

Nature at Work: A Natural Selection Activity

In this lab, you will investigate how natural selection can lead to changes in a species over time (**evolution**). You will explore how both **genetic and environmental factors** play a part in **natural selection**.

Problem: How do species change over time (evolve)?

Materials

25 Event Cards 50 Yellow “Mouse” Cards

Procedure

Table 1: “Mouse” Cards

Number	Label	Meaning	Possible Genotypes	Possible Phenotypes
25	F	Dominant allele for white fur		
25	f	Recessive allele for brown fur		

Table 2: “Event” Cards

Number	Label	Meaning
5	S	Mouse survives
1	D	Disease kills mouse
1	P	Predator kills mouse of all colors
18	C	Predator kills mouse that <i>contrasts/differs</i> with the environment

Part 1: A White Sand Environment

1. Make predictions about the outcome of this scenario.

Prediction: Which mice will have a higher chance of survival, the white or brown? Why?
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2. Mix up the yellow mouse cards. Separately, mix up the pink event cards.

3. Take the *top two* mouse cards.
4. Take the *top* event card. Remember an “S” card means the mouse survives. A “D” or “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).
5. If the mouse lives, record its survival with a tally mark in the “live” column in the data table below. Put the two mouse cards in a “live mice” pile.
6. If the mouse dies, record its death with a tally mark in the “dead” column in the data table below. Put the two mouse cards in a “dead mice” pile.
7. Put the event card at the bottom of its pack.
8. Repeat steps 4 through 8 with the remaining mouse cards to study the first generation of mice.
9. For generation 2, use only the “live mice.” Mix the “live mice” pile. Mix the event cards and repeat steps 4 through 9. Record your results in the data table below.
10. For generation 3, again only use the “live mice.” Repeat just as you did for generation 2. Record your results in the data table below.

Data Table – Part 1:

Type of Environment: White Desert Floor						
Generation	Live		Dead		Total	
	White	Brown	White	Brown	White	Brown
1						
2						
3						
total						
survival rate						

11. Calculate the survival rate of white and brown mice. To calculate the survival rate for white mice, **divide** the total number of **live white mice** (the column on the left) **by the total number of white mice** (the column on the right), then multiply by 100 to get your percent. Do the same for brown mice. Write your answers in the table above.

For example: $40 \text{ total live white mice} \div 50 \text{ total white mice} \times 100 = 80\% \text{ survived!}$

Space to show your work:

12. Which color mice during Part 1 had the higher survival rate & why?

13. If the events here occurred in nature, how might this group of mice change over time & why?

Part 2: A Brown Forest Environment

14. Make predictions about the outcome of this scenario.

Prediction: Which mice will have a higher chance of survival, the white or brown? Why?

15. Repeat the procedure for part 1 for the brown forest environment to test your prediction. Remember that a “C” card now means that any mouse with white fur will die. Record your results in the data table below.

Data Table – Part 2:

Type of Environment: Brown Forest Floor						
Generation	Live		Dead		Total	
	White	Brown	White	Brown	White	Brown
1						
2						
3						
total						
survival rate						

16. Calculate the survival rate of white and brown mice. To calculate the survival rate for white mice, **divide** the total number of **live white mice** (the column on the left) **by the total number of white mice** (the column on the right), then multiply by 100 to get your percent. Do the same for brown mice. Write your answers in the table above.

17. Which color mice during Part 2 had the higher survival rate & why?

18. If the events here occurred in nature, how might this group of mice change over time & why?

19. What were the environmental factors that affected the mice in both scenarios?

20. Think about what the “C” cards represent. How would it affect the model if you increased the number of “C” cards? Explain why.

21. What are some ways in which this investigation models natural selection? Remember the phrase “survival of the fittest”