**MYP Biology 9: Natural Selection Simulation Lab**

**Pre Lab Questions**

1. Define genetic mutation.
2. How do genetic mutations happen?

**Designing the Experiment**

In this lab, you will be controlling the mutations and the environment of a population of rabbits. You will write a hypothesis and design an experiment to test each one. You will be able to select with your group which trait you will be testing. You will be able to choose if the rabbits are white or brown, the mutation that occurs (fur color, teeth length, tail length), and the selection factor (wolves, food or nothing).

**Hypothesis**

*Use the following format to write a hypothesis as a group.*

If the rabbit population is living in the (environment), and is (color), and the population changes so that the rabbits now have (mutation), and there is (specific food type or predator), the population will (grow, die, become smaller), because (provide a reason).

**Completing the Simulation**

Go to <https://phet.colorado.edu/en/simulation/natural-selection>

Click on “Run Now”

Your group will work together to test your group’s hypothesis. Remember, you need to have a control in your simulation – **you choose what you want to use for a control**. Fill in the environment, mutation, if it is recessive or dominant, and your selection factor for your control and for your experiment. Check with your teacher prior to beginning the simulation.

At the beginning of the simulation, click “add a friend” **AND** select the mutation you choose. Each time you run the simulation, be sure to wait until the third generation of rabbits to add your selective factor (either food or wolves). The population will contains the mutation and not the mutation (look at the graph to determine the number of rabbits with and without the mutation). You will do three experimental runs. Each time you must fill in the information in the table. You need to keep track of the number of generations there have been. It shows the time until the next generation, and you will have to count each time the bar runs out. After completing the simulations, answer the questions that follow. \*\*If you are doing the wolves as the selective factor be sure to do a population count after the wolves have come through.

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| --- | --- | --- | --- | --- |
| Trial | 1 | 2 | 3 | Mean  |
| Environment |  |  |  |  |
| Mutation |  |  |  |  |
| Is the Mutation Dominant or Recessive |  |  |  |  |
| Selection Factor |  |  |  |  |
| ***Population with Mutation at 3rd Generation*** |  |  |  |  |
| Population without Mutation at 3rd Generation |  |  |  |  |
| ***Population with Mutation at 4th Generation*** |  |  |  |  |
| Population without Mutation at 4th Generation |  |  |  |  |
| ***Population with Mutation at 5th Generation*** |  |  |  |  |
| Population without Mutation at 5th Generation |  |  |  |  |
| ***Population with Mutation at 6th Generation*** |  |  |  |  |
| Population without Mutation at 6th Generation |  |  |  |  |
| ***Population with Mutation at 7th Generation*** |  |  |  |  |
| Population without Mutation at 7th Generation |  |  |  |  |

Graph your data.

 \*\* be sure to include axis labels and titles!

 \*\* you may want to use different colors to represent different trials

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**Post Lab Questions**

1. How do you think your selective factor affected the population of rabbits with the mutation *and* without the mutation?
2. Was it favorable to have the selected mutation or not? Why or why not?
3. What do you think would happen if you made your mutation dominant rather than recessive or vice versa?
4. Based on your evidence from the simulation, what conclusion are you able to make about your selected mutation in rabbits?
5. Select another mutation. Hypothesize what would happen if your rabbit population now got that mutation, if everything else is kept the same. Explain why you think that would happen.
6. Based on your results, and your knowledge about the individual words, come up with a definition for the term natural selection.
7. Do you think that you have the same species of rabbits at the end as you did in the beginning? Why or why not?
8. Do you think that if your rabbits had multiple genetic mutations, that another species of rabbits would develop? Why or why not?
9. How would you determine if genetic variation and mutations led to variation of a population or the rise of different species?