

## Medicine in Stamps

# Armauer Hansen (1841-1912): discoverer of the cause of leprosy

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The Egyptian papyrus dates back to 4,000 BC, and made reference to leprosy, clearly a disease of antiquity. Pejoratively called lepers, they suffered from disfiguring skin nodules and auto-amputation, the consequence of neuropathic sensory loss. To be a leper was to be ostracised from society, because the disease was linked to notions of uncleanness. In public, lepers wore bells around their necks to signal their approach and to warn others to stay clear. This was not so much for fear of acquiring the disease; as leprosy, which tends to congregate in certain families, was thought to be an inherited condition. Another causative theory was the excessive consumption of fish, especially decomposed or diseased fish. However, uncovering the final truth behind leprosy was left to a Norwegian doctor named Armauer Hansen, who demonstrated that a bacterium, subsequently identified as *Mycobacterium leprae*, was the aetiological agent.

**HANSEN'S DISCOVERY** Around the mid-1800s, the leading researcher in the field of leprosy was Daniel Danielssen, a Norwegian physician who headed the newly-opened leprosy hospital in Bergen, a town on the west coast of Norway. Danielssen was known for his famous book, "On Leprosy", which he co-authored with Carl Boeck, a fellow Norwegian dermatologist-syphilologist. The book endorsed the view that leprosy was inherited rather than transmitted.

Armauer Hansen, yet another Norwegian, was born in Bergen in 1841, and became Danielssen's protégé shortly after he graduated with honours from the University of Christiania (now Oslo) in 1866. After a brief stint as a general practitioner in Lofoten, a small Norwegian fishing village, he returned to his hometown of Bergen, and began working at the Lungegaard Leper Hospital, eventually assuming its directorship. His first scientific publication dealt with normal and pathological lymph nodes. He observed "yellow granular masses" within lymph nodes and skin nodules of leprosy patients, and suggested that this was a specific finding for the disease. After acquiring

additional training in histopathology, Hansen went on to describe ". . . in every leprous tubercle extirpated from a living individual . . . small staff-like bodies, much resembling bacteria, lying within the cells; not in all, but many of them." In 1874, the Medical Society of Christiania published these remarkable observations, which established, for the first time, an infectious aetiology for the disease.

The organism was *Mycobacterium leprae*, and a few years later, Albert Neisser, a pupil of Robert Koch, attempted to assert his own claim to its discovery on the basis of *in vitro* staining characteristics. History, however, decided in favour of Hansen (leprosy is now called Hansen's disease), even though the ultimate proof of causation was never forthcoming. What continued to stump Hansen was his failure to isolate the organism and to transmit it. He was unable to satisfy Koch's postulates, which require that any putative pathogen be first isolated and then shown to cause the same disease when re-introduced into another animal. Despite many attempts, Hansen failed to grow *Mycobacterium leprae* on artificial media or in live rabbits. To this day, the leprosy bacillus cannot be grown *in vitro*, surviving only in humans and in the footpads of mice and armadillos.

**HANSEN ON TRIAL** Desperate to prove his case, Hansen inoculated himself with extracts of the "yellow granular masses." His chief, Danielssen, also attempted self-inoculation several years prior. Neither of them developed the disease, because of the now-recognised low virulence of the organism. On November 3, 1879, Hansen went one step further, and "used a cataract knife which just previously had been used to cut a nodule from a patient suffering from nodular leprosy, on the eye of another female patient in the hospital." It was a reckless attempt at human experimentation. Reasoning that the recipient patient would not have agreed anyway, Hansen carried out the experiment without her consent.

In response to a lawsuit for pain and suffering,



Hansen offered several feeble defences. These included the argument that the operation was harmless, and that any pain experienced was simply a result of the patient's anxiety. His most ardent defence for using a human subject was his failed attempts to infect rabbits. The medical community was mostly on his side, including the Director General of the Norwegian Health Directorate, who justified the experimentation "*by a man who had already made considerable contribution to the question mentioned.*" In the end, Hansen was found guilty for failure to obtain consent, and lost his position as resident physician at the Bergen Leprosy Hospital, although he was able to remain medical officer of health for leprosy in Norway.

**PERSONAL LIFE** By all accounts, Hansen was well respected by his colleagues, though less so by his patients whom he kept in strict isolation. He was described as humble and hardworking, with a fine sense of humour. As he neared his 70th birthday, he chronicled his memoirs in his autobiography: "The Memories and Reflections of Dr. Gerhard Armauer Hansen." Growing up the eighth of fifteen children, he recounted a mischievous childhood that was moderated by his strict father, Claus Hansen, a merchant who often worked multiple jobs and was eventually forced into bankruptcy. Due to the family's financial difficulties, Hansen worked to put himself through school, first as a personal tutor and later as a teacher at a girl's school. Of his teaching experience, he wrote: "*Each of us has some peculiarity which is his Achilles heel and invitation for teasing. Mine, in particular, was my use of the expression, 'Now then'—as preface to some point I wished to make. My mischievous students could always anticipate when it was coming and before I could speak, I was greeted with a girlish chorus of, 'Now then'.*"

Hansen was apparently contemptuous of religion. The writings of Charles Darwin had a profound effect on

him and may have contributed to his views. In his book, he wrote of watching a poor elderly woman in a church in Vienna, throwing herself on the flagstones before the altar, prostrate and in prayer, and the incongruity of a young man politely tipping his hat to the altar, entirely oblivious to her presence. Hansen also asserted that he had never been able to confirm that children derived much benefit from being sent to church.

Hansen does not mention either of his two wives in his autobiography. His first wife was the daughter of chief Danielssen. Tragically, she died from tuberculosis shortly after their marriage. Two years later, he remarried and had a son who would enter into the field of medicine, specialising in cardiology. Ironically, Hansen, reputed to have suffered from syphilis, died of a heart attack on February 12, 1912. He was 71 years old. Today, the Leprosy Museum in Bergen and the Armauer Hansen Building, a research facility located at Haukeland University Hospital, stand in lasting tribute to this Norwegian discoverer of the aetiology of leprosy.

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