

The Conflict Between Medical Science, Public Health, and the Antivaccination Movement in Nineteenth Century England

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“The Conflict between Medical Science, Public Health and the Antivaccination Movement in Nineteenth Century England” examines the evolution of medical opposition to vaccination from the discovery of the vaccine in the late 18th century until the end of the 19th century. It analyzes how the nature of the vaccine debate was influenced by laws that mandated the vaccination of infants. This paper argues that many of the anti-vaccine claims were engendered by the lack of understanding of disease causality and immunity and a misinterpretation of statistical data. Some antivaccinationists arguments were groundless while others were legitimate concerns based on sound observations. It was only after several improvements to the system of vaccination and the development of the germ theory that anti-vaccine claims could be completely refuted.

In 1840, the British Parliament passed the first of a series of Acts that made smallpox vaccination mandatory and led to the rise of an anti-vaccination movement. Leicester was a strong hold of anti-vaccinationists during the Victorian era. In 1883, only 1,732 out of 4,819 infants had been vaccinated in the city.¹ This willful neglect by the parents of the unvaccinated infants caused the local courts to issue more than 6,000 summons, sixty-four imprisonments and about £2,500 in fines and led to the loss of 200 homes (sold to cover arrears).² On March 23, 1885, anti-vaccinationists held a large demonstration in Leicester that attracted thousands of people from across the country.³ They protested the compulsion of the Acts, which they felt invaded their personal liberties and the stringency of the punishments incurred by violators.⁴ Both young and old repeated slogans and held banners that included phrases such as “entire repeal not compromise,” “better a felon’s cell than a poisoned babe” and “sanitation not vaccination.”⁵ In excerpts from the periodical, *Vaccination Inquirer*, the following description was given of the scene:

From half the counties of England, from scores of towns and cities, men of all professions, of all trades, bound in close bonds of sympathy not by tens and twenties, but by hundreds and thousands met...A procession...of ‘law-breakers,’ without a single policeman in ranks to keep order; and at the end of the day not the rumour of a child knocked down or a pocket-handkerchief lost!⁶

¹ J. T. Biggs, *Leicester: sanitation versus vaccination: its vital statistics compared with those of other towns, the army, navy, Japan and England and Wales* (London: The National Anti-Vaccination League, 1912), 101.

² Ibid.

³ Ibid.

⁴ Ibid., 106.

⁵ Ibid., 109-110.

⁶ Ibid., 111

Guardians, enforcers of the parliamentary Acts, elected in Leicester following the protests in 1886 were overwhelmingly against compulsory vaccination.⁷ The guardians struggled with the local government without progress until 1889, when mounting pressure from anti-vaccinationists all over the country led to the formation of a royal commission to evaluate the vaccination Acts.⁸ The smallpox anti-vaccination movement exemplified by the Leicester demonstration was a struggle against a radical paradigm shift in scientific thought that changed the practice of medicine and revolutionized public health. As the movement would reveal, it took more than just facts to bend the human will or change centuries-old convictions.

Overview of Smallpox

Two strains of the variola virus cause smallpox in humans: variola major and variola minor. Both are highly contagious, but variola minor has a mortality rate of less than one percent while the more prevalent variola major has a mortality rate of thirty percent.⁹ The disease has an incubation period of ten to twelve days and is transmitted between people via airborne droplets.¹⁰ Smallpox causes flu like symptoms in the first two to three days of illness, followed by a red rash, papules, vesicles and then finally pustules.¹¹

Inoculation was one of the earliest effective methods of combating smallpox. The practice can be traced back some 1,000 years to China. As part of their normal practice, Chinese healers blew powdered smallpox scabs into the nostrils of the healthy to activate immunity.¹² By the 1700s, variants of the practice of inoculation (also known as variolation) had spread or developed independently throughout Eurasia. Smallpox survivor, Lady Mary Wortley Montague, formally introduced the British people to inoculation after learning of it in Turkey.¹³ The practice eventually gained widespread repute when the two daughters of the Princess of Wales were variolated, and it was officially endorsed by the Royal Society in 1727.¹⁴

Edward Jenner and the Cowpox Vaccine

⁷ Dale L. Ross, "Leicester and The Anti-Vaccination Movement 1853 – 1889," *Transactions of the Leicestershire Archaeological and Historical Society*, 43 (1968): 35-44.

⁸ Ross, 41.

⁹ World Health Organization, "Smallpox," September 21, 2007, <http://www.who.int/mediacentre/factsheets/smallpox/en/> (accessed November 19, 2017).

¹⁰ Institute of Medicine (US) Board on Health Promotion and Disease, *Scientific Background on Smallpox and Smallpox Vaccination, In Scientific and Policy Considerations in Developing Smallpox Vaccination Options: A Workshop Report* (Washington, DC: National Academies Press, 2002).

¹¹ Ibid.

¹² Science Museum: Brought to Life, "Exploring the History of Medicine, Smallpox: inoculation and vaccination," <http://broughttolife.sciencemuseum.org.uk/broughttolife/themes/diseases/smallpox> (accessed November 19, 2017).

¹³ Stefan Riedel, "Edward Jenner and the history of smallpox and vaccination." *Proceedings* (Baylor University Medical Center) 18, no. 1 (2005): 21-25.

¹⁴ Abbas M. Behbehani, "The Smallpox Story: Life and Death of an Old Disease," *Microbiological Review* 47, no. 4 (December 1983): 455-509.

Despite the growing popularity of smallpox inoculation in Europe, the disease was still highly prevalent in many areas. By the late eighteenth century, smallpox killed an average of 400,000 Europeans annually out of a population of less than 200 million.¹⁵ The disease was also responsible for a third of all cases of blindness in seventeenth and eighteenth-century Europe.¹⁶ Much needed relief came with the introduction of the vaccine.

Edward Jenner, a country physician from Gloucestershire, is credited with the discovery of the smallpox vaccine.¹⁷ It was well known that milkmaids who suffered from cowpox (very closely related to smallpox), a mild disease that affected the teats of cows did not contract smallpox. On May 14, 1796, Jenner tested this observation by inoculating eight-year-old James Phipps with matter from cowpox lesions from the hands of a dairy maid. After James recovered, Jenner tried and failed repeatedly to infect him with smallpox. Jenner concluded that the *Variolae vaccinae* (cowpox) imparted permanent immunity to the boy. Unlike inoculation, which involved using actual smallpox virus (attenuated to varying degrees) and still held a risk (1 to 2%) of transmitting smallpox, vaccination using cowpox held no risk of causing smallpox.¹⁸ In 1798, Jenner published his first book describing his study of cowpox: *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 "Cowpox."*¹⁹ Subsequent tests by noted members of the medical community including the surgeon and lecturer Henry Cline (1750-1827) provided the positive publicity that led to the increase in vaccination throughout England and the rest of Europe.²⁰ For his work, the British Parliament compensated Edward Jenner twice—£10,000 in 1802 and £20,000 in 1807.²¹

With the support of many well-established physicians and the patronage of the royal family, the Royal Jennerian Society was established in 1803 to promote smallpox eradication.²² The Society's first publication, in addition to detailing the instructions for properly administering the cowpox vaccine, distinguished between the formation and progression of a healthy vesicle—the sign of vaccine inoculation success—and a “spurious vesicle.”²³ The publication directed vaccinators to transfer matter from a cowpox vesicle, taken prior to the complete development of the areola of one patient (inflamed or reddened region surrounding vesicle), into a superficial puncture in the arm of the second patient using a lancet (or thread or any reasonable tool) to confer immunity.²⁴ If practitioners allowed the vaccine matter to lose potency through exposure to harsh

¹⁵ J. N. Hays, *Epidemics and Pandemics: Their Impacts on Human History* (ABC-CLIO, 2005), 151.

¹⁶ World Health Organization, "Smallpox", September 21, 2007

¹⁷ There is some evidence of cowpox inoculations prior to Jenner's discovery. See: Behbehani, 468

¹⁸ Riedel, 21-25.

¹⁹ Behbehani, 471.

²⁰ Riedel, 21-25. Cline was later elected as the head of the Royal College of Surgeons.

²¹ Ibid.

²² Royal Jennerian Society, *Address of the Royal Jennerian Society, for the extermination of the small-pox. With the plan, regulations, and instructions for vaccine inoculation. To which is added, a list of the subscribers*, (London: W. Phillips, George Yard, 1803), 26.

²³ Royal Jennerian Society, 39-41.

²⁴ Royal Jennerian Society, 41.

environmental conditions or were inept at administering the material to a patient, spurious vesicles would form which would not provide immunity.²⁵ Despite the official support of the cowpox vaccine, some practitioners remained unconvinced of its benefits.

Opposition to Jenner's Vaccine

The earliest opponents of vaccination were overwhelmingly comprised of Jenner's own medical colleagues, and they promulgated arguments that ranged from the scientifically complex and somewhat logical to very base personal attacks on Dr. Jenner. These men were legitimate practitioners who became well-known within the public sphere for writing extensively against vaccination. Most notorious of Jenner's early challengers were Drs. Benjamin Mosely, John Birch, and John Stuart. Dr. Benjamin Mosely (1742-1819), a member of the Royal College of Physicians, argued that cowpox inoculation was an unjustifiable attempt to displace the superior system of smallpox inoculation and would cause a person to develop bovine traits.²⁶ He summarized some of his wild unsubstantiated speculations:

The subject, respecting the distempers of the brute creation, of which we know but little has not been overlooked by the learned and curious; nor is history destitute of many influences of their fatal effects to the human race. Can any person say what may be the consequences of introducing the Lues Bovilla, a bestial humour—into the human frame, after a long lapse of years? Who knows, besides, what ideas may rise, in the course of time, from a brutal fever having excited its incongruous impressions on the brain? Who knows, also, but that the human character may undergo strange mutations from quadrupedan sympathy; and that some modern Pasiphae may rival the fables of old?²⁷

Mosely fueled existing fears of the “transformative effects” of contaminating the body with animal diseases. Another opponent, Dr. John Birch (1745-1815) was the “surgeon extraordinary to the Prince of Wales and Surgeon to St. Thomas Hospital,” and he published many tracts, books, letters and pamphlets (often anonymously) that undermined the practice of vaccination in favor of smallpox inoculation.²⁸ His endeavor to “pursue truth”—or as many countered, to protect his profitable smallpox inoculation practice—led him to “uncover” many purported vaccination failures, particularly in the town of Ringwood. He claimed many things: that sixty-two people died from smallpox in Ringwood, that there were at least 150 confessed failures, that fewer than three

²⁵ Royal Jennerian Society, 42.

²⁶ Benjamin Moseley, *A treatise on sugar: with miscellaneous medical observations* (London: John Nichols, 1800) 182-183.

²⁷ *Ibid.*

²⁸ John Birch, *Serious reasons for uniformly objecting to the practice of vaccination: in answer to the report of the Jennerian Society* (London: J. Smeeton, 1806).

people had died of smallpox inoculation in over fifty years, that Jacobine instructions were being communicated under the guise of vaccination instructions, that the vaccine was dangerous and caused ulcers, and that cowpox was unrelated to smallpox and caused novel eruptions.²⁹ In response to these alleged failures, a medical deputation from the Jennerian society went to Ringwood to investigate the issue.³⁰ They found no instances where smallpox took place after vaccination had been rightly completed.³¹

Dr. Stuart (1745-1814) entitled his magnum opus *£30,000 for the Cow-pox!!! An Address (to Ld. H.P., and) to the British Parliament, on Vaccination; (of the Greatest Importance to Mankind) Wherein the Report of the College of Physicians is Completely Confuted*. His book was a rebuttal to the many arguments offered by pro-vaccinationists and a grievance of the loss of £30,000 to Jenner, a person he believed to be a charlatan.³² He claimed his own son was a cowpox martyr. According to the doctor who vaccinated Stuart's 22-day-old infant, Stuart oversaw his child's health after he was vaccinated and "employed mercury to the child, both inwardly and outwardly."³³ It was highly unlikely that the child died from cowpox, but, nonetheless, Stuart publicized his death as a smallpox casualty. He also offered this tragic example:

Two healthy children of Mr. Sparks, a shoe-maker, in Billericay, Essex, were inoculated with Cow-Pox, by one of the most distinguished and skillful practitioners in that town, in the year 1804: they both broke out in shocking eruptions, with blotches, ulcers, &c. which resisted every remedy; and after nearly twelve months of dreadful suffering, both died, wretched and miserable victims to the Cow-Pox, about eighteen months ago.—This fact is well known in Billericay, and I pledge myself for the truth of it. These were the only children of Mr. and Mrs. Sparks, both the parents young and healthy, who, as well as their children, are dead, and the whole family thus become extinct.³⁴

Dr. Thomas Brown (1778-1820), an Edinburgh surgeon, tried to dismantle the practice of vaccination and diminish its public support by offering more sophisticated arguments than some of his colleagues. He asserted that there was no consensus among scientists concerning the standards of vaccination, the nature of cowpox and its effects on smallpox, the appearance of the

²⁹ Ibid.; The Jacobin Club or Jacobins was a militant political group that formed during the French Revolution.

³⁰ William Blair, *Hints for the Consideration of Parliament* (London: J. Callow, 1808), 200.

³¹ Ibid., 201.

³² Smyth Ferdinand Stuart, *£30,000 for the cow-pox!!! An address (to Ld. H.P., and) to the British Parliament, on vaccination; (of the greatest importance to mankind) wherein the report of the College of Physicians is completely confuted*, (London: Hatchard, 1807).

³³ Stuart, 15.

³⁴ Stuart, 16.

healthy vesicle or even the transferability of diseases between humans and animals.³⁵ According to Brown, the number of cowpox inoculation successes did not exceed the number of failures and were greatly exaggerated. Also, there were “so few well-authenticated instances of permanent security being afforded, as not perhaps to exceed a hundred.” He was particularly offended by the fact that vaccination was practiced by lay people “even into the hand of clergymen and females”.³⁶

The reasons for rejecting the practice of vaccination postulated by Birch, Stuart, and Brown, all prominent smallpox inoculationists, are simply a cursory overview of the arguments that circulated after Jenner’s discovery. While a few opponents like Brown pointed out some legitimate problems that needed to be addressed within the system of vaccination, most, like Birch and Stuart who profited from smallpox inoculations, employed pseudoscience and misconstrued statistics to foment mass hysteria, fear of the Variolae vaccinae and public distrust of the medical profession. Caught in this battle between doctors and not knowing what to believe, the public balked and vaccination rates decreased.

To settle the debate and restore confidence in vaccination, the Royal Jennerian Society and the House of Commons launched investigations of their own. In 1805, a committee consisting of twenty-five members of the Royal Jennerian Society was assembled to look into the cases involving alleged vaccine failures.³⁷ The committee affirmed the efficacy of vaccination after scrupulously investigating every opinion and assertion against the Variolae vaccinae. To further allay any remaining doubts and accusations of biased reporting, the House of Commons commissioned a neutral body, the Royal College of Physicians, to inquire into the state of cowpox inoculation in 1806.³⁸ After a nine-month probe, the College of Physicians released its report: the cowpox vaccine was safe and was guaranteed to work if the correct vaccination procedure was carefully followed by a skilled individual.³⁹ This report temporarily quelled the debate and brought nearly unanimous support for vaccination within the medical community. Unprecedented developments in public health in the following decades, principally with the introduction of legislation mandating vaccination and broad sanitation reforms, would reignite the vaccine debate once more.

Smallpox Acts and Public Health

Compulsory vaccination Acts were passed in response to smallpox outbreaks and increases in smallpox mortality. Between 1837 and 1840, a smallpox epidemic killed 41,253 people in

³⁵ Thomas Brown, *An inquiry into the antivariolous power of vaccination: in which, from the state of the phenomena, and the occurrence of a great variety of cases, the most serious doubts are suggested of the efficacy of the whole practice, and its powers at best proved* (Edinburgh: George Ramsay and Co., 1807).

³⁶ Brown, 74.

³⁷ John Simon, *Papers relating to the history and practice of vaccination*, (London: George Edward Eyre and William Spottiswoode, 1857), 17.

³⁸ *Ibid.*, 20.

³⁹ *Ibid.*

England, making it one of the worst episodes of the disease in British history.⁴⁰ Around this period, physicians still practiced smallpox variolation alongside vaccination at great risk to the public. To prevent future attacks of smallpox, Parliament passed an Act in 1840 that made all forms of variolation illegal and allowed for free vaccination of the poor at public expense.⁴¹ Also in 1837, the General Register Office began civil registrations and took over recording such things as births, deaths and marriages—a task formerly performed by the parish registers.⁴² The advent of civil registrations was vital in the advancement of infectious disease epidemiology because statistical data on mortality rates for different diseases could be accurately recorded and compared. In the case of smallpox, the annual death rate in England and Wales was revealed to have decreased from 770 out of a million from 1838 to 1840 to 304 out of a million from 1841 to 1853; however, infants were still disproportionately killed by the disease due to low vaccination rates.⁴³ From 1848 to 1852, only thirty-five percent of newborns were vaccinated annually.⁴⁴ Parliament intervened again and passed a new more efficacious Act in 1853 that made it mandatory for all infants to be vaccinated within their first three months of life; violating parents were fined.⁴⁵ The Act soon lost its impact and vaccination rates quickly plummeted because it required nothing more than a single fine or a short prison sentence from the parents.

In 1848, John Simon (1816-1904), a renowned surgeon and member of the Royal College of Physicians, was made Medical Officer of Health for London, and he began the behemoth task of mending the broken system of vaccination.⁴⁶ He started by extensively and honestly evaluating its structure and operations. He found that vaccination procedures and the quality of the inoculated lymph were inadequately supervised under the existing system controlled by the Poor Law Board.⁴⁷ The practitioners—“clergy, amateurs, druggists, old women, midwives,” basically anyone with a lancet—were often incompetent.⁴⁸ He had the following recommendations enacted: (1) “the special qualification of public vaccinators [set up training stations in medical schools and hospitals],” (2) “systematic medical supervision of the results of public vaccination,” (3) “thorough medical inquiry whenever cause of complaint is alleged or suspected,” (4) “the regulation of details of the service on a uniform plan under the advice of members of the medical profession specially

⁴⁰ Charles Creighton, *A History of Epidemics in Britain, Volume 2*, (Cambridge: The University Press, 1894).

⁴¹ George Grieson, Grieson, *An Act of Parliament to Extend the Practice of Vaccination*, (Dublin, July 23, 1840).

⁴² Simon, 44-45; No general death registrations existed outside of London before 1838. Even in London, The Bill of Mortality supplied by the parish registrar only took account of the burials with the parochial Church of England not the total deaths.

⁴³ *Ibid.*, 73.

⁴⁴ *Ibid.*, 69.

⁴⁵ John Lithiby, *Shaws' manual of the vaccination law: containing the Vaccination Acts, 1867, 1871, 1874, 1898 & 1907; the Vaccination Orders, 1898, 1899, 1905 & 1907 and the instructional circulars and memoranda issued by the Local Government Board with introduction*, (London: Shaw & Sons, 1908), 4.

⁴⁶ Dorothy Porter and Roy Porter, "The Politics of Prevention: Anti-Vaccinationism and Public Health in Nineteenth-Century England." *Medical History* 32, no. 3 (1988): 231-252.

⁴⁷ *Ibid.*

⁴⁸ Simon, 74.

skilled in the subject,” and (5) more regulation on the lymph supply.⁴⁹ Legislators rewrote the 1853 Act in 1867 to include compulsory vaccination for all children fourteen and younger and allowed the Board of Guardians to appoint special officers to oversee the vaccinations.⁵⁰ Under this new law, defaulters could be continuously fined and convicted and jailed.⁵¹ The Act also provided practitioners with financial incentives per child vaccinated.⁵² Following the Franco-Prussian war (1870-1871) three years later, a massive influx of French refugees into England and Wales led to another smallpox epidemic that caused the deaths of 42,084 people.⁵³ After the epidemic, punishments that were formerly laxly administered were strictly carried out.

Recognizing that the system of vaccination was not functioning properly, John Simon introduced new revisions that would address the concerns of the public and the medical community. Despite his efforts, die-hard antivaccinationists still refused to vaccinate their children. Stronger parliamentary laws were necessary to force these parents to conform, and the vaccination Acts were rewritten to have more teeth—summary convictions and continuous fines. With each epidemic, it became clear that there could be no exemptions where public safety was concerned; the unvaccinated children would host and perpetuate the spread of smallpox. The stricter laws unfortunately strengthened antagonism toward vaccination. People continued to believe that science refuted the legitimacy of the immunity provided by the *Variolae vaccinae*, so they refused to obey the Acts.

Anti-Vaccination Movement vs. Public Health

The introduction of the mandatory smallpox Acts evoked an eruption of opposition that rivalled the Cambrian explosion in terms of the heterogeneity of ideas. While before, the strongest dissent came from a sect of medical professionals who were essentially driven by the same underlying motives, the outcry after the first of the Acts was issued was from intellectuals from a wide variety of fields as well as from working class citizens. The attacks were no longer just directed at Edward Jenner or any one scientist, but also at Parliament and other governmental institutions.

Dissenters formed anti-vaccination organizations and societies to give the front of strength, foster ideas, share support and resources, as well as proselytize and lobby for the repeal of compulsory vaccination. In 1896, the National Anti-Vaccination League (NAVL) was formed from the combination of the Anti-Compulsory Vaccination League founded by Richard Gibbs in 1867, the National Anti-Compulsory Vaccination League founded in 1874 by Reverend and Madam Hume-Hume Rothery, the London Society for the Abolition of Compulsory Vaccination

⁴⁹ Simon, 76; Porter and Porter, 231-252.

⁵⁰ Lithiby, 6. The Board of Guardians: administrators of the poor law from 1835 – 1930. The Poor Law Act was passed by Parliament in 1834 to lessen the financial burden of the poor on the state.

⁵¹ Ibid.

⁵² Porter and Porter, 231-252.

⁵³ Creighton, 615.

founded in 1880 by William Tebb, and many other provincial organizations.⁵⁴ Tracts and pamphlets abounded that allowed messages to be disseminated far and wide at unprecedented rates. William Tebb (1830–1917), a British merchant and social activist began the *Vaccination Inquirer* in 1879, which eventually became the official publication of the NAVL.⁵⁵

The opposition arguments after the formal organization of the anti-vaccination movement could be categorized into two main groups: scientific or statistical and ethical or moral. The delineation between the two categories was often blurred. Those who rejected vaccination on ethical grounds often used medical science and epidemiological data to back their positions. As the movement developed, parallel advances in microbiology based on the works of men like John Snow, Louis Pasteur and Robert Koch led to the establishment of the causal relation between germs and disease. This discovery explained how humans contracted smallpox and gave a little insight into immunity. However, the germ theory was rejected by the majority of anti-vaccine physicians in favor of alternate ideas such as the filth theory, the miasmatic theory or the zymotic theory of disease. Many anti-vaccine scientists made sound observations about the issues with the practice of vaccination, but because their theories of disease were false or inadequate, they were forced to reject the entire system rather make corrections that would make vaccinations safer.

The main arguments pushed by anti-vaccine medical scientists were that the vaccine was either useless, injurious or both. Charles Creighton (1847-1927), physician and pioneering epidemiologist, was a man of great renown in the NAVL. His work was often cited by anti-vaccinationists to add scientific clout to their writings.⁵⁶ Charles Creighton advanced the theory that the cowpox was not well understood and could convey syphilis.⁵⁷ He echoed the confusion that existed about the nature of the cowpox since Jenner's time. It was unclear to medical scientists if it was an equine disease (horsepox) that infected cows or just a form of the human smallpox in cows. Its effect on the human immune system was also not well understood. In some people, the immunity conferred by the vaccine seemed to get impaired after twelve to fourteen years, when according to Jenner, the cowpox was supposed to impart the same lifelong immunity that inoculation or a natural infection with the smallpox afforded.⁵⁸ Since the immune response occasionally deviated from the norm, anti-vaccinationists were able to argue that the viruses were unrelated.⁵⁹ While physicians who supported vaccination encouraged revaccination, opponents decried the entire practice as worthless.

The idea of the lymph transmitting syphilis and other infectious diseases (including smallpox) was also not unfounded. In 1859, a British medical officer in Manchester, Dr. James Whitehead, published a report that revealed that in one year, a taint was communicated in 34 out

⁵⁴ Porter and Porter, 231-252.

⁵⁵ Porter and porter, 231-252.

⁵⁶ Ibid.

⁵⁷ Charles Creighton, *The natural history of cow-pox and vaccinal syphilis*. (London: Cassell & Company, Limited, 1887).

⁵⁸ Charles T. Pearce, *Vaccination: its tested effects on health, mortality, and population* (London: Bailliere Brothers, 1868), 37.

⁵⁹ Pearce, 44.

of 1,435 vaccinations.⁶⁰ All thirty-four cases exhibited evidence of constitutional syphilis or a disease of syphilitic character.⁶¹ Dr. Charles T. Pearce (1815-1883), a member of the Royal College of Surgeons and a prominent homeopath also presented evidence that linked vaccination to a higher risk of contracting and dying from chest diseases such as tuberculosis, convulsions and measles.⁶² To deal with such problems of cross infections, an 1898 smallpox Act replaced arm-to-arm vaccination, which had the potential of transmitting infectious diseases from person to person, with glycerinated calf lymph.⁶³

Even when the vaccine was effective, there was fear among some vaccine oppositionists that it would stymie the natural process of putrefaction brought on by the smallpox fever that riddled the body of poisons. Furthermore, it would not really decrease general mortality, rather it would interfere with a natural equilibrium that would lead to an increase in deaths from other diseases.⁶⁴ This radical view promoted by physicians like Pearce saw diseases as having “certain periods, according to the occult and unaccountable alterations which happen in the bowels of the earth.”⁶⁵ Smallpox from this perspective was an unavoidable, necessary evil.

Both vaccinationists and anti-vaccinationists used statistical analysis to bolster their arguments. Anti-vaccine physicians claimed that other side hyperbolized both the impact of smallpox—especially during periods when diseases like Scarlet fever or tuberculosis claimed more lives—and the rates of death among the unvaccinated.⁶⁶ Data on mortality rate was crucial in mounting credible attacks against the efficacy of the vaccine (Table 1).

Decades	Estimated Mean Population	Small-pox Deaths
1851-60	2,570,489	7,150
1861-70	3,018,193	8,34.7
1871-80	3,486,486	15,551

Table 1. Smallpox mortality in London. Adapted from Tebb (1881)

Based on the data above, for instance, prominent anti-vaccinationists like Sir Alfred Russell Wallace and William Tebb assumed that the 1867 Act (with its cumulative punishments) had increased vaccination rates, and they correlated an increase in vaccination coverage with an

⁶⁰ James Whitehead, “Third report of the Clinical Hospital, Manchester: containing results on physical development, hooping cough, and transmitted diseases.” (London: John Churchill, 1859).

⁶¹ *Ibid.*, 51-52.

⁶² Pearce, 34.

⁶³ Lithiby, 45.

⁶⁴ Pearce, 98.

⁶⁵ Pearce, 98.

⁶⁶ *Ibid.*, 65.

increase in deaths from smallpox.⁶⁷ However, statistical evidence was rarely conclusive without context. The eighty percent increase in the smallpox mortality rate could likely be attributed to the 1870-1871 epidemic, which caused a spike in smallpox deaths and skewed the data.

Opponents presented sanitation as a cheaper, less harmful, more efficacious alternative to preventing smallpox and other infectious diseases. The sanitary movement was based on the common belief among antivaccinationists that diseases were caused by filth. A combination of sanitation, prompt reporting, isolation and quarantine of smallpox cases known as the “Leicester Method” won many converts to the sanitation camp. It was put into practice by the Leicester’s Assistant Medical Officer, Dr. Johnston in 1877, and it was effective in suppressing smallpox epidemics before they could spread. An 1892-1894 outbreak of smallpox in Leicester revealed the strengths and weaknesses of the “Leicester Method.” In 1892, a case of smallpox was misdiagnosed as chickenpox and led to an outbreak that infected 366 people with 21 deaths.⁶⁸ The “Leicester Method” unlike vaccination could not prevent smallpox—it could only limit its spread. Many NAVL members of the sanitation movement did not believe in the germ theory of disease, or even in the idea of the contagion, but they still heralded the practice of isolation and containment. This behavior was self-contradictory because implicit in the philosophy of isolation and containment was the idea that a contagion or virus could be transmitted from one person to another and therefore had to be kept away from the public.

Medical, religious and ethical opposition arguments birthed the conscientious objection movement. The phrase “conscience objection” was first introduced into the English language due to the anti-vaccination crusade.⁶⁹ In 1898, anti-vaccinators made a legislative gain when a new Act was issued that allowed parents to apply for certificates of “conscientious objection”.⁷⁰ The certificates allowed parents to choose not to vaccinate their children if doing so would violate their conscience. The number of these exemptions grew from 200,000 in 1898 to “25 percent of all births” by 1907.⁷¹ Dissenters simply wanted their civil liberties protected—especially, the right to control what happened to their bodies and those of their children. Mary Hume-Rothery, co-founder of the National Anti-Compulsory Vaccination League described compulsory vaccination as “legalizing bodily assault and possible murder on the bodies of fellow-citizen’s children.”⁷² Conscientious objection was linked to morality, religion, independent thought and citizenship; for this reason, it was a very convincing argument against vaccination.

⁶⁷ William Tebb, "Sanitation not Vaccination the True Protection Against Smallpox." (International Congress of Anti-Vaccinators. Cologne, October 12, 1881), 12.; Thomas P. Weber, “Alfred Russel Wallace and the Antivaccination Movement in Victorian England,” *Centers for Disease Control and Prevention* (2010), https://wwwnc.cdc.gov/eid/article/16/4/09-0434_article.

⁶⁸ Biggs, 411-419.

⁶⁹ Porter and Porter.

⁷⁰ Nadja Durbach, "Class, Gender, and the Conscientious Objector to Vaccination, 1898-1907," *Journal of British Studies* 41, no. 1 (2002): 58-83.

⁷¹ Ibid.

⁷² Nadja Durbach “Class, Gender, and the Conscientious Objector to Vaccination.”

Conclusion

Smallpox was one of the few diseases that could be credited with restructuring societies, changing demographics, collapsing some empires and building others up. Many died, and survivors lived with permanent reminders of their ordeal on their bodies. No cure was ever found for it, and up until the discovery of inoculation there was no defense against it. For this reason, its ravages were often seen as providential. Immunity was not a foreign concept. It was well understood that one only had to suffer from certain illnesses once and would forever be protected from them. Jenner's vaccination was revolutionary because it was based on many truths that had not yet been solidified within the scientific community or the public such as the fact that smallpox was spread by a contagion (the germ theory), or that diseases could be transferred from animals to humans (both had the same biological building blocks). The reason why scientific opposition to vaccination lasted so long, especially in the face repeated experimentation and trials that proved that the vaccine was safe, was because the dominant paradigm for the most of the nineteenth century taught that diseases had environmental or inanimate causes. The massive shift in thought that replaced the existing ideas of disease causation with the germ theory, revolutionized the practice of medicine and helped scientists understand the mechanism of action of vaccinations.

Scientists and members of the public who continued to reject the vaccine based on false ideas of disease transmission were given the leeway to exercise their opinions through the conscientious objection movement. Conscientious objection disregarded the efficacy of the vaccine and focused only on the principle autonomy. Today it is through the legal exemptions offered by conscientious objection that parents without medical excuses can refuse having their children vaccinated.

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