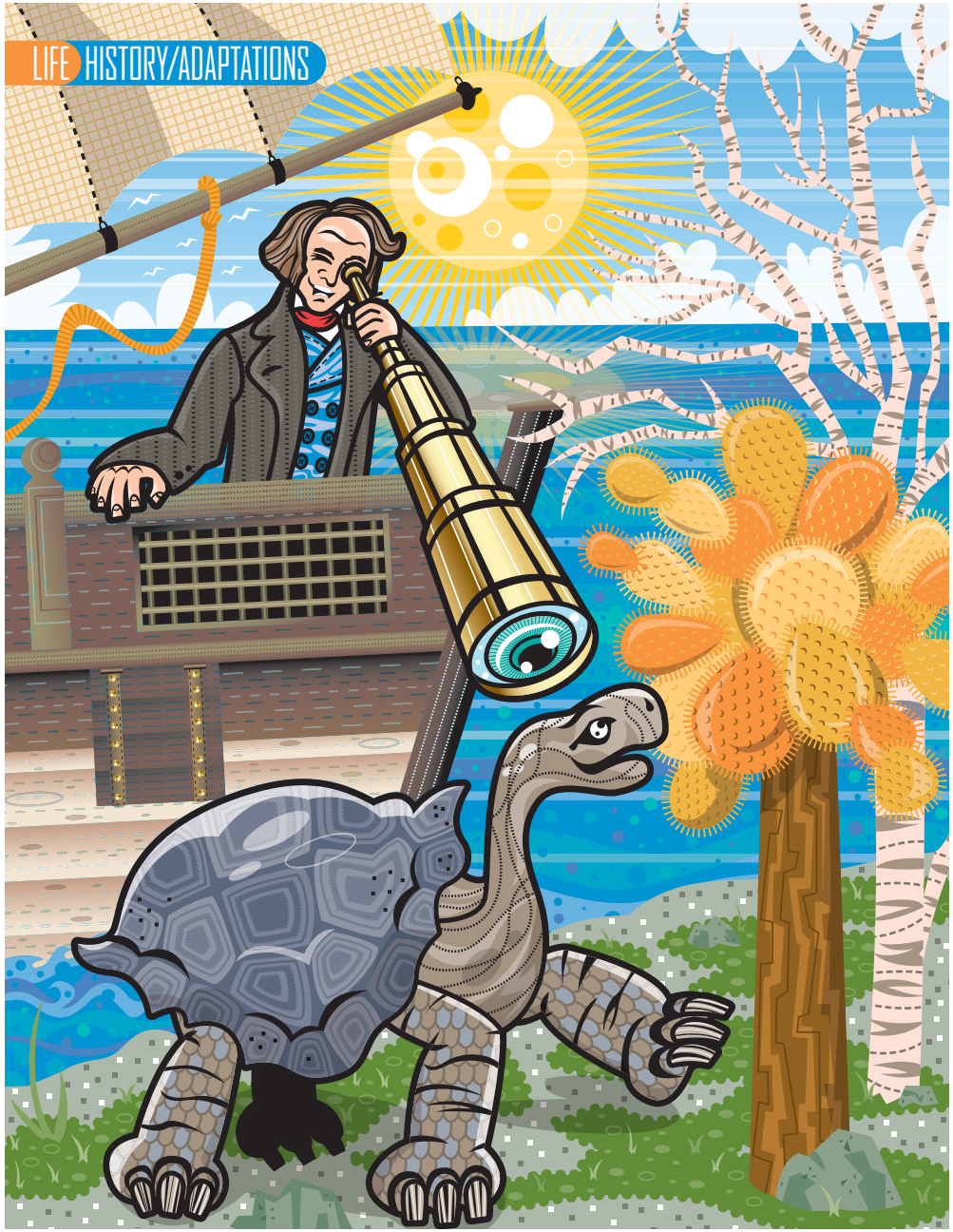


ILLUSTRATION: TIM GOLDMAN; ELDREDGE: STAV BIRNBAUM; GALÁPAGOS: NORMAN OWEN TOMALIN/WWW.BOUSA.COM

VOYAGE of Discovery

SCHOLASTIC and AMERICAN MUSEUM OF NATURAL HISTORY present SCIENCE EXPLORATIONS

A historic South American cruise led to groundbreaking findings about the wild kingdom

BY MONA CHIANG

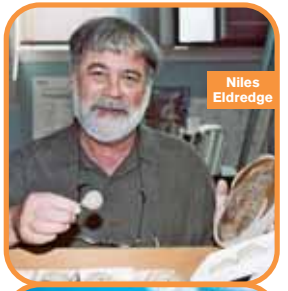
Why don't polar bears live in a steamy rain forest? And why don't pandas live in the Arctic? It may seem obvious that animals have different *traits* that help them survive in different environments. But how did the animals develop these physical characteristics in the first place? It wasn't until the 19th century that scientists began to understand this process. That's when British *naturalist* Charles Darwin (1809–1882) introduced many ideas that changed people's perceptions about the natural world, says **Niles Eldredge**, a *paleontologist* who studies fossils at the American Museum of Natural History in New York.

By examining nature, Darwin became one of the first scientists to piece together how so many different types of organisms came about, and how each one became suited to a particular environment. "His writings are still fundamental to science today," says Eldredge, a Darwin expert. What were some of Darwin's ideas, and how did he develop them?

When Darwin was 22 years old, he was offered the opportunity of a lifetime. The captain of the HMS *Beagle* invited him to join his ocean voyage to explore South America. "Darwin had an unstoppable fascination with nature, so he jumped at the chance to leave England and see another part of the world," Eldredge says. Eldredge tells *Science World* how the eye-opening sights, on what turned out to be a five-year trip, inspired Darwin's thinking about the diversity of life on Earth.

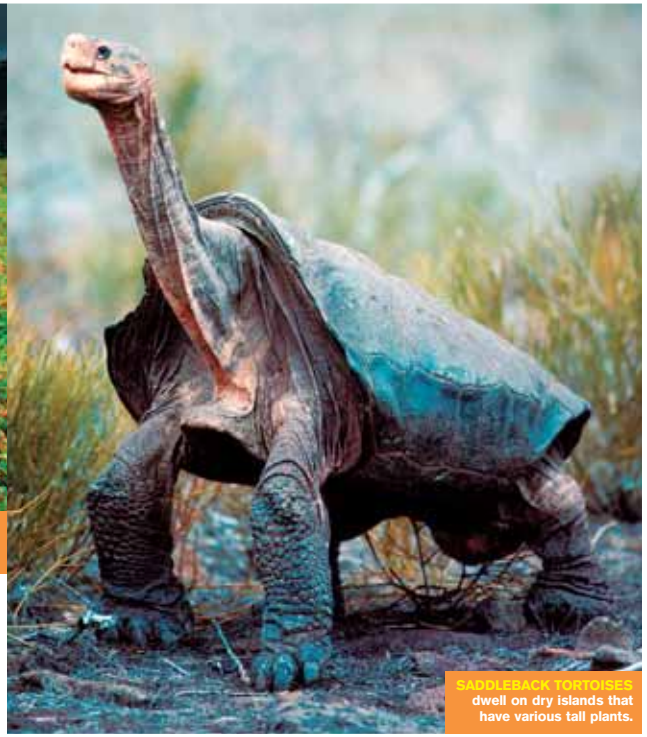
How did Darwin conduct his research during the ship's lengthy voyage?

Darwin was very prone to seasickness, so he got off the *Beagle* and onto dry land whenever he could. He spent months exploring whatever areas they reached (*see map, p. 16*). Darwin was so full of curiosity that he collected and catalogued all sorts of plant and animal specimens. He took notes on their traits, and even sent crates full of organisms back to England so that he could study them further upon his return.



SAMPLE THIS: Eldredge (*top*), a Darwin expert, studies fossils that he has collected. Charles Darwin found many of his research specimens in the Galápagos Islands (*bottom*).

DOME-SHAPED TORTOISES live on moist islands filled with grass and low vegetation.



SADDLEBACK TORTOISES dwell on dry islands that have various tall plants.

Are there any funny stories related to the specimens that Darwin collected?

There are these large, flightless birds in Argentina called *rheas*. Local rumor had it that a different species of rhea existed, but most people had never seen it. Naturally, Darwin was anxious to find and study the elusive bird.

For dinner one night, Darwin ate a smaller-than-usual rhea. In the middle of the meal, Darwin noticed that the bird's bones didn't look like the common rheas' bones. Suddenly, he went "oops!" He had eaten the mystery bird.

Yikes! Did anyone find another small rhea?

Yes—as it turned out, the smaller rhea that Darwin had eaten for dinner that night was not in its usual habitat. Darwin later learned that the smaller bird normally lives in a region south of where it was caught. This got Darwin wondering: Why would two birds that are so closely related live apart from each other, thriving in different environments?

Did Darwin find an answer?

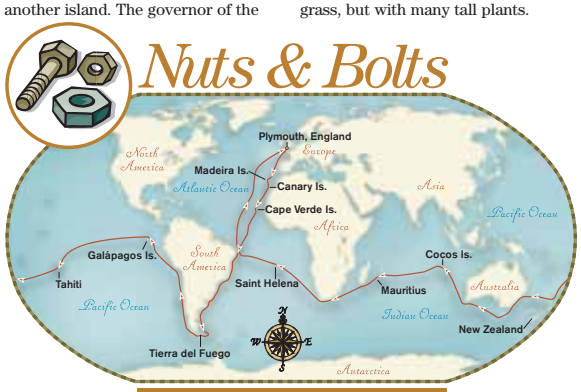
Yes, but first he made similar observations about many other animals. He was particularly inspired by his visit to the Galápagos Islands. Darwin noticed a pattern among plants and animals living there: Many animals, such as mockingbirds and giant tortoises, looked slightly different on one island than they did on another island. The governor of the Galápagos Islands even told Darwin that he could tell which island a tortoise is from just by looking at the shape and pattern of its shell.

What is so telling about the shape of the tortoises' shells?

There are two main shell shapes (*see photos, above*). Saddleback tortoises live on dry islands with little grass, but with many tall plants. These tortoises have shells that allow their long necks to extend upward to reach the food.

On the other hand, tortoises with dome-shaped shells live on wetter islands where plants grow low to the ground. This shell shape only allows the animal's shorter neck to extend forward—fine for grabbing a bite of low-lying grass. Each island appeared to have different conditions that made the resident tortoise develop a shell type that helped increase the animal's chances to eat and thus survive there.

Nuts & Bolts



VOYAGE OF THE *BEAGLE* (1831–1836)
The ship visited the Galápagos in 1835.

DOME-SHAPED TORTOISE: ART WOLFE/GETTY IMAGES; SADDLEBACK TORTOISE: TUI DE ROY/WWW.BBCUSA.COM; MAP: JIM MCMAHON

What else did Darwin discover?

After Darwin returned to London, he spent many years poring over the notes he took and the specimens that he had sent back from his five-year-long journey. He was puzzled about something: What keeps one species of plant or animal from overpopulating the planet—and living in every corner of the world? Darwin had an idea, but first he thought it through using an animal he was familiar with—elephants: Suppose a pair of elephants were to mate and have a couple of babies in their lifetime. When the babies matured, they would have their own offspring. The cycle would go on and on, and the elephant population would explode. Since the world isn't neck to neck with elephants, Darwin realized that there must be something in nature that limits populations.

WEB EXTRA
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What does this have to do with tortoises and rheas?

From his observations, Darwin proposed a process he called *natural selection*. As the environment changes, a species may evolve by changing its physical features over time, making it better adapted to its new habitat. Animals with traits best suited for their habitat—such as being especially able at gathering food or resisting predators—often will produce more young in the next generation than those less suited to the environment. These offspring will normally inherit the same traits as their parents, or in rare cases, develop new ones. Over time, these better-adapted traits, or *adaptations*, will replace the old traits, and so the physical features of the population will change.

How have Darwin's ideas influenced your work?

I'm interested in all aspects of life, and my expertise is in *fossils* called trilobites. These traces of extinct organisms hint at what life was like millions of years ago and how organisms have changed since then. Darwin opened the door to this field of study.

Check it Out:

During his voyage aboard the *Beagle*, Charles Darwin collected numerous previously unknown plants and animals. Many of these species can be seen in an exhibition at the American Museum of Natural History documenting this great scientist's life and work. With more than 30 million objects in its collection, the Museum has been researching and celebrating the natural world for more than 135 years. Its 200 scientists travel around the world on 100 field expeditions each year, studying everything from fossils to lizards to the universe.

To learn more, ask your teacher, or visit www.amnh.org.