

Bean Bunny Evolution

Modeling Gene Frequency Change (Evolution) Population by Natural Selection

Today you will examine natural selection in a small population of wild rabbits. Evolution, on a genetic level, is a change in the frequency of alleles in a population over a period of time (or how often an allele appears over time). Breeders of rabbits have long been familiar with a variety of genetics traits that affect the survivability of rabbits in the wild, as well as in breeding populations. One such trait is the trait of furless rabbits (naked bunnies). This trait was first discovered in England by W.E. Castle in 1933. The furless rabbit is rarely found in the wild because the cold English winter is a definite selective force against it.

In this activity, "F" represents the dominant allele for normal fur and "f" represents the recessive allele for no fur. Bunnies that inherit two "F" alleles or one "F" and one "f" allele will have fur (FF or Ff), while bunnies that inherit two "f" alleles will have no fur (ff).

PURPOSE:

In this activity you will model evolution by natural selection by examining the gene frequency of two alleles in a population of organisms. You will also calculate the gene frequency of the alleles (how common they are) for each generation and then graph the frequency of the two alleles over 9 generations.

HYPOTHESIS:

Will natural selection cause furless rabbits to be eliminated from the population? Why do you think so?

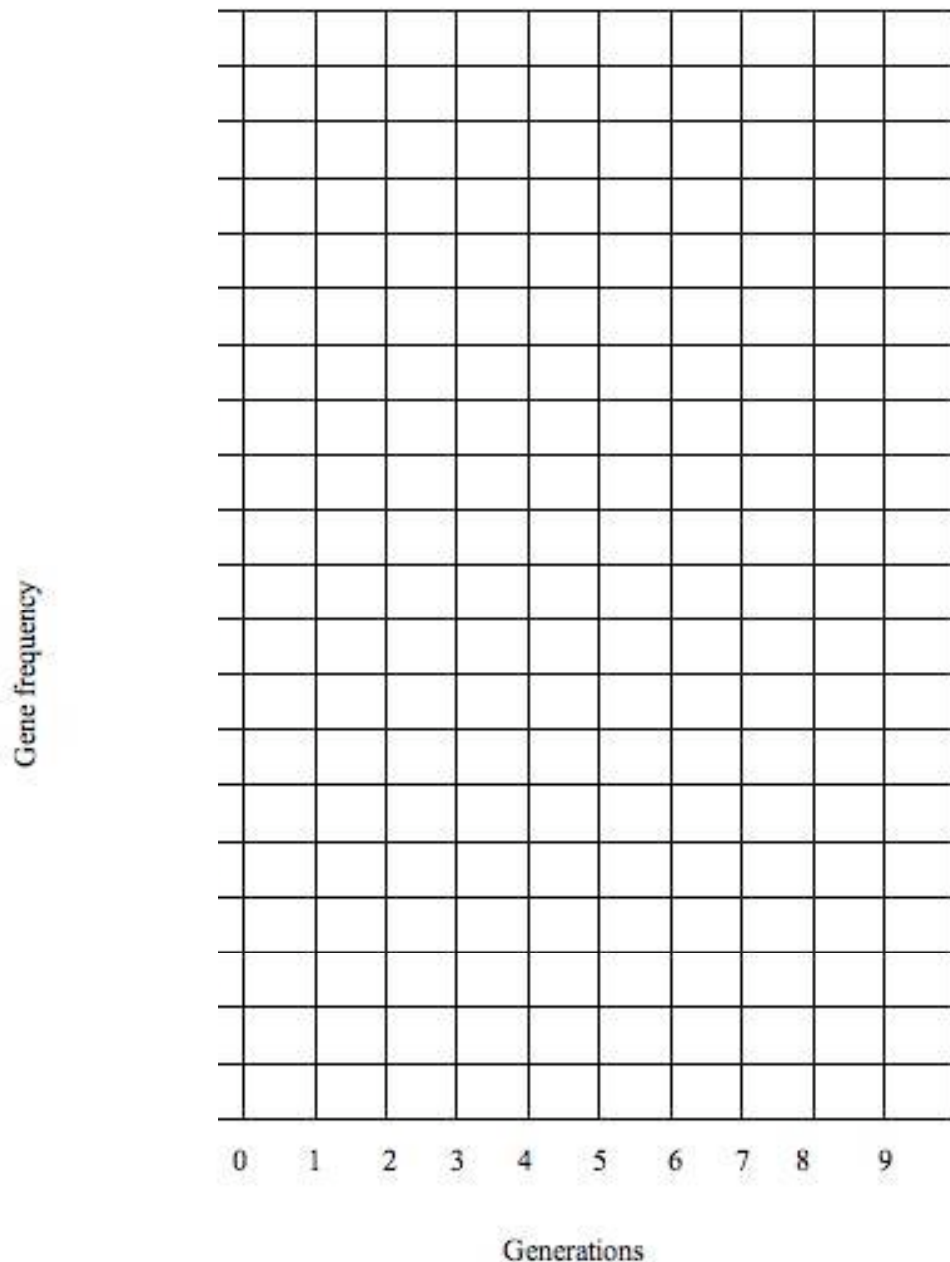
Materials:

- | | |
|---------------------------------------|-------------------------------------|
| -Activity sheet | -ff Petri dish (furless nursery) |
| -Pencil | -1 brown bag (English country side) |
| -Calculator | -1 beaker (bunny cemetery) |
| -FF petri dish (purebred fur nursery) | -30 white beans and 30 brown beans |
| -Ff Petri dish (hybrid fur nursery) | |

DATA ANALYSIS (GRAPHING)

4. Graph the frequencies of the F allele and the f allele on the graph paper provided. Prepare a **line graph** with the horizontal x-axis as the generation number and the vertical y-axis as the frequency in decimals. Plot both frequencies on one graph. Make a key or label the lines as "F allele" or "f allele."
5. Answer the conclusion questions of the activity.

Gene Frequencies of Fur and Furless Bunnies over 9 Generations



Conclusion Questions: (use complete sentences)

1. What was the original frequency of the "F" and "f" alleles before the temperature change?

2. How did the gene frequency of the "F" and "f" alleles change after the temperature change? (Use your data and your graph to support your answer.)

3. How is this simulation an example of evolution by natural selection?

4. In nature, how is it that an allele, like furlessness, are still passed along through generations and not completely selected (removed) out of the population.
