

Peppered Moths Station

Station Roles: You will look for EVIDENCE of...

Student 1 - Descent with modification

Student 2 - Overproduction

Student 3 - Genetic variation

Student 4 - Competition

Student 5 - Differential survival and reproduction

Procedure:

Observations

1 – Look at the Data and Map Sheet and observe the causes of the peppered moth's evolution.

2 – Where were the majority of light versus dark peppered moths found in the early 1800s (in reference to London)?

3 – How do the prevailing wind directions affect the distribution of light versus dark peppered moths?

4 – What happened to the light and dark peppered moth population numbers pre-industrial versus post-industrial?

Information Sheet

Use the information sheet as needed to gather evidence.

Large Group Rotation Sheet (5 students per group)

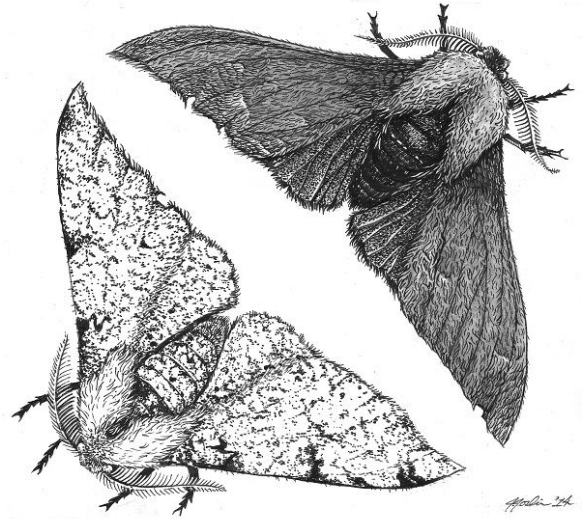


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Color Variation in Peppered Moths

The story of the peppered moth (*Biston betularia*) is one of the most famous examples of natural selection in action. These moths are found throughout Europe and North America and are known for their two main color variations: a light, speckled form and a dark, almost black form. The changes in their population over time reveal how environmental pressures can shape the traits of living organisms.



Each female peppered moth can produce up to 200 eggs during their 6-8 week life cycle. This means that not all moths will live long enough to reproduce. Within this large population, there is natural variation in traits, including differences in coloration. Some of these variations offer advantages in specific environments, while others do not.

In the early 1800s, most peppered moths were light-colored, which helped them blend in with the pale, lichen-covered tree trunks where they rested. This camouflage protected them from being eaten by birds. The darker moths, which occurred due to a genetic mutation, were rare because they stood out against the light bark, making them easier prey.

During the Industrial Revolution in England, factories released large amounts of soot and pollution into the air. This pollution darkened tree trunks by killing the light-colored lichen and covering the bark with black soot. In these new conditions, light-colored moths became easier for predators to spot, while dark-colored moths were better camouflaged. As a result, the dark moths were more likely to survive and reproduce, while the light-colored moths were eaten more frequently.

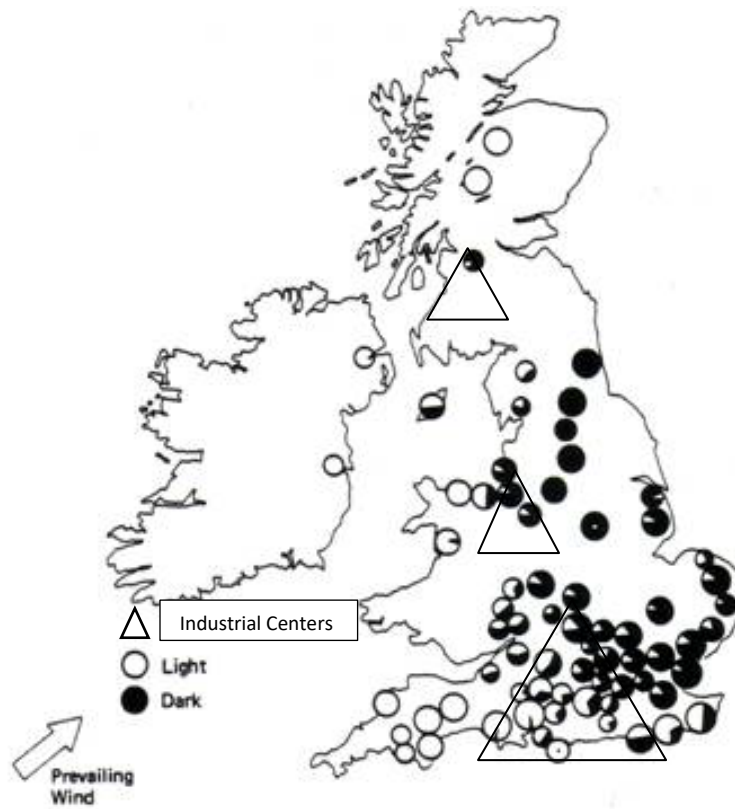
Over several generations, the population of peppered moths shifted. The once-rare dark moths became much more common in industrial areas, while light-colored moths became scarce. This change in the population, where one trait becomes more common because it provides a survival advantage, is an example of how natural selection works. Because moths reproduce in large numbers, even small advantages in survival can lead to significant changes in the population over time.

Later, as environmental regulations reduced pollution and tree trunks became lighter again, the pattern reversed. Light-colored moths regained their advantage, and their numbers increased, while dark moths became less common. This ongoing change shows how a population can evolve as environmental conditions shift.

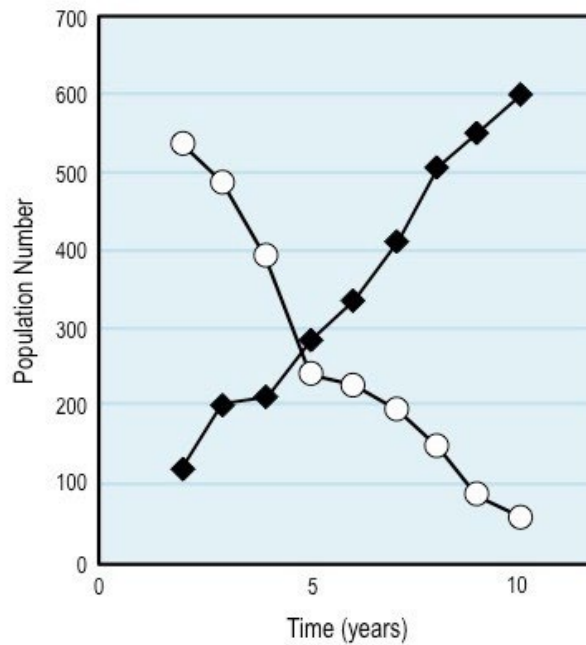
Scientists have studied peppered moths extensively to understand how natural selection works in real time. By observing how moth populations change in response to environmental pressures, researchers have demonstrated that traits providing better camouflage and survival can become more common across generations. The case of the peppered moth is a clear illustration of how species evolve through natural selection in response to their environment.

Peppered Moth Data Sheet

Britain early 1800s



Pre-Industrial Revolution



Post-Industrial Revolution



Peppered Moths