**Natural Selection Simulation at Phet **

Website <http://phet.colorado.edu/en/simulation/natural-selection>
You will need Java to access the simulation. It is a trusted source!

Need help? Click on your computer type and then click on a question. <https://phet.colorado.edu/en/help-center/running-sims/general>



1.  When you first open the simulation, one bunny will be shown on your screen.  If you don’t do anything with the simulation, what happens to the bunny?

2.  The simulation allows you to control types of mutations that occur in the bunnies.  Look for the area that says “add mutation.”  What kind of changes can you make to your bunny?

3.  There are two selection factors listed that can also be changed.  What are they?

4.  What are the two environments you can choose?

 5.  Click on the RESET ALL button and you will get another bunny.  This time, click the button that says “add a friend.”    What happens to the bunnies this time?

6.  In nature,  populations don’t get out of control because there are limiting factors in the environment.   Start your simulation over and click to add food as a selection factor.   **Describe**what happens to the bunnies when food is added as a selection factor.

7.  Animals have adaptations that can help them survive in their environment.   Reset the simulation and add the “long teeth” mutation to your bunnies and use “food” as your selection factor.    **Describe** what happens to the bunnies this time.

8. The graph at the bottom of the simulation will show that bunnies with long teeth seem to have an advantage when food is a selection factor.  **Suggest a reason** for this trait providing an advantage to the bunnies.

9.  Reset your simulation and change the selection factor to “Wolves”
Which trait do you think will have the greatest advantage in the equator environment?

a)  brown fur               b)  long tail                  c)  long teeth

10.  Develop a way to test the prediction and describe your test and results below. What did you do to test this?



11.  Which trait seemed to provide the greatest *advantage* when wolves were the selection factor and *equator* was the environment?

12. **Describe** what happens to the brown bunnies if you change the environment to “arctic?”

**Analysis**

Consider what you have learned in the simulation.  If you are not sure of the answer, you can always go to the simulation and check. Answer True or False

\_\_\_\_ 13.  Tooth length is a type of selection factor.
\_\_\_\_ 14.   White bunnies that live in arctic environments will ONLY have an advantage if wolves are present.
\_\_\_\_ 15.   Selection factors, like food, will limit the population size.
\_\_\_\_ 16.   Mutation factors, like long tails, will limit the population size.
\_\_\_\_ 17.   Bunnies will overpopulate if you do not have a selection factor chosen.
\_\_\_\_ 18.  Bunnies with long teeth are more likely to survive when food is limited.
\_\_\_\_ 19.  Bunnies with brown fur that live at the equator are more likely to survive when wolves are present.
\_\_\_\_ 20.  A mutation can be an advantage in one environment, but not the other.

**Complete the VIDA Chart** - focusing on the bunnies in the simulation

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| --- | --- | --- |
| **Condition** | **Description** | **Evidence from Species Studied** |
| **V**ariation😍😎 | Individuals in a population differ in some trait.   **Variations** can be physical features,  behaviors,  bodily functions, or resistance to disease. |   |
| **I**nheritance👪 | The trait is **inherited** (passed fromparents to offspring).  The variation comes from random  mutations and the recombination during sexual reproduction. |   |
| **D**ifferential Survival and Reproduction👍👎 | Some individuals with a trait are more likely to survive and reproduce than those without the trait.***Selection****depends on the environment. Traits that are beneficial in one environment may not be beneficial in another.* |   |
| **A**daptations🙋🙋🙋 | The **frequency**of the trait that helps individuals survive or leave more offspring will increase in the population over time. |   |