

Developing an Explanation for Mouse Fur Color

Introduction

Rock pocket mice are interesting in many ways. They make a living in the intense heat of the desert. They also come in different fur colors—from tan to black. What causes fur color in *individual* mice? In mice, a molecule called *melanin* affects fur color. Melanin is actually a group of molecules found in many different organisms, and it has a broad range of functions. It causes the black color of both bird feathers and the ink shot out by some squid and octopuses as a defense mechanism. The light-brown or tan color of several species of mice is caused by hairs having bands of yellow and black, which makes the hair look tan. In black mice, the hair is not banded but is solid black. So scientists understand what causes the color of fur in an individual. But how do we explain why some *populations* of mice are mostly black and others mostly tan? More evidence is needed.

The American Southwest is a fantastic place to study rock pocket mice with different coat colors. Lava flows created patches of dark rock among the surrounding light-colored sand. Researchers noticed that black rock pocket mice were more common on the dark lava flows, whereas the tan rock pocket mice were more common on the light-colored sand. Can this pattern be explained by natural selection? What evidence exists to make the case?

Procedure

1. Watch the Howard Hughes Medical Institute’s short film *The Making of the Fittest: Natural Selection and Adaptation* up to the 2:37 time mark. Pause the video when Dr. Nachman says, “Almost all of them.”
2. On your own, write your best answers to the following questions:
 - a. How would biologists explain how the mice on the lava flow evolved black fur? Include all of the elements you think are needed for a full explanation.

- b. Would biologists say that the mice changed because they wanted or needed to change? Why?

3. Review handout 3.11 (Natural Selection Explanation Table). This table can help you analyze any specific case of natural selection and summarize the evidence needed for a full explanation of trait changes in a population based on the process of natural selection.

4. Watch the rest of the short film *The Making of the Fittest: Natural Selection and Adaptation*. As you watch the film, identify any evidence you see or hear that supports each principle of natural selection for the change in fur color in some populations of rock pocket mice. Record the evidence on your Natural Selection Explanation Table.
5. After watching the video, add more evidence to your table based on your memory of the film and the video transcript.

Use-and-Apply Question

Oldfield mice (*Peromyscus polionotus*, also called *beach mice*) in the southeastern United States are in a different genus than rock pocket mice (*Chaetodipus intermedius*). Oldfield mice from the mainland live in areas with dark soil. These mice mostly have dark fur. Populations of the same species that live on the white beaches of Florida and Alabama have light fur. Describe the evidence you would need to collect to support the claim that the fur-color differences in these populations are due to natural selection.

Source: Adapted from an activity in the Evolution of Human Skin Color curriculum unit for AP Biology that is a part of the Smithsonian Institution’s National Science Foundation-funded Teaching Evolution through Human Examples project (Grant No. 1119468). See <http://humanorigins.si.edu/education/teaching-evolution-through-human-examples> to explore the full curriculum supplement.