Is Natural Selection Fur-real?!

LO1: Students will be able to understand how individual characteristics affect survivorship of species (natural selection) by manipulating variables including physiology and environment. (10th)

LO2: Students will be able to understand how natural selection drives the process of evolution by running simulations in PhET. (10th)

Instructions

· Google Search “PhET Natural Selection Simulation”

· Click “Run Now”

· Manipulate variables available in the dashboard of the program to edit traits, selection factors, and environment.

· Get familiar with the program. Add friends, add a food source/predators, add mutations, ect…

· Complete the tasks below and turn in.

Task 1:

a) Select dominant and recessive traits.

b) Select for food to be available.

c) Select equator environment.

d) Let the simulation run for a few generations, then introduce the predator factor.

e) Repeat step “d” multiple times.

Question: After running the simulation for multiple generations, what do you notice about the population of bunnies? What is driving the observation you observed? As more and more generations of bunnies are born, are more desirable or undesirable traits being passed on (relate this to fitness: the ability to produce offspring that survive themselves to reproduce)?

The population will be mostly brown fur due to blending in with the environment even if the brown fur were recessive. The white rabbits were eaten more frequently by the wolves, and therefore not passing on the white fur genes.

Task 2:

a) Repeat steps “a” and “b” from Task 1.

b) Select the Arctic environment.

c) Repeat steps “d” and “e” from Task 1.

Question: After running your second simulation of bunnies, what do you notice about the population in the Arctic environment? Do you notice any differences from your first simulation? Formulate a hypothesis why you are seeing a difference (or not).

The population will be mostly white fur also due to blending in with the snow. Short tails were also more common due to less heat loss (short tail is not a required answer). The brown rabbits were easily spotted by the predators and were not able to pass on their genes as frequently.

Analysis:

Review your notes from the simulations between the Arctic and Equator simulations.

Reflect over your results, and think about these populations in relation to Natural Selection.

Question: If you have a population of bunnies with 50% having brown coats and 50% of the bunnies having white coats, would one color of bunnies be more fit in the Arctic environment? How does the survival of the bunnies explain evolution by natural selection?

The survival of the rabbits showed that fitness depends on the environment. In this case, the overall color of the environment favored a similar coat color. White bunnies in the arctic (or brown bunnies at the equator) survived and reproduced better, passing on the genes for that coat color to the next generation, and so on. Eventually the population becomes almost entirely one color. This change IS evolution.