

## section 1 Darwin's Theory of Natural Selection

### ● Before You Read

In this section you will learn about Charles Darwin and his theory of natural selection. Read the first paragraph of the *Read to Learn* section. On the lines below, write the ideas about life on Earth that were common during Charles Darwin's lifetime.

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### MAIN Idea

**Charles Darwin developed a theory of evolution based on natural selection.**

### What You'll Learn

- the evidence that led Darwin to conclude species could change over time
- the four principles of natural selection

### ● Read to Learn

#### Developing the Theory of Natural Selection

When Charles Darwin boarded the HMS *Beagle*, people believed that the world was only a few thousand years old. Most people believed the plants and animals they saw had not changed. Darwin believed these things too.

#### What did Darwin do on the HMS *Beagle*?

The mission of the *Beagle* was to survey the coast of South America. Darwin's original role on the ship was as the captain's companion. He was someone the captain could talk to during the long voyage. Darwin also served as the ship's naturalist. His job was to collect rocks, fossils, plants, and animals from the places he visited.

During the five-year voyage, Darwin read *Principles of Geology*, by Charles Lyell. Lyell's book proposed that Earth was millions of years old. The book influenced Darwin's thinking as he found fossils of marine life high in the Andes mountains. He also found fossils of giant versions of smaller living mammals. He observed how earthquakes could quickly lift rocks great distances.

### Mark the Text

#### Identify Main Ideas

Highlight every heading in the reading that asks a question. Then highlight each answer as you find it.

### Reading Check

- 1. Name** an observation Charles Darwin made.

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**✓ Reading Check**

**2. Identify** Where are the Galápagos Islands?

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**Picture This**


**3. Explain** Each of the Galápagos islands had different types of plants. How might this explain the differences in beak shape in finches?

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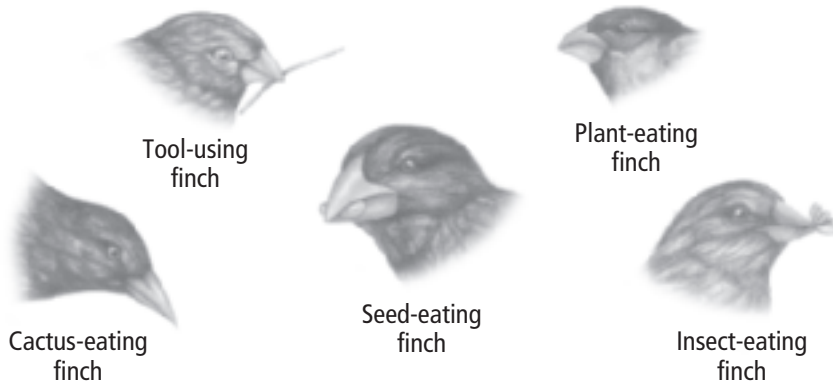
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**What did Darwin find on the Galápagos Islands?**

One of the places the *Beagle* sailed was the Galápagos (guh LAH puh gus) Islands off the coast of Ecuador. Darwin noticed that mockingbirds on one island were slightly different from mockingbirds on the other islands. He took careful collections of these birds. Darwin thought that the finches he saw were not related to one another and probably had representatives on mainland South America. Although he noted the differences, he did not think much about these differences at the time. Darwin also did not notice that tortoise shells were different on each island. 

When Darwin returned home, he showed his specimens to naturalist John Gould. Gould told Darwin that the mockingbirds from different islands were different species. Gould also determined that the Galápagos finches did not live anywhere else in South America. They were different species too. A few of Darwin's finches are shown in the picture below. Notice the difference in beak size and shape.

The Galápagos finches most closely resembled finches from the closest mainland in South America. Darwin suspected that populations from the mainland changed after reaching the Galápagos.



**What did Darwin learn from artificial selection?**

Darwin suspected that small, gradual changes might lead to new species. Darwin knew that people could create new breeds of plants and animals by breeding plants and animals that express the desired traits. Darwin called this selective breeding **artificial selection**.

Darwin thought that if people could change species by artificial selection, perhaps species could also change in the natural world. Darwin reasoned that, given enough time, gradual change could produce new species.

## What principles did Darwin use?

Darwin developed a theory for how one species could change to become multiple new species. Darwin based his theory on four principles.

**Principle 1** Individuals in a population show differences, even among the same species. For example, there are variations of traits among you and your classmates.

**Principle 2** The variations are inherited. Traits are passed down from parents to their offspring.

**Principle 3** Animals have more young than can survive on the resources in their environment. For example, the average female cardinal lays nine eggs in a summer. If each of the offspring lives one year and reproduces, in eight years the offspring would produce a million cardinals. The population of cardinals would quickly outgrow the food supply.

**Principle 4** Some variations increase an organism's reproductive success, or its chance of having living offspring. Any variation that increases reproductive success will be inherited by offspring and will be more common in the next generation. For example, if pigeons with fan-shaped tails have more reproductive success than pigeons without fan-shaped tails the more pigeons in the next generation will have fan-shaped tails.

These principles formed the basis of Darwin's theory of evolution by **natural selection**, which explains how traits of a population can change over time. Darwin reasoned that given enough time, natural selection could produce a new species.

## The Origin of Species

Darwin began writing a book describing how natural selection could produce new species. In 1858, he learned that Alfred Russel Wallace, another English naturalist, had reached similar conclusions about natural selection. In 1858, both Wallace and Darwin presented their findings at a scientific meeting. In 1859, Darwin published his book, *On the Origin of Species by Means of Natural Selection*.

Darwin did not use the word "evolution" until the last page of his book. Today, biologists use **evolution** to describe the way a species changes over time. Darwin's theory of natural selection explains how evolution can occur.



### Think it Over

- 4. Identify** Name a resource that could limit the survival of animals within a population.

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### Think it Over

- 5. Contrast** How does natural selection differ from evolution?

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