



36 ANTONY VAN LEEUVENHOEK

1632 - 1723

Antony van Leeuwenhoek, the man who discovered microbes, was born in 1632, in the town of Delft, in the Netherlands. He came from a middle-class family, and for most of his adult life held a minor post with the town government.

Leeuwenhoek's great discovery came about because he had taken up microscopy as a hobby. In those days, of course, one could not purchase microscopes in a store, and Leeuwenhoek constructed his own instruments. He was never a professional lens grinder, nor did he ever receive formal instruction in the field; but the skill he developed was truly remarkable, far exceeding that of any of the professionals of his day.

Although the compound microscope had been invented a generation before he was born, Leeuwenhoek did not make use of it. Instead, by very careful and accurate grinding of small lenses of very short focal length, Leeuwenhoek was able to attain a resolving power greater than that of any of the early compound microscopes. One of his surviving lenses has a magnifying power of about 270 times, and there are indications that he had made even more powerful ones.

Leeuwenhoek was an extremely patient and careful observer, and he was possessed of keen eyesight and unbounded curiosity. With his minute lenses, he examined a wide variety of materials, from human hair to dog's semen; from rain water to small insects; as well as muscle fibers, skin tissues, and many other specimens. He took careful notes, and he made meticulous drawings of the things he observed.

From 1673 on, Leeuwenhoek was in correspondence with the Royal Society of England, the leading scientific society of his day. Despite his lack of advanced education (he had attended an elementary school, but knew no language except Dutch), he was elected a fellow of the society in 1680. He also became a corresponding member of the Academy of Sciences in Paris.

Leeuwenhoek married twice and had six children, but no grandchildren. He enjoyed good health, and was able to continue working in his later years. Many dignitaries came to visit him, including both the Czar of Russia (Peter the Great) and the Queen of England. He died in 1723, in Delft, at the age of ninety.

Leeuwenhoek made many significant discoveries. He was the first person to describe spermatozoa (1677), and one of the earliest to describe red blood corpuscles. He opposed the theory of spontaneous generation of lower forms of life, and presented much evidence against it. He was able to show, for example, that fleas propagate in the usual manner of winged insects.

His greatest discovery came in 1674, when he made the first observations of microbes. It was one of the great seminal discoveries in human history. Inside a small drop of water,

Leeuwenhoek had discovered an entire new world, a totally unsuspected new world, teeming with life. And although he did not know it yet, this new world was of very great importance to human beings. Indeed, those "very little animalcules" that he had observed often held the power of life and death over humans. Once he had studied them, Leeuwenhoek was able to find microbes in many different places: in wells and ponds, in rain water, in the mouths and intestines of human beings. He described various types of bacteria, as well as protozoa, and calculated their sizes.

Applications of Leeuwenhoek's great discovery were not to come until the time of Pasteur, almost two centuries later. In fact, the entire subject of microbiology remained practically dormant until the nineteenth century, when improved microscopes were developed. One might therefore argue that had Leeuwenhoek never lived, and his discoveries not been made until the nineteenth century, it might have made little difference to the progress of science. However, there is no denying that Leeuwenhoek did discover microbes, and that it was through him that the scientific world actually became aware of their existence.

Leeuwenhoek is sometimes regarded as a man who by sheer luck happened to stumble on an important scientific discovery. Nothing could be further from the truth. His discovery of microorganisms was a natural consequence of his careful construction of microscopes of unprecedented quality, and of his patience and accuracy as an observer. In other words, his discovery resulted from a combination of skill and hard work—the very antithesis of mere luck.

The discovery of microbes is one of the few really important scientific discoveries that is largely attributable to the work of a single person. Leeuwenhoek worked alone. His discovery of protozoa and bacteria was unanticipated and—unlike most other advances in biology—was in no sense a natural outgrowth of previous biological knowledge. It is that factor, together with the importance of the eventual applications of his discovery, which account for his high place on this list.