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Ruminant Vaccines: A Guide to Surviving Smallpox During a National Emergency

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Miguel Muñoz, *Método sencillo, claro y fácil de asistir a los niños en la actual epidemia de viruelas naturales* (San Luis Potosí, Mexico: Ladislao Vildosola, 1830)

Francis A. Countway Library of Medicine, Rare Books RC183.55.M6 M93 1830

<https://curiosity.lib.harvard.edu/contagion/catalog/36-990057593620203941>

Commentary

A slim pamphlet published a few years after Mexico's independence from Spain, the *Método sencillo, claro y fácil de asistir a los niños en la actual epidemia de viruelas naturales*, did what its title announced: showed citizens of the new nation how to tend to children with smallpox.[1] It also demonstrated, however, that purposeful infection with vaccine was necessary to save them from disease. At the time of its publication, smallpox was on the minds of many in Mexico. A blistering and painful viral infection caused by a pathogen carried in human saliva, smallpox is identifiable by the pustules that erupt on the skin's surface, which become grave lesions that leave some survivors blind.



Illustration from Codex Telleriano-Remensis, folio 46v (Loubat edition). Universitätsbibliothek Rostock. Digital image courtesy of Ancient Americas at Los Angeles County Museum of Art (ancientamericas.org). Used with permission. Indigenous Mexican artists who rendered smallpox in 16th-century codices were equally struck by the high rates of death from the illness. In this image, a bundle of corpses binds year glyphs for 1544 and 1545. The caption below it reads in Spanish: "Year 1544 and 1545 there was a great mortality among the Indians."

Entirely novel and erratic in the early years of European migration and settlement in the Americas, by the 18th century smallpox struck

with predictable regularity. Roughly every 16 or 18 years—the time it took for sufficient numbers of newly born, non-immune children to create a pool of carriers to propagate the disease—pandemics erupted from New Orleans to Mexico City, Guatemala, and Lima like a ticking time bomb.

While the deadly early history of smallpox in the Americas is well known, the role of Mexico in the control and elimination of the disease is sometimes ignored. Public health experts deemed smallpox eradicated in Mexico in 1951, and universally in the 1970s—the only contagious human disease to hold this distinction. But global eradication was neither quick nor easy. Before vaccines were made in laboratories, the first human vaccine against infectious disease came from a cow—*vacca* in Latin, *vaca* in Spanish, *vache* in French—with cowpox matter from infected animals propagated through human bodies to confer protection. The word *vaccine* and its variants (*vaccin*, *vacuna*, *Vakzine*) are reminders of these bovine origins. Even today, the term is applied to any prophylactic measure used to boost biological immunities against diseases, including rabies, poliovirus, and the latest coronavirus outbreak.

The *Método sencillo* of 1830 intervened in a critical moment in this history of medicine and immunization. Its author, the surgeon Miguel Muñoz (1779–1855), had overseen some of the earliest vaccination sessions anywhere in the world. A native of Mexico City, Muñoz was conferred the title “conservator of vaccine” for his work in preserving vaccine fluid after 1804, when a global expedition transported cowpox throughout Mexico.[2] One of the foremost experts on the matter, Muñoz nevertheless took care to compose a guide that was suitable for broader use. As a technical publication meant to enroll non-specialists in public health efforts, above all reluctant parents—in other words, as a popular or vernacular work—the pamphlet is of special interest for the way that it mediated between the specialized learning of the medical profession and a community of lay readers.[3]

In the excerpt presented here, from the first section of the guide, Muñoz explains the theory and practice of vaccination, with a brief history of its origins and a lesson in possible dangers. It begins with the discovery of English physician Edward Jenner (1749–1823), based on Jenner’s observations of the manner in which milkmaids in Gloucester were “inoculated” by their interactions with cows infected with a bovine strain of smallpox. The finding that human–animal communication conferred protection from smallpox infection (we would call it “crossover immunity”) marked a considerable improvement over the familiar form of immunization, known as inoculation, or variolation, whereby people were infected by the transfer of live human smallpox to induce a mild illness. As Muñoz remarks elsewhere, one hazard of inoculation was the possibility that the operation would transmit smallpox via the deadlier natural route, and even ignite an epidemic. Jenner’s experiments with cowpox effectively eliminated the possibility.

Physicians and officials in the Spanish kingdoms of New Spain (Mexico), Guatemala, New Granada, and Peru had followed these developments closely. With a pandemic raging in the Americas, Jenner’s publications on vaccine promised relief from the deep scars and painful mortality of smallpox. Like their counterparts in Europe, the experts conducted searches on cattle ranches in the hope that the bovine pox might be found locally.[4] When this failed, they wrote the King to request that he send a supply to the Americas. The Royal Philanthropic Vaccination Expedition set sail from the northwestern port of Coruña, Spain, in November 1803, with physicians, surgeons, nurses, and twenty-two orphaned children, the latter vaccinated from arm to arm to incubate the vaccine during the Atlantic journey. After stops in the Canary Islands, Puerto Rico, Caracas, and Cuba, the team arrived in Mexico in August 1804, where district officials, merchants, parents, pastors, village elders, children, and medical practitioners (including Muñoz) were involved in hundreds of vaccination sessions. It was a momentous event, in terms of numbers of participants, in the geographic coverage of the various sub-expeditions (eventually touching all four continents of Spain’s empire), and in the nature of the procedure itself. As historians have noted, vaccination was one of the earliest practices in which the power of the state was experienced directly, with “outside agents touching the bodies of people of all ages, including very young children.”[5] Many of these children had to endure the pricking of the vaccinator not once, but twice, when the precious fluid was transferred from their arms into a new round of recipients.

In hindsight, scholars have identified the Spanish expedition as the first truly global public health campaign, a coordinated effort spanning continents that aimed to institutionalize the practice by establishing formal juntas for the storage and administration of vaccine.[6] With the expedition’s departure, these efforts look more fleeting and irregular. Muñoz’s boast that vaccine had been available for 26 years in Mexico despite repeated failures to locate a source of cowpox there—its “benign climate,” he recounts in a note, rendered cowpox, like smallpox, epidemic rather than endemic, and usually unavailable—obscures the realities of practice. Particularly during the tumultuous years of Mexican insurgency (roughly 1810–1821), major roads became impassable, towns and regions were held by insurgent forces, and locals were left to coordinate ad hoc campaigns with inadequate supplies of vaccine and variable sources of funding.[7] By the Republican period (1823–1835), when matters of public health and hygiene were under the purview of municipal councils (*ayuntamientos*) and health committees composed of physicians, priests, councilmen, and citizens of means, campaigns continued to follow rhythms of local infection rather than a uniform plan. Perhaps this happened because terrified parents were more willing to immunize their children in the face of imminent contagion.[8]

While consent is a complicated matter involving questions of power, race, and class, the activities of one municipal health committee bring into focus other aspects of this struggle to introduce the vaccine. The Superior Health Committee of Oaxaca, in the south of Mexico, was revived in 1824 to deal with a regional outbreak of typhus. By the summer of 1827, it was overseeing vaccinations in the provincial capital, preparing to remit glass slides coated with vaccine fluid to subaltern juntas in outlying districts, and searching for copies of a printed instruction to distribute with the vaccine. In 1829, with rates of smallpox climbing, Mexico’s financial woes became evident in the committee’s recommendation that the funds of lay religious organizations (or confraternities) in villages and the capital be loaned out to support vaccinations. Members reminded the government that without the involvement of priests to encourage parishioners and vaccinate children, efforts to propagate the vaccine far and wide would be fruitless.[9] At last, vaccination sessions in

outlying districts commenced, with glass slides and practitioners dispatched to departments and villages.[10] In the following decades, public health bodies had to rely on charitable donations to support these initiatives rather than a dedicated revenue source. Repeated requests from outlying districts for *criscales* (glass slides) or *tubos* (vials) loaded with vaccine lymph, and for printed instructions and trained practitioners to operate, indicate a commitment to public health that ebbed and flowed with outbreaks.[11]

As records show, copies of inexpensive, easily-transported manuals were central to these fragmentary efforts, but they were in short supply.[12] The *Método sencillo*, published in Mexico City and then in the mining province of San Luis Potosí to address this scarcity, came out when the young Mexican republic was loosely unified. Epidemic disaster was inseparable from federal instability and territorial threats, especially in the northern province of Texas.[13] Medical experts and legislators attempted to reform medical training, licensing, and practice but struggled to cast off Spanish influences in favor a French model of instruction and anatomy.[14] By 1830, these reforms had not yet born fruit, nor did they override governing councils and public health committees in the provinces, where poverty and illness were rampant. In a preliminary note, in which Muñoz addresses his fellow Mexicans, “rich and poor, wise and ignorant,” and parents of families menaced by smallpox, he refers to one of the few experiences that unified the diverse population: aches and pains, fevers, unruly bodily fluids, and general uncertainty. Citing the lack of a suitable manual to guide readers in need, Muñoz offers his own, simplified work.

The guide conjures an eclectic universe of medical practice and knowledge. We read of lancets, lesions, and cow udders; pustules the size of a lentil, the fluid gathered on the tips of lancets or smeared onto glass plates for safe transport over long distances; and phlogiston, atmospheric poisons, sweat baths, and poultices. Its humoral approach confirms that immunization joined but did not replace a broader repertoire of strategies to cope with epidemic disease. Indeed, the slender work does more than simply instruct vaccinators to practice. The second section describes the daily symptoms of smallpox, followed by a discussion inflammatory effects on the exterior and interior of the body gleaned from dissections of cadavers. A lengthy middle section turns to treatment, with a focus on diet, the emptying and drying of pustules, and the patient's comfort. Domestic remedies abound here, including a full account of the therapeutic benefits of lukewarm baths, to be taken in the morning and again at night to soothe the erupting skin and cool the feverish patient. Following this is another theoretical discussion of infection, which explains how a single irritant or miasma can have such divergent effects depending on the predisposition of the patient. Toward the end is an instruction for inoculation with human smallpox, to be achieved by means of threads moistened from the pustules and carefully secured, with a dry rag and bandage, to a small incision made in the arm of the child.

The last may seem surprising. By the author's own admission, inoculation was a risky technique, more dangerous and less desirable than Jenner's vaccine. Why endorse the older procedure, a remnant of another era? Its inclusion makes sense when we consider that immunization campaigns tended to follow epidemic outbreaks, which made a supply of human smallpox readily available. Cowpox material, by contrast, traveled poorly and at great expense and was inaccessible in many regions. Muñoz knew this, and further believed that careless operation compromised vaccines—he refers to “*vacuna falsa*,” fluid that had deteriorated or been taken in the wrong moment or manner. Decades later, medical experts in Mexico City became so convinced that vaccination by inexperienced practitioners facilitated the accidental transmission of skin infections and syphilis that they backed the use of an animal source, instead of immunized children, as a surer reservoir.[15] The *Método sencillo* reflects more a realistic approach, and might even have contributed to the inability to standardize practice throughout the 19th century. Simply put, human smallpox was at hand to infect, even when cowpox was not.

Like other examples in this medical genre, the guide is evidence of a long liminal moment in the adoption of modern immunization, a transition through which we may still be passing. As further illustration of this unsettled state, it is worth noting that pamphlets featuring a religious approach to infectious disease were more numerous by far in Mexico at the time. Although not represented in the *Contagion* collection (and in fact entirely missing from the Harvard Library system), they provide an indispensable picture of 19th-century social relief and prevention that incorporated both divine and human healers. In the form of prayer booklets, they instruct how to request relief for a variety of ailments and dangers by means of saintly sponsors, including plague (or *peste*), “contagious air” and “deadly contagion,” hunger, and sudden death. Not only St. Roch, the renowned plague saint, but also early Christian martyrs (Caralampio, Hippolytus) and Our Lady of Guadalupe, Mexico's patron and “special advocate against the plague,” are invoked in these booklets, which were intended especially if not exclusively for wealthier classes and often note particularly efficacious times of the year for practice.[16] One example, published during Mexico's 1850 cholera epidemic, combines a simple medical instruction for prevention and treatment with hymns to the Virgin Mary and a three-day prayer cycle for Our Lady of the Remedies in a single work.[17] Taken together, they indicate the continued popularity and coexistence of religious modes of managing contagion. [18] Immunization made impressive inroads in the 19th century, but we should not assume that its use came at the expense of other cultures of healing.

The *Método sencillo* raises a number of questions. What would the hypothetical parent, addressed directly in the opening pages of the manual, have made of its contents? The portions that deal with vaccination are fairly straightforward, but subsequent discussions of disease etiology and medical theory and research—for example, the physical effects of smallpox on the arterial and nervous systems as revealed in human autopsies—turn erudite and technical, with few of the familiar analogies one would expect from a general healing manual. Perhaps sensing this, Muñoz defines and clarifies, in a brief closing section, several technical terms (e.g., poison, gas, contagion, epidemic) and explains further the theory that vaccine works by eliminating the second of two routes of common infection, namely respiration and the skin. The theoretical nature of some passages may reflect the distance that separated medical professionals

from laypeople, or just as likely, the idiosyncrasies of one aging practitioner, whose attempts to translate his specialized medical learning occasionally come off somewhat awkwardly.

Regarding the procedure itself, even more questions arise. Where was vaccination to take place? The manual refers to a sheltered room, which could refer to a church, home, municipal building, or hospital—the last rarely used in Mexico because of its associations with illness and death. Who served as vaccination's practitioners? Informally-trained surgeons and a number of other practitioners, including barber-bleeders, midwives, and *curanderos*, had some facility with needles and other sharp implements. Did they assist? Were caretakers enticed with incentives to immunize the children? It had been customary to provide gifts or compensation, but there is no mention of these measures. What roles did priests and other authorities play? Most remarkable, religious rituals and settings are missing from the source. In a time when the medical profession attempted to distance itself from religious institutions and other legacies of Spanish rule, Muñoz seems to have willfully disregarded the broader society in which immunization was being introduced. Yet technological advances depended on establishing trust, and thus on more than medical technique and theory.

In the end, the greatest omission may be the absence of any children's perspectives. We are left to imagine their responses when faced with the lancet in the vaccinator's hand.

Translation

A Simple, Clear, and Easy Method to Assist Children in the Current Epidemic of Natural Smallpox. According to the Newest and Best Medical Doctrines of the Day.

By citizen Miguel Muñoz, approved by the Municipal Health Committee, and printed by order of the most excellent Ayuntamiento of this [federal] district.

Mexico, 1830. Reprinted in San Luis Potosi, in the office of the State [located] in the [Royal] Palace, by Citizen Ladislao Vildosola.

To the most excellent *Ayuntamiento* and its Health Committee.

Mexicans. Compatriots. Rich and poor men, wise and ignorant. I speak to all of you: parents of families, who see your existence maliciously threatened along with that of your beloved children. Days ago, I reported to you in the newspapers[a] the appearance of what is known as natural smallpox, as soon as the first case of this horrific sickness arrived at my hands. Since then, I reported the matter to the head of the Protomedicato, Dr. Febles, to stimulate his philanthropy on your behalf in the manner of his office and responsibilities. For my part, I have wanted to contribute directly with a brief and superficial instruction, a few lines containing everything worth knowing on short notice about vaccine, to be able to use it with certainty, [as well as] a succinct explanation of the most common symptoms of smallpox, the manner of inoculating with it, and its corresponding method of treatment.

Finally, following this, I have included some observations about vaccine, and others that seem to me quite useful, about the common manner by which poisons operate on the surfaces of the human body and their varying degrees of effect; about the ordinary method of treating different poisonings; the analogous extension of this method to other cases; and the application of these doctrines to the treatment of smallpox in the current epidemic, considering the disease as the toxic and harmful effect of the atmosphere that we breathe, etc.

I have been moved to take this step by the daily ravages of this infection, above all when it works via the common manner of airborne or gaseous poisons and is concealed in other sicknesses, according to the specific preconditions of each individual, to remain undetected by many. This is why pustules do not always appear on the infected person's exterior, or if they do appear, they are not always those known as benign or confluent, but rather they take so many and such varied forms, even in the same subject, that to describe them all would require an entire volume. Fevers of various degrees, acute colds, external and internal fluxions of all types, with fever and without, vague acute pains, discharges of blood, hot flashes, flushes and sleeplessness and lack of appetite, exacerbation of all chronic, habitual, etc. infirmities, are in sum the common scourge of our people today.

In view of all this, and knowing that there is no concise manual of this nature to shine some light on those in need and guide them through such critical circumstances, I resolved to complete it, despite my shortcomings.

Note

I well might have compiled in this work numerous facts of all types in support of the principles put forth on the topic of vaccine and smallpox, as by now I have gathered and confirmed the one and the other as a natural result of my practice and rigorous reading of select authors. But it was my wish to omit this extravagance, knowing that the truth can shine forth on its own before the good sense of enlightened readers so long as it is grounded in facts, which outcome should be the same in other hands as in mine, if the laws of human life and of scientific medicine are observed and kept in the same manner.

True Vaccine

Between days 9 and 10, the normal period of maturity of a blossom of vaccine lymph, a flat pustule the size of a lentil and the color of

straw, with a hollow or depression in the center, appears at each vaccination incision, and around it a mild inflammation of the skin [*erysipelas*], which is known as an areola. The depression at the center is composed of a tiny scab caused by the small scar left by the incision of the vaccination lancet, which gives the pustule its particular form.

The greater the inflamed circumference, the bigger the white border of the pustule, the more fluid it contains, and the greater its reproductive potency. As a result, the person who will vaccinate should always select this class of superior pustule in order to propagate it with good success.

So-Called False Vaccine

This ordinary pustule does not take shape with regular edges. It presents with a jagged shape, like a pimple or small blister, whose content is putrid, in the same manner of any of those rashes that heat or filth produce in children. The carelessness of the vaccinator is to blame for its appearance, even when other pustules emerge apart from those that appeared at the injection sites.

It is necessarily quite harmful to reproduce this putrid, artificial pustule, because it does not protect against smallpox, and undoubtedly transmits other humoral infections that reign hereditarily in the blood of some individuals. Fortunately, it is not easy to confuse this type of ordinary pustule, which the authors have improperly labeled false vaccine.

METHOD OF VACCINATION

Having selected a good mature pustule that has not been drained, and with all the children who will be vaccinated present, take the lancet near its tip and prick the white border of the pustule little by little, with the incisions close together, to bring out the pure lymph (truly vaccine), which emerges in droplets from the cells in which it is contained. In this way, one regulates the quantity of liquid needed for each vaccinated individual, supplies numerous children, and avoids moreover the vitiation of lymph that has been exposed to air for a long time, as would happen by breaking the entire border all at once.

Take one of the droplets emerging from the incisions with just the tip of the lancet and transfer it to the front of the arm, where it is inserted by pulling back the skin with the left hand while pricking very superficially with the right, introducing the point of the lancet and sort of lifting the epidermis or outer skin with it, so that the lymph runs and drips into the small wound thus opened. Experience has shown that this manner of vaccination is the easiest and safest by which to activate and reproduce a true vaccine pustule.

You should make between two and four incisions in each arm, more if desired, although the activation of one of them is sufficient to protect against natural smallpox.

Once the punctured areas of the white border no longer yield vaccine lymph, but rather serum, which you will recognize when the humor that comes out is runnier and thinner and no longer hardens or crystallizes in the air, you should abandon this area and prick successively just beyond, thus to continue to vaccinate favorably. In addition, try not to scratch much with the lancet, or drain the border excessively, so as not to pass through and break the base of the pustule, in which case a quantity of serum is produced in abundance, which mixes with the blossom of vaccine lymph, vitiates it, and renders it useless, causing terrible injuries to the children thus operated on.

It is therefore crucial not to injure the white border or pass through it to the base of the pustule. It is likewise advisable not to damage the center by lifting the scab there (as frequently is done by those who are not experienced), because although this opening yields much more clear humor than any other, it is nevertheless as harmful in its results as the serum at the base, which I previously discussed, and just as useless for protecting children against smallpox. Consequently, you should avoid its use, and abandon the pustule if it has thus been inadvertently disturbed.

Manner of collecting vaccine lymph blossom in glass plates for distant transport, and method for its use.

Having selected the best pustule between the ninth and tenth days, and one that has not been emptied, prick carefully and little by little the entire white border so that all of the lymph contained in its cells emerges in one fell swoop. As the droplets well up, they should be spread onto two glass slides the size of an inch, on only one of the surfaces, until the slides are well loaded and the lymph runs out. Always take care not to take the serum that emerges together with the lymph, above all if the pustule has been disturbed and scratched by emptying the border.

With the slides well loaded, join the surfaces containing the lymph, which will immediately stick together. They should be covered with paper and placed in a tin case built to the size of the slides, with a lid, and sealed with tin to impede contact with air and light, which are harmful to the lymph and will alter it. With this you can remit true vaccine great distances and walk a long time without having it deteriorate.

Method of using the vaccine lymph collected in glass slides.

With all the children who will be vaccinated gathered in an enclosed room, unseal the box, remove the slides, and detach them. Moisten the tip of the lancet (in very clean) warm water, and use it to dissolve the hardened vaccine, stirring until it resembles natural lymph and can be used, as I have said, in the manner of arm-to-arm vaccinations, certain that the effects will be the same.

OBSERVATIONS

The artificial vaccine pustule that we propagate in Mexico owes its origin to the natural pustule inoculated from cows in the district of Gloucester,* England, whose happy discovery is owed to the immortal Dr. Jenner, at the end of the last century.

Those cows suffer on their teats an endemic, irregularly shaped cellular pustule, azure sunflower in color and surrounded by a red inflammation. The center of this cow pox contains a clear humor with which the milkmaids inadvertently inoculate themselves by touching it when [the skin of] their hands are cracked, which leaves them liberated from contracting natural smallpox.

Inoculated in this manner, the milkmaids endure as many pustules as cracks that touched the humor of the pox on the cow's teat, and the resulting pustule grows following the extensiveness and shape of the crack; yet the pustules thus acquired present with the hollowed and scabrous center of artificial vaccine, which the natural pustule of the cow does not have. Such is the origin of the vaccine that the cultured nations of Europe have adopted, following the practical persuasions of thousands of beneficent and marvelous examples of its protective virtue against natural smallpox, and which we have possessed for 26 years.

Effects of the true vaccine that we propagate artificially, and preparation of children to receive it.

The only necessary preparation of those who will be vaccinated is to rub their arms with warm water a moment before the procedure. The purpose is to rouse sensibility and absorption in the region, so that the vaccine takes more quickly, principally in those whose skin is dirty, hard, and rough. In all else there is no need to make a single alteration to their ordinary way of living, either before or after they are vaccinated.

Once vaccinated, the children feel no discomfort in the region from the first to the third day. From the fourth to the fifth, the pockmarks become reddish. From the fifth to the seventh, the ruddiness rises, and the pustule now appears flat and sunken, which is its natural form. In this period, a ring of red inflammation, called the areola, manifests around the pustule. From the ninth to the tenth day, which is the period of maturity of the pustule, it is already fully developed, which is the preferred state for vaccination. From this date forward, the white border begins to darken and dry and the areola resolves, finally leaving everything in one dark scab that comes off after twenty or twenty-five days.

The method of vaccination from arm to arm is preferable to any other.

No vaccine pustules emerge beyond the incision site, and in some it is necessary to repeat the incision to get one to take.

There is not a single example of vaccine being transmitted from one person to another, except by injection.

Vaccine undoubtedly prevents against smallpox if used on time. If, however, on performing the procedure, one has not been notified that the child was previously infected with smallpox, and perhaps the child is vaccinated when already suffering from fever, the infection follows its natural course and flourishes, and its morbid effects dominate and render useless the salutary effects of the inopportunistly used preservative.

Do not use any vaccine pustule that erupts on a person simultaneously suffering from infectious smallpox, because the result would always be malignant smallpox, due to the ongoing dual stimulation of the patient.

I do not say the same about the vaccine pustule that erupts on someone who suffers from any other common illnesses, because when used well the vaccine lymph enclosed in the pustule's cells does not convey any infection that is not of its class, and as a result it can be used, in isolation, without danger.

All speak poorly of vaccine they call false, while no one has thus spoken of true vaccine when it has been poorly used.

But that very same false vaccine can proceed from any circumstance at all, even if taken from true vaccine, the danger consisting solely in the manner and time of extracting the lymph. For this reason, when discussing the manner of vaccination, I instruct very specifically not to prick more than the cells of the white border, which are the ones that contain in isolation the vaccine fluid blossom, true preservative against infectious smallpox and incapable of giving rise to any humoral perversion, including the putrid pustules that have been improperly called false vaccine. And regarding time, I say that after a vaccine pustule has been artificially or inadvertently emptied once, it should be abandoned, without regard for the fact that it appears to fill up one or more times, because the humor that reproduces is only serum, without any of the qualities and virtues of the vaccine fluid blossom, whose precious liquid is obtained only once in life.

Notes

[1] Miguel Muñoz, *Método sencillo, claro y fácil de asistir a los niños en la actual epidemia de viruelas naturales* (San Luis Potosí, Mexico: Ladislao Vildosola, 1830).

- [2] Ernesto Cordero Galindo, "Miguel Muñoz: Cirujano y partero, conservador de la vacuna, promotor de la enseñanza médica," *Revista de la Facultad de Medicina UNAM* 43, no. 4 (2000): 157–61.
- [3] See *The Popularization of Medicine*, ed. Roy Porter (New York: Routledge, 1992), especially Mary Fissell's chapter, "Readers, Texts, and Contexts: Vernacular Works in Early Modern England," 72–96. On the role of vernacular print culture in Mexican epidemics, see Paul Ramírez, *Enlightened Immunity: Mexico's Experiments with Disease Prevention in the Age of Reason* (Palo Alto: Stanford University Press, 2018), esp. ch. 2.
- [4] For European contexts, see Andrea Rusnock, "Catching Cowpox: The Early Spread of Smallpox Vaccination," *Bulletin of the History of Medicine* 83, no. 1 (Spring 2009): 17–36, esp. 20–22.
- [5] Sanjoy Bhattacharya and Niels Brimnes, "Simultaneously Global and Local: Reassessing Smallpox Vaccination and Its Spread," *Bulletin of the History of Medicine* 83, no.1 (Spring 2009): 1–16, here 10, discussing Peter Baldwin's scholarship.
- [6] Catherine Mark and José Rigau-Pérez, "The World's First Immunization Campaign: The Spanish Smallpox Vaccine Expedition, 1803–1813," *Bulletin of the History of Medicine* 83, no. 1 (Spring 2009): 63–94.
- [7] On immunization campaigns in Mexico in this period, see Ramírez, *Enlightened Immunity*, ch. 5. For the province of San Luis Potosí, see Ana Irisarri Aguirre, "La vacunación contra la viruela en la provincia de San Luis Potosí tras la expedición de Balmis, 1805–1821," *Fronteras de la Historia* 12 (2007): 197–226.
- [8] As Chantal Cramaussel concludes, "La lucha contra la viruela en Chihuahua durante el siglo XIX," *Relaciones* 114 (Spring 2008): 101–32, on 119.
- [9] Archivo General del Estado de Oaxaca (AGEO), Gobernación, Juntas y Consejos, Sanidad, Hospitales, legajo 1 (files for 1827 and 1829).
- [10] E.g., AGEO, Gobernación, Gobierno de Distritos, Jamiltepec, Junta de Sanidad, legajo 5, exp. 2.
- [11] On municipal efforts in other provinces, Cramaussel, "La lucha contra la viruela," and Angela T. Thompson, "To Save the Children: Smallpox Inoculation, Vaccination, and Public Health in Guanajuato, Mexico, 1797–1840," *The Americas* 49, no. 4 (1993): 431–55. Based on archival research in northern Mexico, Chantal Cramaussel argues that in the second half of the century smallpox appeared more frequently, at least every ten years, and almost exclusively in children. In other words, it had become an endemic childhood disease (106–107).
- [12] The last version apparently came out under the Spanish government, in 1814. A survey of publications relating to infectious disease turns up hardly any other literature on immunization. One guide published by Mexico City's health committee in 1824 to prevent and treat a cluster of disease outbreaks in the absence of a trained physician makes no mention of inoculation or vaccination, focusing instead on diet and other humoral medicine. *Junta de Sanidad, Breve exposicion de la epidemia que está reinando en México y sus alrededores ...* (Mexico City: Oficina del Ciudadano Alejandro Valdés, 1824).
- [13] For an account of Mexico's political climate in these years, see Nettie Lee Benson, "Texas as Viewed from Mexico," *The Southwestern Historical Quarterly* 90, no. 3 (January 1987): 219–91.
- [14] On this transition, see Luz María Hernández Sáenz, *Carving a Niche: The Medical Profession in Mexico, 1800–1870* (Montreal; Chicago: McGill–Queen's University Press, 2018).
- [15] Claudia Agostoni, *Médicos, campañas y vacunas: La viruela y la cultura de su prevención en México, 1870–1952* (Mexico City: Universidad Nacional Autónoma de México, Instituto de Investigaciones Dr. José María Luis Mora), 30–54.
- [16] The majority of these are reissues from previous centuries: *Novena dedicada al culto del ínclito presbítero San Caralampio, primer abogado contra la peste y aire contagioso, adoptado por el mismo Jesucristo* (Mexico City: Imprenta de D. Alejandro Valdés, 1827); *Rosario a los siete derramamientos de la preciosa sangre de Nuestro Señor Jesucristo, que se compone de siete misterios. Devocion muy provechosa, para que por medio de ella aplaque su divina Magestad la presente epidemia* (Mexico City: Imprenta del Ciudadano Alejandro Valdés, 1831); José Mariano de Gondra, *Novena y día trece en honra del santo mártir Hipolito, patron especialísimo de Mexico, y abogado contra la peste* (Mexico City: Imprenta de Luis Abadiano y Valdés, 1841); *Traduccion de las jaculatorias de San Zacarías obispo de Jerusalén, invocaciones á Jesucristo, himno y oracion á San Roque, para pedir á Dios nos libre de la peste ...* (Mexico City: Imprenta del editor, Portal del Aguila de Oro, 1850); *Carta de esclavitud a María Santísima de Guadalupe, para que nos libre de la peste* (Mexico City: 1850, Tipografía de R. Rafael); Manuel Alonso Martínez, *Novena a María Santísima de Guadalupe, especial abogada contra la peste* (Mexico City: Imprenta de Luis Abadiano y Valdés, 1854). The works dedicated to Guadalupe make no mention of epidemic contexts beyond their titles, while the first example above, apparently newly composed in 1827, contains metaphors, e.g., "my scars are rotten and decayed [*se pudrieron y están corrompidas mis cicatrices*]," that vividly root sin and suffering in the physical process of infectious disease. The 1850 edition of St. Zachary's prayers, from a 16th-century translation, invokes the power of the cross as an amulet or talisman to dispel peste.
- [17] *Triduo perpetuo para implorar de María Santísima de los Remedios, su amparo en las presentes necesidades ...* (Mexico City: Case de Santiago Perez, 1850). In this instance, the cover and title conceal the medical work embedded inside.

[18] On what is sometimes called “medical pluralism,” see Sherry Fields, *Pestilence and Headcolds: Encountering Illness in Colonial Mexico* (New York: Columbia University Press, 2008), and Marcos Cueto and Steven Palmer, *Medicine and Public Health in Latin America* (New York: Cambridge University Press, 2015). For an example of a colonial Mexican guide in this mode, the Jesuit priest Juan de Esteyneffer’s *Florilegio medicinal, de todas las enfermedades* (Mexico City: Herederos de Juan Joseph Guillena Carrascoto, 1712) features saintly advocates for each illness treated yet is principally dedicated to practical instruction in humoral remedies and medicine.

[a] See my notice to parents, issued in *El sol*, no. 156. [TULANE MIC 865]

* Since the time of the Spanish government, vaccine, or cowpox, has been hopelessly searched for throughout the Republic in different seasons, and it has not been found no matter how many mercenaries have offered to locate it. I believe this discovery will not be obtained, by virtue of the fact that in our benign climate smallpox is not endemic but rather periodic, with a lapse of many years, which necessarily affects our cows, such that they suffer pustules with at most the same frequency as we do, which is to say every 16 years, or more.