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Activity 2: Hiding in the Background

Guiding Question: How does the environment affect an individual's probability of survival and successful reproduction?

Key Words: ***pattern. trait, variation***

Get Started:

1. Read the introduction and Guiding Question to Activity 2, "Hiding in the Background," in your Student Book.

2. Imagine a population of worms in which there is some variation in color: some worms are lighter and some are darker. Birds eat these worms. Most of the birds that eat these worms are better at seeing lighter worms. Which worms do you think are more likely to be eaten?

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3. What do you think would happen to the color of the worm population over many generations, and why?

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Do the Activity:

1. Read the "Toothpick Worm Model."

The Toothpick Worm Model

Imagine that you are a bird that eats small worms. In this activity, toothpicks will represent the worms that you eat. There are two traits for worm color: beige and green. Different color toothpicks represent these two traits.

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2. Read Procedure Steps 1-11 in your Student Book. *Watch the LABsent video (found here: https://labaids.s3.us-east-2.amazonaws.com/labsent-videos/3e+Evolution+1.mp4), and record your data on Student Sheet 2.1, "Worm Populations," which is attached to this packet.* Each time the video says to record, you may want to pause the video to give you ample time to complete your observations.

Procedure Step 8: Each surviving adult worm is reproducing, and each of them has 4 offspring that are identical to the parent. On Student Sheet 2.1, multiply the numbers of green and beige surviving adult worms by 4. For example, if you had 7 green worms still alive, there would be a total of 28 green offspring worms (7 x 4 = 28). Record this number in Row 3.

Procedure Step 9: Add Rows 2 and 3 to get the total number of surviving adults and offspring for green worms and beige worms. Record this number in Row 4.This number represents the number of green worms and beige worms that are present in the habitat at the start of the second generation. Copy these numbers into Row 1 of the table for Generation 2.

3. Some of your classmates continued on to model a third generation. However, since there are only green worms left, what do you think the totals are for the Generation 3 data table? Complete the Generation 3 data table on Student Sheet 2.1, knowing that there were only green worms left.

4. Create a graph, in the space provided on the next page, showing the results from the start of Generation 1 through the end of Generation 3.

Data:
Graph

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Build Understanding:

1. A *pattern* is a set of repeating things or events. Scientists observe patterns in their data. Patterns lead to questions about relationships and ideas about what causes these relationships. How does the crosscutting concept of *patterns* relate to this activity?

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2. *Cause and Effect:* Events have causes. If "A" causes "B" to happen, they have a cause-and- effect relationship. A major activity of science is to explain how this happens. Sometime the causes are simple and sometimes they are complex. Sometimes both A and B occur, but one does not cause the other. How does the crosscutting concept of cause and effect relate to this activity?

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3. What do you think would happen to the color of the worm population over many generations, and why?

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4. What if a beige worm were dyed green and released again into the environment—would its chances of survival improve? What about its offspring: would their chances of survival improve?

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5. Look at Visual Aid 2.1, "Worm Color Model," which is attached to this packet. Explain the model.

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Analysis:

1. Look at your worm population results.1819202122
    1. Use a ratio to compare the number of green worms to the number of beige worms. For example, the ratio of green to beige worms in Generation 1 is 25:25, or 1:1.
    2. Calculate the percentage of green worms and beige worms in each generation.
    3. Describe how the percentage of green and beige worms changed over the three generations.
    4. Did any individual worm change color? Explain.
    5. Why do you think you observed this pattern? Provide a cause- and-effect explanation for this pattern.

Hint: A **pattern** is something that happens in a repeated and predictable way.

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2. Imagine that you performed this simulation for another generation. What do you predict the percentage would be of green and beige worms among the worm population in their habitat? Explain your prediction.

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3. Due to a drought, grass begins to dry out and die, leaving only dead grass stalks. What is likely to happen to the percentage of green and beige worms? Explain.2

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4. Compare and contrast your findings with those from the activity "The Full Course." How are they similar? How are they different?

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5. **Revisit the issue:** How might people be changing the environment and therefore affecting evolution?

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STUDENT SHEET 2.1

WORM POPULATIONS

Generation 1

		Green worms	Beige worms
1	Initial population	25	25
2	Surviving adults		
3	Offspring produced by surviving adults (multiply Row 2 by four [4] because each adult has four offspring)		
4	Total number of survivors and offspring (add Row 2 and Row 3)		

Generation 2

		Green worms	Beige worms
1	Initial population (from Row 4 in Generation 1)		
2	Surviving adults		
3	Offspring produced by survivors adults (multiply Row 2 by four [4] because each adult has four offspring)		
4	Total number of surviving and offspring (add Row 2 and Row 3)		

Generation 3

		Green worms	Beige worms
1	Initial population (from Row 4 in Generation 2)		
2	Surviving adults		
3	Offspring produced by surviving adults (multiply Row 2 by four [4] because each adult has four offspring)		
4	Total number of survivors and offspring (add Row 2 and Row 3)		

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VISUAL AID 2.1

WORM COLOR MODEL