INTERNET BioLab

Natural Selection and Allelic Frequency

Chapter 15

PREPARATION

Problem

How does natural selection affect allelic frequency?

Objectives

In this BioLab, you will:
- **Simulate** natural selection by using beans of two different colors.
- **Calculate** allelic frequencies over five generations.
- **Demonstrate** how natural selection can affect allelic frequencies over time.
- **Use the Internet** to collect and compare data from other students.

Materials

colored pencils (2)
paper bag
graph paper
pinto beans
white navy beans

Safety Precautions

CAUTION: *Clean up spilled beans immediately to prevent anyone from slipping.*

Skill Handbook

Use the **Skill Handbook** if you need additional help with this lab.

PROCEDURE

1. Use the data table.
2. Place 50 pinto beans and 50 white navy beans into the paper bag.
3. Shake the bag. Remove two beans. These represent one rabbit's genotype. Set the pair aside, and continue to remove 49 more pairs.
4. Arrange the beans on a flat surface in two columns representing the two possible rabbit phenotypes, gray (genotypes *GG* or *Gg*) and white (genotype *gg*).
5. Examine your columns. Remove 25 percent of the gray rabbits and 100 percent of the white rabbits. These numbers represent a random selection pressure on your rabbit population. If the number you calculate is a fraction, remove a whole rabbit to make whole numbers.
6. Count the number of pinto and navy beans remaining. Record this number in your data table.
7. Calculate the allelic frequencies by dividing the number of beans of one type by 100. Record these numbers in your data table.
8. Begin the next generation by placing 100 beans into the bag. The proportions of pinto and navy beans should be the same as the percentages you calculated in step 7.
9. Repeat steps 3 through 8, collecting data for five generations.
10. Go to **bdol.glencoe.com/internet_lab** to post your data.
11. Graph the frequencies of each allele over five generations. Plot the frequency of the allele on the vertical axis and the number of the generation on the horizontal axis. Use a different colored pencil for each allele.
12. **Cleanup and Disposal** Return all materials to their proper places for reuse.

BioLab Natural Selection and Allelic Frequency, *continued*

Data Table

Generation	Allele G			Allele g		
	Number	Percentage	Frequency	Number	Percentage	Frequency
Start	50	50	0.50	50	50	0.50
1						
2						
3						
4						
5						

ANALYZE AND CONCLUDE

1. Analyze Data Did either allele disappear? Why or why not?

_____

_____

2. Think Critically What does your graph show about allelic frequencies and natural selection?

_____

_____

3. Infer What would happen to the allelic frequencies if the number of eagles declined?

_____

_____

4. Error Analysis Explain any differences in allelic frequencies you observed between your data and the data from the Internet. What advantage is there to have a large amount of data? What problems might there be in using data from the Internet?

_____

_____

_____

_____

CHAPTER 15 The Theory of Evolution