

Vaccinations in earlier centuries

In the past 12 months, we watched the COVID-19 vaccines being developed, tested, approved, and rolled out. Now, we are checking our smartphones, and the tv and the radio, for the latest news and plans, and wondering when it will be our turn to get our shots.

While we wait, it might be of some comfort to imagine what it would have been like to have lived in an earlier century. Back then, it took a lot longer for diseases and news to 'go viral', and for the vaccines to be developed and transported.

We have Louis Pasteur to thank for the word 'vaccination.' He adopted it to honour and to thank the English country doctor Edward Jenner, who did the very first real vaccinations.

This piece is about the groundwork laid down by these two scientists. Of the two, Jenner is less well known, even though his vaccine helped to eradicate **smallpox**, a disease that was one of the greatest **killers** and **maimers** of all time. The **Jenner Institute** in Oxford, now led by Irish-born vaccinologist Adrian Hill, is named after him.

Smallpox was one of the deadliest, commonest and feared of all infectious diseases. Survivors were often crippled or blinded, and had hideous pockmark scars on the face and body. 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 than never to have had the disease at all.** So, people deliberately took matter from a pimple (or 'pustule') on a person with a mild case of smallpox, and scratched it into the arm of a person who hadn't had it, hoping it would produce a mild version of the disease. Sometimes, however, this **inoculation**, as it was called, killed the **inoculated** person. Or, that **inoculated** person could naturally infect **others**, and **they** could get very sick.

Cows get a milder cousin of smallpox, called **cowpox**. In the 1700s, dairy-farming people in the south-west of England noticed something. If the milkmaids and other dairy workers had any **breaks in their skin**, they could get cowpox from handling the cows' udders. But then, after getting this, they were **immune** to **smallpox** for the rest of their life. Naturally, they were in big demand to nurse smallpox patients without fear of catching the disease themselves.

In 1796 Dr Jenner **decided** to act on this local knowledge. He waited until a milkmaid, named Sara, caught the cowpox. Then he chose the son of his gardener,

a healthy eight-year-old boy named James, as his first vaccinee. He took a scraping of material from the **cowpox** pustule on Sara's hand, and scratched it into James' arm. To quote Jenner, 'On day 7, James complained of uneasiness in the armpit; on day 9 he became a little chilly, lost his appetite, and had a slight headache, and was restless that night, but on day 10 he was perfectly well.'

Jenner wanted to know whether this milder version made James "secure from the small-pox". So, 6 weeks later, Jenner took matter from a pustule of a person with the **smallpox**. He made slight punctures and cuts on both of James' arms, and carefully inserted this matter. "No disease followed" -- James didn't even get a mild infection. Jenner challenged him with the real smallpox again several months afterwards, and again, it had no noticeable effect. The boy seemed to be protected against smallpox.

Jenner's report of these results was rejected by the Royal Society, because **they were so much 'at variance with established knowledge, so incredible', and tested on so few subjects**. Unfortunately, the next year, the smallpox didn't show up, so Jenner had to wait until the Spring of the following year to test his method on several more children, including his own 11-month old son.

He published his results at his own expense. In Latin, he called cowpox 'smallpox **of the cow**'. The word '**of the cow**' in Latin is '**vaccinae**', so his process soon became **vaccination**.

Although there were critics, vaccination was rolled out quite quickly. The dried vaccine was transported on quills and lancets, dried scabs, or cotton threads impregnated with matter from pustules. The technique was upgraded in the 1860s.

Many listeners born before 1960 have the inoculation mark on their arm. Smallpox was **eradicated** from the world in **1977**.

I turn now to Louis Pasteur. He is best known for establishing the '**germ theory**' and for his way of keeping **milk** and **wine** from going off. His process is now called **pasteurization**. But Pasteur also developed **vaccines** against several animal and human diseases, using lab-based ways to **attenuate (weaken)** the source material.

His **first** target was a **bacterial** disease that killed **chickens**. He isolated the bacteria and figured out how to make them **weak enough** that they no longer made them very sick, but **strong enough** that they gave immunity (at least for a while). Generations of biology students have been told that this was a '**lucky**' discovery:

while Pasteur was on his holidays, his collaborators forgot to refresh the cultures and so they became weaker with time. We now know from his notebooks, which he kept very private, that **that wasn't the real story**, even if it fits with Pasteur's lifelong principle that "**Chance only favours the prepared mind.**"

Another bacterial disease he targeted was **anthrax**, and he tested his vaccine against it in a **very public field trial**. At that time in Europe anthrax was a widespread cause of disease in livestock and humans. In 1881, after a lot of lab work, Pasteur announced that he had developed a weakened culture of the anthrax bacillus. He was immediately challenged by a French vet who did not believe that germs caused disease. The **vet offered his own farm** outside of Paris for a public field trial of Pasteur's new vaccine. Pasteur quickly accepted. The vet collected money to fund the trial. The conditions of the trial were agreed and written down ahead of time, just as today's vaccine companies register their protocols for their trials.

The trial began in early May, watched by a crowd of 200 farmers, vets, doctors, officials and journalists. 24 of the sheep provided were selected and marked with a hole in their ears. Pasteur's assistants then injected drops of a weakened anthrax into each of these 24 sheep. They returned 12 days later, and found them all well, and re-vaccinated them with another weakened anthrax culture.

Then, two weeks later they injected these 24 sheep, as **well as 24 other sheep that had not been vaccinated**, with **the very virulent strain of anthrax**. The vet suspected that Pasteur might try to inject **different** material into the vaccinated and the un-vaccinated animals. So he insisted that the sheep were given the anthrax injections every second one - first an inoculated animal, then a non-inoculated one, and so on.

Then, everyone decided to meet again 48 hours later

When they arrived on June 2, the results amazed them. The **24** sheep that had received the **vaccinations** of weakened anthrax "were sound, and frolicked, and gave signs of **perfect health**." In contrast, "**21** sheep that had **not** been vaccinated had **already died** of anthrax; 2 unvaccinated sheep **died in front of the onlookers**, and the 1 remaining sheep died at the **end of the day**."

The newspapers the next day called it an **infallible preventitive that is neither costly nor difficult**, for a single man can inoculate 1,000 sheep in a day.

There was *one* scare, but it was quickly cleared up.

On June 3, **one of the vaccinated ewes died**. An **autopsy** the same day found that she died because she was carrying a full-term lamb that had died in utero 2 weeks earlier.

Within a month 25,000 sheep and many cattle and horses were vaccinated; Pasteur had trouble keeping up with the demand.

For many people, Pasteur's greatest contribution was his treatment for **humans bitten by animals with rabies, a dreaded disease** produced by a **virus -- too small to be seen under the normal microscope, even today**. The news of it **went viral** and his lab was **swamped with patients from all over the world**.

His last years, trying to get **funding** for the new Pasteur Institute, were very stressful.

He was so desperate that he competed for a big cash prize offered by the Government of New South Wales in Australia. They were looking for a new way to **exterminate the rabbits**, without harming any other animals. I highly recommend 'Pasteur's Gambit', the book that tells that story.

I have left out many details of how, over the centuries, convicts, orphans, and hired help were used in the testing the various smallpox 'vaccines'. These practices, and the limited and very secret data that Pasteur relied on before announcing his 'successes' on two patients, would not be allowed by today's regulators.

We have also come a long way from Jenner's '**vaccine**' from the **cow**. 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. The various COVID vaccines have nothing to do with cows. **But they are built on these previous discoveries**.

The ancient philosophers explained why **today we see more and see farther than our predecessors**. It is **not** because we have **better eyesight** or are **taller**. Instead it is because we are "**dwarfs standing on the shoulders of giants**."

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