

## ALLELE AND PHENOTYPE FREQUENCIES IN ROCK POCKET MOUSE POPULATIONS

### OVERVIEW

This activity serves as a guide to the HHMI short film *The Making of the Fittest: Natural Selection and Adaptation* and a means of reinforcing the concepts of variation and natural selection. If your class does not cover the Hardy-Weinberg equilibrium, you may wish to use the other activity, "Color Variation Over Time in Rock Pocket Mouse Populations."

### LEARNING OBJECTIVES

Student will be able to:

- explain how natural selection preserves favorable traits.
- describe how variation, selection, and time fuel the process of evolution.
- manipulate and analyze data.

### KEY TERMS

allele, allele frequency, Hardy-Weinberg, mutation, natural selection, melanism, variation, adaptation

### TIME REQUIREMENT

This lesson will take one or two 50-minute class periods.

### APPROPRIATE LEVELS

This lesson is appropriate for high-school biology (all levels including AP and IB) and introductory college biology.

### PRIOR KNOWLEDGE

Students should have a basic understanding of evolution, adaptation, and algebra.

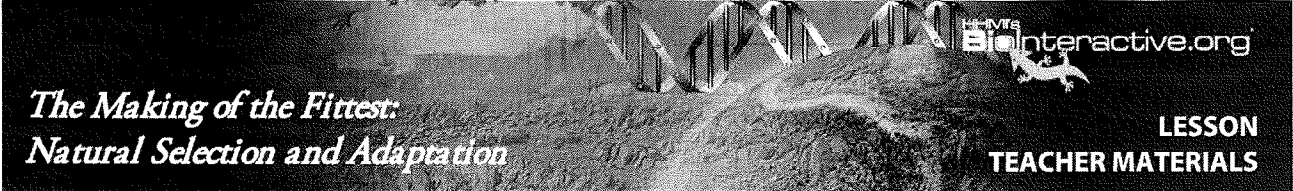
### MATERIALS

Students will need:

- calculator
- a computer and the Selection Coefficient Excel file found under "Survival of the Fittest—Battling Beetles" at <http://www.biointeractive.org/activities/index.html>

### TEACHING TIPS

- Fill a few plastic sandwich bags with 15 grams of paperclips and pass them around so that students have an idea of how much a rock pocket mouse weighs.
- You may want to show the film more than once so students can take notes. Encourage them to write down questions they have about the film's content.
- Students should understand that individuals do not evolve but that populations evolve and that variations may be favorable, neutral, or negative. Variations occur randomly and not "as needed."
- Explain that Hardy-Weinberg describes conditions under which evolution will *not* occur. This informs us about the conditions under which it *will* occur such as small population size, migration, nonrandom mating, occurrence of mutation, and finally selection. Selection is influenced by factors such as environmental change, predation, and disease. These actively influence the competitive advantage of specific traits present in a population. Point out that a population will almost always meet one or more of these conditions. In other words, populations are always evolving.



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

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LESSON  
TEACHER MATERIALS

- Reinforce with students that dominant alleles are not always more common. The allele for dark-colored coat color is dominant, but only common in populations living on basaltic substrates.
- If your students are not completely comfortable with the math involved in solving Hardy-Weinberg questions, it may be helpful to go over the problems in Part 1 as a class. The stepped-out math has been provided in the answer key for Part 1.
- Information about how the selection coefficient is derived mathematically is provided in the “Survival of the Fittest—Battling Beetles” activity located under Classroom Activities on the BioInteractive website (<http://www.biointeractive.org/activities/index.html>). The Excel spreadsheet is also at that location.