



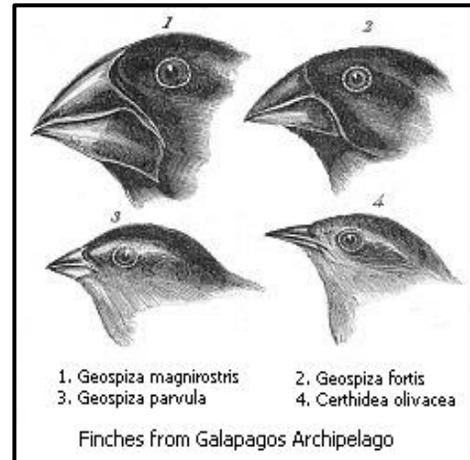
Name: _____ Date: _____ Group: _____

Darwin's Fancy with Finches

(Lexile 940L)

1 Whales are mammals that live in water. They can hold their breath under the water for a long time, yet still need to go up to the surface to breathe. This is evidence that the modern whale's ancestors used to live on land. They changed over time to be able to live in the ocean. White hair in animals is due to the loss of the chemical that causes the hair to be colored. Biologists conclude that the ancestors to polar bears lost their dark hair over time. The change in polar bears and whales is described by a theory known as natural selection. This theory was described in 1859 in Charles Darwin's book, *On the Origin of Species by Means of Natural Selection*. Through the process of natural selection, organisms evolve

adaptations to their environment over time. Evolution means changes in the inherited traits of a species. Natural selection also plays a role in the origin of new species. Natural selection means that the organisms with traits that best fit their environment will be more likely to survive. Over time, they will have more offspring.



2 Charles Darwin was just 22 years old in 1831. He was sailing as a naturalist on the HMS *Beagle*. This journey led him to develop his theory of evolution. His job was to collect samples of plants and animals he found while sailing around the world. He found many unusual animals and plants in the Galápagos Islands. These islands are found 600 miles west of the coast of Ecuador. Darwin studied 14 types of small birds called finches. He wondered how there could be so many different, yet similar, species of finches living so close to each other on this chain of islands. For the next 20 years, Darwin studied the animals and plants he had found. He developed a hypothesis that became known as the theory of evolution by natural selection. Even today, this theory is one of the most important concepts in life science.

3 Four factors describe natural selection:

1. In general, organisms have more offspring than can survive.
2. Individuals of a species have variations.
3. These variations affect the survival and reproduction of individuals.
4. Some variations enhance survival and reproduction in the offspring. These traits will become more and more common in the population over time.

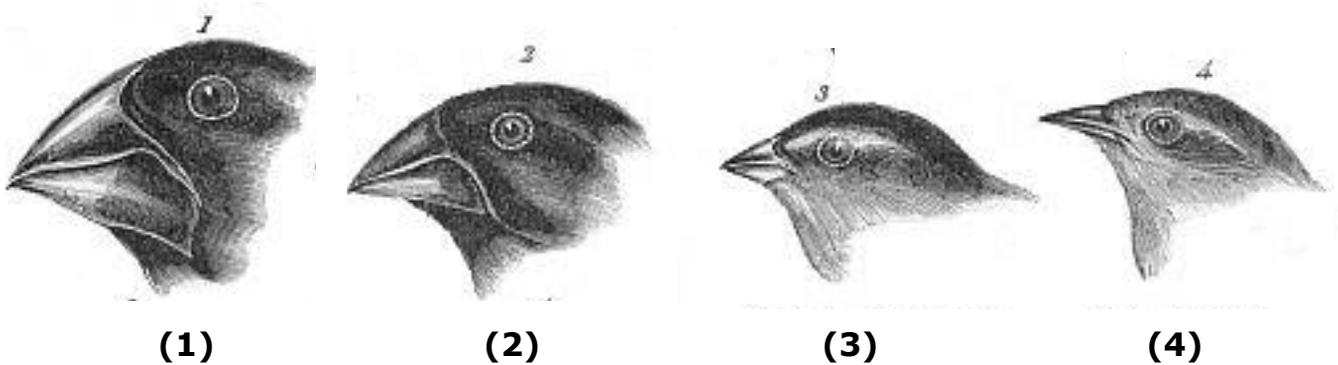


- 4 This is particularly true for variations that provide a survival advantage to individuals within the environment. Variations come from changes in an organism's DNA, which is also known as mutation. Variations may include the organism's color, chemical makeup, shape, and size. Camouflage coloring, for example, is a protective adaptation. An organism with camouflage can blend in with the environment to avoid predators. Those individuals that survive can have offspring. They will pass on those variations through their genes. This is how adaptation of species occurs.
- 5 Darwin's finches are the classic example of how this can happen. He studied the types of beak sizes and shapes of the Galápagos finches. All 14 species of these finches are closely related. Each island has its own variations of environment from spot to spot. There are also changes over time. The environment had periods of severe drought. There were also long periods of El Niño with heavy rains. These variations affect the geography, climate, and plants of the islands. Finches that did not fit their environment did not survive. There was little or no human activity on the islands, so people had not had an effect on these species. Thus, biologists conclude that the adaptations in the finches are due to changes in environment and natural selection. Darwin studied how the size of the beaks related to the different diets of the different types of finch he found on the islands. Darwin described evidence that one species of finch was a "common ancestor" to all 14 species he had found. It had likely evolved into many different species on each island in the Galápagos. Environmental conditions affect the food types that grow on each island. The birds adapted to the local food sources on each island. The finches' main adaptation was the shape and type of their beaks.
- 6 Today, adaptations of species can be seen in our everyday lives. For example, some insects evolved over many years to resist some of the chemicals used to kill them. Their resistance to insecticides has made it more and more difficult to control them. Insecticide resistance causes loss of money for farmers, and in some cases, the loss of the crops. Adaptations also affect human health. Biologists have seen that many harmful bacteria and viruses have evolved resistance to medicines used against them. One example is the HIV epidemic. Doctors have found that the HIV virus will rapidly evolve to resist drugs that had once been able to control it. Resistance to medicines is another example that illustrates Darwin's natural selection process.



- 1** What is natural selection?
- A** a process that happens in the absence of environmental conditions
 - B** a single process of adaptation within an individual
 - C** the survival of the fittest
 - D** an ability to predict the outcome of a defined species over time
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- 2** What does Darwin's controversial book, *On the Origin of Species by Means of Natural Selection*, illustrate?
- A** the importance of variations in organisms
 - B** that traits affect how likely an organism is to reproduce
 - C** how species evolve by adapting to their environment
 - D** all the above
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- 3** Complete the following analogy:
beak size:Galápagos finches as white hair:_____
- A** whales
 - B** tigers
 - C** giraffes
 - D** polar bears

- 4 Based on context, the term **resistance** in paragraph 6 means _____.
- A opposition
 - B approval
 - C variation
 - D individualized



- 5 Based on the information in paragraph 5, which of the finches in the diagram above is most likely to have adapted to an area where the main food source is large, hard seeds?
- A (4)
 - B (3)
 - C (2)
 - D (1)