

Peppered Moth Survey

#12

Introduction

Industrial melanism is the term used to describe the adaptation of an organism in response to a type of industrial pollution. One example of rapid industrial melanism occurred in the peppered moth, *Biston betularia*, in the area of Manchester, England, from 1845 to 1890.

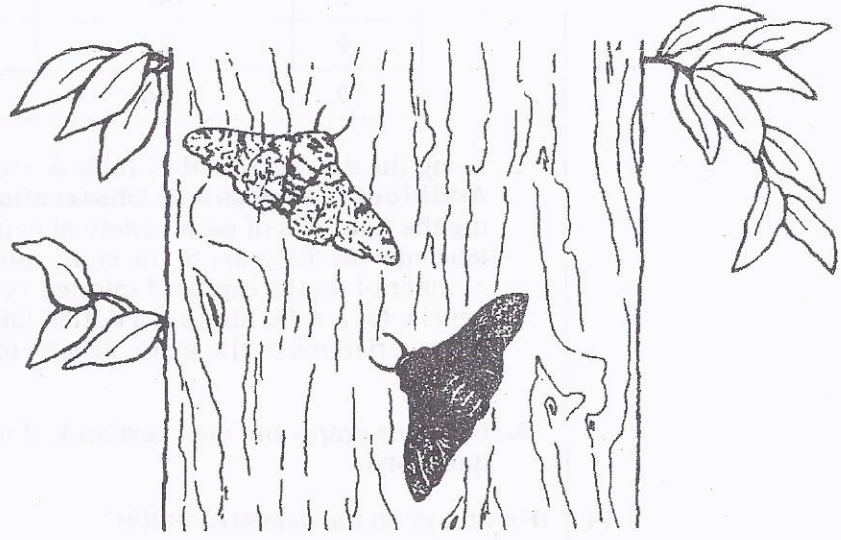
Before the Industrial Revolution, the trees in the forest around Manchester were light grayish-green due to the presence of lichens on their trunks. Peppered moths, which lived in the area, were colored light with dark spots. Their coloring served as protective camouflage against predators, especially birds. As the Industrial Revolution progressed, the trees became covered with soot, turning the trunks dark. Over a period of 45 years, a change in the peppered moths took place.

In this investigation, you will observe the effects of industrial melanism in the peppered moths over the course of 10 years. You will then determine the relationship between the environmental changes and the color variation of the peppered moth by using research data to graph the effects of an environmental adaptation.

Materials

- Graph paper
- Colored pencils (2) (optional)

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Focus Question

Design your own **Focus Question** based on the information presented in the Introduction and Materials sections above, as well as the additional information presented in the Procedure section that follows. Write your Focus Question on the Vee Form.

Knowing Side

With the help of your teacher, your class will discuss the **Subject Area** background for this investigation. Then, with the help of your classmates, list the **Concepts** and the new **Vocabulary** words on your Vee Form. In the **Concept Statements** section of your Vee Form, use these words in sentences that define and explain them.

Procedure

1. Table A contains data from a 10-year study of two varieties of the same species of peppered moth. The numbers represent moths captured in each of 10 consecutive years. The traps were located in the same area each year.

Table A

Year	Number of Light Moths Captured	Number of Dark Moths Captured
2	537	112
3	484	198
4	392	210
5	246	281
6	225	357
7	193	412
8	147	503
9	84	594
10	56	638

2. Using the data provided in Table A, construct a graph in the **Additional Records and Observations** section of your Vee comparing the numbers of each variety of peppered moth. The axes are labeled with the years of the study (plotted horizontally) and the number of moths captured (plotted vertically). Use different colored pencils (or a solid line and a dotted line) to indicate each of the two color variations of the moth. Be sure to include in a key beneath the graph.
3. Use your graph and your textbook, if needed, to answer the following questions:

a. *What preys on the peppered moths?*

INVESTIGATION 9-1 CONT.

b. If the bark of trees is dark and the moths that rest there are light, what might happen to the moths?

c. What is a mutation?

d. What could have caused the first few moths to change from a light variety to a dark variety?

e. What event caused the tree trunks of many trees in England to turn from light to dark?

f. Which variety of moth increased over the 10-year period?

g. What is the name of this type of evolutionary change?

Use the information on the **Knowing Side** of the Vee to interpret your results from the **Doing Side**, and then to help you determine your **Knowledge Claim**. Write a **Value Claim** for this study.

Analysis

h. 1. Using the data on the graph, draw a conclusion concerning the population of peppered moths in the sampled area of England.

i. 2. Explain the reason for the increase in the number of dark-colored moths.

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INVESTIGATION 9-1 CONT.

3. What means could be used to return the environment of moth to its original state?

4. What effect would cleaning up the environment have on the moths?

Going Further

In the appropriate space on your Vee Form, write a **New Focus Question** that could be the point of a new investigation based on what you have learned.

- Research another organism that has shown a dramatic adaptation over a relatively short period of time, such as pesticide-resistant insects or antibiotic-resistant bacteria. Prepare a report on the circumstances surrounding this event.