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HEALTH AND THE ENVIRONMENT

Health Issues Relating to Vaccination in Europe (Eighteenth Century to the Present)

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ABSTRACT

Many regions in the world were seemingly familiar with empirical forms of immunization against contagious diseases, including a fairly successful one, namely inoculation against smallpox. This practice, which was imported to Europe in the eighteenth century by an Englishwoman, anticipated Jenner's discovery of the first actual vaccination. The demographic fate of Europeans was linked to this preventive method, which was subsequently globalized but nevertheless had its detractors.

Constant Joseph Desbordes (1761-1827), *The Doctor Jean Louis Alibert (1768-1837) Carrying Out an Anti-Smallpox Vaccination*, oil on canvas, 139 x 111 cm, circa 1820, Collection du Musée de la chartreuse de Douai, Dépot du musée du Louvre. Source : Wikipédia

Contagious diseases do not stop at borders. The history of the black plague that ravaged Europe in the mid-fourteenth century and cut its population in half is well known. However, these major epidemics followed cycles that were partly determined by environmental

conditions—including human ones—and by "competition" among diseases. Each historical period can be associated with the prevalence of one or another. This concept, called *pathocenosis* by the historian of medicine Mirko Grmek, provides an explanatory framework for the sanitary evolution of Europeans over time, from the Plague of Justinian to the AIDS epidemic.

From Variolation to Vaccination (Eighteenth Century)

Major diseases owe their prevalence to certain favorable conditions such as a change in climate, the development of land or maritime trade, the gathering of humans in cities, their penetration into virgin territory, and their cohabitation with animals, among others. Beginning in the eighteenth century, European peoples who had previously suffered their epidemic fate rather than controlled it discovered a new prophylactic method—inoculation and later vaccination. The first of these practices, which involved voluntarily inoculating young children with smallpox using the dried pus of a patient, was imported from the Orient in 1721 by Lady Montagu, the wife of an English ambassador to Constantinople. The immunization obtained was good (since the virus was present but naturally attenuated) but dangerous (this natural attenuation was unpredictable). At the end of the century, the English country doctor Edward Jenner noticed that cows contracted a similar disease (the vaccine, or cowpox), one that was transmissible to humans and triggered immunity against the human form. He named this bovine disease *variola vaccina*, with the term "vaccination" deriving from this discovery.

Jennerian vaccination offered many advantages compared to inoculation: the vaccine was not contagious from human to human, provided very good immunity against smallpox, and proved much less dangerous. However, the "vaccine fluid" was difficult to obtain because the bovine disease was rare, and so samples had to be taken directly from the immunizing lymph of young patients, as was done during inoculation. This method, known as "arm to arm," soon raised sanitary health issues, as the lymph taken in this manner could contain other transmissible germs, including that of syphilis. Be that as it may, it was adopted throughout the world in a few years, with operations in Vienna and Stockholm occurring barely two months after the announcement of Jenner's discovery, and later in Hanover, Geneva, and Genoa. The vaccine crossed the Atlantic in the summer of 1799. In 1801, it was already known throughout the Western world and reached Russia, and then India in 1801, Australia in 1804, and the Philippines in 1805. In France, Jenner's primary student, Dr. Woodville, obtained special passports despite the war to bring the first tubes to Paris in June 1800. The First Consul Napoleon was immediately won over by the health prospects for his precious soldiers.

The Generalization of Vaccines (Nineteenth-Twentieth Century)

Unfortunately, this medical "miracle" only concerned smallpox. Despite numerous attempts, it proved impossible to produce artificial immunization against the plague, tuberculosis, cholera, typhoid, and syphilis, among others. These diseases became dominant as Europe urbanized and industrialized. Cholera, which supplanted the plague, and typhoid benefited from the crowding of populations in cities, where the supply of drinking water was problematic. Tuberculosis thrived in the overcrowded and insalubrious conditions of urban housing, and syphilis with the development of prostitution. From the mid-nineteenth century, the statistical importance of behavioral (alcoholism, smoking), degenerative, and cancerous

diseases in the morbi-lethality increased as a consequence of changing lifestyles, aging population and pollution. Within this pathocenosis, only infectious diseases could be fought through vaccination, although it was not until the work of Koch's students in Germany and Pasteur's in France that research advanced. The procedure was initially tested on animals (for instance against anthrax, or "sheep fever"), and then on humans in July 1885 in Pasteur's famous experiment on the young Joseph Meister, who had been bitten by a rabid dog. New vaccines were invented (for rabies, typhoid, tuberculosis, whooping cough, diphtheria, tetanus, yellow fever) between 1885 and 1940, greatly reducing the danger of these scourges. The "vaccine revolution" did not bring about a transition in European demography, but it did accompany its growth, notably by enabling a substantial decrease in infant mortality through its combination with other important hygienic measures (improved diet, mains drainage, running water, sterilization).

After the Second World War, research continued against new threats and more tenacious infectious agents including polio (1954), measles (1963), mumps (1966), influenza (vaccine discovered in 1944, adapted each year since the 1970s to seasonal viruses), meningococcal meningitis, hepatitis B (1976), and rubella (1969). Combined with antibiotics and offered to a broad public thanks to international vaccination campaigns, these vaccines had a massive effect on Europeans' state of health and numbers. After more than 250 years of struggle, the eradication of smallpox was officially recognized in 1980, and polio is on the verge of being defeated today in the early twenty-first century (there are approximately thirty cases per year worldwide). The extension of vaccination to the prevention of certain cancers (vaccine against hepatitis B mentioned above) provides new prospects for public health.

Resistance to Vaccination

However, this vaccine revolution was not to everyone's taste, especially in France. Beginning in Jenner's days, critics were voiced by an international "anti-vaccine" movement whose virulence varied over time. Born in England, it reached the rest of Europe and North America in the eighteenth and nineteenth centuries. The motivations and actors were very diverse. There was a religious antivaccinism limited to a few sectarian movements, as well as a "learned" antivaccinism that rejected the method as dangerous, ineffective, or both. This rejection endured even after immunology laws were established in the early twentieth century, and can be found today among those subscribing to alternative, hygienist, and holistic medicine. With States making vaccination compulsory to achieve greater group immunity (in 1853 for smallpox in England), another form of political opposition emerged, that challenged the legitimacy of such a bodily intrusion. Today critics concentrate on the sometimes financially hazy relations between States and the largely globalized pharmaceutical industry, as four major laboratories produce most of the vaccines currently available. Since production techniques, including those that use genetic engineering, have become increasingly complex, the price of vaccines has skyrocketed, which calls for reconsidering the cost/benefit/risk analysis in certain cases. These doubts and questionings are present especially in Western countries, where vaccines are ultimately the victims of their own success, with most serious infectious diseases having considerably regressed. This is a luxury that countries where these deadly diseases continue to strike cannot afford.

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