

# 8<sup>th</sup> Grade Science Packet

Week: March 23 – March 27, 2020

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Read through the notes "Darwin & Evolution by Natural Selection" located on Google Classroom.  
Then, complete the following pages.

Proposed by:

Also Known As:

Examples :

# Natural Selection

For each of the following, define in your own words and give an example of how it relates to natural selection. You may also illustrate the term.

Overproduction:

Competition:

Variation:

Heredity:

Differential Reproductive Success:

The word "Evolution" is written in a stylized, blue, italicized font with a lightning bolt graphic behind the letter 'E'.

# Natural Selection - Crash Course Biology #14

Watch the video using the link (also posted on Google Classroom):  
[https://www.youtube.com/watch?v=aTftyFboC\\_M](https://www.youtube.com/watch?v=aTftyFboC_M)

*Give a description of each term based on the video.*

1) Natural Selection [1:27](#)

2) Adaptation [2:56](#)

3) Fitness [3:36](#)

The Four Principles [3:54](#)

4) Variations [4:01](#)

5) Heritability [4:17](#)

6) "The Struggle for Existence" [4:25](#)

7) Survival and Reproductive Rates [5:00](#)

8) Charles Darwin [5:59](#)

Modes of Selection [7:40](#)

9) Directional Selection [8:17](#)

10) Stabilizing Selection [8:56](#)

11) Disruptive Selection [9:27](#)

12) Sexual Selection [10:22](#)

13) Artificial Selection [11:24](#)

## **Exploration: Bunnies are taking over the world!**

### Introduction

In 1778 the First Fleet, a group of English citizens, arrived to establish a new settlement in Australia. They brought with them a number of rabbits, which were to be bred for food. In 1859, Thomas Austin, missing the rabbit hunting he was accustomed to in England, had 24 European rabbits shipped to him so that he could establish a rabbit population large enough that it could be used for hunting in Australia.

What these settlers did not realize is that Australia's mild winters allow rabbits to breed throughout the year and feed on the abundant low-lying vegetation. By 1886, the rabbit population exploded, despite the fact that over two million of them were shot every year.

The rabbits had become a pest species in their new habitat. Their ravenous appetites caused a drastic loss of native plant species, which in turn increased erosion. This wreaked havoc on both the aquatic and terrestrial ecosystems in the area.

The government finally had to resort to dealing with the rising population by promoting increased hunting and trapping, destroying the rabbits' holes, and introducing viruses that decreased the population by one sixth of its size. However, genetic resistance allowed the number to rise three-fold by the early 1990s. The government tried to use another virus to control the population. This grew out of the government's control and started infecting many pets around the country. Australia still struggles with rabbits as a pest species today.

### Purpose

The purpose of this activity is to simulate the growth of a rabbit population in order to understand the role of limiting factors and variation in maintaining or destroying the population.

### **Things to note about this particular rabbit population:**

- **Brown rabbits camouflage with their surroundings, which allow them to avoid being eaten by predators. White rabbits are easily spotted by predators.**
- **Short-toothed rabbits are not able to eat the food when provided. Only long-toothed rabbits can access the provided food source.**

### Procedure

1. Navigate to <http://phet.colorado.edu/en/simulation/natural-selection>
2. Click on the "RUN NOW" button
3. Once you have the simulation window active, click the "PAUSE" button at the bottom to stop the simulation.

**NOTE: you can always start over by pressing the "RESET ALL" button**

4. The simulation starts you off with only one bunny. When you "add a friend", the two bunnies will start to reproduce.

Without changing any of the parameters within the simulation, write a prediction of what you think will happen to the bunny population when you "add a friend" in [Table 1](#).



5. Press "Play" and then "Add a friend". Let the simulation run for several generations. Record what actually happened to the bunny population (You may write "matches prediction" if you were right). Finally, write an explanation for what you observed.
6. Repeat steps 4-5 for each of the scenarios in Table 1. Be sure to write your prediction BEFORE pressing play! Also, allow the simulation to run long enough for you to actually see what will happen to the population.

<b>Table 1: Predictions and Results</b>			
<b>Scenario</b>	<b>What do you think will happen?</b>	<b>What actually happened?</b>	<b>Why did this happen?</b>
#1: No selection factors or mutations			
#2: Introduce wolves after the population gets above 50, no mutations			
#3: Introduce food after the population gets above 50, no mutations			
#4: Introduce brown fur mutation, Introduce wolves after the total population gets above 50			
#5: Introduce long teeth mutation, Introduce food after the total population gets above 50			

Conclusions

1. Based on what you observed, what are some factors that you believe to be essential to keeping the size of a population in check?

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2. Compare scenarios #2 and #4 and #3 and #5. What happened when the bunnies were all the same compared to when there were two *different* types of bunnies?

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3. Based on your response to #2, would you consider variation, or differences, within a population to be beneficial or harmful? Explain.

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**EXTRA CREDIT CHALLENGE**

Manipulate the simulation so that it never stops, that is, the bunnies do not “take over the world” and the population never dies out.

When you figure out this challenge, describe the selection factors and mutations involved in creating this situation and explain why the simulation keeps going indefinitely.

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## Adaptation and Natural Selection Library Activity

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Directions:** Pick an animal to research. You may use anything in the library to help you understand your animal.

Name of animal: \_\_\_\_\_

Where does your animal live: \_\_\_\_\_

Name at least 4 adaptations your animal has made to survive in this environment and how it helps them to survive:

- Helps:
- Helps:
- Helps:
- Helps:
- Helps:

What did your animal's ancestors look like many years ago? (google: "(animal name) ancestors") Describe it:

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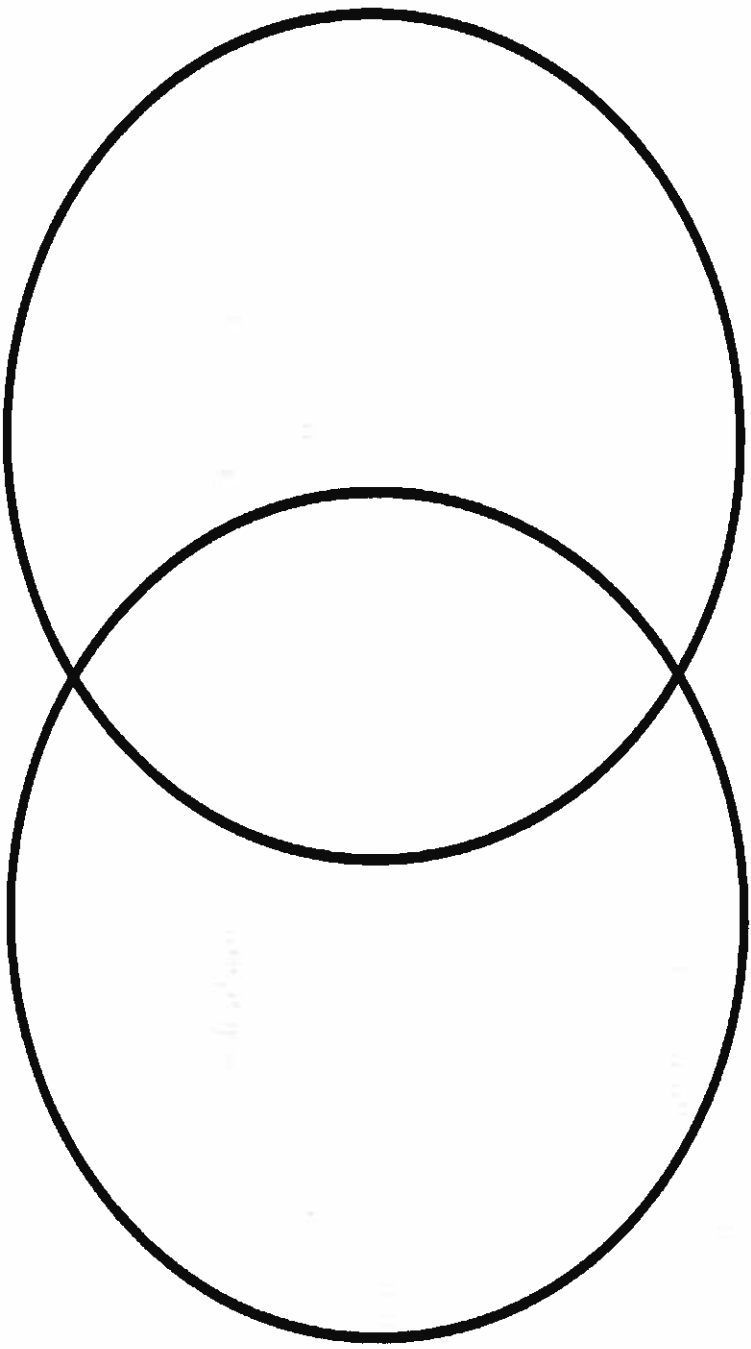
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Compare and contrast the two.



Why do you think your animal of today is better adapted for its environment than its ancestor?

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Who was natural selection for? Ancestor or Today's?

Who was natural selection against? Ancestor or today's?



Name: \_\_\_\_\_ Date: \_\_\_\_\_

Annotate as you read.

### How does personality form?

For many years, scientists have wondered whether **personality** is dependent on how you were raised, or if it is mainly genetic. What do you think?

Studies of animals can possibly answer this question. An experiment was done in Siberia, Russia, that started in the 1950's. In this experiment, **foxes** were selectively bred for certain behaviors. **Selective Breeding** is when two animals

with **desirable traits**, a male and a female, are placed in the same room, and are encouraged to mate. After they mate, their offspring will have the traits the scientists want. Selective breeding is not just done by scientists; it has been done for thousands of

WHAT IS SELECTIVE BREEDING? WHY IS IT DONE?

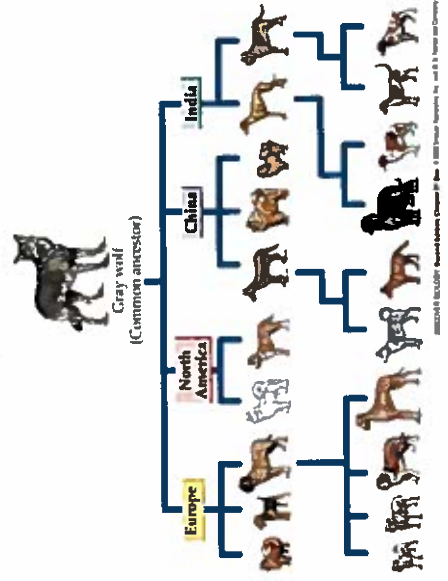
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years in different countries - by farmers to get the horses they wanted, or the chickens with the tastiest eggs. *Look at the example below: Dogs were bred from wolves. Now dogs have many colors, sizes and personalities.*



Selective Breeding

In the Siberian experiment, researchers used **two groups** of foxes. One group of foxes was bred to be very tame, well behaved and friendly. The other group of foxes was bred to be very, very aggressive, nasty and completely unfriendly. This

experiment started in the 1950's and is still going on today. You can imagine that after about sixty years of doing the same thing, you really get the results you want. Right now, the lab has some really tame foxes, and really **aggressive** foxes.



**Aggressive fox**

**DESCRIBE THE SIBERIAN EXPERIMENT. WHAT DID THE RESEARCHERS DO?**

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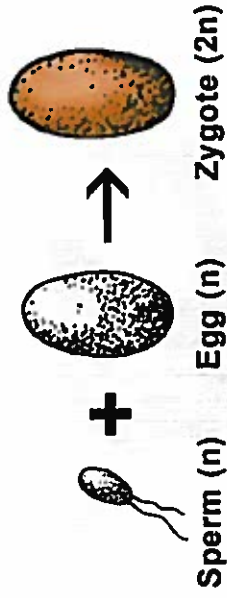
**Nice, friendly fox**

So in order to see if personality is genetic or if it is dependent on how you were raised, researchers tried something interesting. They took babies born to tame foxes, and had the aggressive female foxes **adopt** them and raise them. (Certain mammals, just like people adopt.) The scientists thought that the aggressive foxes would “teach” the tame babies to be aggressive. This did not happen, when the babies became adults, they were still very friendly towards humans. The scientists also did the reverse; they took away babies born to aggressive fox

mothers, and gave them to the nice/tame mothers to adopt. Once again, the babies were aggressive as adults, even though they were raised by nice mothers!

What's the extra step that the researchers did? Describe the result.

The researchers repeated the adoption process several times, and each time, the results were the same, your genes seemed to make your personality, not the mother who raised you.



Then researchers tried one more thing. They created a **zygote** from the aggressive mother's egg, and the aggressive father's sperm. Then, they implanted the zygote in the *tame* mother's uterus. Basically the tame mother was pregnant with someone else's child, specifically the aggressive fox's child. Then, when the child was born, the tame fox raised it. Still, the results were the same, the baby fox grew up to be aggressive. The reverse of this, where the "tame" zygote was implanted into the aggressive fox's uterus, and then raised by the aggressive fox showed that the fox that has the tame genes was tame no matter what.

Based on these carefully planned out and recorded experiments, the scientists at the laboratory concluded that personality is coded for by the DNA, and that the environment has little to do with it. Do you agree?

What is the last and final thing that the researchers did? What was the result?

Name: \_\_\_\_\_

1. **Select a quote that you found interesting, and explain why you thought it was interesting.**
2. **What was the purpose of this experiment?**
3. **What conclusion did the researchers draw at the end of the experiment?**
4. **Do you believe that personality is from genes or do you believe that it comes from the environment/upbringing? Explain. Did the content of the article influence your answer?**

5. **Select** a quote that represents something that really surprised you. **Explain** why it surprised you.

6. Write down 2 questions you still have. The answer must not be in the article.