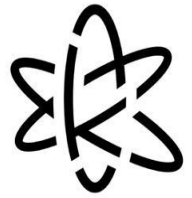




# **Eighth Grade Science**

## 8<sup>th</sup> Grade Science: Activity # 2

# How does genetic variation within a species help an organism survive dramatic environmental changes?



Directions: This handout goes with a KCS Teacher Video. If you have access to the video, watch the video while doing this activity. You can find the videos here <https://www.knoxschools.org/Page/21816>

## Peppered Moth and Natural Selection

**Part One: Set up this activity first. You will use it during the rest of the lesson.**

**Preferred Materials (Method 1):** Newspaper, Black Construction Paper, and Scissors

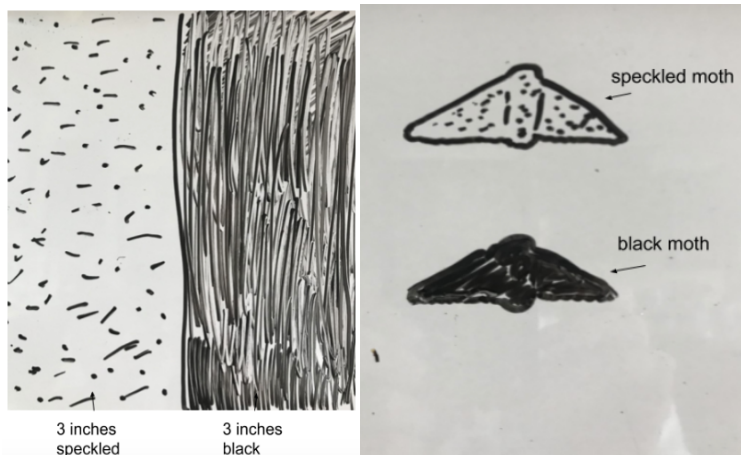
**Alternate Materials (Method 2):** Paper, Pencil or Marker, and Scissors

### Method 1--

1. Cut both the newspaper and construction paper into strips approximately 3 inches wide.
2. Cut the shape of a moth out of both the newspaper and construction paper. Do your best and be sure to leave enough paper for your moths to hide on. You may reference the example below.

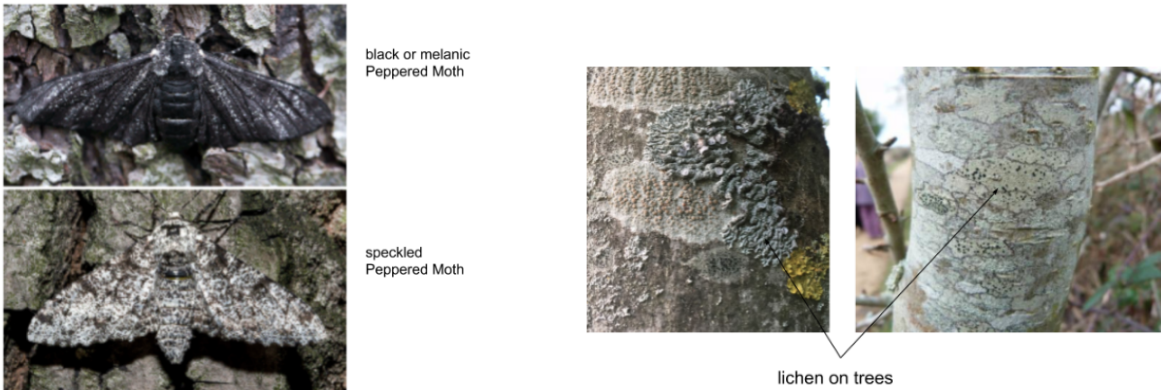
### Method 2--

1. Draw two, three-inch wide strips on a piece of paper.
2. Color one strip black, and put dashes and dots all over the other strip.
3. Cut the shape of a moth out of both the speckled and black strip of paper. Do your best and be sure to leave enough paper for your moths to hide on. You may reference the example below.



## Part Two: Environmental Changes and Natural Selection

Read the following passages using the materials you set up in Part One to make predictions:



The Peppered Moth is commonly found throughout the British Isles, and it is one of the most famous examples of natural selection at work. Most peppered moths are white with black speckles across their wings and body, thus the name Peppered Moth. However, due to genetic variation, there is a small percentage of Peppered Moths that are black, also called melanic. Under normal circumstances in Britain, healthy trees are covered in lichens. Moths typically fly at night, but rest on the trunks of trees during the day to avoid predators. Moths are an important food source for birds (predators) in this area. Birds fly in and pick the moths off the trees as they rest on the tree trunk. **Move both moths to the healthy lichen covered tree (newspaper or speckled paper) and answer question one.**

1. Which version of the Peppered Moth is more likely to survive on healthy lichen covered trees?  
**Why?**

The (black, speckled) Peppered Moth is more likely to survive on healthy lichen covered trees because \_\_\_\_\_.

During the nineteenth century, the industrial revolution was underway, and cities did not have regulations to control pollution. Pollution was not only coming from industry, but people were also heating their homes with coal fire, which creates black smoke. Air in the cities became sooty, killing the lichens, and blackening both trees and buildings. **Now move both moths to the pollution-blackened tree (the black paper) and answer question number two.**



2. Which version of the Peppered Moth is more likely to survive on the tree blackened by pollution? **Why?**

The (black, speckled) Pepper Moth is more likely to survive on the tree blackened by pollution because \_\_\_\_\_.

By the mid-twentieth century air quality was improving due to controls introduced to reduce air pollution. Lichens once again returned to city trees.

3. What do you think happened to the peppered moth population once lichens returned to the trees?

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4. Do you see any similarities with the improvement of city environments in the twentieth century with what is happening now during the global pandemic? **Explain.**

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5. Peppered moths reproduce every year. Adult moths emerge from their pupa in early to mid summer and lay their eggs and die by the end of summer. Do you think the process of natural selection could have been seen so quickly in a larger animal with a longer gestation period? **Why or why not?**

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### Part Three: Online Peppered Moth Game Simulation

Go to <https://askabiologist.asu.edu/peppered-moths-game/peppered-moth.html> for the next activity. On this website, you will find interesting information about the peppered moth, its life cycle, and the history of the changes that happened to it during the Industrial Revolution.

1. Read the information on the two tabs, Peppered Moth and Natural Selection.
2. This simulation allows you to watch natural selection in action. A population of moths will be released in a forest. At the beginning, the population is 50 percent light moths and 50 percent dark. During the simulation, graphs at the bottom will record any changes in the population. The only factor different between the two types of moths is the color of the wings. Your role in the simulation is that of a **predator** (bird who eats the moths). Guide the bird with the mouse to the moths. Click on the moth with the mouse to eat



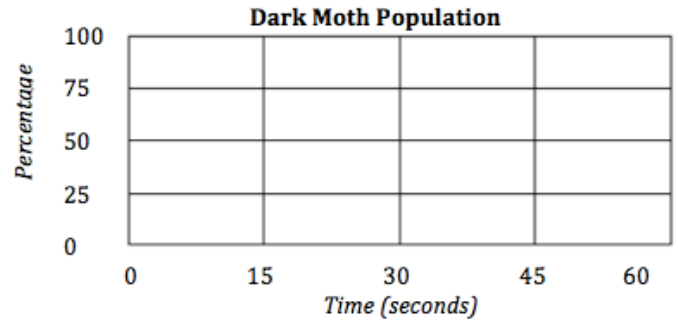
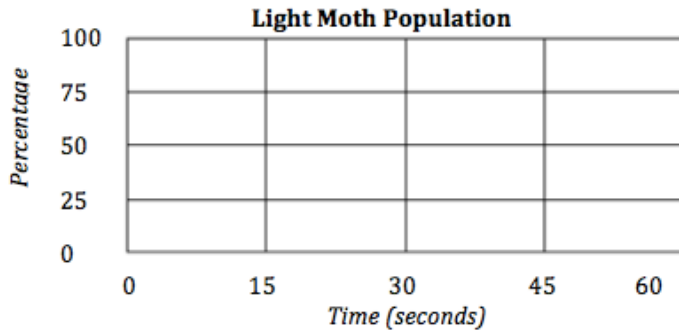
the moth. Every time you eat a moth, you will hear the crunch of an exoskeleton. If you miss the moth, you will hear the bird call. Eat as many moths as possible in the minute you have.

- Click on the **Play Game** tab. You will play the game twice, once in the light forest and once in the dark forest. As you finish the first game, stop and copy the graphs the game will create for you in the blanks graphs provided below. Do this for both games (light forest and dark forest). Use your graphs to answer the questions at the end.

### Light Forest Graphs (Round 1 of Game)



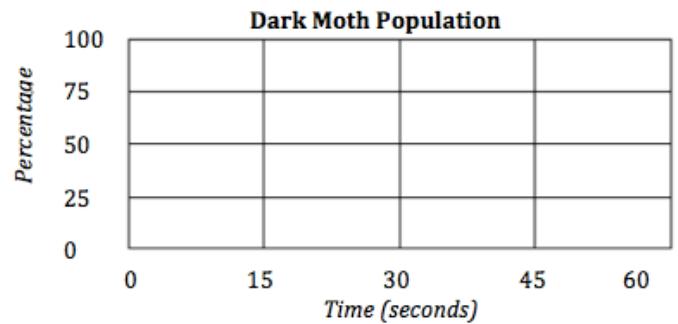
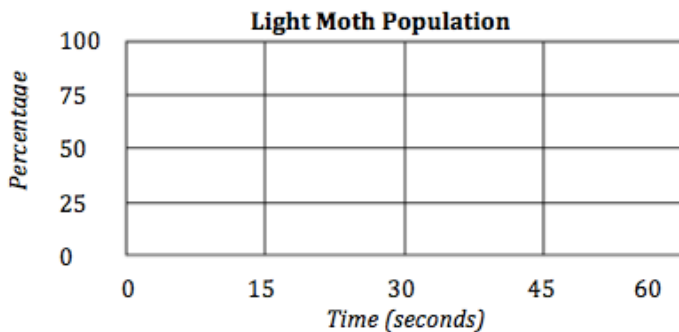
Light Forest



### Dark Forest Graphs (Round 2 of Game)



Dark Forest



a. What trends do you see in your data (the graphs from the two games)?

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b. How do the trends support what you have learned about Natural Selection?

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