

# Evolution

According to Darwin's theory of evolution by natural selection, the individuals best suited to their environment will have a better chance of surviving and multiplying. This is sometimes called "**survival of the fittest**". Their characteristics will be passed on to the next generation. Thus if a particular species is well adapted to its environment then little change will occur between generations. But if the species is **not** well adapted to its environment, large changes may occur between generations. Some organisms seem to have changed little over hundreds of millions of years: for example, insects such as cockroaches and vertebrates such as tortoises and crocodiles.

When bacteria become immune to drugs it is because they have **evolved** into a slightly different bacteria which the drugs are ineffective against.

What is evolution in your own words:

USING SCIENCE 3 <i>Biston betularia</i> — THE PEPPERED MOTH	
Before 1845, a population of peppered moths near Manchester, England, was mostly light coloured. By 1950, 98% were dark coloured. For nearly 100 years, biologists speculated about why the population was changing. Then in 1959, a biologist named Kettlewell published an article in <i>Scientific American</i> which gave details of a number of experiments he had done. He had marked a large number of light and dark	moths with a spot of paint, then released them in both polluted and unpolluted forests. A few days later, he recaptured some of these moths by setting up light traps at night. He found that he recaptured a much larger proportion of dark moths in polluted forests and light moths in unpolluted forests. The following diagrams summarise some of the ideas Kettlewell used to explain the changes.



Up to 1848 the creamy peppered moth was camouflaged on lichen-encrusted tree trunks.



1848—the first black peppered moth was observed in the Manchester area.



Industrial revolution—burning coal produced sulfur dioxide.



Sulfur dioxide killed the lichen—tree trunks now appeared darker.



The creamy peppered moth was no longer camouflaged but the black moth was well hidden on the dark tree trunks.



By 1895, 95% of the peppered moth population in the Manchester area was black.

FIGURE 8.14

**DISCUSSION**

- 1 Use natural selection to explain the changes in the population.
- 2 In recent years, there have been much stricter laws to control industrial pollution in England. Predict how the peppered moth population may have changed since 1950.
- 3 Recent scientific articles have cast doubt on some of Kettlewell's results. In some of the original experiments, dead moths were fastened to tree trunks and the behaviour of birds was observed. Now it has been suggested that moths may not rest on tree trunks during the day at all and that other factors besides camouflage may be contributing to these changes. What other explanations can you think of?