

Biog

# a history of medicine in pictures

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## Jenner: Smallpox is Stemmed

"MAY I NOT with perfect confidence congratulate my country and society at large on their beholding...an antidote that is capable of extirpating from the earth a disease which is every hour devouring its victims; a disease that has ever been considered as the severest scourge of the human race!"

With these mild, modest phrases did Edward Jenner, in the year 1800, close his third publication, *A Continuation of Facts and Observations Relative to the Variolae Vaccinae, or Cowpox*. The statement was typical of this homeloving English country doctor of Berkeley, whose keen sense of observation and persistence in experimentation had given to Medicine and to the world an entirely new principle with which to combat disease: vaccination.

Smallpox had been a scourge upon humanity for untold centuries. Described accurately by the Persian, Rhazes (865-925), smallpox evidently had been known in China and in India long before; and for centuries Orientals had sought to protect themselves against the disease by inoculation: by snuffing dried crusts of smallpox pustules into the nose; inserting pustular material from an infected person into a vein of a healthy person; or by binding a bit of such material over a scratch in the skin. By one of these methods, practitioners sought to confer immunity to smallpox upon healthy persons,



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particularly children, by producing in them a mild form of smallpox. If the procedure was successful, the patient was unlikely to be affected during subsequent inevitable epidemics of smallpox in his community; and hazards of severe scarring and of crippling from infection were lessened. If unsuccessful—well, the patient probably would have succumbed to smallpox later on, anyway. The risk was considered worthwhile, even though the procedure carried the further risk that inoculated persons might convey active infection to others in the community.

Inoculation, though long practiced in the Far East, in Greece, and in the Ottoman Empire, did not find acceptance in Europe until 1717, after the idea was advocated by Lady Mary Wortley Montagu, wife of the British Ambassador to Turkey. Lady Mary's efforts were at first violently denounced; but when, through her influence, King George I permitted his two granddaughters to be inoculated, the practice was accepted. Concurrently, the Reverend Cotton Mather, in Boston, was pressing the cause for inoculation in the American colonies, with the cooperation of Dr. Zabdiel Boylston. On June 26, 1721, Boylston inoculated his six-year-old son and two Negro slaves. His experiment was successful—but his acts and Mather's publications touched off near-riotous reactions.

Such was the status of the medical profession's and of the public's attitudes toward smallpox when Edward Jenner came into the world. As prevalent as measles, but far more deadly, smallpox during the latter half of the eighteenth century accounted for 10 per cent of all deaths. Often smallpox disfigured faces of those whom it did not kill, and caused much of the blindness of that time.

The impact of Jenner's work was not limited to his victory over smallpox: extension of his principle, of vaccination as a means of prevention of disease, in the next 160 years was to enable the medical profession to score almost total victory over several other infectious diseases.

Edward Jenner was born May 17, 1749, the son of the Reverend Stephen Jenner, vicar of Berkeley, in Gloucestershire, England. When he was five, his father died, and he was looked after by his elder clergyman brother. Early in life he exhibited an extraordinary interest in nature. At age thirteen he was apprenticed to Daniel Ludlow, surgeon and apothecary of Sodbury. In 1770 Jenner became a student at St. George's Hospital, in London, and a house pupil of the famous London surgeon and naturalist, John Hunter. From this relationship developed a lifelong friendship, a strong interest in comparative anatomy, and collaboration in research and observation of natural phenomena. Young Jenner's abilities as a naturalist earned him the job of classifying and of arranging zoological specimens brought back by Joseph Banks from Captain Cook's first voyage to the Pacific, in 1771, and an offer to accompany Cook's next expedition. Jenner turned down this and other lucrative offers, for he preferred to return to his native Berkeley to engage in the practice of medicine.

**the picture** The first vaccination against smallpox was performed by Edward Jenner, English "country" physician, in his apartment in Chantry House, Berkeley, Gloucestershire. Exudate from a cowpox pustule on the hand of dairymaid Sarah Nelmes was inserted into scratches on the arm of eight-year-old James Phipps, May 14, 1796. The vaccination was effective, for two later attempts to induce infection with smallpox were unsuccessful. Proving and reproving his vaccination discovery, Jenner published his findings in 1798. Despite opposition, vaccination became accepted practice during Jenner's lifetime.

Dr. Jenner is described as a rather handsome man of stocky build who liked to dress well. He was generally beloved for his congenial and kindly personality and for his readiness to go to the sick through storm or mud. He did not disdain to look at a farmer's sick cow, after having cared for his family. Not only was he a competent physician; he also was interested in music and in poetry—even to composing bits of verse from time to time. At Berkeley, where he lived in Chantry Cottage near the church, he continued his studies of natural history, goaded frequently by letters from John Hunter demanding this investigation or that specimen. From Hunter he received a famous bit of advice: "Why think? Why not try the experiment?" Jenner's work on habits of the cuckoo and on migration of birds brought him fame and controversy long before he wrote on vaccination; from time to time he also addressed papers on various medical subjects to local medical societies.

Jenner was quite familiar with inoculation as a means of preventing smallpox; he carried a vivid memory of the severity of his own experience following inoculation when he was but a boy.

Early in his career, Jenner was impressed by the insistence of dairymaids, suffering from sores and from mild reactions to cowpox, that they now would be safe from smallpox. Medical men believed this to be but an old country folk saying; but the idea intrigued Jenner. He then collected examples of persons who had had cowpox and afterward had escaped smallpox; or who, having had cowpox, did not react successfully to smallpox inoculation. Of this methodical work, Underwood says: "Even at this early stage he seems to have been obsessed by the feeling that cowpox *ought* to give complete and permanent immunity to smallpox. This is indeed strange, since every practitioner

knew that smallpox did not always give complete and permanent protection against itself...Jenner set out to show that cowpox protected against smallpox, and also that cowpox could be transmitted from one human being to another just as smallpox could...that cowpox, naturally acquired, could be transmitted artificially *from person to person* so that there would result an increasing reservoir of persons who had been given the opportunity of becoming...immune...to smallpox... That was the cardinal factor in Jenner's doctrine, and it was an idea which had probably not occurred seriously to anyone before; at least, no one had attempted to put it into practice."

Jenner's progress was slow. His observations extended over a quarter of a century. It was in 1796 that Jenner made his crucial experiment. He found that Sarah Nelmes, a dairymaid, had a typical cowpox lesion on her hand. On May 14, he inoculated a young friend, eight-year-old James Phipps. Jenner reported: "The matter was taken from a sore on the hand of a dairymaid, who was infected by her master's cows, and it was inserted... into the arm of the boy by means of two superficial incisions, barely penetrating the cutis, each about half an inch long.

"On the seventh day he complained of uneasiness in the axilla, and on the ninth he became a little chilly, lost his appetite, and had a slight headache. During the whole of this day he was perceptibly indisposed, and spent the night with some degree of restlessness, but on the day following he was perfectly well."

But Jenner wanted to be sure. Therefore, he wrote: "In order to ascertain whether the boy, after feeling so slight an affection of the system from the cowpox virus, was secure from the contagion of the smallpox, he was inoculated on the 1st of July following with vari-

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olous matter, immediately taken from a pustule. Several slight punctures were made on both his arms, and the matter was carefully inserted, but no disease followed...Several months afterward he was again inoculated with variolous matter, but no sensible effect was produced on the constitution."

By spring, 1798, Jenner had collected further evidence to substantiate his claims, and privately published his famous booklet: *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 Cowpox.*

Jenner's great discovery at first evoked resistance, not acceptance. Three months in London in 1798 failed to arouse interest either among physicians or among patients. His first break came when Henry Cline, a surgeon, used a quill of dried cowpox serum, which Jenner had left with him, as a counter-irritant in treating another disease, and found later that his patient had become immune to smallpox inoculation. From interest created by Cline's report of this incident the practice of vaccination began to spread.

As vaccination became popular, there was no lack of detractors, nor of persons seeking spurious credit for its discovery. Jenner's work, however, was based upon sound experimental data; his results were so positive and so convincing and the need for this surer, safer, and less torturous prophylaxis was so great, that he received official recognition earlier in life than did most medical innovators. In 1800, Jenner was invited officially to London to vaccinate the 85th regiment, which assignment he took personally. In the United States, Professor Benjamin Waterhouse performed the first vaccination in July, 1800, with material received from London. After lengthy investigation of Jenner's claims, Parliament in 1802 voted him a sum of £10,000; and again, in 1806, a grant of £20,000.

Despite swirling currents of fame and of

defamation, Jenner continued to make his home in Berkeley and to practice medicine. He published two additional pamphlets on vaccination: *Further Observations on the Variolae Vaccinae or Cowpox*, in 1799; and *A Continuation*, previously mentioned, in 1800. His correspondence grew in volume apace with his fame, taking up more and more of his time. In the midst of such circumstances, the life of the great benefactor of mankind ended, at Chantry Cottage, in his seventy-fourth year. A cerebral hemorrhage was fatal to Jenner on January 26, 1823.

Jenner's dedication to his cause and to singleness of purpose is well defined in his own words:

"While the vaccine discovery was progressive, the joy I felt at the prospect before me of being the instrument destined to take away from the world one of its great calamities, blended with the fond hope of enjoying independence and domestic peace and happiness, was often so excessive that, in pursuing my favorite subject among the meadows, I have sometimes found myself in a kind of reverie. It is pleasant for me to recollect that these reflections always ended in devout acknowledgments to that Being from whom this and all other mercies flow."

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