Lesson Overview

16.1 Darwin’s Voyage of Discovery
THINK ABOUT IT

If you’d met young Charles Darwin, you probably wouldn’t have guessed that his ideas would change the way we look at the world. As a boy, Darwin wasn’t a star student.

Yet Charles would one day come up with one of the most important scientific theories of all time.
Darwin’s Epic Journey

What was Charles Darwin’s contribution to science?
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Darwin’s Epic Journey

Charles Darwin was born in England on February 12, 1809. He grew up at a time when the scientific view of the natural world was shifting dramatically.

Geologists were suggesting that Earth was ancient and had changed over time, and biologists were suggesting that life on Earth had also changed.

The process of change over time is called evolution.

Darwin developed a scientific theory of biological evolution that explains how modern organisms evolved over long periods of time through descent from common ancestors.
Darwin’s Epic Journey

Darwin was invited to sail on the HMS Beagle’s five-year voyage mapping the coastline of South America.

Darwin planned to collect specimens of plants and animals on the voyage.

No one knew it, but this would be one of the most important scientific voyages in history.
Observations Aboard the *Beagle*

What three patterns of biodiversity did Darwin note?
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Darwin noticed that different, yet ecologically similar, animal species inhabited separated, but ecologically similar, habitats around the globe.

Darwin noticed that different, yet related, animal species often occupied different habitats within a local area.
Observations Aboard the *Beagle*

- What three patterns of biodiversity did Darwin note?

- Darwin noticed that some fossils of extinct animals were similar to living species.
Observations Aboard the *Beagle*

Darwin filled his notebooks with observations about the characteristics and habitats of the different species he saw.

Darwin wanted to explain the biological diversity he observed in a scientific way. He looked for larger patterns into which his observations might fit.

As he traveled, Darwin noticed three distinctive patterns of biological diversity: (1) Species vary globally, (2) species vary locally, and (3) species vary over time.
Species Vary Globally

Darwin noticed that different, yet ecologically similar, animal species inhabited separated, but ecologically similar, habitats around the globe.

For example, Darwin found flightless, ground-dwelling birds called rheas living in the grasslands of South America. Rheas look and act a lot like ostriches. Yet rheas live only in South America, and ostriches live only in Africa. When Darwin visited Australia’s grasslands, he found another large flightless bird, the emu.
Species Vary Globally

Darwin also noticed that rabbits and other species living in European grasslands were missing from the grasslands of South America and Australia.

Australia’s grasslands were home to kangaroos and other animals that were found nowhere else.

What did these patterns of geographic distribution mean?
Species Vary Locally

Darwin noticed that different, yet related, animal species often occupied different habitats within a local area.

For example, Darwin found two species of rheas living in South America: one in Argentina’s grasslands and the other in the colder, harsher grass and scrubland to the south.
Species Vary Locally

Other examples of local variation came from the Galápagos Islands, about 1000 km off the Pacific coast of South America.

These islands are close to one another, yet they have different ecological conditions. Several islands were home to distinct forms of giant land tortoises.

Darwin saw differences among the giant land tortoises that inhabit the islands and learned from the islands’ governor that the tortoises’ shells varied in predictable ways from one island to another.
Species Vary Locally

The shape of the tortoises’ shells corresponds to different habitats.

Isabela Island has high peaks, is rainy, and has abundant vegetation that is close to the ground.

A tortoise from Isabela Island has a dome-shaped shell and short neck.
Species Vary Locally

Hood Island, in contrast, is flat, dry, and has sparse vegetation.

A long neck and a shell that is curved and open around the neck and legs allow the Hood Island tortoise to reach sparse, high vegetation.
Species Vary Locally

Darwin also observed that different islands had different varieties of mockingbirds, all of which resembled mockingbirds Darwin had seen in South America.

In addition, Darwin noticed several types of small brown birds on the islands with beaks of different shapes. He didn’t consider these smaller birds to be unusual or important—at first.
Species Vary Over Time

Darwin also collected **fossils**, which are the preserved remains or traces of ancient organisms.

Darwin noticed that some fossils of extinct animals were similar to living species.
Species Vary Over Time

One set of fossils unearthed by Darwin belonged to the long-extinct glyptodont, a giant armored animal similar to the armadillo. Darwin wondered if the armadillo might be related to the ancient glyptodont.

Why had glyptodonts disappeared? And why did they resemble armadillos?
Putting the Pieces of the Puzzle Together

On the voyage home, Darwin thought about the patterns he’d seen. Darwin sent plant and animal specimens to experts for identification.

The Galápagos mockingbirds turned out to belong to three separate species found nowhere else.

The little brown birds were actually all species of finches, also found nowhere else, though they resembled a South American finch species.

The same was true of Galápagos tortoises, marine iguanas, and many plants that Darwin had collected on the islands.
Darwin began to wonder whether different Galápagos species might have evolved from South American ancestors.

He spent years actively researching and filling notebooks with ideas about species and evolution.

The evidence suggested that species are not fixed and that they could change by some natural process.