cows developed painful pocks that spread to the hands of milkers. Starting as small vesicles, they progressed to pustules and then to scabs that peeled away in a week or two; there was no fatality, and milkers with cowpox recovered without developing serious illness. There was even an old wives’ tale that cowpox was beneficial—milkers having had cowpox were not susceptible to the plague of smallpox. The tale was true. It was the impetus for the greatest medical discovery of the century—and perhaps ever—which was reported in London in 1798 and had begun with a disease of cattle.

2. EDWARD JENNER: ZOOLOGIST, PHYSICIAN, PIONEER

In the mid-1700s, human smallpox was a horrific and disfiguring lethal disease that decimated global human populations. Called by physicians variola (from the Latin varius, for speckled), smallpox spread from patient to patient through the mouth and nose. Physicians called it a contagion—a disease caused by contact. No one knew about the cause or that, after silently multiplying locally in the tonsils for a week or so, massive amounts of variola virus were released into the bloodstream. As it spread throughout the body, there was debilitating fever, headaches, and collapse; lodging in the skin, smallpox virus speckled the victim with ugly vesicles, pustules, and scabs, if the patient survived that long.¹³

To lessen the mortality, physicians offered a risky preventative, variolation—scraping a tiny piece of scab from a sick smallpox patient into the skin of the forearm of a healthy person.¹⁴ A local smallpox pustule would develop on the variolated arm and the variolated patient would sicken but survive; the peripheral site of infection would bypass massive viral replication in the tonsils, providing time for an immune response that could prevent disease from being fatal; but not always—variolation still carried a risk of serious disease and death from smallpox.

In the dairy farming country of Southwest England, cows carried their own pox virus. Cowpox appeared on the teats and udder of milk cows as vesicles, then pustules, and finally scabs that healed within a few weeks. The pustules would “degenerate into phagedenic ulcers, which prove extremely troublesome. The animals become indisposed, and the secretion of milk is much lessened.”¹⁵ The problem was, cowpox was a zoonotic disease—transmissible to people.
Milkmaids and male servants assisting with milking developed cowpox—with identical vesicles, pustules, and ulcers on their hands; the “system becomes affected” with headache, muscle pain, fever, and swelling of axillary nodes, yet humans, like cows, recovered. Local folk knowledge was that milkers, drovers, and other cow handlers that had developed cowpox would not “take the smallpox.” It was common opinion that milkmaids having had cowpox could safely nurse smallpox patients without fear.

In the Dorset village of Yetminster—far removed from the sophisticates in London—farmer Benjamin Jesty and his two servants became infected with cowpox. In 1774, impressed that all had passed through the next smallpox epidemic untouched, Jesty took his wife and two sons to a cowpox-infected dairy farm nearby and, making skin abrasions with a darning needle, inoculated them with purulent material from cowpox scabs. When the cowpox lesions healed, they too passed through smallpox episodes without taking the disease. Yet the citizens of Dorset saw farmer Jesty’s act as unnatural. Rather than attracting fame, he was ridiculed by friends and vilified by gentry for having violated the laws of nature.

In the next two decades, other creative people in England, Denmark, and Germany used cowpox to protect against smallpox. John Fewster, an apothecary in Thornbury, Gloucestershire, inoculated children with cowpox, suggesting that it protected against smallpox. In 1791 the German teacher Peter Plett inoculated three children with cowpox exudate fluid, and he too saw them protected. Turns out, experienced physicians in the dairy farming areas were aware that cowpox could be used for protection, but these were anecdotal cases, unpublished, unpopular, and disbelieved by the medical establishment. But that changed when a scientist in Gloucestershire went at the problem systematically.

In the English dairy country of Gloucestershire smallpox was common, and in the village of Berkeley physician Edward Jenner used variolation in his medical practice. This was the flat fertile valley of the River Severn, home of the Gloucestershire Old Spots pigs and Gloucestershire cows—large black-brown animals with white underlines, a white stripe along the spine that extended over the tail, and curved white horns with black tips that rivaled those of Ayrshire cattle. Their milk was high in butterfat and protein—good for making Double Gloucestershire cheese.

In 1770 Jenner left Gloucestershire to serve an apprenticeship in anatomy and surgery with John Hunter, the famed Scottish surgeon in St. George’s Hospital in London. Hunter taught him the scientific method, passing on
William Harvey’s advice: “Don’t think, try.” An inquisitive naturalist, Jenner pursued lifelong studies in zoology and was elected a Fellow of the Royal Society in 1788, an honor based on his paper about the nesting habits and parasites of the common cuckoo; with observation, dissection, and experiment he had proven that newly hatched cuckoos, not adults, pushed competing eggs and fledglings out of the nest.

In his medical practice in Berkeley, Jenner noted that milking servants having had cowpox were resistant to variolation; no pustule would develop on the forearm where the smallpox material had been scraped into the skin. Attentive to the folktales and anecdotes of his medical colleagues, he began collecting information on his patients. Within one year his case records were surprisingly clear. Milkmaids who had suffered cowpox were resistant when exposed to smallpox; others, having had smallpox as children, would not develop pustules of cowpox.

By 1796 Jenner had accumulated sufficient evidence to attempt an experimental inoculation. In the spring, vesicle fluid from a cowpox lesion on the hand of a milkmaid was scraped into the arm of a healthy eight-year-old boy, James Phillips, the son of his gardener. The boy developed lesions of cowpox that regressed as expected, and six weeks later material from a smallpox pustule was scraped into a small spot on his arm—no pustule, no fever, and no smallpox. In his garden hut, Jenner began scratching cowpox scabs into the local villagers free of charge.

Presenting his views to the county medical society, Jenner was ridiculed and told that if he persisted, he would be requested to resign. Perhaps there was a cultural basis for the society’s stance. Gloucestershire’s most famous citizen was William Tyndale, an Oxford scholar of the Protestant Reformation who first translated the Bible into English; for his efforts, he had been strangled and burned at the stake by orders of Henry VIII.

Publishing his book on his own in 1798, Jenner included case descriptions that documented the cross-protection observed in his practice and that by deliberately pricking cowpox scabs into the skin of the arms of healthy people he could induce protection against smallpox. It was a new way to think about disease prevention. The Royal Society advised that he should be cautious and prudent and not risk his reputation by presenting evidence so much at variance with established knowledge.

Perhaps the medical authorities in London were concerned about Jenner’s unlikely proposal that a horse disease was also connected to smallpox. In his book, Jenner had described twenty-three case studies of animal diseases and
their role in human smallpox; eleven cases involved horses and their pox-like
disease of the heels that was transmitted to humans and, Jenner believed, to
cows. He begins with a description of “grease,” an “inflammation and swell-
ing in the heel” that when transmitted to horse handlers and farriers causes a
disease that “bears so strong a resemblance to the smallpox that I think it highly
probable it may be the source of the disease.” Jenner proposed that the horse
handlers who assisted in milking transmitted the equine disease to the teats of
cows and that cows infected humans—“although I have not been able to prove
it from actual experiments.” He notes in support that attempts to variolate farri-
ers were frequently “foiled” and that in Ireland, where men do not milk cows,
cowpox was not known.  

To a worried populace the process of using cowpox for protection seemed
worth the risk. It was being called vaccination—derived from *vacca*, Latin for

*The Cow Pock—or—the Wonderful Effects of the New Inoculation!* The political cartoon arose
from the anti-science zealots of the anti-vaccination movement. At left, the poor are enticed
in with free food, then inoculated. Jenner, the doctor, holds the right arm of a woman and
slashes it with a knife as blood is collected by a boy. At right, those inoculated have sprouted
miniature cow parts on their limbs and body. (Originally published by H. Humphrey,
St. James’s St., London, June 12, 1802. James Gillray, artist. Courtesy of the
Library of Congress Prints and Photographs Division, Washington, D.C.)
cow. As Jenner’s method became widespread, critics called him a criminal and money grabber who had duped both the medical community and Parliament. Scratching smallpox scabs into a healthy person was seen as a way to cause disease, not prevent it. Sanitarianism, the “atmospheric” and “vapors” theories of disease causation, made it clear that the removal of “filth” was the way to prevent disease. There was no concept of specific causes for disease.

There were serious drawbacks to vaccination. The small vaccination scarifications, if not kept clean, could harbor bacteria that caused tetanus that killed the patient. Syphilis was another concern. In early vaccinations, it was the custom to use scab material from the arm of a recently vaccinated person to vaccinate another, and there were rumors that syphilis had been transferred at the same time.

Public fears that this new “vaccination” would cause bad things was driven by an anti-intellectual culture and anti-science prejudice. Gossip expressed in the press led to panic and fear of unfounded dangers. Anti-vaccination societies formed in both Britain and France. Developing hostility on the basis of misinformation, they dissipated their anger in caustic ways. Panic was promoted by anti-vaccination zealots. The anti-vaccination movement would be alive for nearly a century.

3. WILLIAM DICK: FROM FARRIER TO VETERINARIAN IN EDINBURGH

As improbable as it seems, much of North America’s early heritage in veterinary medicine originated from the knurled hands of Scotsman John Dick, an extraordinary farrier in Edinburgh. The earliest British farriers were both blacksmith and horseshoer; using cast iron, they built the shoe and shod the horse. Some also served as veterinary nurses, providing amateur diagnoses and dispensing crude treatments. In the British Army, farriers were responsible for euthanasia and keeping records of horses put down, a duty little changed from that of the farriers of the English Crusaders in the twelfth century. In today’s ceremonial parades, the British Army farrier marches behind bearing the symbol of his trade, the farrier’s ax, an instrument with a spiked end used to produce a lethal blow to the head and a blade to cut off the foot of the dead horse for military records.