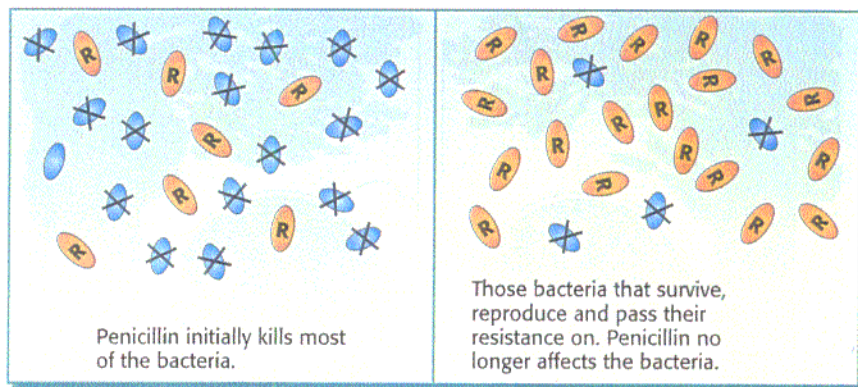


Figure 9.12 Natural selection explains the increase of penicillin resistant bacteria.



Darwin's book started a debate that never has abated completely. Because of its effect on scientific and religious thought, it can be considered one of the most influential intellectual achievements of all time.

soot, more light-colored moths can be found. This change in color is the result of a change in the frequency of alleles for color in moths.

Other natural experiments have shown the same process of natural selection in bacteria (see Figure 9.12). About 30 years ago, penicillin killed most types of bacteria, but now many strains are unaffected by this antibiotic. This has come about because a few bacteria always had a genetic resistance to the penicillin. As nonresistant individuals were killed, the penicillin-resistant strains were left to reproduce. Therefore, there were a greater number of resistant individuals in the next generations. To avoid having this happen again, antibiotics are used more carefully today often on a rotating basis.

Extensive field work and experimentation continue to support Darwin's theory of natural selection as one evolutionary force. Mechanisms other than natural selection also have been proposed and have supporting evidence. Thus, now the question is not *whether* evolution occurs, but *how* it occurs, and how rapidly it occurs.

CONCEPT REVIEW

1. Compare and contrast artificial selection with natural selection.
2. What are adaptations and how are they important to the survival of an individual and a population or species?
3. What is meant by evolution through natural selection?

Guidepost

How do genetic mechanisms influence evolution?

Evolution and Genetics

9.6 Evidence from Genetics Supports Natural Selection

In this century, although they are the framework for much of today's research, Darwin's original ideas have been modified and expanded greatly. Evolution may be defined as change in a species or population through time, but what type of change? Mendel's discoveries, which led to the chromosome theory of heredity, showed the way in which variations could be inherited and maintained in a population. Darwin clearly understood that only hereditary variations could have any meaning in the evolutionary process. Variations that are not passed on do not lead to changes in a species or a population. Hereditary variations, however, are products of an organism's genes.