

Idea Exchange

Teddy Graham Evolution
Hardy-Weinberg activity
Biology 11

I can't remember where I got the original idea from (I think it was Sharon Zylstra) but my students really enjoy this activity.

Connie Williams
Chilliwack Senior Secondary School
Chilliwack, B.C.
Email: c_Williams@chill.org
Phone: (604) 795-7295

Name _____

Teddy Graham Evolution

Procedure

1. Work in groups of three for this lab. Your teacher will give your group a handful of teddy grahams that were taken, without looking, from the box; this is your first generation of teddy grahams. Sort these into "happy" and "sad" teddy grahams. Record the number of each of these as well as the total number of teddy grahams in the population in your data table.
2. Eat **three** "happy" teddy grahams. If you have less than three "happy" teddy grahams, eat all the "happy" teddy grahams that you have.
3. Your teacher will give you another handful of teddy grahams taken at random from the box (this is the second generation). Add these to the teddy grahams that are left from the previous generation and again sort into "happy" and "sad" teddy grahams. Record, in the appropriate places on your table, the number of "happy" and "sad" teddy grahams for **both generations together**, and the total number of teddy grahams in the population.
4. Repeat steps 2 and 3 three more times so that you have tabulated results from five generations altogether.
5. Calculate the percentage of "happy" and "sad" teddy grahams from each of the five generations, using the following formulae:

$$\% \text{ of "Happy" Teddy Grahams} = \frac{\text{number of "happy teddy grahams}}{\text{total number of teddy grahams in pop.}} \times 100$$

$$\% \text{ of "Sad" Teddy Grahams} = \frac{\text{number of "sad" teddy grahams}}{\text{total number of teddy grahams in the pop.}} \times 100$$

Record each of these percentages in the appropriate places on your table.

Natural Selection in “Happy” vs. “Sad” Teddy Grahams

	Number of “Happy” Teddy Grahams	Number of “Sad” Teddy Grahams	Total Number of Teddy Grahams in the Population	% of Population that is “Happy”	% of Population that is “Sad”
First Generation					
Second Generation					
Third Generation					
Fourth Generation					
Fifth Generation					

Evolution of Teddy Grahams

The “happy” teddy grahams are homozygous recessive (ss). The “sad” teddy grahams are either homozygous dominant (SS) or heterozygous (Ss). Use your data from the above chart and the Hardy-Weinberg principle to fill in the following chart.

	p ² value (SS frequency)	2pq value (Ss frequency)	q ² value (ss frequency)	p value (S allele frequency)	q value (s allele frequency)
First Generation					
Second Generation					
Third Generation					
Fourth Generation					
Fifth Generation					

Analysis

1. Explain which trait is not favorable **using your data** to support your answer.
2. Which **phenotype** is reduced in the population?
3. What happens to the genotype frequencies of each trait from generation 1 to generation 5?
4. Make a graph showing separate lines for the p and q value in each generation. Are p and q constant over time?

5. What has occurred when there is a change in gene frequencies over time?

6. Explain what would happen over time if the selection pressure changed and the dominant trait was selected for? (For example, what would happen if the sad teddy grahams started to get eaten because they were depressed and didn't resist predators?)

7. What would happen if it were better to be heterozygous (Aa)? Would homozygous bears still be found in the population? Explain.

8. Explain why the recessive gene would not disappear entirely from the population over time.