

From: "Stuart Green" <stuartgreenmd@yahoo.com>  
To: "Benjamin Franklin" <dr\_benjamin\_franklin@yahoo.com>  
Subject: **An account of the small-pox**

Dear Doctor Franklin:

Although you may find it impossible to believe, smallpox no longer exists. Of all the afflictions that plagued mankind, none affected you as deeply as the smallpox epidemic of 1736, which carried away your 4-year-old son Francis (Franky).

Your 1772 letter to your sister Jane grieves me when you spoke of "my son Franky, tho' now dead 36 years, whom I have seldom since seen equaled in every thing, and whom to this day I cannot think of without a sigh."

Rumors swirled through Philadelphia, you'll recall, that Franky died from a smallpox inoculation. You tried to set the record straight by publishing an announcement in your *Pennsylvania Gazette* declaring that Franky "was not inoculated but received the distemper in the common way of infection."

I also know you truly intended to have Francis inoculated, but delayed because he had another illness. Having put off Franky's inoculation must have added a double sense of loss when he died, first because you no longer had your son, and second, because the death might have been avoided if you only followed your "known opinion that inoculation was a safe and beneficial practice."

I can understand a parent's reluctance to inoculate by the method used in your times. After all, as performed during the 18<sup>th</sup> century, the patient was purposefully given a mild case of smallpox to immunize against a more serious one in the future.

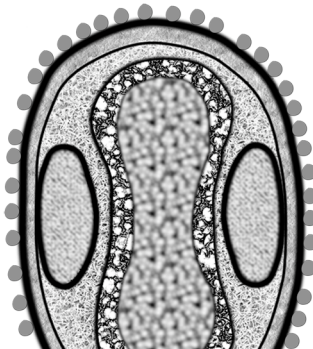
A highly contagious virus causes smallpox. (Viruses are the tiny organisms—hundreds of times smaller than the bacteria I mentioned in yesterday's email.) About thirty percent of those who contract the disease perish during the illness as the virus invades their internal organs. The smallpox virus, like all other viruses, cannot multiply on its own; instead, it takes over the reproductive machinery of the invaded cells to create copy viruses that soon attack other cells. The rapidly multiplying viruses eventually overwhelm the victim.

Virus particles, when suspended in the saliva of the infected, pass to others when victims cough or sneeze. Contact with the fluid from infected skin blisters also spreads the disease.

The disease got its name from the small pock-marks (skin pits) that cover victims who survive the illness. Once infected, a survivor gains lifetime immunity from smallpox. This well-known fact suggested that a pock-marked slave offered for sale would be a wise purchase. Do you remember that your *Pennsylvania Gazette*, in 1732, carried an advertisement for a "young negro fellow, about 19 or 20 years of age" who was "very fit for labour, being used to plantation work, and he has had the small-pox"?

Many years ago, the Chinese discovered that one could acquire a mild form of smallpox—thereby providing lifetime immunity—by inhaling ground-up scabs taken from sufferers of the disease. The resulting illness was usually mild, although about 3% of those so infected didn't survive the ordeal.

(I realize you knew about the Chinese inoculation for smallpox. In 1746 you told your Boston friend William Vassall that you had "somewhere read that the Chinese actually preserve scabs taken from a healthy person for the purpose, tho' their manner of inoculation is different from ours.")



Smallpox virus, cross-section X100,000



Smallpox virus, cross-section

During the late middle ages, Asian physicians learned that rubbing pus or blister fluid from smallpox victims into scratched skin of the uninfected could induce permanent immunity with a low fatality rate—about 1 percent—from the immunization.

Skin-scratch inoculation reached North America via Britain in the early 1700s. Here, the procedure's champion, you might recollect, was Boston's Puritan leader Cotton Mather. There were also local voices opposed to inoculation—people who thought it absurd to induce a potentially fatal illness to prevent one. Recall that a particularly vocal member of the opposition was your own brother James, publisher of the *New England Courant* and employer—technically the owner—of an indentured apprentice, namely you.

Do you remember the *Courant's* first issue of August 7, 1721? It contained an attack on smallpox inoculation written by Dr. William Douglass, the only physician in North America with a European M.D.

degree. His article heaped “Ridicule on the inoculator” for “the dubious, dangerous practice of inoculation.”

The Mathers struck back with a factious *Anti-Courant*—obligingly printed by your brother James and perhaps typeset by you—which ranted, “Go on, Monsieur Courant, and prosper; Fear not to please your stupid admirers...and write in your native stile...VERY, VERY DULL!”

The *New England Courant's* next issue contained a further assault, setting the stage for a running battle between your brother and the Mather family. Cotton Mather called the debate “a libel on purpose...despicable, even detestable...a wickedness that was never known before in any country, Christian, Turkish or Pagan, on the face of the earth.” After that, your brother backed off and turned his paper towards lighter fare.

According to your *Autobiography*, you gradually tired of James’ increasingly “harsh & tyrannical” mistreatment. Your sly escape from Boston, ending in Philadelphia at the age of 17, has become an American legend.

Nobody today knows your thoughts about the smallpox inoculation controversy that permeated Boston while you lived there. Ten years later, however, you came down squarely on the side of inoculation. Your *Pennsylvania Gazette* in 1730 described a Massachusetts epidemic thus: “There is an account published of the number of persons inoculated in Boston in the month of March, amounting to seventy-two; of which two only died, and the rest have recovered perfect health. Of those who had it in the common way, [that is, by what we now call person-to-person spread] ‘tis computed that one in four died.” Likewise, your letters to sister Jane often containing news of smallpox epidemics, reminding her to get inoculated.

Twenty-three years after arriving in Philadelphia, you had acquired enough information about the safety of inoculation to tell Vassall that “between 150 and 160 persons... have been inoculated... of which number one only died.”

I know that you advocated self-inoculation for the poor or for those without suitable access to a doctor because you told Vassall how to do it: “As to your going to New York to be inoculated, perhaps such a journey is not quite necessary; since, as has been tried here with success, a dry scab or two will communicate the distemper by inoculation, as well as fresh Matter taken from a Pustule and kept warm till applied to the incision. And such might be sent you per post from hence, corked up tight in a small phial.” Nobody knows if you were thus inoculated—perhaps you’ll enlighten us when you get a chance.

Although you couldn’t have known it at the time, while you drafted your proposal to create the Philadelphia Academy (now the *University of Pennsylvania*), a boy named Edward, destined to conquer smallpox, was born to Vicar and Mrs. Stephen Jenner of Berkley, in the borough of Gloucestershire, about 150 miles west of London.

At the age of seven, Edward Jenner nearly died of a bad reaction to a smallpox inoculation. He never forgot the experience. Six years later, when only thirteen, Jenner was apprenticed for seven years to a physician, your London friend Dr. John Hunter. Jenner noted that clear-skinned milkmaids with cowpox pimples on their hands seemed strangely immune from smallpox even though they had never been inoculated. Years passed before Jenner grasped the importance of this observation.

Meanwhile, debates raged about inoculation with fluid from smallpox skin lesions. In our own time, when parents worry about exposing their children to a possibly of a fatal reaction that occurs once in 10 million immunizations, it’s easy to understand resistance to inoculation with a 1 in 50 chance of dying from the procedure.

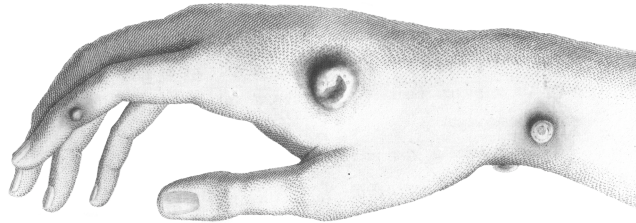
In 1759, the pamphlet you and Dr. William Heberden published in London, *Some Account of the Success of Inoculation for the Small-Pox in England and America*, did more to promote North American acceptance of inoculation than any other public effort.

(Physicians today recognize Heberden’s name because it’s associated with the small bumps—Heberden’s nodes—that frequently develop on the top of our finger joints as we age. He also first characterized angina pectoris—chest pain associated with insufficient blood supply to the heart muscle.)

Your *Preface* to Heberden’s smallpox pamphlet impresses modern physicians because it contained statistical evidence that inoculation was much safer than risking infection in “the common way.” (Indeed, historians believe that you persuaded Heberden to write the smallpox account to convince reluctant North American colonists to acquire smallpox immunity from inoculation.)

During the next three decades you had little, if anything, to say about smallpox, busy as you were with other matters. At the time of your “death” in April 1790, you couldn’t have known that the potential for smallpox eradication was literally at hand.

After Edward Jenner's apprenticeship, he had established a successful if not particularly prominent medical practice. All that changed on May 14, 1796, when Jenner used material from a cowpox lesion on a milkmaid's palm to inoculate an eight year-old boy who never had smallpox. The lad developed a small inoculation-site blister that healed completely in two weeks. After that, Jenner couldn't induce any sort of reaction in the child with blister fluid from a smallpox patient.



Cowpox lesions by Jenner

Edward Jenner worked tirelessly to promote cowpox inoculations. He called his technique “vaccination” because he used material obtained from skin lesions on cows (*vaccus* in Latin). Jenner had so much confidence in the value of his discovery that in 1801 he proposed a worldwide vaccination program to eliminate smallpox forever.

Thomas Jefferson, when president of the United States, wrote Jenner in 1806, offering “a portion of the tribute of gratitude due to you from the whole human family. Medicine has never before produced any single improvement of such utility...You have erased from the calendar of human afflictions one of its greatest...”

The success of smallpox vaccination seems especially remarkable because the procedure was practiced without understanding the disease's cause. Physicians in your time and Jenner's surmised that smallpox was spread by a toxin—a poisonous substance that, upon entering the body, induced the formation of more toxin, which spread the illness to others. We now know that the toxic material consists of microorganisms that self-replicate at the expense of cells they invade.



Edward Jenner

Today, with the safety of inoculation for many diseases well established, a few parents still fear exposing their children to any risk of an unfavorable inoculation reaction no matter how slight. For this reason alone, they should read your Preface to Heberden's pamphlet: "As the practice of Inoculation always divided people into parties, some contending warmly for it, and others as strongly against it..." it was necessary to have "a strict and impartial enquiry" into the inoculation and death rates during epidemics.

To refresh your memory, here's what you said about the risk of inoculation: "if the chance were only as *two to one* in favour of the practice among children, would it not be sufficient to induce a tender parent to lay hold of the advantage? But when it's so much greater, as it appears to be by these accounts (in some even as *thirty to one*) surely parents will no longer refuse to accept and thankfully use a discovery GOD in his mercy has been pleased to bless mankind with..."



William Heberden

A worldwide effort to eradicate smallpox started in earnest in 1958 with a comprehensive global vaccination program. On December 9, 1979, the goal was finally achieved: Smallpox is no more. Your own effort to encourage acceptance of inoculation contributed to that objective; never again should a parent lose a child, as did you, to the dreaded scourge of smallpox.