

# Dog Natural Selection Lab

## Background

This activity takes 10 different dog breeds and ranks them on a 1-10 scale according to the thickness of their coat. The Mexican Hairless dog is 1 and the Old English Sheepdog is 10. This models the release of random numbers of dogs per breed in two different environments: cold (Alaskan wilderness) and hot (Chihuahuan desert).

The dogs were released so that geographical barriers (e.g. a deep river, a tall mountain) prevent crosses between breeds and have assumed that the population of each breed is capable of doubling with every generation. The model depicts changes in population that would occur over five generations in each environment.

There are two major forces at play in the production and selection of the adaptations. On the one hand, there is genetic variation. There are animals with different size legs, different thickness in coat, different shape fins or teeth, etc. Mutations on genes mainly cause the genetic variation. Not all mutations translate into traits that are appropriate for a given environment. Natural selection, which describes the whole of the elements, physical (e.g. temperature, humidity, elevation, etc.) or biological (e.g. sources of food, predators, etc.) with which animals interact with, comes into play as the second force so that fit traits are favored and unfit traits are eventually eliminated from the population. This process is constantly going on in the wild, however, it involves a progressive change that spans many generations.

## Problem

What are some factors that influence natural selection in dog breeds?  
How can these influences be measured and what are its effects?

## **Procedure**

Carefully observe the information provided in the chart on changes in the relative numbers of dogs in a cold (Alaskan wilderness) and hot (Chihuahuan desert) environment for five generations.

## **Data Table**

### **Cold Environment**

<b>Dog Breed</b>	<b>P Gen</b>	<b>Gen 1</b>	<b>Gen 2</b>	<b>Gen 3</b>	<b>Gen 4</b>	<b>Gen 5</b>
Mexican hairless	11	0	0	0	0	0
Greyhound	2	0	0	0	0	0
Bulldog	43	17	6	2	0	0
Basenji	46	36	28	22	17	13
Golden retriever	5	5	5	5	5	5
English setter	12	19	30	47	75	119
Huskie	45	89	177	353	705	1409
Collie	8	12	19	30	47	75
St. Bernard	9	10	11	13	15	17
Old English sheepdog	10	7	5	3	2	0

### **Hot Environment**

<b>Dog Breed</b>	<b>P Gen</b>	<b>Gen 1</b>	<b>Gen 2</b>	<b>Gen 3</b>	<b>Gen 4</b>	<b>Gen 5</b>
Mexican hairless	11	17	27	43	68	108
Greyhound	2	3	5	9	17	33
Bulldog	43	68	108	172	275	439
Basenji	46	3	2	0	0	0
Golden retriever	5	4	0	0	0	0
English setter	12	4	0	0	0	0
Huskie	45	0	0	0	0	0
Collie	8	0	0	0	0	0
St. Bernard	9	0	0	0	0	0
Old English sheepdog	10	0	0	0	0	0

**Conclusion** Answer the following questions based on the information from the charts you studied and the information from class notes.

1. How could variation play a role in the natural selection of these dogs? List and completely explain at least two examples.

2. How would a geographic barrier prevent breeding between the different dog breeds? List and explain at least one example.

3. Explain the natural selection of the Huskie and the problems faced by the Mexican hairless in a cold environment.

4. What are some other species besides the Huskie that had an advantage in being selected for in a cold environment? Why?

5. Which species appeared to have an advantage and were selected for in a hot environment? Why did they have this advantage?

6. If these species had been allowed to interbreed, how might this have affected the survival of the species over several generations?