Natural Selection In Action

I. Introduction

Natural selection is the gradual process by which biological traits become either more or less common in a population as a result of the effect of inherited traits on the reproductive success of organisms interacting with their environment. It is a key mechanism of evolution. The term "natural selection" was popularized by Charles Darwin who developed a theory of evolution based on observations he made while sailing worldwide on the *HMS Beagle* between 1831 and 1836. In general, Darwin's theory of evolution based on natural selection states that, "organisms best-suited for their environment have higher chances of survival and reproduction".

In this activity, you will demonstrate natural selection using rabbit populations. The demonstration will allow you to change environmental factors, such as habitat and predators. In addition, you will be able to illustrate genetic factors involved with natural selection by altering gene dominance and adding mutations to the populations.

II. Procedure

1. Go to the following website : http://phet.colorado.edu/en/simulation/natural-selection .

2. Click on "Run Now!". Then open the JNLP file.

3. You will now perform five experiments using the simulation. For each experiment, you must identify a control and an experimental group of rabbits (based on fur color, tail length, and tooth size). Record these variables in the table. Also, record the environment in which the simulation is occurring.

4. For each of the experiments, begin by adding a friend and a mutation. The Chart option should also be set to Population. The mutation is the experimental group.

5. After three generations pass (indicated by jumps in the population graph), pause the demonstration and record the Initial Population of the Control Group and Experimental Group.

6. Then, add a Selection Factor by choosing wolves or food. Record the selective factor in the table. Continue playing the simulation for 4 more generations.

7. After four more generations pass, pause the demonstration and record the Final Population of the Control Group and Experimental Group.

8. Reset the simulation and repeat the procedure four more times by choosing different variables.

III. Data Table

Control Group	Experimental Group	Environment	Initial Pop. (Control)	Initial Pop. (Exper.)	Selection Factor	Final Pop. (Control)	Final Pop. (Exper.)

IV. Analysis & Conclusions

1. Based upon your evidence from the simulation, what conclusion are you able to make about each of the three different types of phenotypes (mutations) in rabbits?

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2. What happens to animals that cannot compete as well as other animals in the wild?

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3. Sometimes animals that are introduced into an area that they have never lived in before, will out-compete and endanger resident species. Why does this happen?

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4. How does this simulation mimic natural selection? Fail to represent natural selection?

   Mimic : _____

   Fail : _____