Gerhard Hansen: discoverer of the organism of leprosy

This year marks the hundredth anniversary of the death, on 12 February 1912, of the Norwegian leprologist, Gerhard Hansen, who was the first to describe the *Mycobacterium leprae* (Hansen's bacillus). It was, in fact, only the second specific disease-causing organism to be discovered, the first being the bacillus of anthrax.

Leprosy apparently first appeared in Europe in the early centuries of the Christian era, although it was probably widely distributed through the ancient world. It gradually spread through the Mediterranean, then northwards through Europe. With its frightening manifestations, which included gross facial disfigurement, cutaneous lesions, and progressive deformity and destruction of anaesthetic limbs, it was much feared. The disease was regarded as highly contagious (which it is not), and strict regulations were widely introduced to segregate its victims. The leper would be banished from society, excluded from the church, confined to a leprosarium and might even be declared legally dead.

Many of these so-called lepers were probably suffering from other diseases, for example syphilis, which had probably been introduced to Europe from the West Indies by Columbus's men towards the end of the 15th century and which then spread widely in a virulent form.

Gerhard Henrik Armauer Hansen was born in 1841 in Bergen, Norway, the eighth of 15 children. His father, a merchant, became bankrupt when Gerhard was a child and then became a bank clerk. Hansen entered the University of Christiana (now Oslo), in 1859, working his way through medical school first by teaching in a girl's college and then by tutoring in anatomy. After internship in Oslo, Hansen first worked as doctor to the fishing community in the Lofoten islands of northern Norway, then returned to Bergen in 1868. Bergen was then the Norwegian centre for research and care of leprosy, and there were no fewer than three leprosaria, hospitals for the care and treatment of this disease. Here he became assistant to Dr Daniel Danielssen, an authority on the disease. Danielssen, like many other investigators, believed that leprosy was an inherited disease, based on its well-known occurrence in families. Others thought it spread through the air as a mysterious miasma.

Other theories abounded. That great surgeon Sir Jonathan Hutchinson (1828–1913), of the London Hospital, wrote no less than 12 papers and a monograph on leprosy. He noted that the disease prevailed on islands, the sea coast and along the courses of rivers and concluded that leprosy was in some way connected to the eating of badly cured fish. In spite of a long friendship with Hansen, Hutchinson maintained this theory until his death in 1913; even the greatest, surely, are allowed one mistake.

'Hansen's studies convinced him that leprosy was ... spread by an organism from one patient to another'

Hansen's epidemiological studies convinced him that leprosy was a specific disease spread by an organism from one patient to another and noted what he took to be organisms in his microscopic studies of leprous lymph nodes. In 1870 he received a grant to study histopathology in Bonn and Vienna. In 1873, at 32 years of age, he published an 88-page monograph describing his research findings. He could find no organisms in the blood of leprous patients, but noted rod-shaped bodies in skin nodule biopsies. This was only the second demonstration of bacteria in a disease process. The first was by Franz Pollender, in 1849, who described rod-shaped bacilli found in the blood of cattle dying of anthrax.

In 1879, Hansen was visited by a young German investigator, Albert Neisser, aged 24 years, who, using staining techniques, had that year described the infecting organism of gonorrhoea – the gonococcus. Using this staining method, Neisser was able to describe in leprous material large numbers of 'small thin rods, whose length amounts to about half the diameter of a human red blood corpuscle'. Using this staining method, Hansen was able to confirm Neisser's findings.

Neisser claimed to have discovered the causative organism of leprosy and sought to discredit Hansen. In his memoirs, written 30 years later, Hansen wrote that he took Neisser's claim without rancour or excitement. However, Hansen's senior, Danielssen, was furious that Hansen had not responded more vigorously to this attempt to steal his discovery.

The organism, *Mycobacterium leprae*, or Hansen's bacillus, is an intracellular rod-shaped organism, more acid-fast than *M. tuberculosis* (which it resembles), and remains a difficult organism to the bacteriologist. In spite of every effort, there are no confirmed reports of its growth in culture. For decades it resisted attempts to inoculate the organism in animals. It was nearly 100 years after its discovery that Eleanor Stores discovered leprosy infection in the nine-ringed armadillo, which is now used as an experimental model of the disease, and in 1960 Shepherd reported successful growth of the bacterium in the foot pad of the mouse.

In 1873, Hansen married the daughter of his chief, Dr Danielssen. Sadly, she died in the same year of tuberculosis, as did her three sisters, all probably infected from their father. Two years later, Hansen remarried. His son, and only child, qualified in medicine and went on to become chief doctor of the tuberculosis hospital in Bergen.

Hansen became chief medical officer for leprosy in Norway and was President of the International Conference on Leprosy which was held in Bergen in 1909. He received many national and international honours. He died in 1912 of heart disease at the age of 70 years. **BJHM**

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