

Activity: Simulate a Genetic Bottleneck

Directions: Begin with a container of 20 objects, 8 of one color and 6 each of two other colors. This set of objects is Generation 1 of your sample population. Each color represents a phenotype. In this activity, you will follow this sample population through several generations, including one that experienced a genetic bottleneck.

1. As a class, assign each color a letter:

Color A:

Color B:

Color C:

Generation 1:

Phenotype	Frequency	Ratio (%)
A		
B		
C		

Event: A disaster drastically reduces the population of Generation 1, causing a genetic bottleneck.

2. To simulate changes to the gene pool caused by the Event, have one person, without looking, randomly choose ten objects out of the container. (Set aside the other 10 objects that were not selected.) This set of objects represents the population's adjusted gene pool—those who survived the Event. Record the new phenotype frequencies and ratios for Generation 1 in this table:

Generation 1 Survivors:

Phenotype	Frequency	Ratio (%)
A		
B		
C		

3. Have one person in your group, without looking, randomly draw half (five) of the objects from the Generation 1 Survivors population. These objects are the sample of genes that will be passed on to Generation 2. (Place the other five objects not selected back in the envelope). Each chosen object will reproduce another of its kind (same color) to bring the survivor population back to its original number (10) in Generation 2 (add one of each color from the envelope). Record the data for Generation 2 in this table.

Generation 2:

Phenotype	Frequency	Ratio (%)
A		
B		
C		

4. Repeat the process for Generation 3.

Generation 3:

Phenotype	Frequency	Ratio (%)
A		
B		
C		

5. Repeat the process one last time for Generation 4.

Generation 4:

Phenotype	Frequency	Ratio (%)
A		
B		
C		

6. Conclusions: Discuss how the genetics of the population changed through the generations by means of their phenotypes, especially after the Event. What other factors could change the genetic makeup of the population? What other challenges could the population face?
