

Need a Title

Edward Jenner

Edward Jenner was born on 17th May 1749 in Berkeley, Gloucestershire, England. His father was the vicar of Berkeley, the Reverend Stephen Jenner and his mother, Sarah Jenner. He was the eighth of nine children. Jenner was an orphan by age five and moved in with his older brother. During his formative years, Jenner developed a keen interest in natural sciences that persisted throughout his adult life. Jenner became an apprentice at 13 for a surgeon and apothecary in Sodbury, near Bristol.¹ In Sodbury, Jenner overheard a dairymaid state: 'I shall never have smallpox for I have had cowpox. I shall never have an ugly pockmarked face.'² At the time, it was a commonly held belief that dairymaids were somehow safe from the ravages of smallpox.

At the age of 21, Jenner became a student of John Hunter, who was, at the time, working at St George Hospital in London. Hunter was one of the most distinguished scientists and surgeons of his time. Hunter and Jenner enjoyed a close personal and professional friendship until Hunter's death in 1793. Jenner had a wide range of interests; he researched geology and conducted experiments in human blood. Along with his schooling and experience in biology, Jenner made advancements in clinical surgery while training under Hunter, including creating an enhanced method for readying a medication called tartar emetic. After two years of working with Hunter, Jenner went back to Berkeley and set up as a local doctor, where he experienced great success as he was well-liked, skilled and very capable.³

While Jenner had an interest in using cowpox to protect from smallpox for many years earlier, in 1796, he made the initial steps in a lengthy process which would result in the eradication of smallpox. Smallpox was the second most feared disease, subsequent to the plague, in 18th-century Europe. Smallpox is a product of a virus from a group called Orthopoxviruses, which includes the variola virus that causes smallpox. Cowpox is another Orthopoxvirus markedly different from smallpox and is mainly a minor, self-limiting cattle disease. Cowpox gives humans milder, more flu-like symptoms, but this disease

¹ Stefan Riedel, 'Edward Jenner and the History of Smallpox and Vaccination', *Baylor University Medical Centre Proceedings*, 18.1 (2005), 21-25.

² Susan Brink, *NPR* (2018) <<https://www.npr.org/sections/goatsandsoda/2018/02/01/582370199/whats-the-real-story-about-the-milkmaid-and-the-smallpox-vaccine>> [accessed 2nd May 2023]

³ Stefan Riedel, 'Edward Jenner and the History of Smallpox and Vaccination', *Baylor University Medical Centre Proceedings*, 18.1 (2005), 21-25.

is historically significant, as Edward Jenner ascertained at the end of the 18th century.⁴

Smallpox origins

The origins of smallpox are unknown. However, some believe it first emerged around 10,000 BC when the initial agricultural settlements in Northeastern Africa began. It likely spread from there to India through Egyptian merchants.⁵ There is evidence of lesions on mummies, which could be smallpox, from the 18th and 20th Egyptian Dynasties. Smallpox had been described in accounts from Asian civilisations around 1000 BC; there is a report that the disease was in China in 1122 BC. Smallpox was brought to Europe around the 5th to 7th centuries, and there were regular outbreaks during the Middle Ages. Smallpox considerably affected the expansion and progress of Western civilisations.⁶

The initial stages of the fall of the Roman Empire concurred with a nationwide epidemic entitled the Plague of Antonine, which began around the end of 165 or the start of 166 AD. This disease was responsible for nearly 7 million deaths and was believed to be smallpox. The Crusades, the Arab expansion, and the discovery of the West Indies exacerbated the spread of smallpox.⁷

Smallpox was introduced to the Americas by the Spanish and Portuguese invaders. 'In these settings, smallpox had a transformative importance in clearing the land of its inhabitants and thereby promoting settlement by Europeans who possessed a robust immunity.'⁸ The British also used smallpox as biological warfare to decrease the Native American population. The precedent for this was instituted by Sir Jeffery Amherst, a British Army Officer, when he intentionally offered blankets contaminated with smallpox to Native Americans, intending to

⁴ Frank M. Snowden, *Epidemics and Society: From the Black Death to the Present*, (New Haven: Yale University Press, 2019)

⁵ Tomislav Meštrović, *Medical News* (2021) <<https://www.news-medical.net/health/Smallpox-History.aspx#:~:text=The%20origin%20of%20smallpox,means%20of%20ancient%20Egyptian%20merchants.>> [accessed 4th May 2023]

⁶ Frank M. Snowden, *Epidemics and Society: From the Black Death to the Present*, (New Haven: Yale University Press, 2019)

⁷ Frank M. Snowden, *Epidemics and Society: From the Black Death to the Present*, (New Haven: Yale University Press, 2019)

⁸ Frank M. Snowden, *Epidemics and Society: From the Black Death to the Present*, (New Haven: Yale University Press, 2019) p.102.

reduce their population. This event is significant and relevant as the fear of biological warfare is as present now as ever. Its effective use in the 18th century helps explain why smallpox is ranked high on the list of 'biological agents most feared by public health authorities.'⁹

How smallpox operates

An essential point about smallpox is that it can only infect humans. This element is crucially important to the vaccination campaign that eventually led to the eradication of smallpox in 1980, the first and only human disease that was deliberately eradicated. One of the main reasons for this is that the disease had no animal reserves that could revive the disease whenever the virus established means to crossover barriers from animal species to human species.

Smallpox is exceptionally contagious. Infected people disperse millions of infectious viruses into their immediate vicinity from their skin rash or open wounds in their throats. A person is infectious from just prior to the outbreak of the rash to when the last scab comes off some weeks later. It is estimated that the probability of a person contracting smallpox from an infected person in their household was 50/50. The disease is spread in three ways. The first is by an infected person spraying droplets into the air by exhaling, sneezing, or coughing and then the droplets being inhaled by people in close vicinity to the infected person. Smallpox is most often spread in an area of close contact over an extensive period, such as a household, a classroom, a hospital ward, a close contact workplace, or a workhouse, particularly throughout cold, dry winter months.¹⁰

A notable reason for the extreme fear of smallpox was the horridness of its course in the body and the lifetime disfigurement that resulted. In the principal European cities, smallpox was primarily a disease of childhood, as a third of all deaths in children throughout the 17th century were due to smallpox. These aspects were as significant as the terror of death in the spread of fear. Doctors who tended to patients suffering from smallpox strongly believed this disease was the worst of all human illnesses. Donald Hopkins writes in his book:

'In the suddenness and predictability of its attack, the grotesque torture of its victims, the brutality of its lethal or disfiguring

⁹ Frank M. Snowden, *Epidemics and Society: From the Black Death to the Present*, (New Haven: Yale University Press, 2019) p.104.

¹⁰ Frank M. Snowden, *Epidemics and Society: From the Black Death to the Present*, (New Haven: Yale University Press, 2019)

outcome, and the terror that it inspired, smallpox is unique among human diseases.’¹¹

Day-to-day stages

The incubation period usually endured for around twelve days; meanwhile, sufferers exhibited no symptoms, increasing the disease’s spread. The beginning of symptoms included a high fever and an experience of sudden restlessness, which began a month-long misery. Initial symptoms were acute back pain, nausea, and throbbing tension headaches. Children commonly suffered convulsions. Occasionally, the virus would be so overpowering and crushing that an infected person would die within 36 hours with no physical symptoms.¹²

On the third day of symptoms, sufferers often felt significantly better; this is when the rash would first appear. Three days after this, lesions that appeared with the rash would increase in size, change colour from red to purple, and the lesions would fill with fluid. At this point, doctors would diagnose the illness to be smallpox. Sufferers would experience escalating difficulty swallowing and speaking as blisters covered their throats.¹³

When the rash had been there six days, the blisters started to fill with pus, and the sufferers would feel noticeably worse. Their fever would spike, and parts of their body would become badly swollen; these include nose, tongue, lips and eyes. Sufferers would not be able to swallow and would gradually deteriorate as they become mainly drowsy during the day and restless at night. They frequently fell into delirium and attempted to escape. These psychological issues were not only a symptom of a spiked fever but ensured by the participation of the central nervous system in the virus. Due to this, even if the sufferer lived through the disease, the injuries to the brain were likely to be long-lasting and to give lifelong impairment.¹⁴

¹¹ Donald Hopkins, *Princes and Peasants: Smallpox in History* (Chicago: University of Chicago Press, 1983) p.3.

¹² Centres for Disease Control and Prevention, *CDC: Clinical Disease* (2016) <<https://www.cdc.gov/smallpox/symptoms/index.html>> accessed 5th May 2023]

¹³ Centres for Disease Control and Prevention, *CDC: Signs and Symptoms* (2016) <<https://www.cdc.gov/smallpox/symptoms/index.html>> accessed 5th May 2023]

¹⁴ Centres for Disease Control and Prevention, *CDC: Signs and Symptoms* (2016) <<https://www.cdc.gov/smallpox/symptoms/index.html>> accessed 5th May 2023]

By the ninth day, women often suffered from uterine haemorrhages; if women were pregnant, they would undoubtedly miscarry. At this stage, sufferers were unable to drink at all as the throat would experience extreme burning sensations. Sufferers would undergo excessive weight loss, and some would suffer from starvation. They would start to resemble a corpse. Eyes often became pockmarked, leaving the sufferer with lifelong blindness.¹⁵

From the tenth to the fourteenth day after the emergence of the rash, scabs started to occur. These held the live virus, which was extremely infectious and largely contributed to the spread of the disease. Large sections of the skin would peel off, leaving wounds exposed and vulnerable due to this, the likelihood of infections increased, and death was most common during this time. Good nursing, quality hygiene, and balanced nutrition decreased the chances of developing an infection and therefore dying. This meant that wealthy people were more likely to live as they could buy quality nursing. Finally, the blisters dried up for the survivors, the scabs fell off, and recovery started.¹⁶

Treatment and Inoculation

It was common knowledge that patients that survived this disease had immunity from contracting it again. Hunting for a cure for smallpox had been taking place for centuries. Throughout the medieval period, there were many herbal treatments, in addition to cold therapy and special linen, to treat and prevent smallpox. One doctor, Dr Thomas Sydenham, believed in cold treatment, which meant refusing to heat the room, leaving the windows open, covering the sufferer in multiple blankets and giving the sufferer constant beer.¹⁷

Before the invention of vaccination, the most successful way of tackling smallpox was inoculation. Inoculation is comprised of giving a mild case of smallpox to a healthy individual through a lancet with the object of protecting a person from catching an acute or deadly case later on. The practice of inoculation appears to have emerged separately when doctors in multiple countries were dealing with widespread epidemics. However, people were concerned that this practice would spread other

¹⁵ Centres for Disease Control and Prevention, *CDC: Signs and Symptoms* (2016) <<https://www.cdc.gov/smallpox/symptoms/index.html>> accessed 5th May 2023]

¹⁶ Centres for Disease Control and Prevention, *CDC: Clinical Disease* (2016) <<https://www.cdc.gov/smallpox/symptoms/index.html>> accessed 5th May 2023]

¹⁷ A.W. Sloan, 'Thomas Sydenham, 1624-1689', *Sabinet African Journals*, 72 (1987), p. 275- 278

diseases, namely syphilis. This practice was used in India, Africa and China well in advance of Europe's implementation in the 18th century.¹⁸

The widespread use of inoculation in Britain can be attributed to Lady Mary Wortley Montague. She suffered a severe case of smallpox in 1715, which left the known beauty's face badly maimed. When living in Istanbul, she inoculated her children, and when she came back to Britain, she started a campaign to make inoculation widespread in Britain. Her high social status, intellect, and dedication to the cause attained a large audience. She persuaded the Princess of Wales to inoculate her own daughters, which greatly attributed to it becoming popular. It is approximated that inoculation killed 1 to 2 percent of people, compared to 25 to 30 percent dying when catching smallpox naturally. There was also a fear that as inoculation utilised natural smallpox, there was a constant risk that inoculation could ignite a widespread outbreak.¹⁹

Creation of vaccination

Jenner was not the first doctor to observe the link between cowpox and smallpox. However, he was the first doctor to verify it by collecting case histories of milkmaids and then proceeding to take the necessary steps for experimentation. He carried out the experiment on 14th May 1796; he took biological material from a lesion of Sarah Nelms, a milkmaid suffering from cowpox, and vaccinated his gardener's 8-year-old son, James Phipps. Phipps developed a mild case of cowpox, and in July 1796, Phipps was inoculated, for the second time, with live smallpox. Phipps did not develop smallpox, and Jenner deemed the experiment a success and proof of his observations.²⁰

Obviously, Jenner's actions were extremely unethical by today's standards. On the 21st June 1798, Jenner self-published his work entitled '*An Inquiry into the Causes and Effects of the Variolae Vaccinae, a Disease Discovered in Some of the Western Counties of England, Particularly Gloucestershire, and Known by the Name of the Cow*

¹⁸ Stefan Riedel, 'Edward Jenner and the History of Smallpox and Vaccination', Baylor University Medical Centre Proceedings, 18.1 (2005), 21-25.

¹⁹ Stefan Riedel, 'Edward Jenner and the History of Smallpox and Vaccination', Baylor University Medical Centre Proceedings, 18.1 (2005), 21-25.

²⁰ Stefan Riedel, 'Edward Jenner and the History of Smallpox and Vaccination', Baylor University Medical Centre Proceedings, 18.1 (2005), 21-25.

Pox'.²¹ Due to his many efforts in making vaccinations common and far-reaching, by 1800, it had extended to most European countries and the British government soon after proclaimed vaccination as one of the most remarkable findings in the history of medicine.

Edward Jenner's impact

The smallpox vaccine was the foundation for a new way of public health not just to prevent smallpox but also influenza, polio, shingles, rabies and many other deadly diseases. Unlike inoculation, vaccination was low risk for individuals and had no risk to the large population. Jenner sent vaccinations to anybody who requested them, although occasionally, supplies were lacking. While he obtained worldwide acknowledgement and multiple commendations, he made no effort to gain financially from his findings. Slowly but surely, vaccination supplanted inoculation, which was banned in 1840.

Conclusion

Edward Jenner died in the early hours of 26th January 1823, and was buried alongside his family. Jenner's persistent advocacy and devotion to vaccination research altered how medicine is conducted. A worldwide campaign was launched in 1967 under the leadership of the World Health Organisation (WHO). On 8th May 1980, they declared that smallpox was globally eradicated and that vaccinations for smallpox would stop. WHO stated:

‘The world and all its people have won freedom from smallpox, which was the most devastating disease sweeping in epidemic form through many countries since earliest times, leaving death, blindness and disfigurement in its wake.’²²

Edward Jenner's findings and vaccination advocacy facilitated the elimination of smallpox: this is Edward Jenner's legacy.

²¹ Kendall A. Smith, 'Edward Jenner and the Small Pox Vaccine', *Frontiers in Immunology*, 2.21 (2011)

²² Izabella Parowicz, 'Dr. Leopold Goeppner's (1766-1824) Pioneering Fight Against Smallpox', in *Genealogy and Social History: Understanding the Global Past through Family Case Studies*, ed. By Eric Martone (Newcastle upon Tyne: Cambridge Scholars Publishing, 2022) pp. 27-69 (p.52)

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