**VIRTUAL NATURAL SELECTION LAB**

TO COMPLETE THIS LAB, GO TO: Natural Selection Simulation

<http://phet.colorado.edu/simulations/sims.php?sim=Natural_Selection>

**Part 1: Exploring the Simulation**

1. Start the simulation. Add a friend. What happens? What happens if you don’t add a friend?
2. Start the simulation. Add a friend. Add a mutation (i.e., brown fur). What happens? Let the simulation continue until bunnies take over the world. Why does this happen?
3. Reset the simulation. Start the simulation. Add a friend. Add a mutation (i.e., brown fur). Add a selection factor (i.e., wolves). What happens? Will bunnies take over the world this time?
4. Reset the simulation. Start the simulation. Add a friend. Add a mutation (i.e., brown fur). Add a selection factor (i.e., wolves). Change the environment. What happens?

**Part 2: Guided Experiments**

*Conduct each of the experiments below. For each experiment,* ***let it run for 10 generations*** *(each generation appears as a big “jump” on the population chart, there is also a bar at the bottom that shows progression of generations) and* ***then record the results (i.e., size of population, appearance of the bunnies****).*

Experiment 1

* Add a friend and a brown fur mutation to the bunny population.
* Add the (natural) selection factor of food after F3 offspring appear.

Results:

Experiment 2

* Add a friend and a long teeth mutation to the bunny population.
* Add the (natural) selection factor of wolves after F3 offspring appear.

Results:

Experiment 3

* Add a friend and a long teeth mutation to the bunny population.
* Add the (natural) selection factor of food after F3 offspring appear.

Results:

**Part 3: Design Your Own Experiment**

1. **Ask a question** (Example: What happens if bunnies living in the *arctic* have the mutation of *brown fur* and subject to the selection factor of *food*?)
2. **Develop a hypothesis** (*Example: Since the color of a bunny does not affect its ability to get food, the population will be a mix of brown and white and since they have limited food, the population will stay pretty small*.)
3. **Outline steps required to run the simulation according to the parameters you set out in the question**. (*Example: Start Simulation. Add a friend. Change the environment to arctic. Add brown fur mutation. Add the (natural) selection factor of food after F3 offspring appear. Let simulation run for 10 generations. Pause simulation and collect data from Population Chart*). **Then run the simulation for at least 10 generations**.
4. **Collect the data from the population chart and explain the results**. (*Example: At the end, only 1 brown bunny was left and since he has no one to mate with the population will completely die out. This is not what I predicted. Since there was not enough food to support the bunnies, they died out*.)

Record all aspects of *your own experiment* below:

1. **Question:**
2. **Hypothesis:**
3. **Experimental Set-up/Directions for setting up the simulation:**
4. **Data and Results:**

**Part 4: Reflection Questions**

1. What examples of genetic variation can be found within the bunny population presented in this simulation?
2. Why are some bunny types better able to survive and reproduce than others?
3. In this simulation, are mutations good or bad? Explain your answer.
4. When can a mutation be considered an *adaptation*?
5. This simulation explores predators (wolves) and food as selective factors (also called selective pressures). Identify two other possible selective factors that could affect the bunny population.

EXTENSION: Challenge Questions:

1. When would long teeth an adaptation?

2. When would a long tail be an adaptation?