

Changes Over Time ▪ *Skills Lab*

Nature at Work

Problem

How do species change over time?

Skills Focus

predicting, making models

Materials

scissors

marking pen

construction paper, 2 colors

Procedure

1. Work on this lab with two other students. One student should choose construction paper of one color and make the team's 50 "mouse" cards, as described in Table 1. The second student should choose a different color construction paper and make the team's 25 "event" cards, as described in Table 2. The third student should record all the data.

PART 1 A White Sand Environment

2. Mix up the mouse cards.
3. Begin by using the cards to model what might happen to a group of mice in an environment of white sand dunes. Choose two mouse cards. Allele pairs WW and Ww produce a white mouse. Allele pair ww produces a brown mouse. Record the color of the mouse with a tally mark in the data table on the next page.
4. Choose an event card. An "S" card means the mouse survives. A "D" or a "P" card means the mouse dies. A "C" card means the mouse dies if its color contrasts with the white sand dunes. (Only brown mice will die when a "C" card is drawn.) Record each death with a tally mark in the data table.
5. If the mouse lives, put the two mouse cards in a "live mice" pile. If the mouse dies, put the cards in a "dead mice" pile. Put the event card at the bottom of its pack.
6. Repeat Steps 3 through 5 with the remaining mouse cards to study the first generation of mice. Record your results.
7. Leave the dead mice cards untouched. Mix up the cards from the live mice pile. Mix up the events cards.
8. Repeat Steps 3 through 7 for the second generation. Then repeat Steps 3 through 6 for the third generation.

The Mouse Game

Mouse Cards		
Number	Label	Meaning
25	W	Dominant allele for white fur
25	w	Recessive allele for brown fur

Event Cards		
Number	Label	Meaning
5	S	Mouse survives.
1	D	Disease kills mouse.
1	P	Predator kills mice of all colors.
18	C	Predator kills mice that contrast with the environment.

Data Table—Part 1

<i>Type of Environment:</i> WHITE SAND DUNES				
Generation	Population		Deaths	
	White Mice	Brown Mice	White Mice	Brown Mice
1				
2				
3				

Data Table—Part 2 "C" Event card now means that any mouse with the white fur will die.

<i>Type of Environment:</i> BROWN FOREST FLOOR				
Generation	Population		Deaths	
	White Mice	Brown Mice	White Mice	Brown Mice
1				
2				
3				

Think: How will the data differ if the mice in this model lived on a dark brown forest floor.



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Nature at Work *(continued)*

PART 2 A Forest Floor Environment

9. How would the data differ if the mice in this model lived on a dark brown forest floor? Record your prediction in the space provided.

10. Use the cards to test your prediction. Remember that a “C” card now means that any mouse with white fur will die.

Analyze and Conclude

Write your answers on a separate sheet of paper.

- 1. Calculating** In Part 1, how many white mice were there in each generation? How many brown mice? In each generation, which color mouse had the higher death rate? (*Hint:* To calculate the death rate for white mice, divide the number of white mice that died by the total number of white mice, then multiply by 100%.)
- 2. Predicting** If the events in Part 1 occurred in nature, how would the group of mice change over time?
- 3. Observing** How did the results in Part 2 differ from those in Part 1?
- 4. Making Models** How would it affect your model if you increased the number of “C” cards? What would happen if you decreased the number of “C” cards?
- 5. Communicating** Imagine that you are trying to explain the point of this lab to Charles Darwin. Write an explanation that you could give to him. To prepare to write, answer the following questions: What are some ways in which this investigation models natural selection? What are some ways in which natural selection differs from this model?

Design an Experiment

Choose a different species with a trait that interests you. Make a set of cards similar to these cards to investigate how natural selection might bring about the evolution of that species. *Obtain your teacher’s permission before carrying out your investigation.*