

# Peppered Moth Investigation

## Natural Selection

Edgenuity Unit: Evolution

Lesson: Factors Affecting Natural Selection

Time: 30-60 minutes

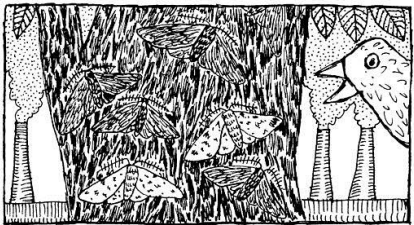


### Learning Target

I can explain how natural selection impacts phenotypes and genotypes of a species over time.

### Materials

- Paper punch
- 2 small plastic cups
- Two sheets dark gray paper
- Two sheets medium gray paper
- Two sheets light gray paper



Wikipedia Commons: Khaydack

Before the year 1845, in the city of Manchester, England a **population** of light gray colored moths known as Peppered moths lived in the surrounding forests. They would cling to the trunks of trees that were themselves covered with a light gray colored bark. The fact that these moths were able to blend in with this light gray background served as an advantage, providing protection in the form of camouflage from birds (predators). However, a gene controls the coloration of moths with **alleles** that can be expressed in different shades of gray. Because of this **genetic variation**, dark and medium gray colored moths were sometimes born. Around 1845 the city started becoming more

industrialized, with factories pouring black coal smoke into the air. This pollution fell into the surrounding forests and slowly turned the bark of the trees to a darker gray color thereby making the lighter gray moths more vulnerable to **predation**. Suddenly the dark gray colored moths possessed an advantage. As a result, over a period of approximately fifty years the moth **population** experienced a “shift” in the frequency of the **alleles** that determine moth coloration.

In this example, the trait of coloration is the targeted selection while the agent of selection is the predation. This investigation will allow you to role-play as the predator.



### Procedures:

Label the following papers on one side:

- Light Gray – Environment 1.

- Medium Gray – Environment 2.
- Dark Gray – Environment 3.

Fill a plastic cup with room temperature or cool water.

Punch out 30 circles each from the three UNLABELED sheets .

Ask a neighbor or the teacher to place 10 dark, 10 medium, and 10 light gray dots on the Environment 1 sheet without you watching.

When your assistant is finished setting up, dip your pointer finger in the cup of water. You'll be using this finger to pick up the dots.

Begin with "Environment 1" and pick up as many dots as you can in 10 seconds with your wet finger. Place these into an empty plastic cup and record the colors in the table below:

	Light Gray Dots	Medium Gray Dots	Dark Gray Dots
Light Gray Environment 1			
Medium Gray Environment 2			
Dark Gray Environment 3			

Repeat with Environments 2 & 3 and record in the table.

Complete the following questions remembering that dots represented peppered moths.

What color was the majority of peppered moths in Manchester before 1845?

Was the shift coloration, from light gray to dark gray, a beneficial change for the moth **population** as a whole? Why or why not?

In this investigation, which "moths" had the best chance for survival in environment 1? Why?

In this investigation, which “moths” had the worst chance for survival in environment 1? Why?

In this investigation, which “moths” had the best chance for survival in environment 2? Why?

In this investigation, which “moths” had the best chance for survival in environment 3? Why?

What do you think would happen to the peppered moth **population** if after the industrial revolution the trees changed back to their original light gray colored bark?

In your opinion, is natural variation within a **population** beneficial to the long-term survival of a **population** (or **species**) as a whole? Please explain, why or why not.