Seeds and Survivors

Trace how inherited traits and limited resources shape diversity

B.LS4.2 "Construct an explanation based on evidence that biological diversity is influenced by (1) the potential for a species to increase in number..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline evidence that finches can produce more young than can survive, circle the sources of inherited differences, and number the steps that connect competition to a change in the population.

A Dry Season on Seed Island

1. On a fictional island called Seed Island, a population of ground finches feeds on seeds. After a rainy season, plants make plenty of seeds, and many finch pairs raise several chicks. If every chick survived and bred, the population could grow rapidly. But nesting sites and food are limited, so the island cannot support every young bird. As the dry season begins, soft seeds become scarce. Finches now compete for the remaining hard seeds. This gap between the number of chicks born and the number that can survive sets the stage for changes in the population.

2. The finches do not all have identical beaks. Some have deeper beaks that can crack hard seeds more efficiently; others have shallower beaks. Beak shape is partly heritable: offspring tend to resemble their parents, though not exactly. Mutations can introduce new genetic variants, while sexual reproduction mixes existing variants into new combinations. Neither process makes a beak change because a bird needs it. During the dry season, birds whose beaks help them use the remaining seeds are more likely to get enough food. A helpful beak does not guarantee survival, but it can raise a bird's chance of breeding.

3. Suppose deeper-beaked finches survive and raise chicks more often than shallower-beaked finches during several dry seasons. Because beak traits are heritable, deeper beaks may become more common in later generations. The population has changed, even though no individual bird grew a new inherited beak in response to drought. A return of frequent rain could change which beaks are most useful. Over many generations, different conditions in different places can favor different inherited traits in populations. Such changes can shape biological diversity within species and, if populations diverge enough to become separate species, add to diversity among species.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why could the finch population grow rapidly after rain, and what prevents every chick from surviving when the island dries?

2. How can mutations and sexual reproduction provide inherited beak differences before finches face a dry season?

3. Explain how competition for seeds could make deeper beaks more common after several dry seasons.

4. Use the passage to explain how different conditions in different places could eventually affect diversity among finch species.

3 YOUR TURN

Your own words

In a pond, water beetles lay many eggs; mutations and sexual reproduction produce inherited differences in shell color. Plant food is limited, and fish spot pale beetles more easily than dark beetles against dark mud. Write one paragraph using all four factors to explain how the beetle population and its shell-color diversity might change over generations.

ANSWER KEY

Seeds and Survivors

HIGH SCHOOL · B.LS4.2

PART 1 · READ AND MARK

Underline evidence that finches can produce more young than can survive, circle the sources of inherited differences, and number the steps that connect competition to a change in the population. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why could the finch population grow rapidly after rain, and what prevents every chick from surviving when the island dries?	**Many pairs raise several chicks, so the population could increase rapidly. Limited food and nesting sites prevent every chick from surviving, and dry conditions make seeds scarcer.**
2	How can mutations and sexual reproduction provide inherited beak differences before finches face a dry season?	**Mutations can introduce new genetic variants, and sexual reproduction combines existing variants in new ways. Offspring can inherit resulting differences in beak shape.**
3	Explain how competition for seeds could make deeper beaks more common after several dry seasons.	**When hard seeds remain and finches compete for food, deeper-beaked birds can crack those seeds more efficiently. If they survive and reproduce more often, their offspring can inherit deeper beaks, making the trait more common.**
4	Use the passage to explain how different conditions in different places could eventually affect diversity among finch species.	**Different conditions can favor different inherited traits in separate populations. Over many generations, the populations may diverge enough to become separate species, increasing diversity among species.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Because water beetles lay many eggs, more young may hatch than the pond can support. Mutations introduce genetic variants, and sexual reproduction combines them, producing inherited differences in shell color. Beetles compete for limited plant food, while fish spot pale beetles more easily against the mud. Dark beetles may survive and reproduce more often, passing on dark shell color. Over generations, dark shells may become more common and pale shells less common, changing diversity within the population.

Accept explanations that connect evidence to survival, reproduction, and inherited change across generations. Students need not predict that pale shells disappear or that the beetles become a new species.