

COLOR VARIATION OVER TIME IN ROCK POCKET MOUSE POPULATIONS

INTRODUCTION

The tiny rock pocket mouse weighs just 15 grams, about as much as a handful of paperclips. A typical rock pocket mouse is just about 170 millimeters long from nose to rump, shorter than an average pencil. Their impact on science, however, has been enormous. What’s so special about these little mice?

Populations of rock pocket mice are found all over the Sonoran Desert in the southwestern United States. There are two common varieties—a light-colored variety and a dark-colored variety. Similarly, there are two major colors of substrate, or surface materials, that make up the desert floor. Most of the landscape consists of light-colored sand and rock. Here and there, however, separated by several kilometers of light-colored substrate, are patches of dark volcanic rocks that formed from cooling lava flows.

The illustrations that follow represent snapshots of rock pocket mouse populations. Each illustration shows the color variation at two different locations, A and B, at a particular moment in time over a period of several hundred years.

Note: The images are out of order.

MATERIALS

You will need:

- colored pencils

PROCEDURE

1. Count the number of light-colored and dark-colored mice present at each location at each moment in time. Record your counts in the spaces provided above each illustration.
2. Place the illustrations in what you think is the correct order from oldest to most recent. Indicate your order by circling the appropriate number under the illustration.
3. Explain how you decided which illustration represents the most recent rock pocket mouse population and why you positioned the others in the sequence as you did.

*The Making of the Fittest:
Natural Selection and Adaptation*

**LESSON
STUDENT HANDOUT**

Location A: number of mice with light-colored fur _____ number of mice with dark-colored fur _____

Location B: number of mice with light-colored fur _____ number of mice with dark-colored fur _____



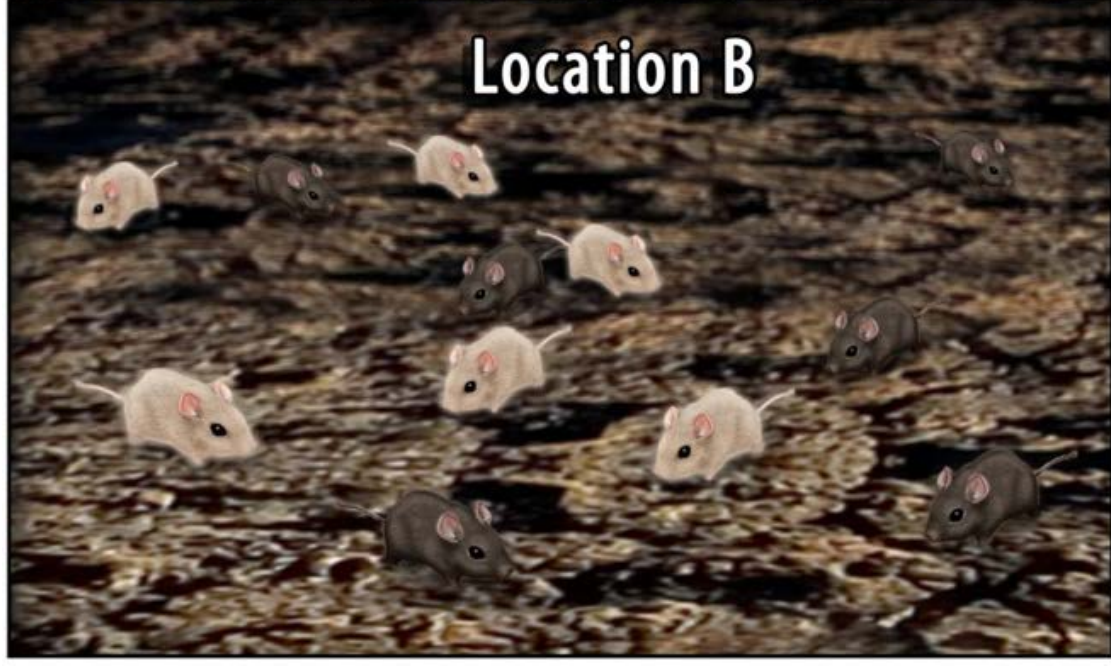
**When all four illustration pages are placed in order, this one is the
1st (oldest) 2nd 3rd 4th (most recent)
(Circle the appropriate number)**

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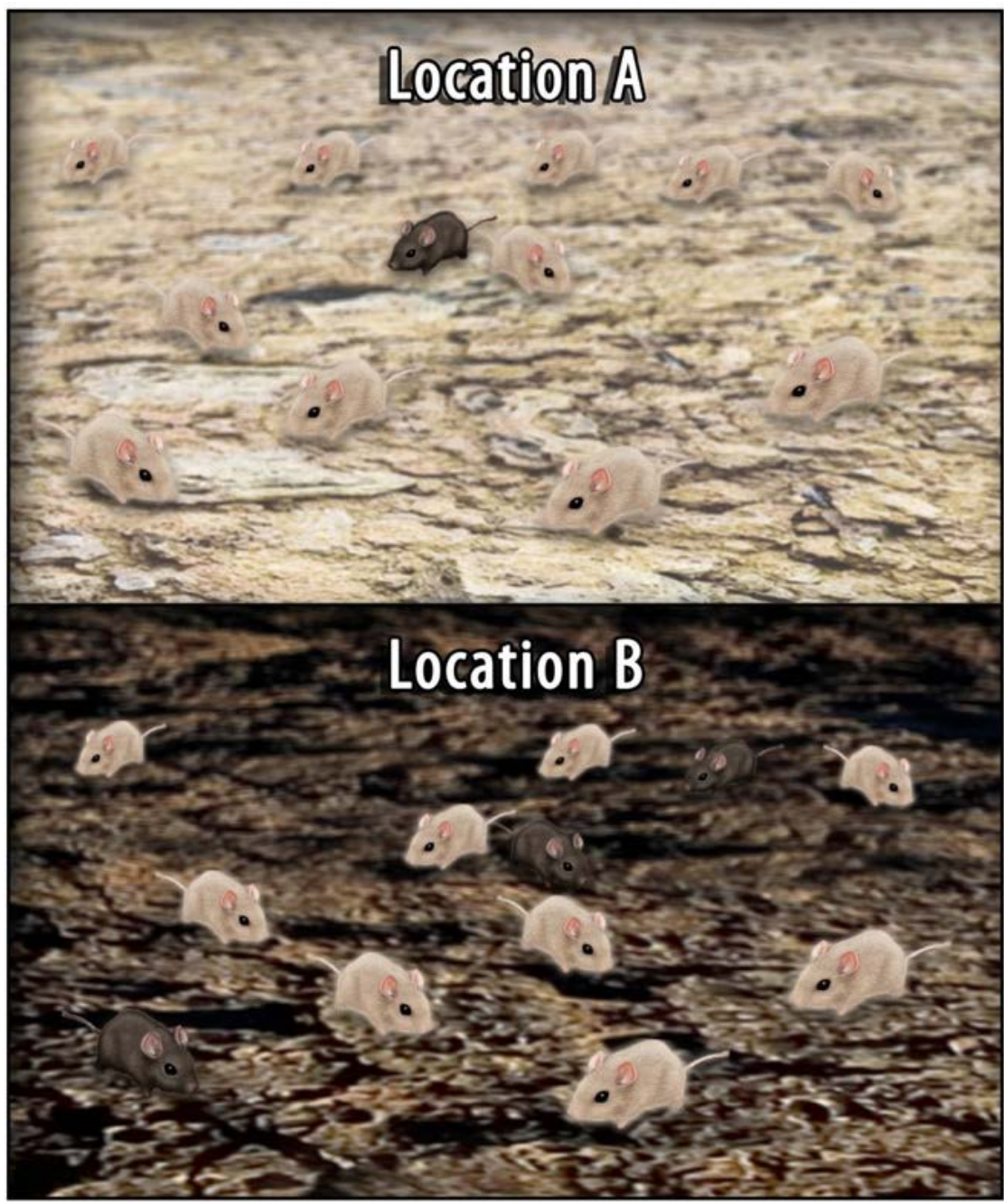
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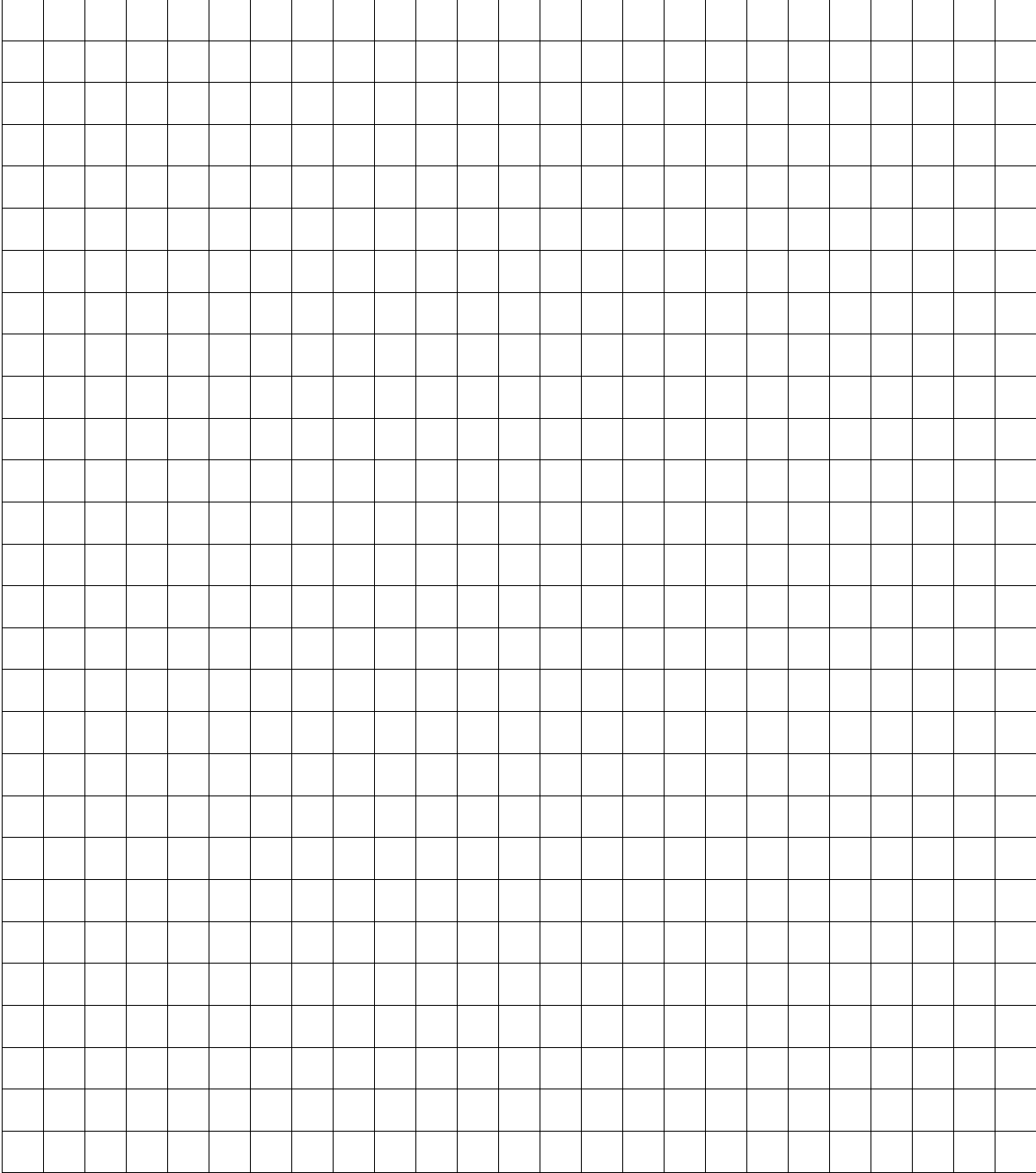
4. Watch the film *The Making of the Fittest: Natural Selection and Adaptation*. As you watch, look for an explanation for the differences among the illustrations that will help you to confirm that the order in which you arranged the illustrations is correct. Think about the following as you watch the film:

- Why are some mice light-colored and some mice dark-colored?
- Does fur color provide any selective advantage or disadvantage?
- What role does the rock pocket mouse play in the desert food web?
- What can explain the differences among the illustrations?

5. Using what you learned by watching the film, check the order in which you arranged the illustrations. Change the numbers you circled under the illustrations as necessary. Once you are satisfied you are correct, fill out the data table using the counts you recorded above the illustrations.

		First (oldest)	Second	Third	Fourth (most recent)
Location A	Number of mice with light fur				
	Number of mice with dark fur				
Location B	Number of mice with light fur				
	Number of mice with dark fur				

6. Use colored pencils to prepare a bar graph based on the data that shows the distribution of the mice at locations A and B through time. Be sure to provide appropriate titles and labels for the x- and y-axes. You may record all of your data for each time period (A and B) on one bar graph or split A and B and make two graphs.



*The Making of the Fittest:
Natural Selection and Adaptation*

**LESSON
STUDENT HANDOUT**

QUESTIONS

1. Explain why a rock pocket mouse's color influences its overall fitness. Remember that "fitness" is defined by an organism's ability to survive and produce offspring.

2. Explain the presence of dark-colored mice at Location A. Why didn't this phenotype become more common in the population?

3. Write a scientific summary that describes changes in the rock pocket mouse populations at Location B. Your summary should include:

- a description of how the population has changed over time.
- an explanation of what caused the changes.
- a prediction that describes what the population will look like 100 years in the future. Your prediction should be based on trends in the data you have organized. You can assume that environmental conditions do not change over the 100 years.

4. Use the data and what you've learned about evolution to explain how mutation is a random process, but natural selection is not random.

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