Crickets Across Water

Trace how separation and mutations may lead to speciation.

L.8.4B.3 "Obtain and evaluate scientific information to explain that separated populations, which remain separated, can evolve through mutations to become a new species (speciation)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline how the cricket groups stay separated, circle the effects of mutations, and number two pieces of evidence used to judge whether speciation occurred.

A River Between Crickets

1. Imagine a population of marsh crickets living along one wide meadow. A river changes course, splitting the meadow into two islands. The crickets cannot cross the water, so the groups stop breeding with each other. At first, both groups belong to the same species and share similar genes. Separation does not instantly make new species. Each time crickets reproduce, copying errors can create mutations, or changes in DNA. Some mutations are passed to offspring. Over many generations, the two groups may change in different ways.

2. On the north island, birds hunt crickets that chirp loudly. A mutation that changes a male's chirp may help him survive long enough to reproduce there. On the south island, fewer birds hunt, and another mutation changes the chirp of some crickets. Mutations can also affect which chirps females prefer, so mating patterns may change. Over many generations, inherited differences build up without breeding between the islands. The river blocks gene flow, while different conditions can favor different inherited traits.

3. In this imagined study, scientists record the chirps and compare DNA from both islands. They find different versions of genes linked to chirping. In mating trials, 12 north pairs and 12 south pairs produce fertile young, but 12 mixed pairs produce no young. These results support the claim that the groups have become separate species because they are not producing offspring together. Still, a small set of trials cannot prove that mixed pairs could never reproduce. The scientists would repeat the trials and look for more evidence.

2 ANSWER WITH EVIDENCE

Use the passage

1. How does the river make it possible for mutations to build up separately in the two cricket groups?

2. Explain how a mutation affecting chirps might spread on the north island.

3. What results from the mating trials support the claim that the groups may be separate species?

4. Why are the mixed-pair results not enough to prove that the groups could never reproduce together?

3 YOUR TURN

Your own words

Suppose a canyon has separated two frog populations for many generations. Their calls differ, but mixed pairs produce fertile young in a lab. In three sentences, explain what mutations might have changed, whether this evidence supports calling them separate species, and what further evidence you would seek.

ANSWER KEY

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GRADE 8 · L.8.4B.3

PART 1 · READ AND MARK

Underline how the cricket groups stay separated, circle the effects of mutations, and number two pieces of evidence used to judge whether speciation occurred. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How does the river make it possible for mutations to build up separately in the two cricket groups?	**The crickets cannot cross the river to breed, so genes do not move between the groups. Inherited mutations can build up separately.**
2	Explain how a mutation affecting chirps might spread on the north island.	**Birds hunt loud crickets there. A mutation that changes a male's chirp may help him survive and reproduce, passing the mutation to offspring.**
3	What results from the mating trials support the claim that the groups may be separate species?	**Pairs from each island produced fertile young, but none of the 12 mixed pairs produced young.**
4	Why are the mixed-pair results not enough to prove that the groups could never reproduce together?	**Only 12 mixed pairs were tested. More trials and evidence are needed to judge whether the groups can reproduce together.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Mutations may have changed inherited traits that affect the frogs' calls. Their different calls suggest change, but fertile young from mixed pairs do not support a claim that they cannot breed together. I would study whether frogs from the two populations choose to mate if they meet in the wild.

Accept other plausible inherited traits that could affect calls. Students should weigh the fertile offspring as evidence against a simple claim of reproductive isolation, while recognizing that more evidence is needed to judge whether speciation has occurred.