

Name _____ Section _____ Date _____

LT: I can analyze how Charles Darwin's observations supported his claim of natural selection.

Do Now: What is spontaneous generation? _____

Developing the theory of Evolution: Charles Darwin's Voyage of the Beagle

Part 1: Overview of Charles Darwin's voyage

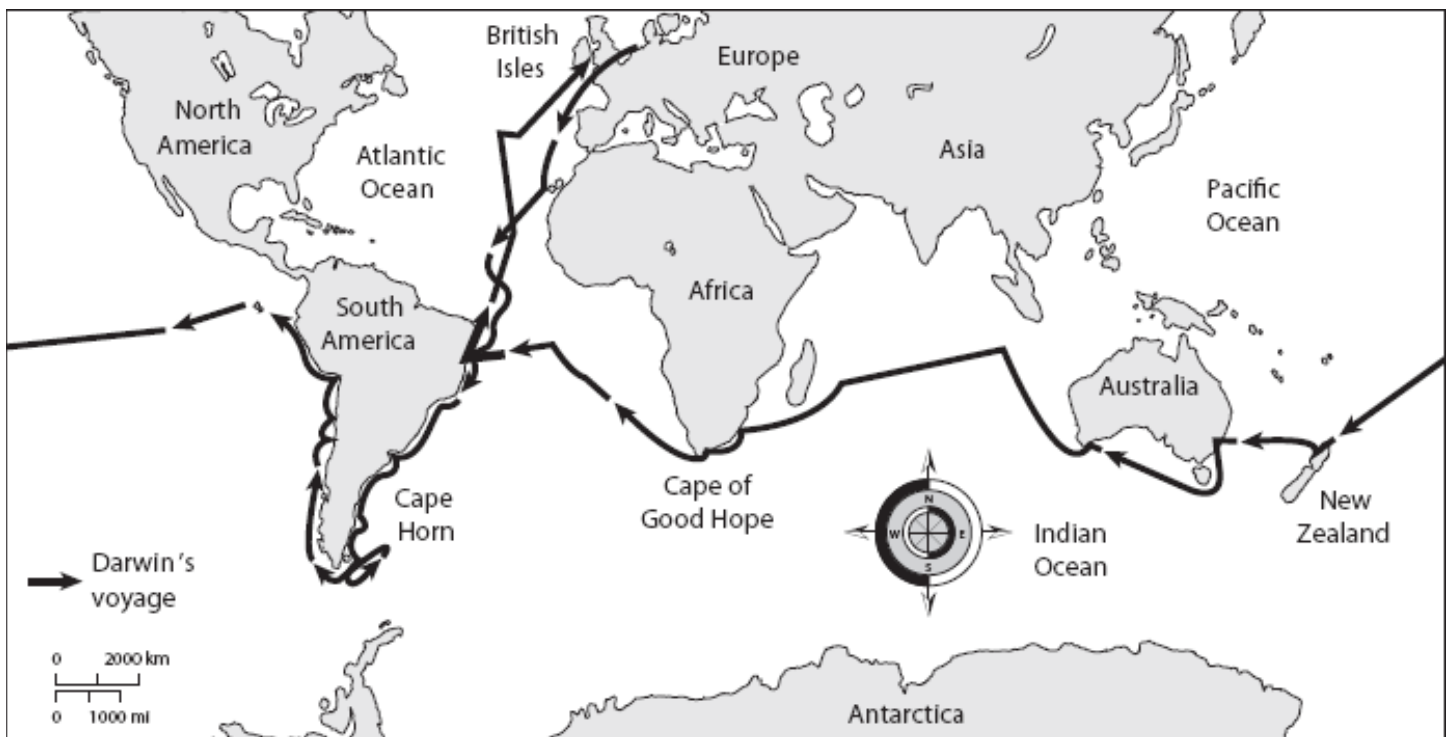
You'll remember from a previous lesson that most people believed in spontaneous generation. Most people thought the Earth was only a couple thousand years old, too, and had always looked the same. However, by studying fossils, some scientists suspected that the Earth was much older, and was constantly changing.

In 1831, when Darwin was just 22 years old, he set sail on a scientific expedition on a ship called the HMS *Beagle*. He was the naturalist on the voyage. As a naturalist, it was his job to observe and collect specimens of plants, animals, rocks, and fossils wherever the expedition went ashore.

During his five-year trip on the *Beagle*, Darwin made many observations:

- He noticed that many different, yet ecologically similar, animal and plant species occupied different, yet ecologically similar, habitats around the globe.
- On the Galápagos Islands, Darwin noticed that the traits of many organisms—such as the shell shapes of tortoises—varied from island to island. He noticed that different, yet related, animal and plant species occupied different habitats within a local area.
- Darwin collected **fossils**, the preserved remains of ancient organisms. He noticed that some fossils of extinct species resembled living species.

Darwin's findings led him to think that species are not fixed and that they could change by some natural process. His findings supported other scientists' work and helped Darwin develop and publish the theory of evolution.



Circle the three continents the Beagle did not visit. AND Label the Galapagos Islands.

Part 2: Analyzing Darwin's observations

Use the front of the page and the other class materials to complete the following questions. Bullet points are okay, but your answers still must be specific and thoughtful.

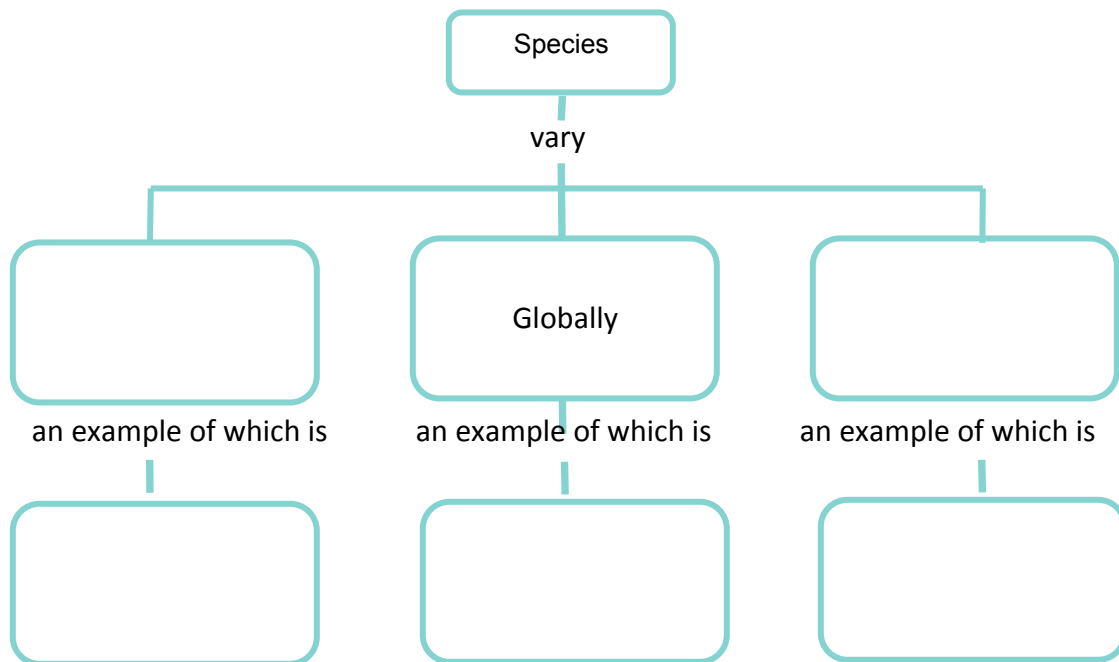
1. What were some observations Darwin made about the Galapagos tortoises?
2. Given its body structure, which tortoise above would require a habitat where food is easy to reach?
3. How do these observations support the claim of evolution?
4. What similarities do the rhea, the emu, and the ostrich share?
5. On the map, place the labels Rheas, Emus, and Ostriches on the continents where they are found. Why were the similarities among rheas, ostriches, and emus surprising to Darwin?
6. What did people at the time believe about Earth? What did Darwin's observations about the rhea, emu, and ostrich suggest about what Earth looked like?
7. Look at the map. Why might Darwin come to think that the finches of the Galápagos Islands might be related to the finches of South America, despite how different the birds were in appearance?
8. Darwin observed that the birds he would eventually discover were finches had differently shaped beaks. What might this suggest about the eating habits of the birds? Explain.
9. What did Darwin's observations about the finches suggest about evolution?

10. How are the glyptodont and the armadillo similar?

11. What did the similarities between fossil animals and modern animals, like the glyptodont and armadillo, suggest to Darwin?

Part 3: Putting in all together.

12. Complete the graphic organizer by listing three ways that species vary. For each pattern of biodiversity, list an example that Darwin observed.



13. Pretend you met someone who has no idea what evolution is. In your own words, explain Charles Darwin's theory of evolution. Make sure to include the phrase "natural selection", and use at least one example of how his observations supported his claim. (4-5 sentences)

14. Darwin waited twenty years to publish his book, *The Origin of Species*, afraid of what people would think. Why did it take courage for Darwin to publish his book? (2-3 sentences)

The Rhea, the Ostrich, and the Emu



Rhea
Found in South America



Emu
Found in Australia

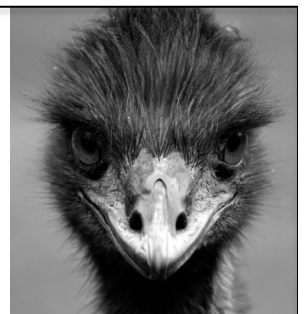


Ostrich
Found in Africa

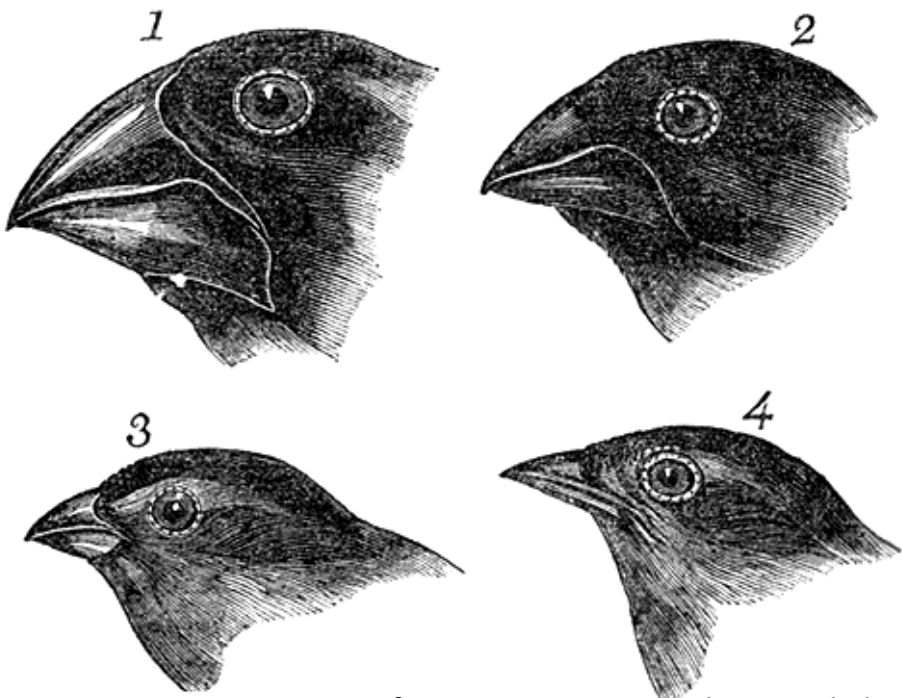


“How do species originate, and how do they come to be where they are? The orthodox story, still firmly embraced by European science at the time of the *Beagle* voyage, was that God had created species independently, in sequential batches (to compensate for extinctions), and had chosen to place them, almost arbitrarily, in their particular locales—kangaroos in Australia, giraffes and zebras in Africa, rheas and sloths and armadillos in South America, extinct and living forms clustered closely in space and time. But to Darwin, all his evidence suggested something more rational: the ideas of relatedness and succession among closely allied species.” (nationalgeographic.com)

Fun fact: When Kelly lived in Australia, she was once chased by an emu. She was scared.

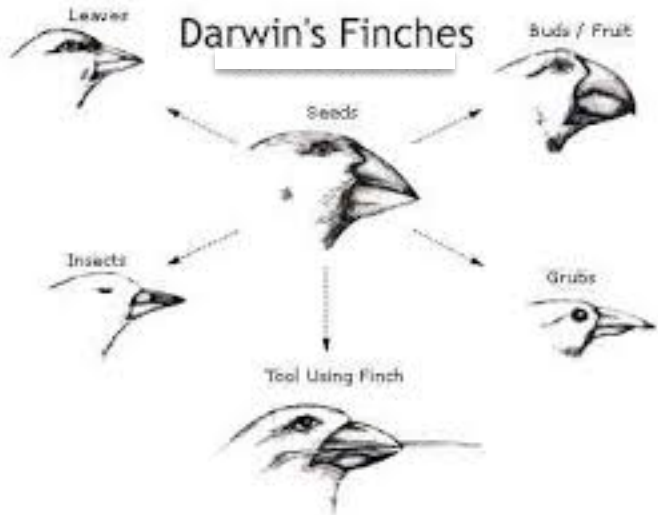


Galapagos Finches



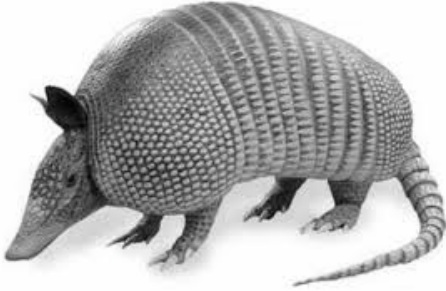
1. *Geospiza magnirostris*. 2. *Geospiza fortis*. 3. *Geospiza parvula*. 4. *Certhidea olivacea*.

“...two species may be often seen climbing about the flowers of the great cactus-trees; but all the other species of this group of finches, mingled together in flocks, feed on the dry and sterile ground of the lower districts. The most curious fact is the perfect gradation in the size of the beaks in the different species of *Geospiza* (finch). Seeing this gradation and diversity of structure in one small, intimately related group of birds, one might really fancy that from an original number of birds in this archipelago, one species had been taken and modified for different ends.”
-Excerpt from Darwin’s journals aboard the Beagle



The glyptodont & the armadillo

Below: An armadillo, which lives almost exclusively in South and Central America, and the southwestern United States.

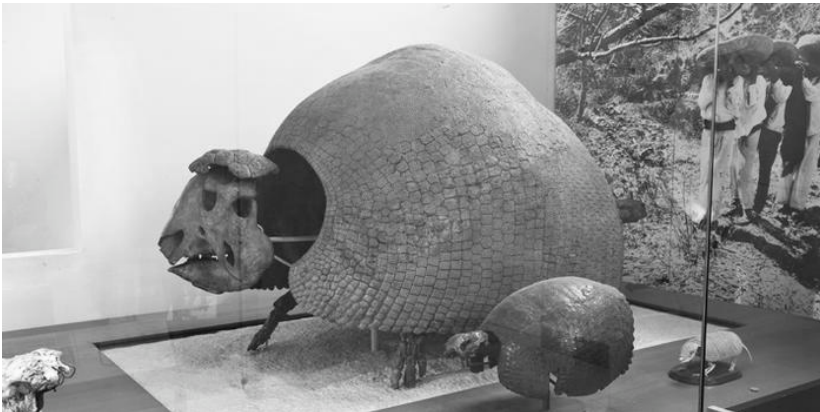


Read the excerpt below. How did Darwin know what armadillos looked like?

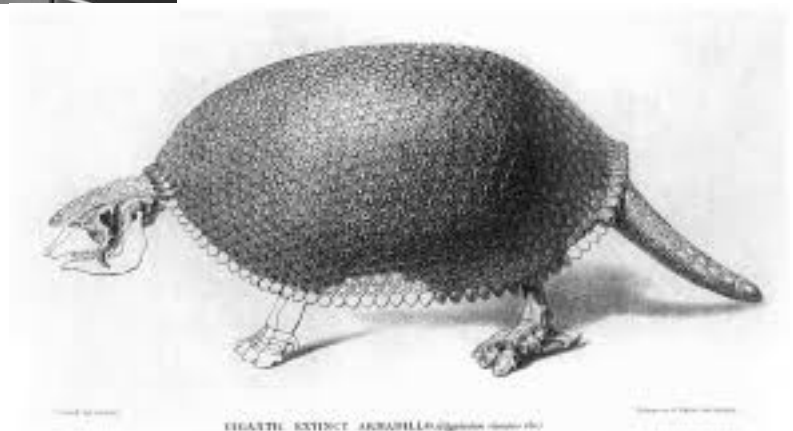
"What we had for dinner to day would sound very odd in England,' Darwin wrote in his diary on September 18, reveling in the exoticism of his new regimen: "Ostrich dumpling & Armadillos." The red meat of the big bird resembled beef, he recorded. The armadillos, peeled out of their shells, tasted and looked like ducks."

(<http://ngm.nationalgeographic.com/>)

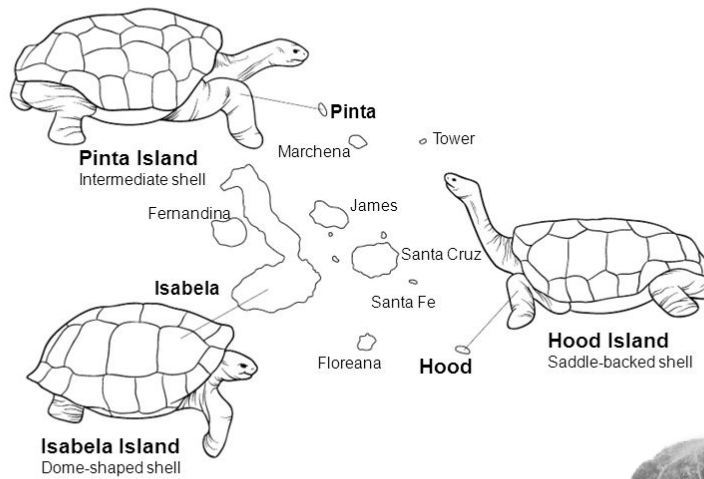
"I obtained a nearly perfect skeleton. It must have been as large as a rhinoceros: in the structure of its head it comes, according to Mr. Owen, nearest to the Cape Anteater, but in some other respects it approaches to the armadilloes." –Excerpt from Darwin's journals aboard the Beagle, writing about a skeleton he had found.



A skeleton of the now extinct glyptodont is above. To the right, Darwin's sketch of a glyptodont skeleton.



Giant Tortoises of the Galápagos Islands



Pinta Island tortoises have shells that rise in the front (right in the overhead view above), like a saddle.



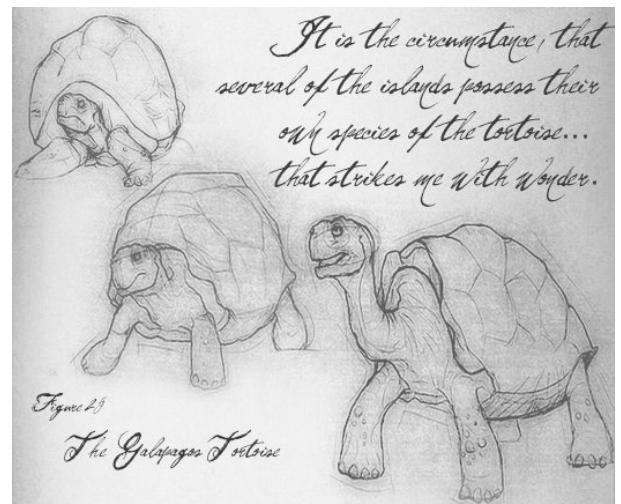
The majority of tortoises on Isabela Island have dome-shaped shells.

“Those which frequent the higher and damp regions, eat the leaves of various trees, a kind of berry which is acid and austere, and likewise a pale green filamentous lichen, that hangs from the boughs of the trees....”

-Excerpt from Darwin's journals



Check out how big those tortoises are!



Drawing from Darwin's sketchbook