CHAPTER 11 QUICK LAB

Genetic Drift

NGSSS: SC.912.L.15.14* Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.

Use a deck of cards to represent a population of island birds. The four suits represent different alleles for tail shape. The allele frequencies in the original population are 25% spade, 25% heart, 25% club, and 25% diamond tail shapes.

**Problem:** How does genetic drift occur?

**MATERIALS:** deck of cards  \hspace{1cm} **PROCESS SKILLS:** Modeling

**Procedure**

1. Shuffle the cards and hold the deck face down. Turn over 40 cards to represent the alleles of 20 offspring produced by random matings in the initial population.

2. Separate the 40 cards by suit. Find the allele frequencies for the offspring by calculating the percentage of each suit.

3. Suppose a storm blows a few birds to another island. They are isolated on this island and start a new population. Reshuffle the deck and draw 10 cards to represent the alleles of five offspring produced in the smaller population.

4. Repeat step 2 to calculate the resulting allele frequencies.

**Analyze and Conclude**

1. **Analyze** Compare the original allele frequencies to those calculated in steps 2 and 4. How did they change?

2. **Analyze** Did step 1 or 3 demonstrate genetic drift?

Teacher Notes

**Time** 15 minutes

**Purpose** Model how isolation of a small portion of a population can affect allele frequency

**Lab Management** Realize that students may not see the purpose of what they are doing right away. **Ask**, in step 3, what effect are you modeling? *founder effect*

**Inclusion** Pair students who have visual impairments with partners. Have the partners call out the suit of the cards as they are drawn so that the students with the visual impairments can complete the lab.

**ANSWERS**

**Sample Data**

**TABLE 1. TRIAL 1**

<table>
<thead>
<tr>
<th></th>
<th>Diamond</th>
<th>Heart</th>
<th>Club</th>
<th>Spade</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td>13</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>25%</td>
<td></td>
<td>32.5%</td>
<td>22.5%</td>
<td>20%</td>
</tr>
</tbody>
</table>

**TABLE 2. TRIAL 2**

<table>
<thead>
<tr>
<th></th>
<th>Diamond</th>
<th>Heart</th>
<th>Club</th>
<th>Spade</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>30%</td>
<td></td>
<td>30%</td>
<td>20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Analyze and Conclude**

1. Answers will vary.

2. After either step 1 or 3, if the allele frequencies differ from the original distribution of 25% each, then genetic drift has occurred. It is more likely to occur in step 3 because the population size is smaller.
3. The activity demonstrates evolution because it shows how the allele frequencies in a population can change. However, the activity does not demonstrate natural selection because the alleles were not passed on due to a selective advantage. The changes in allele frequencies were due to chance alone.