

Appendix B

Snake Activity Materials

Card Sort

<p>There is only 1 snake found north of the Arctic Circle: the European Adder. It gives birth.</p> <p>100% live birth 100 out of 100 snake species in this region give birth.</p>	<p>Of the 27 snake species found in Canada, 15 give live birth.</p> <p>56% live birth 56 out of 100 snake species in this country give birth.</p>
<p>In Michigan, 9 of the 17 snake species give birth.</p> <p>53% live birth 53 out of 100 snake species in this state give birth.</p>	<p>Florida has 37 snake species: 26 species lay eggs, and 11 give birth.</p> <p>30% live birth 30 out of 100 snake species in this state give birth.</p>
<p>In Tennessee, there are 34 snake species: 14 give birth, and 20 lay eggs.</p> <p>41% live birth 41 out of 100 snake species in this state give birth.</p>	<p>Missouri has 46 species of snakes. Half of those snakes give live birth, and half lay eggs.</p> <p>50% live birth 50 out of 100 snake species in this state give birth.</p>

Average Spring Temperatures

Arctic Circle 29.2°F	Canada 41.3°F
Michigan 42.6°F	Florida 69.9°F
Tennessee 57.3°F	Missouri 54.4°F



Image from: "US State Outline Map." (2005) USGS. Retrieved from: https://commons.wikimedia.org/wiki/File:US_state_outline_map.png

Snake Birth Data

In the left column, list the states from north to south, highest latitude to lowest. In the right column, write the corresponding number of snake species out of 100 that give birth.

State	Number of snake species out of 100 that give birth

As you move north on the map, the number of live births _____.

What do you think is causing the change in the number of live births?

What other species do you know of that have traits that change in this same pattern?

Appendix C

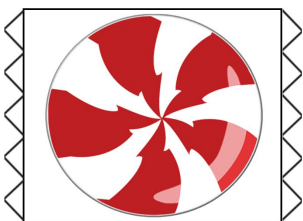
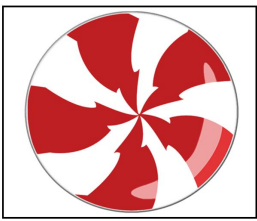
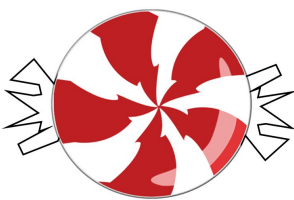

Peppermint Variations

Use the table below to compare the number of peppermints opened based on sock type.

Thin socks	Thick socks

Which type of sock would be most beneficial to the species trying to open the peppermints? Why?

Use the table below to compare the number of peppermints that remain unopened.

What do the peppermints remaining represent?

Which type of peppermint would be most beneficial to the species trying to survive the peppermint predator?

Appendix D

“What is Variation?” Video Notes

In the left column, write all of the important information. Some has been added to get you started. In the right hand column, add examples.

Important information	Examples of trait variations
Variation is _____ _____ _____ _____ _____ _____	
Plants and animals are all _____ _____	

Appendix E

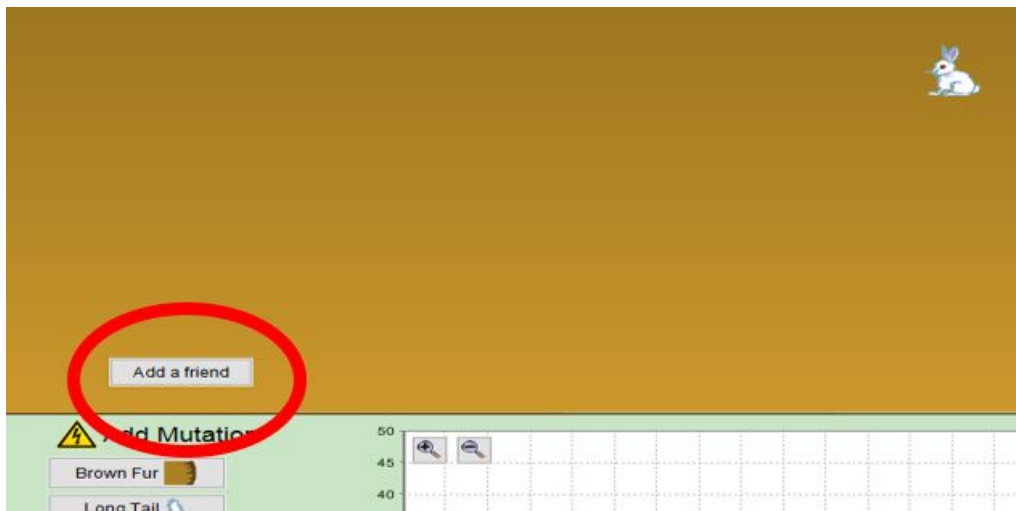
PhET—Natural Selection Simulation Lab

Open the [simulation](#).

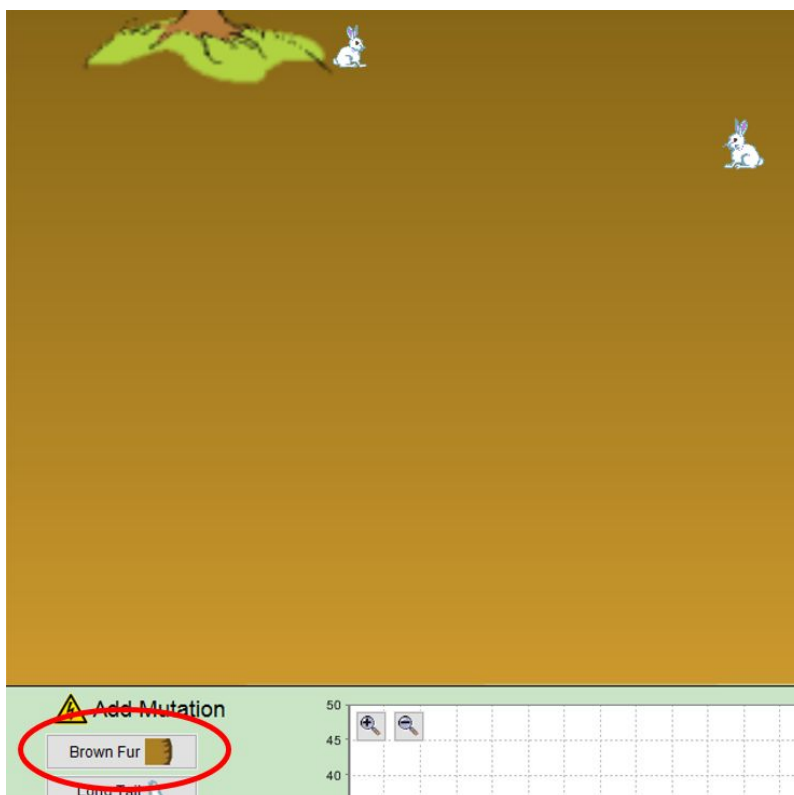
Notice that when the simulation is first opened, the environment is set to equator. What do you know about the environment at the equator? _____

What do you notice about the environment in this simulation? _____

Click add a friend for your bunny.



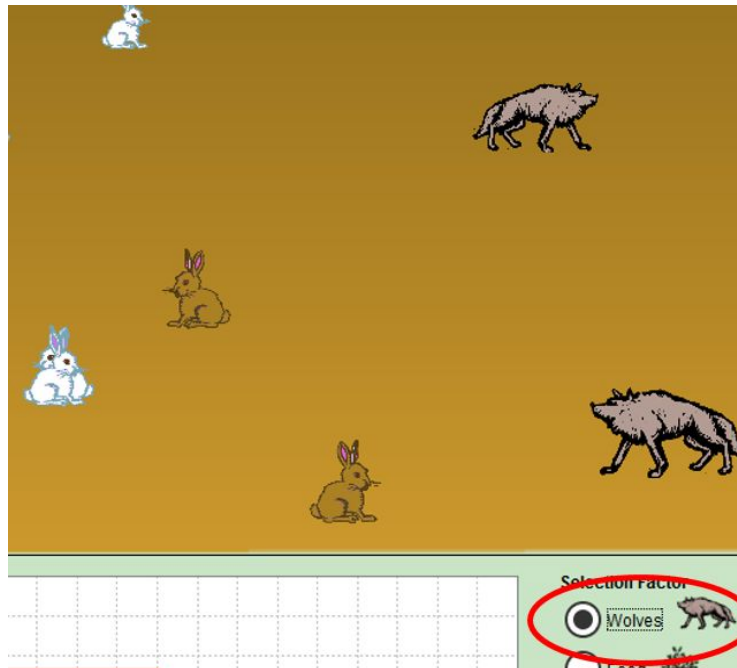
Click to add the brown fur mutation.



Allow the simulation to run for several generations.

Which color rabbit is most common? _____

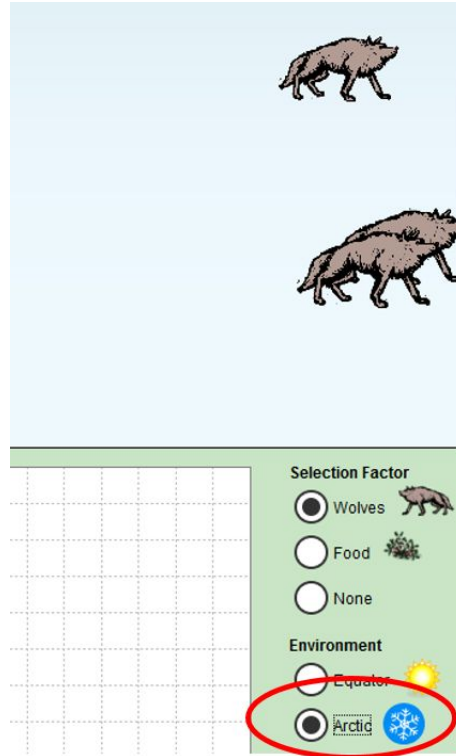
Click to add wolves.



Which color rabbits are the wolves eating the most? _____

Why do you think that might be? _____

Click to change the environment setting to arctic.



Click to remove wolves to allow the rabbit population to build up again.

What do you know about the environment in the arctic? _____

What do you notice about the arctic environment in this simulation? _____

Allow the simulation to run for several generations.

Which color rabbit is most common? _____

Click to add wolves back.

Which color rabbits are the wolves eating the most? _____

Why do you think that might be? _____

How does climate impact the rabbit population? _____

Some snakes lay eggs, and others have live births. Of the two types of rabbits that we saw in the simulation, which was more like the egg-laying snake? Circle one.

Brown Fur Rabbit

White Fur Rabbit

Complete the chart below using the following animals: egg-laying snake, live-birth snake, brown rabbit, and white rabbit.

Location	Most successful animal	
	Snake	Rabbit
Cold climate		
Warm climate		

What do you think is the main reason that one type of rabbit is more successful than the other in a given environment?

Do you think the variation in the rabbits' color serves a similar purpose to the variation in snakes' birthing methods? What other possible environmental factor could explain why snakes have different ways to give birth?

What do you think would happen to the snakes that laid eggs if they moved to a colder environment like the rabbits? _____

Why do you think it is beneficial to snake populations to have variety in the way they produce offspring? _____

Appendix F

Camouflage Lab

In this lab, you will model “paper bugs” with color acting as camouflage against a predator. You will analyze the impact of color on bugs’ visibility. Then, you will determine the population-level benefits of having a variety of traits as the environment changes.

In groups of two, one person is in charge of setup and timing. The other person acts as the predator. With the predator facing away, the partner in charge of set up will lay 10 red, 10 white, and 10 green paper squares on the red section of your paper. The predator will then turn and find as many paper squares as possible in five seconds. The predator may collect only one at a time. As a visual hunter, the predator is choosing those that are easiest to see. Record how many of each are found below.

Green	Red	White

Which color did you collect the most of? _____

Which color did you find the least of? _____

Why do you think your results turned out this way? _____

Let’s look at the data of other groups to compare. Compile your data with two other pairs’ data below and find an average.

	Green	Red	White
My data			
Other pair #1			
Other pair #2			
Add up all three numbers above			
Divide the number above by 3 to find your average			

Were the averaged results the same as yours? _____

Why do you think that is? _____

Create a bar graph of your averaged results below.

Number of "Paper Bugs" Chosen by Color



Which color "paper bug" is most likely to be eaten by the predator? Why? _____

Which color "paper bug" is most likely to survive? Why? _____

What do you think future generations of "paper bugs" will look like? Explain your thinking.

Now, we are going to consider what happens if the “paper bug” is slowly pushed out of its environment and into a different environment. Consider switching roles in your partnership. The partner in charge of setup will lay 10 red, 10 white, and 10 green paper squares on the red and green striped section of your paper. The predator will then turn and find as many paper squares as possible in five seconds. The predator may collect only one at a time. As a visual hunter, the predator is choosing those that are easiest to see. Record how many of each are found below.

Green	Red	White

Which color did you collect the most of? _____

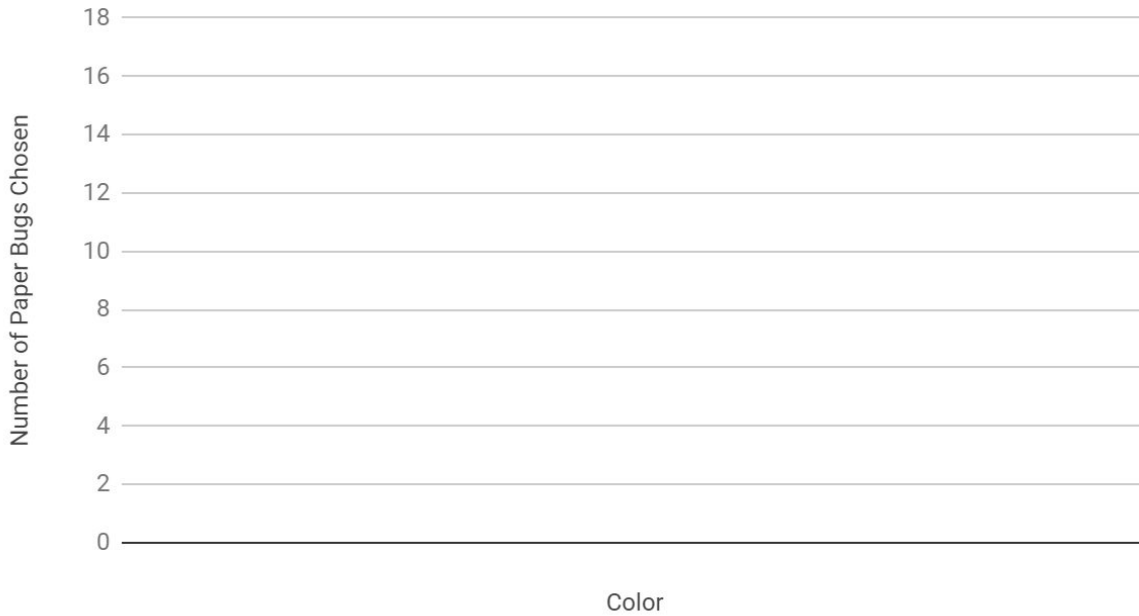
Which color did you find the least of? _____

Why do you think your results turned out this way? _____

How is this different from your results in the last round? _____

Create a bar graph of your results below.

Number of "Paper Bugs" Chosen by Color



Which color "paper bug" is most likely to be eaten by the predator? Why? _____

Which color "paper bug" is most likely to survive? Why? _____

As the environment changed, how do you think the variety of traits benefitted the paper bug? _____

Now, we are going to consider what happens if the “paper bug” is slowly pushed out of its environment and into another different environment. Consider switching roles in your partnership. The partner in charge of set up will lay 10 red, 10 white, and 10 green paper squares on the green section of your paper. The predator will then turn and find as many paper squares as possible in five seconds. The predator may collect only one at a time. As a visual hunter, the predator is choosing those that are easiest to see. Record how many of each are found below.

Green	Red	White

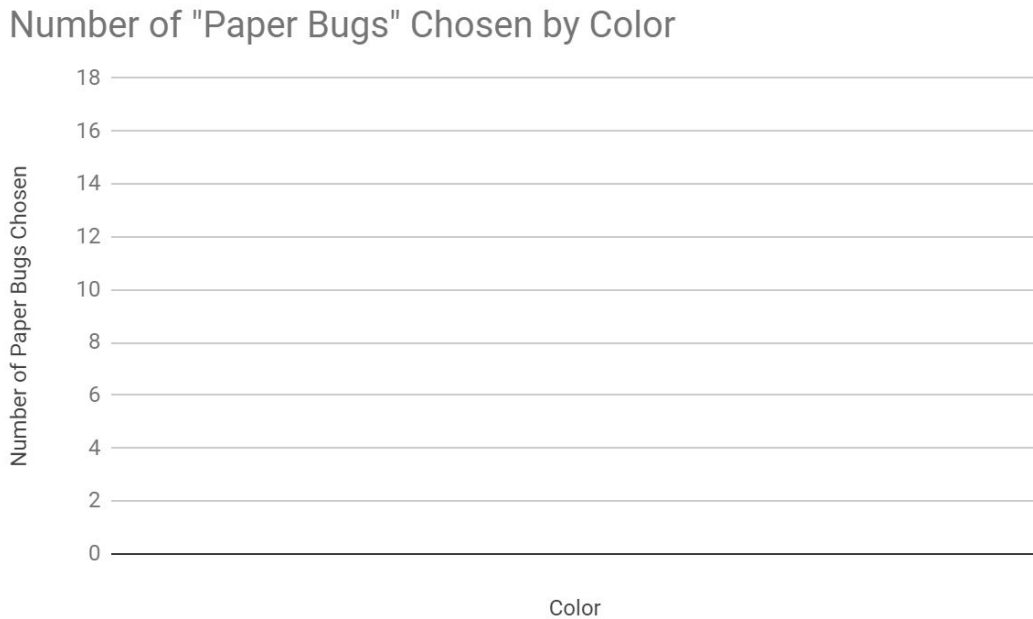
Which color did you collect the most of? _____

Which color did you find the least of? _____

Why do you think your results turned out this way? _____

How is this different from your results in the last round? _____

Create a bar graph of your results below.

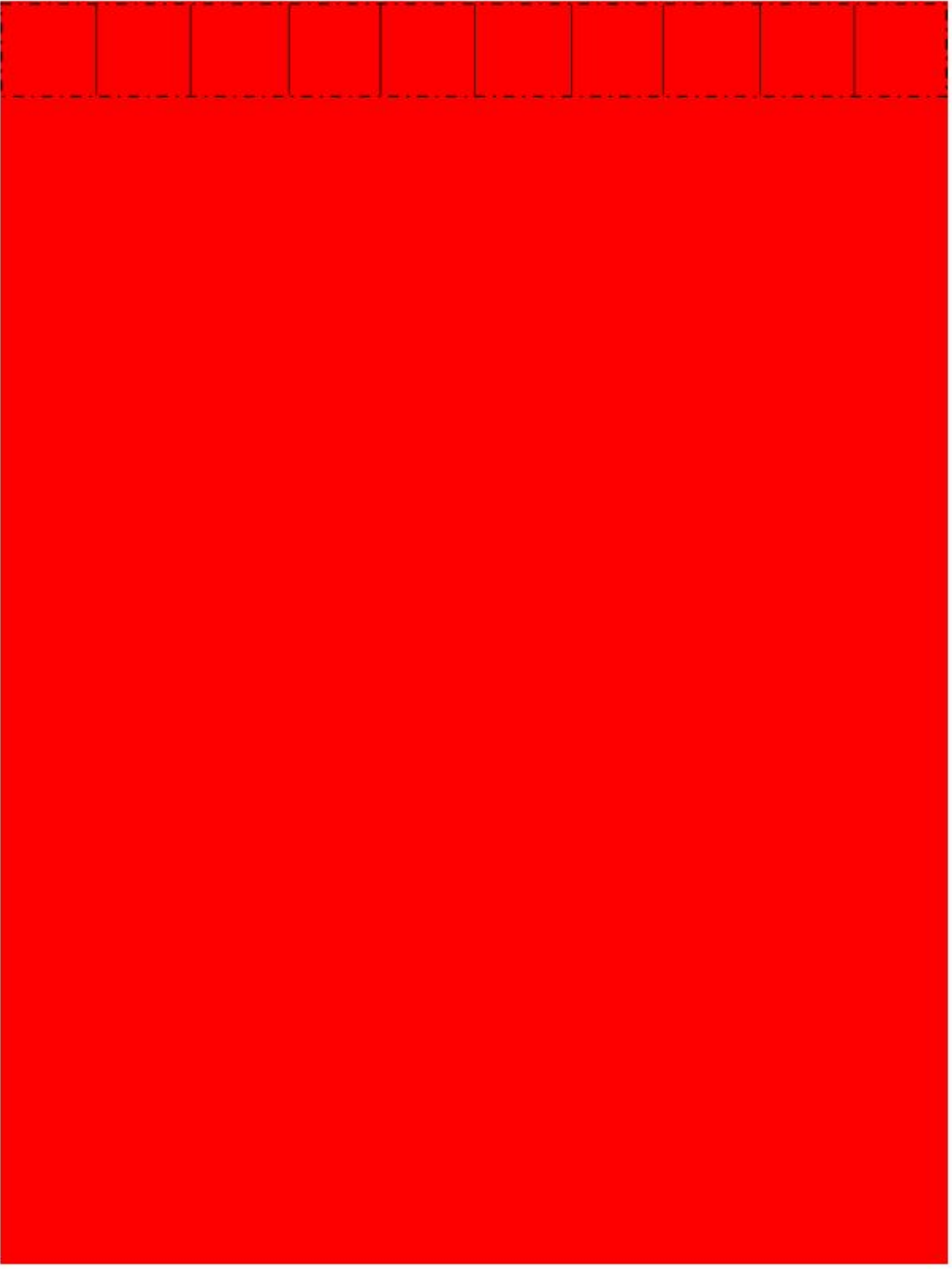


Which color "paper bug" is most likely to be eaten by the predator? Why? _____

Which color "paper bug" is most likely to survive? Why? _____

As the environment changed, how do you think the variety of traits benefitted the paper bug? _____

Much like the "paper bug" expanded its territory, alligators also have expanded their range into Tennessee. How are they able to make this change?



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