



11 LOUIS PASTEUR

1822 - 1895

The French chemist and biologist Louis Pasteur is generally acknowledged to be the most important single figure in the history of medicine. Pasteur made many contributions to science, but he is most famous for his advocacy of the germ theory of disease and for his development of the technique of preventive inoculation.

Pasteur was born in 1822, in the town of Dôle, in eastern France. As a college student in Paris, he studied science. His genius was not evident during his student days; in fact, one of his professors recorded him as "mediocre" in chemistry. However, after receiving his doctorate in 1847, Pasteur soon showed that his professor's judgment had been in error. His research on the

mirror-image isomers of tartaric acid made Pasteur a renowned chemist when he was only twenty-six years old.

He then turned his attention to the study of fermentation, and showed that that process is due to the action of certain types of microorganisms. He also demonstrated that the presence of certain other species of microorganisms could produce undesirable products in the fermenting beverages. This soon led him to the idea that some species of microorganisms could produce undesirable products and effects in human beings and other animals.

Pasteur was not the first person to suggest the germ theory of disease. Similar hypotheses had been advanced earlier by Girolamo Fracastoro, Friedrich Henle, and others. But it was Pasteur's vigorous championship of the germ theory, substantiated by his numerous experiments and demonstrations, that were the principle factor in convincing the scientific community that the theory was correct.

If diseases were caused by germs, it seemed logical that by preventing harmful germs from entering the human body, diseases might be avoided. Pasteur therefore stressed the importance of antiseptic methods for physicians, and he was a major influence on Joseph Lister who introduced antiseptic methods into surgical practice.

Harmful bacteria can enter the human body through food and beverages. Pasteur developed a technique (called *pasteurization*) for destroying microorganisms in beverages. That technique, where practiced, has all but eradicated contaminated milk as a source of infection.

When he was in his mid-fifties, Pasteur turned his attention to the study of anthrax, a serious infectious disease which attacks cattle and many other animals, including human beings. Pasteur was able to show that a particular species of bacterium was responsible for the disease. Of far greater importance, however, was his development of a technique for producing a weakened strain of the anthrax bacillus. Injected into cattle, this weakened strain produced a mild form of the disease, which was not fatal

but which enabled the cattle to develop an immunity to the normal form of the disease. Pasteur's public demonstration of the effectiveness of his technique in immunizing cattle against anthrax aroused great excitement. It was soon realized that his general method might be applied to the prevention of many other communicable diseases.

Pasteur himself, in his most renowned single achievement, developed a technique for inoculating people against the dreaded disease of rabies. Other scientists, applying Pasteur's basic ideas, have since developed vaccines against many other serious diseases, such as epidemic typhus and poliomyelitis.

Pasteur in his laboratory.



Pasteur, who was an unusually hard worker, has a variety of lesser but still useful achievements to his credit. It was his experiments, more than any others, which convincingly demonstrated that microorganisms do not arise through spontaneous generation. Pasteur also discovered the phenomenon of anaerobiosis; i.e., that certain microorganisms can live in the absence of any air or free oxygen. Pasteur's work on diseases of silkworms has been of great commercial value. Among his other achievements was the development of a vaccine for the prevention of chicken cholera, a disease that attacks fowl. Pasteur died in 1895, near Paris.

A comparison is often made between Pasteur and Edward Jenner, the English physician who developed a vaccine against smallpox. Though Jenner's work was done more than eighty years before Pasteur's, I consider Jenner much less important because his method of immunization worked for only one disease, whereas Pasteur's methods could be—and have been—applied to the prevention of a large number of diseases.

Since the mid-nineteenth century, life expectancies in much of the world have roughly doubled. This enormous increase in human life spans has probably had a greater effect on the lives of individual human beings than has any other development in the entire history of the human race. In effect, modern science and medicine have presented each of us now living with virtually a second lifetime. If this increase in longevity could be solely attributed to the work of Pasteur, I would have had no hesitation at all in placing him first in this book. Nevertheless, Pasteur's contributions are so fundamental that there is no question that he deserves the largest share of the credit for the decline in death rates that has occurred in the last century, and that he is therefore assigned a high place on this list.