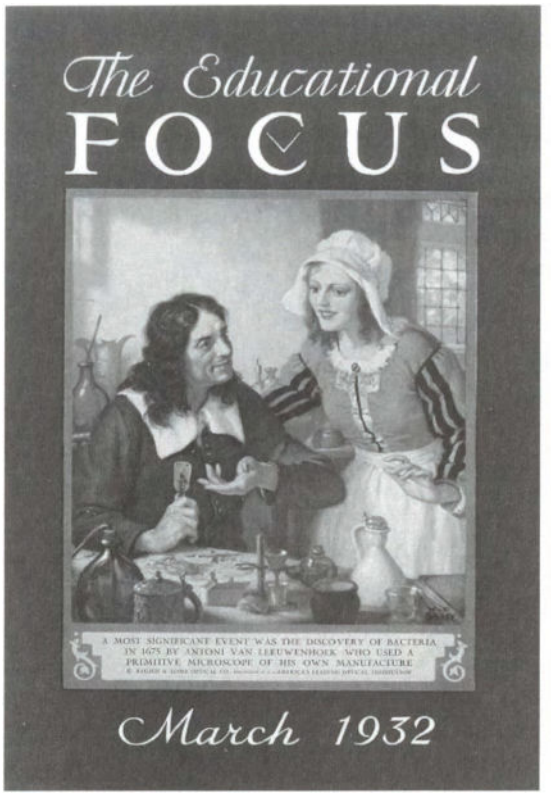
The Unexpected Popularity of Antoni van Leeuwenhoek

When the election for the greatest Dutch person of all time was held in 2004, Antoni van Leeuwenhoek came fourth – after Pim Fortuyn, William of Orange and Willem Drees, but before Erasmus, Rembrandt and Vincent van Gogh. Van Leeuwenhoek's success was largely overlooked by the press; all the media attention went to the questionable methods that had put Fortuyn in first place. Yet it's surprising, to say the least, that of all the representatives of the world of culture and science it was Van Leeuwenhoek who managed to garner so many votes. If the question regarding the greatest Dutch person had been asked to practitioners of the natural sciences alone (to limit ourselves to that single category), then undoubtedly geniuses such as Huygens (now twelfth) and Lorentz (now number 49) would have scored much higher. But the fact that Van Leeuwenhoek is clearly a popular favourite demands an explanation. What does this say about Van Leeuwenhoek, and what does it say – perhaps – about the Netherlands today?

An average Dutchman, but with a long-term pension

One obvious reason for Van Leeuwenhoek's popularity may be that everyone in the country knows about the Antoni van Leeuwenhoek Hospital in Amsterdam, the centre for the treatment of cancer patients in the Netherlands. Cancer is quite a common disease and everyone is afraid of getting it, so no-one can say they've never heard of Antoni van Leeuwenhoek. And while there's also a Huygens Institute, and the Lorentz sluices are part of the Afsluitdijk, these are not nearly as well known.

Yet this cannot be the reason why so many thousands of Dutch people voted for Van Leeuwenhoek. The fact that microbiology appeals far more to the modern imagination that mathematics or physics may be one factor. Van Leeuwenhoek was the discoverer of bacteria and red blood cells, and thus of a world that can only be observed by means of a microscope, although it exercises a great influence on our daily lives. Van Leeuwenhoek knew nothing about the cholera bacterium or the influenza virus, let alone about how such afflictions might be dealt with, but in one way or another his name has clearly become con-



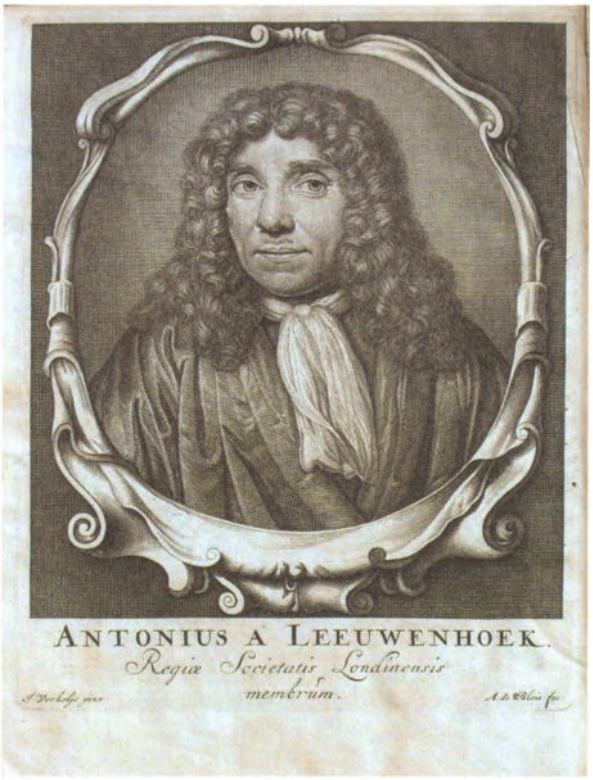
nected with them. And on top of that, Van Leeuwenhoek is the prototype of the ordinary Dutchman. He came from a middle-class environment, ran a textile shop for a while and held a few modest positions in the Delft city hall. In other words, he was a man of the people, someone with little education who nevertheless managed to become a person of consequence, very different from Huygens the aristocrat or Lorentz the professor.

Antoni van Leeuwenhoek was born on 24 October 1632, the son of a fairly prosperous Delft basket-maker. His father died when the boy was seven years old, and because he did not get on very well with his mother's second husband, she sent her son to a boarding school in Warmond and later to an uncle in Benthuizen. Van Leeuwenhoek then served as an apprentice bookkeeper to a Scottish cloth merchant in Amsterdam until he returned to Delft in 1653 or 1654. There he bought a house, got married and opened a draper's shop. Apparently the business was not very successful because in 1660 Van Leeuwenhoek closed it down and was appointed chamberlain to the Lords Regents of Delft, a combination of porter and bailiff. After the death of his wife he remarried a clergyman's daughter (1666) and began to mix in more cultivated society consisting of clergymen and doctors. It was at that time that he also developed a certain interest in intellectual matters. He trained as a surveyor and in 1679 was appointed *wijnroeier*, gauger of casks, responsible for certifying the capacity of wine casks for the city. All his jobs together earned him 800 guilders a year, which was equal to the salary of the city secretary at that time. Remarkably, the city of Delft continued to pay him this sum until his death on 26 August 1723, when he was almost 91 years old. Very few public officials re-

ceived such pensions, and the fact that the Delft regents continued to pay Van Leeuwenhoek shows how proud they were to have this international celebrity within their gates.

Small world, great fame

Until 1673 no one outside Delft had ever heard of Antoni van Leeuwenhoek, but in that year the Delft physician and naturalist Reinier de Graaf sent a report Van Leeuwenhoek had written on the observations he had made using home-made microscopes to the Royal Society in London. As a simple chamberlain from Delft, Van Leeuwenhoek had no access to England's scientific community; on top of that, his only language was Dutch. De Graaf could arrange for an introduction, however, and was more than happy to do so. He had known for some time that Van Leeuwenhoek had an extraordinary talent for making microscopes with powerful magnification, enabling him to see things that no one had ever seen before. In an age bursting with the desire for more and more new discoveries such a talent should not remain hidden, and a letter to the Royal Society was the best means of informing the scientific world. Not only was the letter – in translation – read out to a meeting of the London Society, an excerpt was also published in *Philosophical Transactions*, the journal published by the secretary of the Royal Society, Henri Oldenburg. And on top of that a French translation of the letter appeared shortly thereafter in a French scholarly journal, the *Journal des Scavans*. Van Leeuwenhoek's reputation was secured at a stroke.



After that Van Leeuwenhoek no longer needed special patronage to make his observations widely known. The first letter to the Royal Society was followed by more than a hundred others, and almost all of them, some in summary, were published in the *Philosophical Transactions*. His contribution was so highly valued that in 1680 the gentlemen in London named him a Fellow of the Royal Society. But Van Leeuwenhoek did not send his observations to the Royal Society alone or publish them only in the *Transactions*. Starting in 1684, he issued several books containing compilations of his 'epistles', which were eagerly snapped up by avid readers. From far and wide, too, people came to Delft to see with their own eyes what Van Leeuwenhoek was up to with his microscopes. Royal personages came as well, such as King James II of England, who honoured Van Leeuwenhoek with a visit to his office in 1687, and the Russian Czar Peter the Great, who visited Delft in 1698 and summoned Van Leeuwenhoek to demonstrate his microscopes. Van Leeuwenhoek was not always pleased with such visits (he suspected that some of his fellow-researchers wanted to steal his ideas), but he did feel honoured by the recognition that came to him from official quarters, as in 1716 when the University of Leuven awarded him a medal inscribed with the words '*In tenui labor, at tenuis non gloria*', or: 'Small the work, but not the fame'.

The Columbus of a new reality

With the help of his microscopes Van Leeuwenhoek made the most marvellous discoveries. He not only studied the delicate structure of insects, he was also the first to describe red blood cells (1674) as well as an array of one-celled creatures that we now call infusoria and bacteria (1674 and 1676). He was especially proud of his discovery of capillaries (in 1688), the almost invisible vessels that connect arteries with veins, thus proving that Harvey's theory of blood circulation really was correct. In 1677 – with a certain diffidence, which was why it was reported in Latin – Van Leeuwenhoek also described the male sperm cell, which he believed was more responsible for the emergence of new life than the female egg-cell. Crystals, hair, the fin of an eel, 'toe jam' (his own) and dental plaque (also his own) – he looked at everything through his microscope and almost always discovered something new. When you read his letters and become a bit accustomed to his careless linguistic style, you experience the sensation of observing something for the first time and find yourself looking over the shoulder of a man who expects nothing, but for that very reason makes the most remarkable discoveries. Van Leeuwenhoek and his microscopes opened up a whole new reality, the world of the extremely small, which was just as extraordinary as the distant lands that his countrymen were opening up in America, Africa and Asia – a 'new world' on the other side of his lens. (Another good reason why Van Leeuwenhoek ended up scoring so high in the election of the greatest Dutch person: Van Leeuwenhoek is seen as the Columbus of the microscopically small.)

At least as remarkable as *what* he saw was *how* Van Leeuwenhoek made his observations – his working method and his instruments. In that first letter he said he had uncovered the structure and growth of mould, the sting and mouthparts of a bee and the limbs of a louse with an unsightly instrument, the simple microscope. Microscopes had existed since the beginning of the seventeenth

century. Once the telescope was discovered (we hear of it for the first time in 1608, but the instrument must have been constructed in the late sixteenth century), it didn't take long before someone pulled the tube out a bit further and discovered that in this way nearby objects could be seen in magnified form. Modest observations began to be made with the microscope in Italy and later in the rest of Europe starting in the 1620s, and by around 1650 the instrument was making a triumphal progress through Europe's scientific community. The second half of the seventeenth century was the golden age of microscopic observation, involving the likes of Marcello Malpighi in Italy, Robert Hooke in England and Christiaan Huygens and Jan Swammerdam in the Dutch Republic. But in all these cases the instrument was a compound microscope, a microscope with two lenses in a tube that, when properly adjusted, could produce remarkable magnifications. Van Leeuwenhoek's microscopes had an entirely different appearance. The most common type consisted of two small metal plates clamped on to a small round glass ball, which functioned as the lens. Behind the two plates was mounted a pin on which the specimen could be secured and brought closer or higher by means of a screw thread. There was nothing simple about either making or operating this instrument. One had to have good, homogenous lenses at one's disposal as well as sharp vision. Because the focal length was very short (enabling strong magnification), the researcher had to keep his eye very close to the glass ball. So quite a bit of talent was needed to prepare and position the specimen in such a way that the researcher could see anything at all.

Van Leeuwenhoek had that talent. He had very sharp vision, and as a draper he was very skilled at handling and improving linen testers (a hand magnifier used to determine the quality of fabrics and the density of the weave). But exactly how he made his hundreds of little microscopes (he made a new instrument for each specimen!) was something he never revealed for fear of the competition. Such secrecy had its price, however, and brought its own problems. By being so secretive, Van Leeuwenhoek violated the unwritten rule that in principle research should be verifiable and reproducible. Because his microscopes were of superior quality, other researchers were at first unable to repeat his observations with their own equipment, and because the observations did not appear to be reproducible the obvious conclusion was that they had been invented.

That secrecy also gave colleagues who had a bone to pick with Van Leeuwenhoek the opportunity to claim that making little microscopes was the *only* talent he possessed. One rival, his countryman Nicolaas Hartsoeker, described Van Leeuwenhoek as a man with eyes, lenses and a great deal of patience but little or no power of reasoning. And while another, Leibniz, might say that he preferred someone who wrote what he saw (Van Leeuwenhoek) to someone who wrote what he thought (Descartes), there was a great temptation to portray Van Leeuwenhoek as a man who peered through his microscopes at random but was incapable of thinking systematically and therefore did not really advance scientific knowledge. Van Leeuwenhoek wrote as he spoke and rambled from one subject to the next, so that Hartsoeker could sneer that Van Leeuwenhoek needed five or six volumes to demonstrate what another could say in a few pages. That Van Leeuwenhoek had no academic education and could not read Latin – even in English books he was only able to pick up a few facts from the illustrations – could also easily be used against him. Jan Swammerdam, who

clashed fiercely with Van Leeuwenhoek on a couple of occasions, complained in 1678 that it was almost impossible to discuss anything with Van Leeuwenhoek, *'because he is so prejudiced and his reasoning is barbaric, being without a university education'*.

The advantage of being unacademic

For his part, Van Leeuwenhoek also deliberately exaggerated the differences between himself and his academically-trained fellow researchers. His letters contain frequent expressions of an outspoken anti-intellectualism, as when he claims that the reason he can observe all those *'invisible created truths'* without prejudice is *because* he had no university education. Although his research was thoroughly grounded in a limited number of basic principles (such as that everything in the world consists of small mechanisms, and that spontaneous generation was impossible for theological reasons), he cultivated the image of the unlettered and unspoiled researcher who, unhampered by book-learning, observes the world as it really is. He also stressed that he was just a simple man from Delft and that for this reason his mistakes should not be held too much against him. But he still craved recognition from the official scientific community, however, which explains why he was so delighted with the medal from Leuven University. And when the Royal Society admitted him to their circle, Van Leeuwenhoek asked Constantijn Huygens in all seriousness whether he should still give way to a physician when walking in the street – which for Huygens was proof that Van Leeuwenhoek was really just an upstart.

Subsequent generations have done more to highlight Van Leeuwenhoek's alleged simplicity and modesty than he did himself. When the two hundredth anniversary of Van Leeuwenhoek's discovery of micro-organisms was celebrated in 1875 (erroneously, by the way), Pieter Jacob Haaxman wrote a biography of *'the man who, as a humble citizen of Delft, was not appreciated for his merits by his fellow townsmen or countrymen during his lifetime, but was mentioned with honour and glory and above all with great respect by the leading scholars of his day throughout the civilised world'*, referring to the many visitors who sought out the researcher 'in his humble dwelling'. And in the twentieth century another biographer, A. Schierbeek, pointed out how unique it was *'that a simple city hall functionary using home-made equipment could make discoveries that would astonish the world, and that even centuries later scholars are compelled to honour him as one of the greatest among them'*. It would not surprise me at all if Van Leeuwenhoek's popularity at the beginning of the twenty-first century still had something to do with this admiration for an ordinary man from Delft, who just wrote what he saw and thereby astounded the world. ■

Translated by Nancy Forest-Flier