When Frogs Diverge

Trace how a barrier can lead to lasting reproductive isolation

BIO.4.6 "Construct explanations for the mechanisms of speciation (e.g., geographic, and reproductive isolation)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline where gene flow stops, circle the later barrier to mating, and number the events in the order they could lead to speciation.

Two Marshes, One Starting Population

1. Imagine a population of frogs living throughout one large marsh. A landslide blocks the stream that keeps the marsh wet, leaving two smaller wetlands on opposite sides of a dry strip. Frogs cannot cross the strip, so they mate only with frogs in their own wetland. This is geographic isolation: the physical barrier stops gene flow between the groups. Over many generations, new mutations arise in each group. Chance events also change which inherited traits become common. Because the frogs no longer exchange genes, these changes can build up separately on the two sides.

2. The wetlands do not stay alike. Spring water warms earlier on one side, while the other side remains cool longer. Frogs on the warm side begin breeding earlier in the year. In each wetland, inherited differences in breeding time become more common over many generations. Eventually, the dry strip fills with water again, and frogs from both groups can reach the same pools. Yet the warm-side frogs finish breeding before most cool-side frogs begin. Their different breeding times now limit mating even without a physical barrier. This is a form of reproductive isolation.

3. Can the two groups now be called separate species? A single difference in breeding time is not enough evidence by itself. Researchers would need to check whether the groups continue to exchange genes where they meet. Suppose repeated observations find that the frogs share pools but rarely mate across groups, year after year. Genetic evidence also shows little mixing between the groups. Together, these findings support an explanation of speciation: geographic isolation first allowed differences to accumulate, and reproductive isolation later kept the groups distinct after the physical barrier disappeared.

2 ANSWER WITH EVIDENCE

Use the passage

1. How does the dry strip allow genetic differences to build up between the frog groups?

2. Why does the earlier warming on one side matter to the speciation explanation?

3. After the dry strip disappears, what keeps gene flow limited? Explain how it works.

4. Why are repeated mating observations and genetic evidence more convincing than breeding-time differences alone?

3 YOUR TURN

Your own words

Invent a different animal population split by a physical barrier. In four to six sentences, explain how the barrier could lead to genetic differences and how a new reproductive barrier could keep the groups distinct after the physical barrier disappears.

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PART 1 · READ AND MARK

Underline where gene flow stops, circle the later barrier to mating, and number the events in the order they could lead to speciation. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How does the dry strip allow genetic differences to build up between the frog groups?	**It prevents frogs from crossing and mating between wetlands, so gene flow stops and genetic changes accumulate separately.**
2	Why does the earlier warming on one side matter to the speciation explanation?	**Breeding occurs earlier on the warm side, and inherited differences in breeding time become more common, creating a later barrier to mating.**
3	After the dry strip disappears, what keeps gene flow limited? Explain how it works.	**Reproductive isolation limits gene flow because warm-side frogs finish breeding before most cool-side frogs begin.**
4	Why are repeated mating observations and genetic evidence more convincing than breeding-time differences alone?	**They show that the groups rarely mate and exchange few genes even when they share pools, supporting the claim that reproductive isolation persists.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

A mountain ridge splits a population of insects into two groups. Because the insects cannot cross it, they mate only within their own groups, and genetic changes accumulate separately. Over many generations, the groups begin using different scents to find mates. A pass later opens through the ridge, allowing the insects to meet again. If each group responds only to its own scent, they rarely mate across groups, so reproductive isolation could keep them distinct.

Accept other plausible barriers and inherited mating differences if the response explains both the interruption of gene flow and why gene flow stays limited after contact resumes. Do not require a claim that speciation is certain.