

Chapter 15 Darwin's Theory of Evolution

Modeling Camouflage and Natural Selection

Introduction

As part of his theory of evolution by natural selection, Charles Darwin proposed that organisms best adapted to their environment survive and reproduce more successfully than other organisms. Camouflage, the concealment of an organism because of its color, is an example of an adaptation that can increase an organism's chance of surviving to reproduce. Organisms that are more difficult for predators to see are less likely to be attacked. In this investigation, you will examine the effect of camouflage on the survival of a prey species.

Problem

How does camouflage affect natural selection in a prey species?

Pre-Lab Discussion

Read the entire investigation. Then, work with a partner to answer the following questions.

1. What in nature does the floral-patterned background represent?

2. Do you expect the predator to pick up an equal number of dots of each color? Explain why you think that.

3. Which of the colored dots do you expect to best "survive" attack by the predator?

4. Would an organism that is camouflaged in its usual environment be camouflaged in all environments? Explain your answer.

5. How might the results of this experiment change if the same dots were scattered on a multicolored background of colors that differs from the one that you use?

Materials (per group)

hole punch

colored construction paper (1 sheet of each of the following colors: black, blue, brown, green, orange, purple, red, white, yellow)

9 sealable plastic bags

80 cm × 80 cm piece of floral paper or cloth

transparent tape

Safety

Be careful when handling sharp instruments. Note the safety alert symbol next to step 1 in the Procedure and review the meaning of the symbol by referring to Safety Symbols on page 8.

Procedure



1. Punch 10 dots of each color from the sheets of colored construction paper. Put the dots for each color in a different plastic bag.

CAUTION: *Be careful not to pinch or cut your fingers with the hole punch.*

2. Spread a piece of floral paper or cloth on a flat surface. Use transparent tape to attach each corner of the paper or cloth to the flat surface.
3. Choose one member of your group to be the recorder and another to be the predator. The other members of the group will be the prey.
4. Have the predator look away while the prey randomly spread the dots of each color over the paper.
5. Have the predator turn back to the paper and immediately pick up the first dot he or she sees, and then put that dot aside.
6. In the Data Table, have the recorder make a tally mark in the correct row in the center column. Then across from that, in the column on the right, the recorder should write in the color of the background where the dot was found.
7. Repeat steps 5 and 6 until a total of 10 dots have been picked up. Make sure that the predator looks away before a selection is made each time.
8. In the center column of the Data Table, have the recorder write the total number of dots selected by the predator.
9. Have the recorder and the predator reverse roles. While the predator looks away, return the 10 selected dots to the multicolored surface. Then repeat steps 5 through 8.
10. Have one student from your group record your group data in a class data table drawn on the chalkboard.

Data Table

Color of Dot	Total Number of Dots Recovered	Background Colors (List)
Black		
Blue		
Brown		
Green		
Orange		
Purple		
Red		
White		
Yellow		

Analysis and Conclusions

1. **Comparing and Contrasting** Which color dot was picked up most frequently? Which color dot was picked up least frequently?

2. **Analyzing Data** How did the dots picked up most frequently differ from those that were picked up least frequently?

3. **Comparing and Contrasting** How did your group's results compare with the results of other groups?

4. **Drawing Conclusions** If the colored dots represent a species that is preyed upon, what does this experiment demonstrate?

5. **Predicting** Based on this model, if the original mixture of dots represents varied colors in the members of a population, what would likely happen to that population over many generations?

Going Further

The appearance of some animals changes as their environment changes. Using library materials or the Internet, research animals such as the snowshoe hare, arctic hare, arctic fox, and the gray wolf. Write a short paragraph describing seasonal changes in the appearance of these animals, and how these changes may help the animal survive.