Cuba’s First Smallpox Vaccination Campaign

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In 1804, the smallpox vaccine arrived in Cuba from Puerto Rico. Initial efforts to bring the vaccine to Cuba were in vain. Finally, using arm-to-arm transmission, Maria Bustamante of Puerto Rico accompanied by her son and two young slaves, brought viable material to the island that led Tomás Romay Chacón to initiate, a successful island-wide campaign for the vaccination of Cubans. This effort occurred independently of the great Royal Philanthropic Vaccine Expedition, launched from Spain. Romay’s efforts were instrumental in establishing several societies, to continue the vaccination effort.

Key words: Cowpox, Cuba, Puerto Rico, Smallpox, Vaccine

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INTRODUCTION

Smallpox in the Caribbean

The Spanish conquistadors brought smallpox to the New World. Since the beginning of the European conquest smallpox was “the knife exterminating these lands.”1 The first occurrence of smallpox in the Western Hemisphere was on the island of Hispaniola in 1507. This epidemic decimated numerous American Indian tribes, gradually leading to death. In 1517, another outbreak occurred amongst the African slaves, working in the mines of Hispaniola. The disease quickly spread among the Indian population, killing about one-third of the population. From there smallpox spread to Cuba in 1518, leading to the death of two-thirds of the island’s indigenous population in the following year.2,3

In 1519, Hernán Cortés set sail for Mexico from Cuba. A second expedition from Cuba landed on the island of Cozumel, off the coast of present-day Vera Cruz. Amongst this entourage was a smallpox-infected African. A Spanish friar described what happened next:

“[A]t the time that Captain Pánfilo de Narváez landed in this country, there was in one of his ships a negro stricken with smallpox, a disease which had never been seen here. At this time New Spain was extremely full of people, and when the smallpox began to attack the Indians it became so great a pestilence among them throughout the land that in most provinces more than half the population died; in others the proportion was little less. For as the Indians did not know the remedy for the disease and were very much in the habit of bathing frequently, whether well or ill, and continued to do so even when suffering from smallpox, they died in heaps, like bedbugs…”4

The ensuing epidemic proved catastrophic, for the Aztec Empire and assured the spectacular military successes of Cortes and his conquistadors. From Mexico, the disease spread south reaching the land of the Incas, in 1524, killing about 200,000 of its 6 million inhabitants. Since then, the history of the American continents is punctuated with smallpox epidemics.5-7

Smallpox Epidemiology and Transmission

Being a contagious disease, smallpox killed up to half of those infected and seriously maimed survivors scarring them with deep pock marks, blindness and infertility. However, survivors enjoyed protective immunity from further infection, for the rest of their lives. The smallpox virus scientifically known as variola exists in several forms. Some of them producing more severe illness than others.8

Four Distinct Characteristics of Smallpox

1. First, the disease spread through relatively close contact i.e. the virus can be propelled through the air for short distances or passed along by immediate physical contact with a diseased person or with his or her clothing or linens.
2. Second, smallpox appears in an acute, visible form; it cannot be carried asymptomatically.
3. Third, it virtually never struck the same person twice. Anyone who contracted the disease and managed to survive it incurred lifelong immunity.
4. Fourth, the disease affected humans exclusively; there is no reservoir for variola in flora, fauna, soil or air.9-11

The combination of these characteristics meant that smallpox appeared in periodic waves. It might, for example, flare up in London, where the closely spaced houses facilitated the spread of the virus. Many people would be quickly exposed to the disease. After the infection had run its course, another outbreak was unlikely to occur for several years, as most people would be either immune or dead. Eighteenth century
Europe adopted a method of protection against smallpox that had been practiced among Eastern cultures for centuries all together. This method was variolation. Variolation was performed by rubbing material from a smallpox pustule into multiple veins. This was usually done when an individual was in good health, thus, at peak resistance. Shortly thereafter, the inoculated person would develop smallpox. However, the resulting case of smallpox was generally milder than the naturally occurring form; produced far less facial scarring and had a far lower mortality rate (2%). As with survivors of the natural disease, variolated individuals were subsequently immune to re-infection. However, later on a far better and safer method was developed.

**Vaccination**

Edward Jenner, an English physician, was aware of the immunity against smallpox that milkmaids, formerly exposed to cowpox, enjoyed.15 While nothing was known about viruses during that time, Jenner reasoned that cowpox provided immunity. He studied this phenomenon deeply and on May 14, 1796, he injected eight-year-old James Phipps with cowpox pus obtained from the lesions on the hand of Sarah Nelmes, a milkmaid. Phipps experienced a mild case of cowpox. Jenner described it as follows:

> “On the seventh day he complained of uneasiness in the axilla, and on the ninth he became a little chilly, lost his appetite, and had a slight head-ache” but by the 10th day James was “perfectly well.”13

The next step was to see if Phipps was immune to smallpox. Jenner inoculated him on July 1, with material from smallpox pustule. James did not get sick. Jenner subsequently repeated the procedure with the same result. When Phipps failed to develop smallpox, Jenner released his findings. His *Inquiry into the Causes and Effects of Variolae Vacciniae*, published in 1798, demonstrated that inoculation with cowpox would produce protection against smallpox in humans without ill effects to the patient.12-15

Jenner’s innovative procedure quickly spread across Europe. Because the original infective material was derived from cowpox, Jenner labeled his process as “vaccination” (after the Latin for cow—*vaccinum*). To memorialize that innovation, Louis Pasteur in 1881, generalized the term vaccination to apply to all other sorts of immunizing injections, including those for other illnesses.16

By 1799, Jenner’s work was publicized in Spain and the following year Spanish physicians began vaccinations. These successes quickly spread throughout Spain’s colonies. The New Kingdom of Granada (present-day Colombia) pleaded for the vaccine. By 1802, other colonies were requesting assistance from the Spanish Crown, to fight the smallpox epidemics that continued to desolate their populations.

**Tomás Romay Attempts to Bring the Vaccine to Cuba**

By the second half of the 18th century, slave variolation on the plantations of the British Caribbean had become a matter of routine.17 However, the procedure was less common in the Spanish Caribbean. In 1795, Tomás Romay Chacón, a Cuban physician, published an article reviewing the main controversies raised by variolation in Europe. After weighing the arguments he endorsed the procedure, albeit with a warning about his lack of direct practical experience in implementing the technique.18

When news of Jenner’s process reached Havana, the local Economic Society, an organization setup in 1793 to stimulate the economic and intellectual development of Spain’s colonies, offered an award of 300 pesos (about $1,500) to whomever managed to bring the vaccine to the island and a 400 pesos award to whomever developed the vaccine using cowpox.19 The announcement appeared on February 3, 1803 and Dr. Romay was asked to coordinate the local efforts.20 Romay, born in Havana in 1769, studied medicine there, graduating in 1791, and afterward he was appointed as a professor at the University of Havana. In 1798, he published a well-received tract on yellow fever that was subsequently translated into English and French. In 1802, he published treatise against the common custom of burying the dead in church crypts, advocating the establishment of public cemeteries. However, it was smallpox that most concerned him.18 For almost a year, Dr. Romay attempted to conduct the vaccination procedure using smallpox material received from Philadelphia. While these efforts were unsuccessful, his enthusiasm for the new procedure, remained unabated and in a series of newspaper articles, he continued to defend its effectiveness.18

Cuba’s sister colony of Puerto Rico had also undergone catastrophic smallpox epidemics in 1518, 1689, and in 1792, and smaller outbreaks between 1528 and 1530, in 1597, again between 1623–24, and throughout the 18th century.2,3 Variolation was first performed in Puerto Rico in 1792, by Dr. Francisco Oller, a Military Surgeon who had studied at the Barcelona Royal College of Surgery and arrived in San Juan in 1790; by 1803, Oller was Chief Surgeon of the Royal Military Hospital.20

In November 1803, Puerto Rico was in the midst of yet another smallpox epidemic. Oller, had learnt that Jenner’s procedure was being used on the neighboring Danish island of Saint Thomas (present-day U.S. Virgin Islands).2,20 He wrote to a colleague there, who sent him some threads impregnated with dried lymph. Unsuccessful, on November 23, Oller received more vaccine lymph, this time preserved between glass slides. Oller’s two sons were vaccinated and six days later, the pustule developed a “beautiful areola.” He presented one of his sons to the island’s governor, Ramón de Castro, as a proof that the vaccination procedure worked. Governor “joyfully” tasked Oller, with implementing vaccinations across the island. On December 7, Governor de Castro notified San Juan’s municipal government of these successes and that he had charged Oller and Tomas Prieto (another army physician) for disseminating the vaccine throughout the island. He also informed them of the pending arrival of the Royal Philanthropic Vaccine Expedition.20,21

Berry-Cabán
The Spanish Royal Philanthropic Vaccine Expedition

Although the smallpox vaccine procedure had recently been discovered, there was no effective mean to transport it. It was, Dr. Francisco Xavier de Balmis, the physician to the King of Spain, who developed a process. Balmis was the one who proposed disseminating the vaccine, throughout Spain’s global colonies. The idea was brilliant for its simplicity. For successful outcome, Balmis needed a “human chain.” Execution of the process was not so simple, so he needed people who had never had cowpox or smallpox for the human chain to work. Most adults in Spain had already had one or the other, but many children had never had either disease. The government arranged 22 orphaned boys, between three and nine years of age, to become the human chain. As they crossed the ocean, the boys were vaccinated in pairs, at 9 to 10 day intervals, one after the other, using the arm-to-arm transfer.22–26

The Balmis expedition was the first official mass vaccination campaign in history. Balmis left Spain on November 30, 1803. When he reached San Juan in early February 1804, he was disappointed to find that Oller had already introduced vaccination three months earlier and that nearly 1,500 vaccines had been administered. In a fit of professional jealousy, Balmis denounced Oller’s work and in turn, the governor refused to provide him with a new group of boys as vaccine carriers. Frustrated Balmis departed for Cuba.26

Maria Bustamante

The scooner entered the bay of Havana, with a light flutter of the sails and was soon at rest. The gale winds that had delayed the ship were nearly calm, as it pulled up to the dock. What should have been a five day trip from Puerto Rico had taken eight days. Among the passengers that disembarked were Maria Bustamante, her ten year old son, her two mulata slaves eight and six-years-old, respectively.

Bustamante and her young companions had started out from their hometown in Aguadilla on February 2, 1804. Located at the extreme western point of Puerto Rico, the little village begins in the mountains and descends into the bay. From a makeshift dock, a longboat rowed the passengers and the precious cargo they carried, to the anchored scooner that would take them to Havana.

On February 1, one day before Bustamante and her household left for Cuba, an unknown physician vaccinated her charges. To distribute vaccine throughout Puerto Rico, Governor de Castro requested that each township send a physician to San Juan, with two or three healthy boys who had not had smallpox. The physicians were trained in the arm-to-arm transmission method. The children were vaccinated, and then returned to their town to distribute the lymph.20

Doctors named the vaccination procedure an “operation.” With the consent of the patient, the vaccination “operation” lasted for a minute or two. The physician took hold of the patient’s arm, scoring the skin with a needle or lancet. He then dabbed on the vaccine, either by taking a few droplets of liquid “lymph” from a glass tube or using a small ivory point coated with dry vaccine. Either way, the vaccine contained live cowpox. After about the fourth or fifth day at sea, children began to form a single grain. In the coming days, the virus would produce a blister like vesicle, at the vaccination site. In due course, the lesion would heal, leaving a permanent scar - the distinctive vaccination cicatrix. If all went well, the patient would then enjoy immunity from smallpox forever.

The scooner from Aguadilla arrived on February 10, 1803. Upon entering the port of Havana, Bustamante’s son and her two slaves were all draining perfectly. Without wasting any time, Dr. Romay took pus from the children’s arms and immediately vaccinated his own five children as well as 31 other people “of different ages, sex and conditions.”20[6] Nine of the initial 36 people (25%) vaccinated by Romay developed pustules. “On the day the pustules erupted, its progress and figure was very different from what I had envisioned, conforming to all the characteristics described by the most illustrious vaccinators, I had no doubt that these were real vaccine grains.”20[6] To further verify that these were in fact smallpox lesions, he invited three colleagues, Drs. Bernardo Cózar, Joseph Perez Carrillo and Francisco Gutierrez, “surgeons of the Armada,” that had previously seen pustules in Spain and Puerto Rico. After examining Romay’s efforts on February 17, they “unanimously attested that all had the real vaccine, and that pus should be collected the next day”.20[pp6–7]

Along with Dr. Andres Terriles, Romay and his three colleagues began vaccinating. “So many people attended on the 21, 22 and 23 [of February], that it was impossible to count how many person had been vaccinated; but I’m not afraid to suggest that it was more than two hundred.”20[7] Thus, Bustamante’s charges became the primary source of fluid, for an impressive Cuban campaign of arm-to-arm transmission directed by Romay. He immediately sent the vaccine between glass plates to the bishop of the Santa Clara diocese, Island of Puerto Principe and to several other places in the interior. At the bidding of the bishop, the island’s Captain-General, and the municipal council, Romay was awarded the honorary title of “Physician of the Royal Family.”

After a difficult crossing, with the children’s health weakened, the Balmis expedition arrived in Cuba from Puerto Rico in late May 1804. When Balmis arrived in Havana on May 26, he again discovered that the vaccination process was being used. The day after their arrival, a commission from the municipal council boarded the ship. Accompanied by macebearers, the children were taken to the home of the Captain-General, where “in the presence of the officials of the garrison and of various distinguished persons, hospitality was showered on them.”22

By the time of his arrival, more than four thousand people had been vaccinated. Giving up the pretenses that had gotten him into trouble in Puerto Rico, Balmis praised Romay’s efforts and certified the authenticity of the fluid. Local au-
thorities, in turn, made sure that the members of the Expedition were well accommodated. Balmis formally demonstrated the proper vaccination technique to Romay along with his colleagues and provided detailed instructions for the establishment of a Central Vaccination Board. Balmis then drew up a reglamento for the preservation of the vaccine, incorporating the new Vaccination Board into the Economic Society of Havana. To provide funds for the necessary expenditures, the treasurer general ordered “the imposition of a municipal tax of two reales, the coinage of that country, for each new black slave brought into port”, to compensate the physicians of the Board for the duty of vaccinating twice a week in the Chapter Houses. However, the government in Madrid did not accept this unusual taxation.27

CONCLUSION

In 1805, Romay remitted a copy of a report. The following year in Havana alone, 4,879 people were vaccinated, and although “the board and the governor had taken the greatest precautions, to avoid contact with the slave ships arrived that year bearing infected individuals, a young man managed to jump to shore furtively. He died of smallpox in San Juan de Dios Hospital, and spread the contagion to the surrounding neighborhood. This sad event nonetheless caused many to seek the protection of the vaccine. The number of people vaccinated on the entire island rose to 15,824, in addition to many others who were not counted.” Shortly thereafter, Romay informed the Cuban Economic Society, of this success and awarded Maria Bustamante, the prize of 300 pesos.

Smallpox vaccination contributed greatly to mortality reduction in Cuba, during the first half of the 19th century. Given its ease in implementation, most physicians could be trained to perform the operation. In later years, even individuals with no medical education made excellent vaccinators in rural communities. The Central Vaccine Administration was established on July 13th, 1804 and Romay was appointed as the head of the office for the next 31 years. Under his direction, 311,342 people were vaccinated against smallpox in Cuba, during the first half of the 19th century. Given Smallpox vaccination contributed greatly to mortality reduction in Cuba, during the first half of the 19th century. Given its ease in implementation, most physicians could be trained to perform the operation. In later years, even individuals with no medical education made excellent vaccinators in rural communities. The Central Vaccine Administration was established on July 13th, 1804 and Romay was appointed as the head of the office for the next 31 years. Under his direction, 311,342 people were vaccinated against smallpox in Cuba, during the first half of the 19th century.

CONFLICT OF INTEREST STATEMENT

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