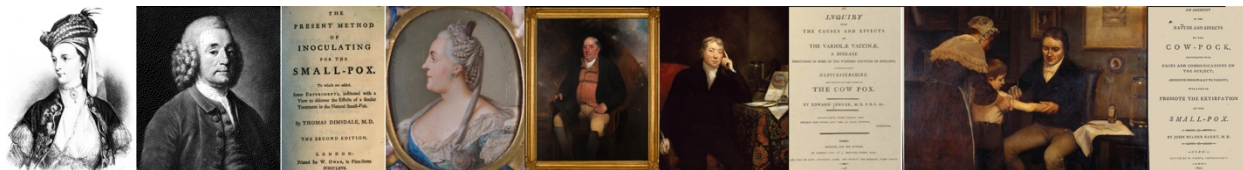


A year to forget? or to remember? : 300 years of inoculations and vaccinations



From Left: Lady Montagu; Dr. Dimsdale; his 1768 book on Inoculation; Catherine the Great; Benjamin Jesty (1774), Edward Jenner; title page of his 1798 book on 'Vaccination'; artist's depiction of Jenner 'vaccinating' James Phipps; title page of Dr. John Milner Barry's 1800 book addressed principally to parents.



2021.10.21
Bere Islanders
on way to CTB to
receive Covid-19
vaccine booster

(Left to right)
Gerald & Mary Orpen
Jackie Sullivan
Timmy Hanley
Danny McCarthy

photo by Barry Sullivan

Before last Christmas, the UK and Israel had started to roll out the first Astra Zeneca and Pfizer vaccines. As the numbers of Christmas cases soared, and we were locked down again, we, like the under-12s now, could hardly wait. We were constantly checking our smartphones, and the television and the radio, for the latest news and plans, and wondering when it will be our turn to get our shots. As we write this before Christmas 2021, approximately 90% of those aged 12 and older in Ireland and Canada have had their shots -- against a virus that the world first learned about less than two Christmases ago.

We could celebrate this remarkable feat by naming a single 'person of the year', or 'achievement of the year', or congratulating ourselves for being so smart, and for living in such sophisticated times. Yes, today, we see more and see farther than our predecessors. But it is not because we have better eyesight or are taller. Instead, as the ancient philosophers used to say, it is because we are "dwarfs standing on the shoulders of giants".

So, where exactly does the word *vaccine* come from? The answer -- from *Latin!* -- and what led up to it are an interesting story, one that is still told in all the epidemiology textbooks. But the story had two little-known local angles. The farming people of Country Cork already their own Gaelic word for it, and were practicing a low-tech *vaccination* method well before the fancier

version was introduced into Ireland in 1800. A Cork doctor played a big role in testing and popularizing this imported medical method, and left us an account. Reading it reminds us how spoiled we are: earlier in this year, we were annoyed at the smallest delay in the COVID vaccines.

To appreciate what a breakthrough the *first vaccine* was, we need to go back at least 300 years. In 1721, its fore-runner, *inoculation*, reached London and Boston. At that time, the enemy was a dreaded disease called *smallpox*, caused by the Variola virus (the other ‘pox’, the ‘great’ pox, was syphilis). Smallpox was one of the oldest, deadliest, commonest and most feared of all infectious diseases. And those who did survive it were often crippled or blinded, or had hideous pockmark scars on the face and body

Inoculations

Early in history, people noticed that those who recovered from smallpox rarely caught it again, and if they did, it was never fatal. It was better to have had a mild case of smallpox in childhood. So, people deliberately tried to give their children a mild case of smallpox. People in China ground up dried smallpox material and blew it into the child’s nostrils. In India and Africa, they scratched matter from a smallpox sore into the skin of the child’s arm. An African slave related the method to his Boston master; it was worked well in the practice of one Boston doctor during an epidemic in 1721.

The formal name for the process was “*inoculation*.” The term comes from horticulture, where one grafts a bud (or *eye*, or *oculus* in Latin) from one plant into another.

This practice of inoculation had also reached Turkey by then, and Lady Montagu, the wife of the English ambassador, had her 6-year son inoculated there. In 1721, after she returned to England, she had her 3-year-old daughter publicly inoculated. As a result, the wife of the future king was keen to have her children inoculated, but she was worried about safety. Before doing so, she had it tried out on six condemned felons on the promise of reprieve, and on six children from an orphanage. The procedure gained some support in England, and in 1767, an English doctor published a manual describing an ‘improved’ method.

In 1768 Catherine the Great of Russia invited its author to St Petersburg. It took him over a month to travel there. He was unsure whether smallpox would behave the same way in Russia as it did in western Europe, so he encouraged her to allow commoners to try the procedure first, but she insisted on leading the way. After he (secretly) inoculated her, and it ‘took’, she promoted it for her people.

Despite these royal endorsements, and further refinements, it was not widely used, except in severe outbreaks. Inoculation was not popular in Puritan Boston or the American colonies. Critics said it was playing God, and it was banned in several colonies. In addition, because the idea had come from a slave, some said it was a trick by the slaves to kill their white masters. In the American Revolutionary War, the immune British forces had a big advantage over the Americans, until George Washington (despite a Continental Congress proclamation prohibiting army surgeons to inoculate) ordered his men to be (secretly) inoculated.

One major obstacle was the risk. It sometimes killed the inoculated person. Or, that inoculated person could infect others, and they could get very sick. As a Dr. John Milner Barry explained to Cork parents in 1800, a mass inoculation programme “required the consent of private families.

Laws compelling people to submit their children to inoculation would be evaded. In the various circumstances which render the inoculation of the smallpox dangerous, the feelings of nature, which are implanted in the breast of every parent, would revolt against such an injustice of power, as tyrannical and unjust.”

That is why Dr. Barry was so excited to be able to tell parents about the newly arrived method. It could be given to children “without subjecting them to the smallest danger”; it was not infectious; and it gave lasting protection!

Vaccinations

Cowpox, a scabby disease of cow’s paps, is a milder cousin of smallpox. Milkmaids and other dairy workers who had breaks in their skin got cowpox from handling the cows' udders. They noticed that after getting this, they were immune to smallpox for the rest of their life. Naturally, they were in big demand to nurse smallpox patients. In 1798, the English country doctor Edward Jenner published his experimental results of deliberately transferring cowpox material to children. He called cowpox ‘smallpox of the cow,’ and put the phrase ‘of the cow’ in Latin. The Latin name for cow is *vacca* and ‘of the cow’ in Latin is *vaccinae*, so he -- and Dr. Milner Barry -- referred to the material using the adjective *vaccine* (just like *bovine*) and called the material/process the *vaccine inoculation*. [Later, Pasteur used the term for material from *any* source, *not just the cow*].

Many histories of medicine credit Dr. Jenner with the first use of the vaccine material, but in fact, direct transfers of cowpox material to humans had been going on for some time before that. A few histories do mention how, in 1774, an English farmer in the south-west of England used a darning needle to inoculate his wife and family with pus taken directed from a cow infected with cowpox. [in 2006, a prestigious medical journal called him the ‘first vaccinator’].

But, until earlier this year, when a historian writing in the ‘Examiner’ told us about Dr Milner Barry and his book, few were aware that farming people in West Cork knew about the protective properties of cow-pox well before 1774. Moreover, there was simple low-tech method for children of non-farming parents to access this protective vaccine material.

Dr. John Milner-Barry was born near Bandon. In his book he relates several cases where a person attributed their escape from smallpox (and not reacting to inoculation) over their lifetimes to having previously had the cow-pock. The details in two cases put the cowpox infection at 24 years previously, i.e., at or before 1776, and in two others at 1760 and 1750. At that time, “there was scarcely a spring that the cows were not affected with it; and it was so universally believed that those who took it were ever after exempted from the small-pox, that people exposed themselves as much as possible to it.”

Indeed, he has direct evidence of this from a Johanna Sullivan, a cook-maid for another Cork doctor. When she was 13 (in 1763), she and a number of other children were brought to a dairy. She and the other children were made to milk the cows until the fluid matter covered their hands. The material was called *Shinach* (from the Gaelic word *sine*, meaning the teat of an animal). “By the general belief of the neighbours”, it would protect them for ever against the smallpox. “When she was 20 years of age she was twice inoculated by an apothecary at Bantry, without effect. She has since resided in Cork, where she was frequently exposed to small-pox, particularly when the

grand-children of the family with whom she lived, were inoculated. In order *to be sure of herself*, she lay with the children four nights at the height of the eruption, but did not take the disease.”

Dr Barry was excited by Dr. Jenner’s results from scratching the ‘cox-pock’ into the arms of English children. And so, in June in 1800, he began to do so in Cork and its neighbourhood. He began with vaccine matter sent to him “on a silk thread, enclosed in a letter from a London doctor (the infection had been taken in London 8 days earlier).” By November, he had inoculated more than 270 and was delighted with how mild the reactions were. Just to be sure it gave protection against smallpox, a few months later he used smallpox material to challenge several of those he had vaccinated. None of them reacted to the smallpox material. He listed their names and addresses so that the details could be verified.

Vaccination spread quickly, but long-distance transport of the live vaccine was problematic. So, vaccinators resorted to using a human chain. To spread vaccination throughout the Spanish empire, a ship sailed to Puerto Rico in 1803 with 22 orphan boys. Two of the boys were inoculated with the cowpox. Pus from their pustules was later scratched into two more boys and so on in succession during the 10 week voyage. The vaccine was then distributed throughout the Caribbean and Mexico. The original orphans were then left in Mexico and 26 more were used to take the cowpox across the Pacific to the Philippines and China.

England outlawed the old-style inoculation (variolation) in 1840, and introduced compulsory vaccination (with a safer source of the cox-pox material) in 1853.

It is estimated that Ireland was one of the first European countries where smallpox ceased to be endemic (there are no reported smallpox deaths from 1910 onwards).

Thanks to vaccination, the eradication of smallpox from the world in the 1970s is one of the great success stories of public health. Instead of smallpox vaccination passports/certificates on our phones, those of us who were born prior to then have them on our arms.

Understanding of the bacterial diseases advanced rapidly in the late 1800s, with the help of the microscope, but viral diseases (e.g., the Spanish flu) and their control remained mysterious until the invention of the electron microscope.

We have come a long way from crude inoculations, shinach, Jenner, Milner Barry, and Pasteur. Today, virus DNA can be sequenced; sections can be cut out and replicated. Using the virus sequence published by the Chinese, Pfizer BioNtech extracted from the virus a sequence that instructs cells to manufacture the big “spike” protein. This is what the pathogen uses to attach onto a person’s cells and gain entry. On its own, without the rest of the virus, the spike is harmless. But our bodies still react to it, and are ready to fight the real virus if it invades.

Pfizer’s ‘vaccine’ contains messenger RNA; the Oxford/Astra-Zeneca one contains a weakened version of a common cold virus from chimpanzees. It has been modified to look more like coronavirus. Unlike those shipped from England in 1800, the various COVID vaccines don’t actually contain any *vaccine* (cow) material. But they are built on these previous insights and discoveries, many of them farming-based, referred to earlier. [And, they elicit some of the same (anti-vax) reactions that inoculations did 300 years ago.]

Those of us who are fortunate enough to be ‘on the baker’s list’ this Christmas have a lot to be thankful for, and a lot of people to thank.

Séamus Hanley and Barry Sullivan

For more material

see <http://www.medicine.mcgill.ca/epidemiology/hanley/vaccinations>

or contact james.hanley@mcgill.ca .