Mice on the Rocks

Trace how inherited traits become more common across generations.

BIO.4.5 "Use Darwin's Theory to explain how genetic variation, competition, overproduction, and unequal reproductive success acts as driving forces of natural selection and evolution."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the sentence about inherited coat-color variation, circle the sentences about overproduction and competition, and number three sentences that trace camouflage to unequal reproduction to evolution.

A Coat for Dark Rock

1. On a stretch of dark volcanic rock in the American Southwest, rock pocket mice search for seeds at night. Some have light fur, while others have dark fur. Differences in inherited DNA, including mutations, can produce these coat colors. Darwin did not know about DNA, but his theory depends on heritable differences among individuals. Fur color is not a choice a mouse makes when it sees dark rock. A mouse inherits gene versions from its parents, and it can pass those versions to its own young. A new mutation can add a version to a population; mating can reshuffle existing versions.

2. A female pocket mouse can produce several young, yet not all young survive to reproduce. This overproduction matters because the habitat has limited seeds and safe hiding places. Mice compete with one another for those resources, and owls hunt mice that leave shelter. On dark rock, a dark coat often makes a mouse harder for an owl to spot than a light coat. Coat color does not guarantee safety: a dark mouse might still be caught or fail to find food. However, dark mice are more likely, on average, to survive long enough to have young in this setting.

3. Suppose this pattern continues across many generations. More dark mice survive and reproduce than light mice, so the inherited versions linked to dark fur become more common among their offspring. Light-fur versions can remain in the population, and a change in habitat could change which coat is favored. Natural selection is not a plan to make perfect mice; it is a difference in reproductive success tied to inherited traits in a particular environment. As the frequencies of inherited versions change across generations, the population evolves. Individual mice do not turn dark because they need camouflage, and a single mouse does not evolve.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why must coat-color differences be inherited for the owls' hunting to change the mouse population across generations?

2. How do overproduction and limited resources together make competition part of natural selection in this population?

3. Trace how a dark coat could lead to a change in the population over many generations.

4. If pale rock replaced the dark rock, how might coat-color frequencies change after many generations? Explain your prediction using the passage.

3 YOUR TURN

Your own words

Imagine a beetle population with inherited green and tan shells in a meadow that dries out, leaving tan soil. In 5 to 6 sentences, explain how overproduction, competition for limited food, bird predation, and unequal reproductive success could change the population over generations, without claiming that individual beetles change color.

Mice on the Rocks

PART 1 · READ AND MARK

Underline the sentence about inherited coat-color variation, circle the sentences about overproduction and competition, and number three sentences that trace camouflage to unequal reproduction to evolution. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why must coat-color differences be inherited for the owls' hunting to change the mouse population across generations?	**Surviving mice can pass inherited coat-color versions to their young. Versions linked to the coat color that helps mice escape owls can then become more common.**
2	How do overproduction and limited resources together make competition part of natural selection in this population?	**More young are produced than can survive, while seeds and safe hiding places are limited. Mice compete for those resources, so not all survive to reproduce.**
3	Trace how a dark coat could lead to a change in the population over many generations.	**On dark rock, dark mice are harder for owls to spot. More dark mice survive and reproduce, passing on versions linked to dark fur. Those versions become more common across generations.**
4	If pale rock replaced the dark rock, how might coat-color frequencies change after many generations? Explain your prediction using the passage.	**Light fur might become more common if it made mice harder for owls to spot on pale rock. More light mice could then survive, reproduce, and pass on versions linked to light fur.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Green and tan shells are inherited variations already present among the beetles. The beetles produce more young than the meadow can support, so they compete for limited food. When the meadow dries, tan beetles may be harder for birds to see against the soil. Some beetles of both colors get enough food, but tan beetles may be more likely to escape birds and reproduce. Their offspring are more likely to inherit tan shells, so tan shells can become more common across generations. Individual green beetles do not turn tan; the population evolves as inherited traits change in frequency.

Accept predictions that explain how a changed background could favor a different inherited coat color. For Part 3, look for all four driving forces and a change in the frequency of an inherited trait across generations, not a color change within an individual.