

**Part of the curriculum: Genetics and evolution [1A3 – Mechanisms of Evolution]**

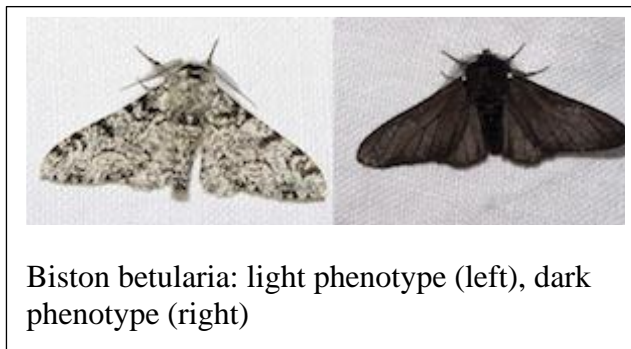
**Peppered moths, an example of evolution**

*BBC GCSE bitesize*

Before the industrial revolution in Britain, most peppered moths were of the pale variety. This meant that they were camouflaged against the pale birch trees that they rest on. Moths with a mutant black colouring were easily spotted and eaten by birds. This gave the white variety an advantage, and they were more likely to survive to reproduce.

Airborne pollution in industrial areas blackened the birch tree bark with soot. This meant

that the mutant black moths were now camouflaged, while the white variety became more vulnerable to predators. This gave the black variety an advantage, and they were more likely to survive and reproduce. Over time, the black peppered moths became far more numerous in urban areas than the pale variety.



**Gene Behind Black Peppered Moth's Color Change Identified**

*By Tanya Lewis for the scientist magazine/ June 6, 2016*

Scientists have finally identified the genetic change that enabled the black peppered moth (*Biston betularia*) to change shades—from a light, speckled color to a dark brown hue—to camouflage itself against Britain's soot-blackened trees during the Industrial Revolution: a mutation in a gene called *cortex*, according to a study published last week in *Nature*.

In the former study, Ilik Saccheri of the University of Liverpool, U.K., and colleagues crossed light- and dark-color moths and mapped their genetic differences. From a genetic sequence of 400,000 bases, the researchers homed in on 87 differences, which they tested individually. The team finally traced the color change to a transposon or "jumping gene" located in the *cortex* gene. "It's this huge chunk of DNA that doesn't itself code for anything, but somehow disrupts the nature of the gene," Saccheri told *The New York Times*.

By examining the genetic variance around this mutation, Saccheri's team estimated that the hue-altering mutation occurred within a 10-year period around 1819, which fits with records of the black moths' first sighting in 1848, according to BBC News.

**Using the text as well as your personal knowledge, answer the following :**

- **Explain why the color of the peppered moth in urban areas as changed since the 19th century**

**You may use the following key words  
pollution – mutation - survival of the fittest**