY CONCEPT Evolution occurs in patterns.

Natural selection is not random. Natural selection can push a population's traits in a certain direction depending on the environmental pressures. And the resulting changes in allele frequencies add up over time. Two clear trends that can occur as a result of natural selection are convergent evolution and divergent evolution:

- **Convergent evolution** is the evolution toward similar traits in unrelated species. This occurs when unrelated species adapt to similar environments.
- **Divergent evolution** is the evolution toward different traits in related species. This occurs when related species adapt to different environments.

Different species can also shape each other over time. **Coevolution** is a process in which two or more species evolve in response to changes in each other. The relationships that evolve can be beneficial to both species or competitive.

Extinction is the elimination of a species from Earth.

- Background extinctions occur continuously at a low rate and occur at about the same rate as speciation. They can be caused by local changes in an ecosystem.
- Mass extinctions occur much less frequently, but they are much more intense. They occur suddenly in geologic time, due to global catastrophic events, and can destroy hundreds or thousands of species at a time.

The theory of **punctuated equilibrium** states that speciation occurs suddenly and rapidly in geologic time, and is followed by long periods with little evolutionary change. The rapid speciation of one ancestral species into many descendant species is called **adaptive radiation.**

1. Why is natural selection not considered a random event?

2. Two related species become more different over time. What type of evolution is this an example of?

3. Contrast background extinctions and mass extinctions.

4. Describe the theory of punctuated equilibrium.