

PUBLIC HEALTH IN NORTHERN NEW SPAIN

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Public health is that branch of preventative medicine in which the community at large has a special interest. When the cause of a neighbor's illness threatens the well being of the entire community or when his disease itself cannot be easily contained then the mechanisms of the state properly intercede. Traditionally public health has articulated two primary, but related goals: the prevention of disease and the improvement of life expectancy. The methods used to achieve these goals have varied throughout history but two basic approaches have dominated the public health effort: monitoring and correcting the environmental causes of illness and arresting the rapid spread of epidemic contagion.¹

Concern with public health issues certainly dates to classical antiquity as examples of public response to health hazards dot the historical record of ancient Greece and Rome. But the first major efforts in the field belong to the Middle Ages when epidemic diseases, especially smallpox, tuberculosis, trachoma and leprosy began their horrible peregrinations through western Europe. The isolation of lepers into special colonies testifies graphically to medieval appreciations of contagion in the thirteenth and fourteenth centuries. In Spain genuine concern with public health issues is more properly traced to the Black Death (probably Bubonic plague) of the middle of the fourteenth century.

The Black Death hit the Iberian peninsula between 1347 and 1351 with devastating results and was followed shortly by other epidemics in 1361-1363, 1371, 1375, and 1396-97. Bubonic plague had originated in Asia, perhaps in India, perhaps in China. It was carried to Europe, by black rats (*Rattus rattus*) who managed to climb aboard sailing vessels and who subse-

¹ Regulation of medical practice can be considered a function of public health but this subject will not be treated in this article.

quently disembarked in Mediterranean ports. The black rats quickly infected local rodents with the deadly bacillus, *Pasteurella pestis* and before the urban rats died the infection was carried from the rodent population to human hosts by fleas sharing the burrows with the rodent population. The sudden presence of thousands of dead rats in a community was an unmistakable sign of impending disaster.

The rapid spread of disease throughout Iberia left some cities with less than half of their original populations. The kingdoms of Aragón and Catalonia were hit as hard as any regions of Europe. The city of Barcelona, for example, had a population of about 500 000 in 1340. Ten years later the number had been reduced to 38 000 and by 1377 there were only 20 000 residents left in that Catalonian city.² This demographic devastation alerted the Iberian medical community to the matter of contagiousness and the need for developing a public health policy. The institution of the quarantine emerged as the first result. Ships calling at Spanish ports were sometimes required to remain at anchor in the harbor for forty days (thus the word quarantine) before anyone could disembark. At approximately the same time concern with prophylaxis prompted the construction of elementary sewage systems, the cleaning of public latrines, a more systematic regulation of public market places and slaughterhouses. It also encouraged the development of medical intelligence, and fostered a new cooperation across international boundaries.

These elementary notions of public health were carried to the New World as part of the cultural baggage Spaniards brought with them. They were surely of great significance as on the heels of the initial contact the war between Indian and micro-organism began. European epidemic diseases quickly spelled demographic disaster for native American populations so long isolated from the gene pool of the remainder of mankind. In the core of New Spain public health policy was formulated by the small medical community in Mexico City, most notably Dr. Cristóbal de Ojeda, Lic. Pedro López, and surgeon Diego Pedraza in consultation with the recently established Protomedicato. On the northern periphery of the viceroyalty,

² Luis S. Granjel, *La Medicina Española Antigua y Medieval*, Salamanca, Ediciones Universidad de Salamanca, 1981; p. 136.

where formally trained medical practitioners were in very short supply, public health policy was improvised by local officials, sometimes with the prodding of provincial governors, and in the late eighteenth century of the Commandant General of the Provincias Internas.

Public health on the far northern frontier of New Spain was largely a product of the eighteenth and early nineteenth centuries. There, as elsewhere in the viceroyalty, the causes of the spread of disease were better understood than the mechanisms for effective therapy. It was much easier to preserve one's health than to recover it. Cure was not dismissed as irrelevant but since environmental considerations and contact between healthy and ill persons were recognized as important factors in the spread of disease major emphasis was placed upon prevention and containment, even if it meant that the public good sometimes took precedence over traditional Hispanic concepts of private property and personal liberty.

Most significant in the development of public preventative medicine were efforts to improve hygienic conditions and to isolate disease pathogens before the vectors could spread the infections to new hosts. Some successes were registered as the vagaries of humans proved rather more manageable than those of poorly understood viruses and bacteria. Public officials knew that human actions could be modified. In some cases the cultivation of healthier hygienic practices required new legislation from the Royal Council of the Indies in Spain, from the Viceroy in Mexico City or from local officials, but in most cases it was simply a matter of applying principles well known and enforcing laws long on the books.

Pollution of municipal water sources was understood to be a major contributor to disease and both royal ordinances and local decrees promulgated by town councils addressed the issue. The *acequia madre* that ran through most towns was used not only for irrigating nearby fields and gardens adjacent to the houses, but also for the potable water needs of the town, for the watering of animals, for the washing of clothes and, because no northern cabildo acknowledged the obligation of collecting and disposing of refuse, for sewage and garbage disposal. It is obvious that these diverse uses of the *acequia* were not entirely compatible with one another.

As early as 1573 King Philip II had issued a set of ordinances on the laying out of new towns and articles 122 and 123 of those regulations specified that all polluting activities were to be located downstream from the town.³ Mining codes also specified that mines could not pollute domestic water supplies.⁴ In spite of the good intentions of the statutes enacted in Spain to proscribe pollution of potable water sources, those northerners who lived downstream were often victimized by the carelessness of their upstream neighbors as contaminants exceeded the capacity of the natural aquatic ecosystems to breakdown, absorb or recycle the materials introduced. All too often human excreta, kitchen and bathing wastes, and small dead animals dirtied the communal water ditch. Chihuahua City found itself with an especially unhealthy situation prompted by an incipient form of industrial pollution. Lead tailings from upstream mines poisoned the municipal system and caused disease.⁵ Ultimately the town fathers had to construct an entirely new water system. Water sources in Sonora were polluted as well and at least one doctor attributed his patient's blood disorder in part to the high metallic content in the water.⁶ In the San Antonio missions, an area of extensive sheep grazing, the fleeces of filthy and sometimes diseased sheep were washed in the acequia following the annual shaving.⁷

The state of seventeenth and eighteenth century science did not permit the establishment of careful standards for drinking water of questionable purity. It was not necessary to count coliform bacteria or to evaluate concentrations of turbidity to be

³ Zelia Nuttall, "Royal Ordinances Concerning the Laying Out of New Towns," *Hispanic American Historical Review* 4 (Nov., 1921); p. 747.

⁴ Ordenanzas del Tribunal General de la Minería de Nueva España, Marzo 22, 1783, in Eusebio Ventura Beleña, *Recopilación de todos los autos, acordados de real audiencia y sala de crimen de esta Nueva España*, 2 vols. México, Universidad Nacional de México, 1981; v. II, p. 262-263.

⁵ Anselmo Rodríguez to Viceroy, May 8, 1797, Archivo General de la Nación (Mexico City), *Alhóndigas*, II, Exp. 3.. Hereafter cited as AGN with appropriate information.

⁶ "...la qualidad de las aguas que llevan una impresión metálica...", Guillermo de Cis to Lorenzo Cancio, Nov. 29, 1769, AGN, *Provincias Internas*, v. 70. A similar situation existed in Durango where it was necessary to "facilitarle la introducción de Aguas limpias y saludables en lugar de las impuras y nocivas...", Josef Fayni to Antonio María Bucareli, Dec. 12, 1722, AGN, *Provincias Internas*, 42.

⁷ Mardith K. Schuetz, "The Indians of the San Antonio Missions, 1718-1821", (Ph. D. Dissertation, University of Texas, 1980), p. 272.

repulsed by the sight of fecal matter or scum floating on the domestic water supply. Because filtering methods were primitive at best, and chemical coagulation centuries in the future, the only answer was to prevent the contamination at its source.

At about the same time that the English Utilitarian theorist Jeremy Bentham was developing his notion of the greatest good for the greatest number, the cabildos throughout the far north were beginning to issue ordinances governing the use of acequia water. In Santa Fe, New Mexico people who bathed or engaged in "other filthy practices," ruining the drinking water of those downstream, were fined four *reales*. The village of San Fernando in Texas had a similar problem but a more imaginative penalty. In 1775 Amador Delgado, the local *alcalde*, had to outlaw the washing of clothes in the acequia because those living further down were drinking contaminated water. His order stated provided that no clothes would be washed in the acequia. Any woman guilty of a violation would have her freshly washed clothes confiscated.⁸

An even worse problem was that of stray animals polluting the acequia. The pigs of San Antonio bore the burden of their owner's carelessness. Anyone who found a pig running loose was free to kill and butcher it without fearing legal retribution from the owner.⁹ The decree, in the long run, was apparently ineffective because some forty-one years later the town council of San Antonio de Béxar was forced to add to the penalty by levying a fine of one peso against anyone who allowed his pigs to run loose.¹⁰ The governor of New Mexico, Fernando de la Concha took a much more drastic step. Informed that stray dogs were spreading disease in the Indian pueblos and Spanish towns he issued an uncompromising decree: "Mando a todos los vesinos e indios dela Prova, sin distincion alguna de personas, qe desde el mismo dia enqe se publique este vando maten o hagan matar cuantos perros tengan en los pueblos, o Plazas

⁸ Amador Delgado, *Alcalde de la Villa de Sn. Fernando, Provincia de los Tejas*, Jan. 15, 1775, Bejar Archives, Reel 11. Hereafter cited as BA with appropriate information.

⁹ *Decreto de Domingo Cabello*, San Antonio de Bexar, Nov. 17, 1783, BA, Reel 15.

¹⁰ José Antonio Saucedo to Sr. *Alcalde 1o*, D. Gaspar Horcs, Feb. 5, 1824, BA, Reel 76.

formales exceptuando esto los Ranchos q se hallen distante de Poblado.”¹¹

The muleteers who brought needed supplies into the towns and villages of the north often left more than the merchant paid for. In San Antonio they tied up their mules for two or three nights in the plaza behind the church. When they left they felt no obligation to clear the plaza of the putrid excrement deposited by the teams of mules. A local ordinance passed in early 1809 ordered the muleteers to park their animals outside the village or, if they wanted to use the plaza behind the church, to pay a fee of two *reales* so that someone could be hired to clean up their mess.¹²

Some northern communities, most notably those in California, developed some simple pollution control systems. A laundry tank (*lavandería*), two or three feet wide and a couple of feet deep, could be found near the central plaza. Built with mortar and sometimes lined with tiles, the *lavandería* discharged the dirty water, not into the main acequia, but into the fields. Unlike the synthetic detergents in use today, the lye soap then in use did not damage the crops. More importantly the system, once properly installed, helped assure a more healthy water supply.¹³

Some attempts were undertaken to modify the local environment in the effort to raise community health levels. Malaria and yellow fever, while never as prevalent on the northern frontier of New Spain as elsewhere in the Viceroyalty, did make their presence known in riverine oases and in the more humid areas of Texas and Nuevo Santander (Tamaulipas)). The year 1765 was especially bad for malaria in the capital city of Santander. After a tour of inspection by a local military engineer, José de Escandón, perhaps aware that Hippocrates had first established the association between malaria and swamps issued orders for the draining of some nearby marshes to reduce the anopheline mosquito populations.¹⁴ It was a good idea but drainage techniques

¹¹ Bando de Don Fernando de la Concha, Jul. 15, 1789, Spanish Archives of New Mexico, Series II, Reel 12. Hereafter cited as SANM with appropriate information.

¹² Providencia de Manuel de Salcedo, Jan. 16, 1809, BA, Reel 39.

¹³ For more information on the *lavanderías* see John Q. Ressler, "Indian and Spanish Water Control on New Spain's Northwest Frontier", *Journal of the West* 7 (January, 1968); p. 15-16.

¹⁴ Lawrence Francis Hill, *José de Escandón and the Founding of Nuevo*

were inadequate to the task. Yet an important lesson had been learned. Public health was not simply the province of the physician. Allied science and technology had crucial contributions to make.

In addition to the hygienic measures adopted to maintain the integrity of the water supply and the attempts to control the breeding of mosquitos, many civil and religious officials in northern New Spain recognized that an unsafe food supply had a negative impact on public health and not only attempted to regulate slaughterhouses and markets but also circulated information on techniques of food preservation. Preserving meat with *aguardiente* (brandy) might change its flavor but, according to one gastronomical savant, one could be sure that the troops in the presidios would not find it disagreeable.¹⁵

Public officials in northern New Spain also appreciated the value of isolation and quarantine to inhibit contagion. In 1781, at the time of the foundation of Los Angeles, Lieutenant José Zúñiga ordered his recruits and their families to build their settlement one league away from the mission of San Gabriel because some of the newcomers to the area had only recently recovered from smallpox.¹⁶ Five years later California governor, Pedro Fages, received more detailed instructions on preventing the spread of smallpox. Forwarding recommendations he had received from Mexico City, Commandant General Jacobo Ugarte y Loyola instructed Governor Fages to build a separate structure for those suspected of having smallpox. It should be built away from the city, taking under consideration the direction of prevailing winds.¹⁷

Officials on the northern reaches of the Viceroyalty did not always follow Spanish medical pronouncements. There the principle of "Obedezco pero no cumplo" reached its ultimate enshrinement as countless officials believed that rules were made to be broken. On occasion, however, those charged with enforc-

Santander: A Study in Spanish Colonization, Columbus, Ohio State University Press, 1926; p. 123.

¹⁵ José Felipe Flores, *Experimentos Sobre la Conservación de las Carnes* (Mexico, M. Ontiveros, 1818), Wellcome Institute, Ms 57.

¹⁶ Sherburne Friend Cook, "La viruela en la California Española y Mexicana", in Enrique Florescano and Elsa Malvido (eds.), *Ensayos Sobre las Epidemias en México*, 2 vols. México, Instituto Mexicano del Seguro Social, 1982; v. I, p. 258.

¹⁷ *Ibid.*, v. I, p. 260.

ing public health in the north were amazingly scrupulous in observing laws enacted under different circumstances, a half a world away. One case in point is the Royal Cedula enacted in Madrid in 1761 under the title *Reglas y precauciones para evitar el uso de ropas y efectos de los éticos y tísicos, y otros enfermos contagiosos*. The cedula read in part, "Haciendo ver la experiencia quan peligroso es el uso de la ropa, muebles y alhajas de los que han adolecido y muerto de enfermedades éticas, tísicas y otras contagiosas, me ha sido muy reparable el abandono con que he entendido se trata la grave importancia de quemar estos efectos..."¹⁸ The importance of this preventative action did not escape surgeon Juan de Dios Morelos in northern California. When Hermenegildo Sal, the commandant of the Monterey presidio, in California, died of tuberculosis in 1800, the resident surgeon burned the roof and windows of the commandant's house, burned all of his furniture and clothing, removed the brick floor and the walls of the house thoroughly scraped.¹⁹

Examples of maritime quarantine also are found in the documentary record. When a severe yellow fever epidemic struck the Mexican port of Veracruz in 1809, killing hundreds, Commandant General Nemesio Salcedo immediately sent out strict instructions to the commanders of coastal cities in Texas. They were not to permit the landing of any individuals or cargo on the Texas shore. Moreover they were authorized to use all local military forces to enforce the order. He concluded his order by indicating that he would not accept any excuses for noncompliance.²⁰

Decrees of the Viceroy, the Commandant General or the northern provincial governor were not always easy to enforce but compliance was preferable to simply waiting for an epidemic to arrive. Once epidemic disease was imminent, government officials and local medical practitioners could not improve much on the advice given centuries earlier when the great plague

¹⁸ *Novísima Recopilación*, Libro 7, Título XL, Ley II. The law is reproduced in its entirety in Juan N. Rodríguez de San Miguel, *Pandectas Hispano-Mexicanas*, 3 vols. México, Universidad Nacional Autónoma de México, 1980; v. II, p. 342-345.

¹⁹ Cephas L. Bard, "Medicine and Surgery Among the First Californians", *Touring Topics* (January, 1930); p. 26.

²⁰ Nemesio Salcedo to Bernardo Bonavia, June 22, 1809. BA, Reel 41.

swept through Europe: "Leave fast, travel far, and return slowly." Suggested treatment did exist for all epidemic diseases but they scarcely constituted effective therapy. Smallpox, for example, was treated by including a little extra fruit in the diet, by consuming vegetable soup with a little citric acid, and by drinking large amount of borax water or water mixed with an extract of violets.²¹ Obviously prevention was a better public alternative.

The most grandiose experiment with preventative medicine in northern New Spain surrounds the tortuous course of immunization against smallpox. The history of this process, in Mexico as elsewhere, went through two phases, that of inoculation or variolation, and later that of vaccination.

Inoculation, or variolation, consists of introducing material from a human smallpox lesion into the body of another person with the hope of producing the disease (*variola inoculata*) in a mild form and, at the same time, insuring subsequent immunity. Variolation, however, was not without its opponents in Western Europe. In many cases the negativism never lifted itself above the plane of moral recrimination but a few European scientists correctly pointed out the perils. Because this potentially effective preventative against smallpox was also potentially dangerous it gained only limited acceptance.

Inoculation in Spain began in the late 1760s but it occasioned tremendous controversy.²² The debate in Spain was echoed in New Spain in the 1770s. Those who wanted guidance from the Mexico City medical community were treated only to the spectacle of lively polemics and endless bickering. Both sides seemed more interested in securing forensic advantage than in promoting the best interests of their respective constituencies. A small but vocal minority of opponents, led by Dr. Domingo Rusi, succeeded in blocking the general use of variolation until 1779

²¹ Rosaura Hernández Rodríguez, "Epidemias Novohispanas durante el siglo XVI", in Florescano and Malvido (eds.), *Epidemias en México*, p. 225. Treatment for other epidemic diseases was dictated by the botanical bounty of the local landscape. The ground leaves of the chichiquelite (*Solanum nigrum* or yerbamora) was widely used in the north to treat typhus, but with little effect. See "Obedeciendo la superior orden espedida por el Sor gobernador..." Dec. 10, 1783, Wellcome Institute, WMS, Amer 50.

²² Luis S. Granjel, *La Medicina Española del Siglo XVIII*, Salamanca, Ediciones Universidad de Salamanca, 1979; p. 122.

when Mexican viceroy Martín de Mayorga gave it his official blessings.²³

It is possible that variolation had reached northern New Spain prior to its official acceptance in 1779. It had been practiced occasionally in other areas of the viceroyalty. It is certain, however, that the immunization procedure was being used in the north by 1781, the year of the most widespread smallpox epidemic ever experienced in the north. At the time of the outbreaks Father Juan Gómez was inoculating Indians in the Baja California mission of San Ignacio.²⁴ According to Father Luis de Sales, reporting later from the same mission, he encountered good success as he lost only three or four of his neophytes.²⁵ Other missionaries lost more. At approximately the same time Dominicans in two other Baja California missions, San Fernando and San Francisco de Borja, were doing the same.²⁶ Further encouragement followed a few years later when Commandant General Jacobo Ugarte y Loyola sent governors of the northern provinces multiple copies of a book published originally in Madrid in 1784. Written by Dr. Francisco Gil, and entitled *Disertacion Fisico-Medica, en la qual se prescribe un metodo seguro para preservar a los pueblos de Viruelas hasta lograr la completa extincion de ellas en todo en reino*, the volume encouraged quarantine and fumigation for the control of smallpox, and in the cases of the most serious epidemics, variolation.²⁷ This recommendation closely paralleled a Royal Order that was issued on April 15, 1785 calling for the establishment of a *cordon sanitaire* dividing infected and uninfected areas of a town and if this were insufficient the use of variolation.²⁸ In 1797, at the time of a severe smallpox epidemic in

²³ Donald B. Cooper, *Epidemic Disease in Mexico City, 1761-1818*, Austin, University of Texas Press, 1965; p. 64-65.

²⁴ Jackson, J., "Epidemic Disease and Population Decline in the Baja California Missions, 1697-1834", *Southern California Quarterly* 63 (Winter, 1981); p. 326-327.

²⁵ Luis de Sales, *Noticias de la Provincia de Californias*, Valencia, Hermanos de Orga, 1794, p. 96.

²⁶ *Ibid.*, p. 327.

²⁷ Robert J. Moes, "Smallpox Immunization in Alta California, a Story Based on Jose Estrada's 1821 Postscript", *Southern California Quarterly* 61 (Summer, 1979); p. 129. A new edition of the book was published under the same title in Mexico by Rolston-Baine in 1983.

²⁸ Robin Price, "State Church Charity and Smallpox: An Epidemic Crisis in the city of Mexico, 1797-98", *Journal of the Royal Society of Medicine* 75 (May, 1982); p. 359-360.

Guatemala, Viceroy Branciforte again reminded the northern governors that variolation was encountering some success in other areas of New Spain.²⁹ That same year Dr. Juan Bautista Crivelli, appointed as Royal Surgeon at the Royal Military Hospital in Chihuahua, inoculated hundreds as he worked his way north from Mexico City and continued the practice after he assumed his new post.³⁰

The variolation procedure, properly performed, was quite effective. The degree of protection is illustrated by statistical evidence available from the city of Durango during a smallpox epidemic in 1798. Of 4 308 persons counted in a survey ordered by the Intendent, 3 824 had been inoculated and 478 had not. During the course of the 1798 epidemic 102 persons died in Durango, 81 of them of smallpox. Of those persons previously inoculated smallpox claimed only 18 deaths or less than one-half of one percent. Of those 478 not inoculated 63 succumbed to smallpox, or over thirteen percent.³¹

While the first rounds of smallpox inoculations were unfolding in northern New Spain the debate in Europe over its efficacy had become extremely intense. British physician Edward Jenner, who as a boy had an extremely severe reaction to a smallpox inoculation, had conducted research into cowpox, a relatively mild disease most prevalent among dairy farmers and others with direct contact with infected cows. Early scientists had observed that persons who had become ill with cowpox seemed to have immunity against smallpox. It was Jenner who proved that contention by demonstrating that smallpox inoculations did not take in the bodies of those who had experienced an earlier cowpox episode, just as it did not take in the bodies of those who had managed to survive an earlier bout with smallpox. From this knowledge it was a short step to vaccination. He took cowpox pus (fluido bacuna) from the sore on the hand of a dairy maid and injected it into the arm of a young boy. Six

²⁹ Cook, "La Viruela en California Española", p. 261-265.

³⁰ Juan Bautista Crivelli, Cirujano Real de San Carlos de Veracruz sobre que se le conceda jubilación con todo su sueldo. Año de 1819, AGN, *Hospitales y Protomedicato*, leg. 10, exp. 6.

³¹ José Manuel Esquivel Navarrete, *Sermón eucarístico por la felicidad que logró la Ciudad de Durango en la Epidemia de viruelas del Año de Mil setecientos noventa y ocho*, (México, Joseph Fernández Jauregui, 1799, p. 19-21), Wellcome Institute. M49.

weeks later the same boy had no reaction whatsoever when inoculated with smallpox pus.

Jenner published his results in London in 1798. His *Inquiry into the Causes and Effects of the Variola Vaccinae* immediately occasioned major debates in the European medical community. Vaccination, as opposed to inoculation or variolation, was not embraced with universal enthusiasm but by 1800 Jenner's experiments had been repeated with the same results so many times that it was difficult to deny the forcefulness of his arguments.

Vaccination was adopted in Spain in late 1800, by physicians Francisco Piguillem and Francisco Salvá y Campillo³² but major problems ensued following the decision to introduce it in Spain's American colonies. Because the vaccine breaks down and desiccates it was difficult to preserve it in an active state and transport for long distances. Attempts to keep the fluid active in crude vacuum containers met with mixed results. One shipment sent to Mexico in 1802 was worthless by the time it arrived.³³ In 1803, however, King Charles IV ordered the formation for the express purpose of transporting the vaccine to America and then the Philippines. The Expedición Filantrópica de la Vacuna was organized by Dr. Francisco Xavier Balmis, the personal physician of King Charles IV and a man who had served the Crown in Mexico previously collecting information of herbal medicines. Balmis first thought of transporting cows sick with cowpox to the new world but ultimately judged this scheme to be impractical. He then decided upon another plan, arm to arm vaccination to keep the fluid active during the difficult Atlantic crossing.³⁴

In the early fall of 1803 Dr. Balmis and his assistants visited orphanages in Santiago de Compostela and La Coruña and identified twenty-five orphaned children who had never had smallpox. They would form part of his expedition. When the *Maria Pita* set sail for America on November 30, 1803 two of the children had already been vaccinated. From their arms on the ninth or tenth day came the cowpox vaccine to be transferred to a subsequent pair. The process continued from pair to

³² Granjel, *La Medicina Española del Siglo XVIII*, p. 124.

³³ *Ibid.*, p. 137.

³⁴ The expedition is detailed in Gonzalo Díaz de Yraola, *La Vuelta al Mundo de la Expedición de la Vacuna*, Sevilla, Escuela de Estudios Hispano-Americanos, 1948.

pair during the entire voyage. The vaccine and all but one of the children arrived safely in San Juan, Puerto Rico on February 9, 1804.³⁵ Balmis was in for a surprise. Medical authorities in Puerto Rico had managed to acquire a good supply of vaccine sent in vacuumed glass slides from the neighboring Danish island of St. Croix. Rather than been pleased that the vaccination was already underway the leader of the scientific expedition chastised local officials for anticipating his arrival and jumping the gun.³⁶ After obtaining a new group of children the expedition continued to Venezuela where it divided itself into two groups. Dr. José Salvany took some of the children with him on a tour of Spanish South America while Dr. Balmis took the remainder to Havana, Cuba and then on to the New Spain's gulf port of Veracruz.

Dr. Balmis, no stranger to controversy, did not anticipate the reception he received in Veracruz in the summer of 1804. As he began actively vaccinating orphaned children and soldiers in the local garrison the towns folk exploded against him. His medical knowledge greatly exceeded his appreciation of group psychology. Nothing had been done to prepare the Veracruz citizenry for massive campaign of vaccination and the people lashed out against him as an assassin of children. Even the local doctors in the port city opposed him. It took a visit from Viceroy José de Iturrigaray and commissioners of the Protomedicato, complete with ceremonial trappings, to calm matters down in Veracruz. The surprise visit culminated with a wonderfully chivalric productions staged by the Viceroy. After leading his Mexico City entourage in a parade through the streets of Veracruz he confronted the assassination hysteria head on by allowing Dr. Juan Arboleya, a professor of medicine, to publicly vaccinate his own young son.³⁷ The significance was obviously more symbolic than genuine.

As the expedition moved on to Mexico City and then to the far corners of the viceroyalty news of the drama at Veracruz

³⁵ The one child apparently died of scurvy, not smallpox during the trip.

³⁶ The vaccination effort in Puerto Rico is skillfully developed in José G. Rigau-Pérez, "The Introduction of Smallpox Vaccine in 1803 and the Adoption of Immunization as a Government Function in Puerto Rico", *Hispanic American Historical Review* 69 (August, 1989); p. 393-424.

³⁷ Gordon Schendel, *Medicine in Mexico: From Aztec Herbs to Betatrons*, Austin, University of Texas Press, 1968; p. 108-112.

preceded it. The viceroy was insistent that the procedure be adopted on a wide scale and even established a special agency in the Hospicio de los Pobres, "for the conservation and propagation of the vaccine fluid for the entire kingdom."³⁸ His resolution exacerbated the tension between tradition and innovation. The vaccination campaign was greeted almost everywhere with either mistrust or open hostility. Not a few parents had their children vaccinated to the taunts of their neighbors but by the late summer of 1804 children carrying the precious fluid in their arms had been dispatched to northern New Spain. Nemesio Salcedo, the commandant general in Chihuahua City and an uncompromising exponent of vaccination urged the governors of the Provincias Internas to begin making preparations for extensive vaccination campaigns.³⁹ In complementary measure, the Bishop of Sonora, also anticipating a negative reaction, asked all missionaries in his diocese to educate the public and promote the many advantages of compliance with the vaccination effort.⁴⁰

Compliance in the north was better than anticipated. Only Alta California, a province that had not yet been visited by a serious smallpox epidemic, was hesitant to accept the claims that the prophylaxis was safe and effective.⁴¹ The other northern provinces were easier to convince as they had suffered tremendously in 1780-1781 and again more recently in 1798-1799. The province of New Mexico affords one excellent example of the northern vaccination effort set in motion by the Balmis expedition. It centers around an obscure New Mexican practitioner, don Cristóbal Larrañaga.

From the time of the Oñate expedition of 1598 New Mexico went for almost two centuries without a genuine doctor. Larrañaga, the first formally trained surgeon to enter the New Mexican province, began practicing in Santa Fe in the late 1780s. Although a civilian, he served as the surgeon of the Santa Fe presidio for over two decades. Unhappy with his modest salary

³⁸ José Joaquín Izquierdo, *Montaña y los Orígenes del Movimiento Social y Científico de México*, México, Ediciones Ciencia, 1955; p. 183.

³⁹ Nemesio Salcedo to Governor of New Mexico, Aug. 10, 1804, SANM, II, Reel 15.

⁴⁰ Fray Francisco Rousert de Jesús to Padre Presidente Estevan Tapis, Nov. 27, 1804, in Cook, "La Viruela en California Española"; p. 268-270.

⁴¹ Cook, "La Viruela en California Española", p. 272; Moes, "Smallpox vaccination in Alta California", p. 140.

he once asked the governor of New Mexico for a raise. Governor Fernando de la Concha forwarded the request to Commandant General Jacobo Ugarte de Loyola in Chihuahua City. The petition was ultimately denied as Governor de la Concha was reminded of a recent royal order asking public officials to economize because of strains on the royal treasury.⁴² Dr. Larrañaga's salary was not high but he had been able to supplement it by private practice in the Santa Fe community.

Governor de la Concha's successor, Fernando Chacón, did not get along well with the Santa Fe surgeon. On one occasion, in 1801, the new Governor even reported to the Commandant General that Dr. Larrañaga was reading potentially dangerous books. He asked his superior to determine if the titles appeared on the *Index Librorum Prohibitorum* of the Holy Office of the Inquisition. The Commandant General checked with local church officials and responded that the books were not proscribed but he would open a file on the matter just in case other suspicious matters were reported.⁴³ No new evidence had been uncovered when the Governor of New Mexico received specific instructions to begin a vaccination campaign in his province. Writing from Chihuahua City, the capital of the Provincias Internas, Commandant General Nemesio Salcedo dispatched the following communique to Santa Fe in the late summer of 1804.

Acreditado en España y casi en toda Europa el descubrimiento de la inoculación de la bacuna como el mas eficaz preventivo de las viruelas naturales he conseguido a beneficio de las providencias mas activas y eficaces verla establecida en esta villa. Ya se ha propagado a algunos pueblos y puestos militares y con el fin de que en el correr de fin del actual año hagase comprender el Cirujano Dn Christoval Larrañaga trayendo en su compañía seis u ocho hijos de la tropa o vecinos para que en ellos se conduzca el fluido inoculando de brazo a brazo quando regresaren de aqui, pues es el medio mas seguro de transmitirlo.

Debe auxiliarse para el viaje al expresado cirujano y niños que trage, sobre cuyo particular tomara V.S. la resolución que crea justa, en inteligencia de que lo seria en mi concepto que estos y asatalos [*sic*] sufriesen los vecinos de facultades de esa Provincia cuyas familias han de disfrutar el veneficio; pero si V.S. tocara

⁴² Jacobo Ugarte de Loyola to Governor Fernando de la Concha, Jan. 28, 1789, SANM, II, Reel 12.

⁴³ Pedro de Nava to Governor of New Mexico, Jan 4, 1802, SANM, II, Reel 14.

inconveniente, podra sacarse el importe del fondo de polvora vendida...⁴⁴

The Commandant General had made a concession, albeit a muted one, to the idea of socialized medicine. He did so not out of a sense of compassion. The issue was not that the disadvantaged would be unable to pay the costs. Rather Nemesio Salcedo understood clearly that this venture in public health required near universal compliance if it were to be effective.⁴⁵ As the details for Dr. Larrañaga's trip were made, it was decided that he would pay his own costs but would recuperate his losses and eventually show a modest profit as he would be allowed to charge the gunpowder tax fund between one and one a half reales per vaccination.⁴⁶ The doctor was not going to become rich overnight. He would earn one peso for every five to eight persons he vaccinated.⁴⁷

Dr. Larrañaga travelled to Chihuahua City with the Santa Fe children in the winter of 1804-1805. There he not only received the necessary vaccine but also instruction in how to keep the supply going.⁴⁸ He began the return trip to Santa Fe in March, 1805, vaccinating children in the small towns of northern Chihuahua and southern New Mexico as he proceeded north. On one occasion he almost lost his supply of vaccine as one of the children recently inoculated contracted leprosy and Larrañaga did not want to take the chance of using the vaccine from this child. Like Balmis before him, he had the foresight, however, to vaccinate his little travelling crew in pairs so that on this occasion he was able to obtain the necessary fluid from the second child. By the time he returned to Santa Fe he had vaccinated 257 children in seven towns and missions. He reported

⁴⁴ Nemesio Salcedo to Governor of New Mexico, Aug. 10, 1804, SANM, II, Reel 15.

⁴⁵ In Spain, at exactly the same time, the Crown required every hospital to vaccinate free anyone who requested the procedure. Michael E. Burke, *The Royal College of San Carlos: Surgery and Spanish Medical Reform in the Late Eighteenth Century*, Durham, N.C., Duke University Press, 1977; p. 155.

⁴⁶ Nemesio Salcedo to Governor of New Mexico, Nov. 14, 1804, SANM, II, Reel 15.

⁴⁷ The *real* equalled one-eighth of a peso. Thomas G. Barnes, Thomas H. Naylor and Charles W. Polzer, *Northern New Spain: A Research Guide*, Tucson, University of Arizona Press, 1981; p. 67.

⁴⁸ Nemesio Salcedo to Joaquin del Real Alencastre, Feb. 17, 1805, SANM, II, Reel 15.

that he would have vaccinated even more except for the fact that he couldn't apply the procedure to many because they were so sick with measles, dysentery or whooping cough.⁴⁹ It was only the beginning. By November, 1805, the number of vaccinated children in the New Mexico province had jumped to 3 610.

If frontier medical practice often brought out the worst in men, Dr. Larrañaga's career indicates that it sometimes inspired the best. With a dedication that must elicit admiration, for the next five years the tireless doctor travelled from town to town vaccinating thousands of additional children between the ages of one and four. In those cases where the vaccination did not take, he would return and repeat the procedure to ensure that his previous supply of vaccine had not been bad.⁵⁰ Only once during the five-year period did he made a serious blunder. Through carelessness in the late summer of 1808 he allowed his supply of vaccine to run out. By September, however, a shipment of dried cowpox scabs was on its way to Santa Fe from Chihuahua City with a terse reminder from the commandant general that the doctor should be more careful.⁵¹ The scolding was followed a few days later by a set of instructions on how to constitute a new supply of vaccine from the dried scabs.

Se toman como dies o dose costras y remolidas en un Almires mui limpio se pone el polvo en un papel y con gota de agua comun se espera en términos de que quede en una masita mui flexible y con la punta de la lanceta o Abuja se toma y se introduce a los niños lo mismo que si fuera fluido bacuno respecto a que hace los mismos efectos y aun es mas segura que prenda la Viruela executandose la inoculacion con el fluido a las costras.⁵²

By October, 1809, Larrañaga was back in business vaccinating 152 children, all under the age of four, in the town of Santa Cruz de la Cañada, north of Santa Fe.⁵³

⁴⁹ Estado que manifiesta el número de niños de ambos sexos por el cirujano de la tropa, Cristobal Ma. Larrañaga, May. 24, 1805, SANM, II, Reel 15.

⁵⁰ Cristobal Ma. Larrañaga to Alcalde Mayor Juan Rafael Ortiz, Aug. 8, 1808, SANM, II, Reel 16.

⁵¹ Nemesio Salcedo to Interim Governor of New Mexico, Sep. 16, 1808, SANM, II, Reel 15.

⁵² Instruccion al modo en que se usa la costra pulverizada dela Viruela Bacuna, Sep. 21, 1808, SANM, II, Reel 16.

⁵³ 1a. Bacuna efectuada en la Cañada el 7 de Octubre de 1809, SANM, II, Reel 16.

Cristóbal Larrañaga gradually wore himself out vaccinating the young children of New Mexico. His sacrifices went largely unrewarded and unacclaimed. By 1810 he had trained a younger man, Antonio Ruiz, to take over for him. Ruiz, although without formal medical credentials, also proved to be a man of great energy. In the fall of 1810 he vaccinated 1 286 children between the ages of one and eight.⁵⁴ The governor of the province authorized him the stingy payment of one real per vaccination.⁵⁵

Vaccination efforts elsewhere in the far north encountered only sporadic successes. Compliance was good to excellent in the provinces of Chihuahua and Nuevo León as the effort got under way in the winter of 1804. Government officials and medical practitioners in Coahuila and Texas, however, procrastinated and allowed their supplies of cowpox to evaporate before even initiating the vaccination effort. The supply was eventually reconstituted from fluid and scabs obtained in Monterrey,⁵⁶ but these two areas were already over a year behind other regions of the far north. In the late spring of 1807 the Commandant General asked for a full report explaining the degree of compliance with vaccination regulations and requesting the number of people that had been vaccinated.⁵⁷ If an answer was ever sent a copy was not deposited in the official archives. A year later the irascible Commandant Nemesio Salcedo was still chiding Texas Governor Antonio Cordero about the slow progress,⁵⁸ but by this time there are indications that vaccinations of children was being performed on a regular basis.⁵⁹ The Texas record was not as good as other areas of the north and as late as 1815 officials were still allowing their supply of vaccine to dry out.⁶⁰

⁵⁴ Estado que manifiestan los niños que se han Bacunado desde 22 de agosto hasta la fecha en esta Jurisdiccion de Albuquerque, Oct. 19, 1810, SANM, II, Reel 17; Estado que manifiesta el número de niños de ambos sexos que se han vacunado por mí en el presente año con expresión de los pueblos y jurisdicciones desde esta capital hasta río arriba, Nov. 6, 1810, SANM, II, Reel 17.

⁵⁵ Nemesio Salcedo to Governor of New Mexico, Oct. 6, 1811, SANM, II, Reel 17.

⁵⁶ Gobernador de Texas to Señor Comandante General, Jan. 22, 1806, BA, Reel 34.

⁵⁷ Nemesio Salcedo to Gobernador de Texas, May. 7, 1807, BA, Reel 36.

⁵⁸ Nemesio Salcedo to Antonio Cordero, Mar. 5, 1808, BA, Reel 37.

⁵⁹ Jayme Gurza to Señor Gobernador, Apr. 22, 1808, BA, Reel 38.

⁶⁰ Unsigned letter to Antonio Cordero, Sep. 13, 1815, BA, Reel 55.

The overall impact of the vaccination effort in northern New Spain was substantial. Smallpox was not conquered but its general devastation unquestionably was muted. In the twenty years prior to the first northern vaccination thirteen smallpox epidemics are recorded in the far north. During the twenty year period following the vaccination effort only six significant outbreaks can be counted. The reduced number of epidemics reveals only one measure of success. The mortality rate in those communities hit by smallpox also fell as greater percentage of young children, traditionally vulnerable, emerged unscathed. It is clear that northerners born at the end of the colonial period, both Indians and non-Indians, stood a better chance than their parents or grandparents of escaping the dreaded smallpox.

Medical care on the northern frontier of New Spain was pitifully inadequate. An insufficient number of doctors left the practice of medicine largely to the empirics, many of whom were incompetent even by the standards of the day. Medicines and medical instruments were always in short supply. Most northern towns had no hospitals and even those facilities referred to as hospitals were in reality single room infirmaries where one might hope to encounter a visiting doctor or at least competent bleeder. And when doctors and medicines were available their costs were often prohibitive, except for the select few. But public health measures did make an impact. A century before the scientific study of bacteriology and immunology it helped to educate the public and to contain many of the most devastating effects of contamination and contagion. Without it the sad state of frontier health would have been even worse.