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Sanitation from Above: Yellow Fever and Foreign Intervention in Peru, 1919–1922

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In recent years, the history of Latin American medicine in the nineteenth and twentieth centuries has been renewed by an increasing number of works focusing on the interweaving of disease, politics, and society.[1] These studies are providing an understanding of modern demographic patterns, little-known aspects of the local culture, and the interactions of well-organized international public health campaigns with incipient national public health systems. This

This article is based on materials consulted in the following U.S. and Peruvian archives: Rockefeller Archive Center, New York; National Archives, Washington, D.C.; Archivo Departamental de Lambayeque, Chiclayo; Archivo Departamental de La Libertad, Trujillo; Archivo General de la Nación, Lima; Archivo de la Cámara de Comercio de Trujillo, Trujillo (abbreviated hereafter as RAC, NA, ADL, ADLL, AGN, and ACCT, respectively). Research for this article was assisted by a grant from Fomciencias Peru, the Joint Committee on Latin American Studies of the Social Science Research Council, and the American Council of Learned Societies, with funds provided by the Ford Foundation and the Andrew W. Mellon Foundation.

1. Some examples of the literature are: Luiz Antonio de Castro Santos, "Power, Ideology and Public Health in Brazil, 1889–1930" (Ph.D. diss., Harvard Univ., 1987); Donald B. Cooper, "The New 'Black Death': Cholera in Brazil, 1855–1856," in *The African Exchange: Toward a Biological History of Black People*, ed. Kenneth F. Kiple (Durham: Duke Univ. Press, 1987), 235–56; Kenneth F. Kiple, "Cholera and Race in the Caribbean," *Journal of Latin American Studies* 17 (1985), 157–77; Teresa Meade, "Civilizing Rio de Janeiro: The Public Health Campaign and the Riot of 1904," *Journal of Social History* 20 (1986), 301–22; Jeffrey D. Needell, "The *Revolta Contra Vacina* of 1904: The Revolt Against 'Modernization' in *Belle Epoque* Rio de Janeiro," *HAHR* 67:2 (May 1987), 233–70; Julian Peard, "The Tropicalista School of Medicine of Bahia, 1860–1889" (Ph.D. diss., Columbia Univ., 1990); Ronn F. Pineo, "Misery and Death in the Pearl of the Pacific: Health Care in Guayaquil, Ecuador, 1870–1925," *HAHR* 70:4 (Nov. 1990), 609–38; Armando Solórzano, "The Rockefeller Foundation in Mexico: Nationalism, Public Health and Yellow Fever, 1911–1924" (Ph.D. diss., Univ. of Wisconsin–Madison, 1990); Nancy Stepan, "The Interplay Between Socio-Economic Factors and Medical Science: Yellow Fever Research in Cuba and the United States," *Social Studies of Science* 8 (1978), 397–424.

article is intended to add to this literature by studying the authoritarian nature of the efforts to eradicate yellow fever from the northern coast of Peru during the first years of the Augusto B. Leguía administration.

A serious epidemic began in 1919, and ended in 1921 only with the intervention of the Rockefeller Foundation. The sanitary campaign directed by American physicians was applied with an unlimited confidence in the capacity of technological resources, little community awareness, and no regard for the education of the people. Adverse reactions to the campaign revealed different ideas about health and illness and combined diverse responses; for example, "traditional" resistance to modern epidemiological methods along with more modern nationalism among the northerners.[2]

Yellow Fever in the Americas

From the seventeenth until the early twentieth century, yellow fever was considered one of the greatest plagues of the New World. Tropical and subtropical cities of the Americas, from New Orleans to Buenos Aires, were subject to frequent epidemics, which decimated the population, paralyzed commerce, and created an environment of bewilderment and panic.[3] The lack of sanitary conditions and the relative lack of medical knowledge that prevailed for most of this period made each summer an ordeal, fraught with the possibility of new outbreaks.

The situation began to change in the late nineteenth century, when some branches of medical research produced a vast literature on control measures, specific organisms, and protective vaccines for infectious diseases. The interest in understanding and controlling epidemics was closely related to the expansion of European and American interest in less-developed countries. The tropics were seen as offering great economic possibilities, if only the environment could be made more salubrious.[4]

Some Latin American governments were also interested in improving public health in their ports and cities as a means of avoiding the effects of

2. Nationalism has been associated with the emergence of the Alianza Popular Revolucionaria Americana (APRA). My revision of the hostility to some aspects of the U.S.-directed sanitation campaign is an addendum to Klarén's interpretation of the origin of the APRA. See Peter F. Klarén, *Modernization, Dislocation and Aprismo: Origins of the Peruvian Aprista Party, 1870–1932* (Austin: Univ. of Texas Press, 1973).

3. A detailed account of the early history of yellow fever may be found in the work of Henry Rose Carter, *Yellow Fever: An Epidemiological and Historical Study of its Place of Origin* (Baltimore: Williams & Wilkins, 1931).

4. See the speech of the president of the Rockefeller Foundation, George E. Vincent, "Team-Work for World Health," 1917. RAC, Rockefeller Foundation archives (hereafter RFA), RG 5, International Health Board/Division, ser. 2, box 64, fol. 849.

quarantine and attracting the coveted European migration. Yellow fever posed a threat not only for foreign colonists but also for travelers, who carried the potential to reinfect the southern United States, a subtropical region that had already suffered severe epidemics.[5] Together these concerns stimulated the idea of freeing Latin America from the scourge of yellow fever.

During the early twentieth century, the eradication of yellow fever seemed to many experts a clear possibility. The disease's mode of transmission and control methods were successfully defined and demonstrated in 1900, when the American Army Commission, working in Havana, investigated the theory advanced by the Cuban Carlos Finlay that yellow fever was transmitted by mosquito.[6] The commission succeeded in scientifically establishing that the *Aedes aegypti* mosquito, a species rarely found far from human habitations, was capable of transmitting yellow fever from person to person.[7] (These experiments were less definitive, however, than people first believed. After the discovery of sylvan fever, also known as jungle yellow fever, in the late 1920s, it was established that the disease existed in more than just coastal areas, was endemic in populations of wild monkeys, and was transmitted by at least five species of mosquitoes. Today, total eradication still has not been achieved.)

Nevertheless, control of the *Aedes* was critical for ending the threat from urban yellow fever, the type of disease that attacked northern Peru. The *Aedes* acquires the yellow fever germ by sucking blood from a patient who is in the first three days of the illness. The infected mosquito transmits the disease only by biting a person who has never been infected. Yellow fever's duration is measured in days; it terminates either in complete recovery and permanent immunity or in death.

Having acquired this knowledge, the American Army Commission organized antimosquito measures in Havana, and by September 1901 the city was free of yellow fever.[8] The commission determined that the propagation of the disease in a location depended on several factors, including some pre-existing cases, a minimum number of nonimmune persons, and the mosquito index: the ratio of the number of containers in which larvae were found to the number of premises examined. Experience showed that

5. William Coleman, *Yellow Fever in the North: The Methods of Early Epidemiology* (Madison: Univ. of Wisconsin Press, 1987), 13–20.

6. According to Stepan, only when the U.S. Army occupied Havana was yellow fever considered a high-priority disease and research encouraged. See Stepan, "Interplay."

7. During the early twentieth century, the yellow fever mosquito was often referred to as the *Culex* and later the *Stegomyia fasciata;* but by the late 1920s the designation *Aedes aegypti* had begun to supplant those terms. See W. G. Downs, "History of Epidemiological Aspects of Yellow Fever," *Yale Journal of Biology and Medicine* 55 (1982), 179–85.

8. Coleman, *Yellow Fever*, 9.

when the index was about 2 percent, yellow fever disappeared. (It would be some years before the actual causative organism was identified and an effective vaccine and curative serum were developed.)

The Havana campaign was followed by similar efforts in Panama City, Santos, Rio de Janeiro, New Orleans, and other cities of the Americas. Before 1900, the practice of prevention had consisted generally in keeping away from yellow fever areas. The new techniques included fumigating houses to kill mosquitoes, covering domestic water receptacles, isolating all suspected cases of the disease, quarantining infected territories, and, eventually, evacuating and razing houses.

Because these measures were expensive, only the wealthier nations could carry them out. Beginning in the 1910s, however, some campaigns, especially in communities lacking adequate water systems, relied on the destruction of the mosquito larvae. By eliminating fumigation and the isolation of the sick, campaigns could proceed at lower cost and with greater efficiency. Still based on the assumption that yellow fever was vectored only by *Aedes aegypti* and existed only in coastal areas, these campaigns took the form of active warfare against the *Aedes* larvae.[9] It was strongly believed that if the total number of *Aedes* in a given area could be reduced below a certain critical threshold yellow fever would automatically disappear.

In this atmosphere of optimism, the Rockefeller Foundation's International Health Commission (later Board and Division) was organized in 1913 under the direction of Wickliffe Rose.[10] The commission's original goal was to extend the work of the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease to countries beyond the United States. Shortly after his appointment, Rose discovered that Asian and British medical authorities were greatly worried that yellow fever might be introduced into Asia as a result of the opening of the Panama Canal in 1914. Infected regions such as the Caribbean, heretofore relatively harmless to outsiders because of their isolation, would soon join the world's route of commerce and travel, while tropical Asia, until then free of the disease, possessed all the conditions needed for an epidemic.

In 1914, William C. Gorgas, the Surgeon General of the United States Army, convinced Rose that the first worldwide sanitation task that might promise definite and lasting results was the eradication of yellow fever.[11]

9. Downs, "History of Epidemiological Aspects."

10. For a narrative account of the overseas programs developed by this branch of the Rockefeller Foundation, see Lewis W. Hackett, "Once Upon a Time," *American Journal of Tropical Medicine and Hygiene* 9:2 (1960), 105–15; and Raymond B. Fosdick, *The Story of the Rockefeller Foundation* (New York: Harper, 1952), 58–70.

11. Wickliffe Rose, "Memorandum on Yellow Fever: Feasibility of its Eradication, Oct. 7, 1914." RAC, RFA, RG 5, International Health Board/Division, ser. 300, box 22, fol. 135.

As a result, the International Health Commission of the Rockefeller Foundation decided to eliminate yellow fever from the few cities where the disease was thought to be endemic in Latin America. The foundation was willing to provide expert personnel and partial financing to help the local governments control the disease.

Following the foundation's rule of giving aid only where local conditions were known, Rose in 1916 sent a commission directed by Gorgas to visit those Latin American locations where the disease was considered endemic. Yellow fever depended on large urban centers, which maintained the infection from year to year and served as the reservoir for reinfecting smaller communities as new nonimmune populations arose. Gorgas' commission, however, found only one such active center: the port city of Guayaquil, Ecuador.[12]

The campaign to eradicate yellow fever from Guayaquil was delayed by the United States' entry into World War I. Finally, in November 1918, antilarval measures were put into practice, and after six weeks the disease was under complete control.[13] In July 1918, however, before the campaign began, another Rockefeller commission was sent to Guayaquil, and it carried on scientific and epidemiological studies for about two months. The outstanding result of this commission's work was the announcement that one of its members, Hideyo Noguchi, had discovered a spirochete that, in guinea pigs, produced lesions suggestive of yellow fever.

In Guayaquil Noguchi isolated the microorganism, which he called *Leptospira icteroides*, from patients who had been diagnosed with yellow fever, thereby suggesting that it was the disease-causing agent.[14] On returning to the United States with living specimens—both laboratory cultures and live guinea pigs—he completed his research, producing both a serum and a vaccine.[15] Noguchi also differentiated *Leptospira icteroides* from *Leptospira icterohemorrhagiae*, the cause of Weil's disease (also known as hemorrhagic jaundice), and affirmed that the two organisms produced different immune reactions.[16]

12. Yellow fever had existed in Guayaquil since 1740. See Lois F. Parks and Gustave A. Nuermberger, "The Sanitation of Guayaquil," *HAHR* 23 (Feb. 1943), 197–221.

13. See Michael E. Connor, "El dominio de la fiebre amarilla en el Ecuador," in *La fiebre amarilla y los médicos de Guayaquil* (Guayaquil: Archivo Histórico de Guayas, 1987), 105–13.

14. Noguchi was a distinguished Japanese scientist who worked at the Rockefeller Institute for Medical Research in New York. For a biographical study, see Paul F. Clark, "Hideyo Noguchi 1876–1928," *Bulletin of the History of Medicine* 33 (1959), 1–20; and Isabel Plesset, *Noguchi and His Patrons* (London: Associated University Presses, 1980).

15. Hideyo Noguchi, "Etiology of Yellow Fever I. Symptomatology and Pathological Findings of the Yellow Fever Prevalent in Guayaquil," *Journal of Experimental Medicine* 29 (1919), 547.

16. Noguchi, "Etiology of Yellow Fever XI. Comparative Immunological Studies on *Leptospira icteroides* and *Leptospira icterohemorrhagiae*," *Journal of Experimental Medicine* 31 (1920), 135.

Noguchi confirmed his findings over the next few years in Peru, Mexico, and Brazil. Although his vaccine never came to be relied upon as the primary preventive measure, the Rockefeller Foundation used it extensively. Between 1918 and 1920 alone, 64,000 cubic centimeters of Noguchi's vaccine and 6,450 cubic centimeters of his serum—sufficient for 16,150 individual doses—were shipped to Peru, El Salvador, Panama, Guatemala, Nicaragua, Honduras, and Mexico.[17] World scientific authorities accepted Noguchi's claims. With the exception of another member of the Rockefeller Institute for Medical Research, however, nobody else could find the *Leptospira icteroides*. As a result, Cuban, Mexican, and Brazilian researchers began to question the discovery.[18]

Noguchi avoided his critics and attributed the uniqueness of his findings to his special training and the importance of proper facilities, suggesting that the "backward" nature of Latin American laboratories prevented their replication of his findings. Noguchi got away with the claim. His *Leptospira* continued for many years to dominate the thinking of most of those working against yellow fever. Moreover, the Rockefeller Institute's director, Simon Flexner, Noguchi's sponsor, was so well regarded in scientific circles that very few researchers attempted to repeat Noguchi's experiments. But although Noguchi was a distinguished scientist in many regards, he was completely wrong on yellow fever, and his vaccine actually was useless. In the late 1920s a Rockefeller Foundation laboratory set up in West Africa identified a virus in rhesus monkeys with yellow fever. Since then yellow fever has been known as a viral disease.[19] Noguchi went to West Africa and attempted to isolate his *Leptospira* in human cases, but he met with no success.[20] Later, a method for cultivating yellow fever virus was found, and in 1937 an effective vaccine became available.[21]

Yet in 1921, when the International Health Commission of the Rockefeller Foundation turned its attention to Peru, all the biomedical aspects

17. Letter of Victor Heiser to Simon Flexner, New York, July 12, 1920. RAC, RFA, RG 5, International Health Board/Division, ser. 1.1, box 47, fol. 713.

18. Two of these critiques were Juan Guiteras, "Expedición al Africa y estudios de fiebre amarilla," *Revista de Medicina y Cirugía de la Habana* 26 (1921), 95–115; and Arístides Agramonte, "Some Observations upon Yellow Fever Prophylaxis," *Journal of Tropical Medicine and Hygiene* 27 (1924), 285–87.

19. Coleman, *Yellow Fever*, 11.

20. In Africa Noguchi himself contracted yellow fever and died. Some authors justify Noguchi's mistake on the basis that he worked with misdiagnosed cases, considering the difficulties of diagnosing yellow fever in the presence of Weil's disease. See E. Bendiner, "Noguchi: Many Triumphs and a Brilliant Failure," *Hospital Practice* 19:2 (1984), 222–27.

21. Max Theiler and his associates developed the vaccine 17D. By 1940 the Rockefeller Institute for Medical Research was mass-producing it. In 1951, in recognition of his contribution, Theiler received the Nobel Prize. Greer Williams, *Virus Hunters, The Lives and Triumphs of Great Modern Medical Pioneers* (New York: Alfred A. Knopf, 1960), 124–25.

of yellow fever seemed to be scientifically understood. For many, it was just a matter of enforcing certain technical measures familiar to a few experts. The Rockefeller Foundation's participation in the Peruvian sanitary campaign was foreshadowed by the work of an American physician who during the first year of the epidemic was an independent consultant to the Peruvian government: Henry Hanson.[22]

The Peruvian Outbreak

Hanson had been stationed in Panama as a member of the U.S. Public Health Service during part of World War I. He had traveled to Lima in 1919 to undertake a three-month study of sanitary conditions in Peru, with special reference to the malaria problem.[23] Before he concluded his assignment, rumors arrived in Lima about a "mysterious" disease in the northern department of Piura. The reports were not taken seriously until the death rate began to increase rapidly, at which point the government sent Hanson to Piura to identify and fight the epidemic. Hanson rapidly established the presence of yellow fever.

Northern Peru had been free of yellow fever since 1895.[24] Over some 25 years the unimmunized population had increased through births and migration from the highlands; the haciendas and towns of the northern coast attracted a large number of Andean migrants fully susceptible to yellow fever. The sanitary conditions in these locations were very poor and highly favorable to an outbreak. Open sewers, an unsanitary water supply, a total lack of latrine facilities, and garbage dumps were common. All these factors conspired to subject the northern Peruvian coast to scourges of malaria, bubonic plague, smallpox, dysentery, and typhoid fever.

The Peruvian government was concerned for this region because it was playing a major role in the economic development of the country during this period. The emergence of large rural estates producing cotton, rice, and especially sugar cane for the international market permitted the Peruvian economy to recover following Peru's defeat in its war with Chile. The increasing power of the sugar planters helped consolidate an emerging civilian elite, whose influence was strongly felt in the Partido Civil, the main political party during the so-called República Aristocrática (1895–

22. A fascinating account of Hanson's stay in Peru appears in Henry Hanson, *The Pied Piper of Peru: Dr. Henry Hanson's Fight Against "Yellow Jack" and Bubonic Plague in South America 1919–1922*, ed. Doris M. Hurnie (Jacksonville: Convention Press, 1961).

23. Henry Hanson, *A Study of Sanitary Conditions in Peru with Special Reference to the Incidence of Malaria* (Mount Hope: Panama Canal Press, 1921).

24. An account of epidemics in nineteenth-century Peru appears in José Toribio Polo, *Apuntes sobre las epidemias en el Perú* (Lima: Imprenta Nacional de Federico Barrionuevo, 1913).

1919).[25] During World War I Peruvian sugar cane producers obtained high profits as the international price of sugar dramatically increased, when European sugar beet producers were forced out of the market.[26]

In addition to great haciendas, the department of Piura enjoyed an important craft production of hats and hides, concentrated in the province of Catacaos. Also in Piura was the port city of Paita, the first Peruvian port of call for steamers south of Panama.[27] Hanson directed a sanitation squad to enforce the closure of the port of Paita; to examine home water supplies, which were kept in containers; and to assist a line of soldiers in preventing land migration to the southern part of Piura. Some of these directions were remnants of the nineteenth-century campaigns; their adoption by Hanson can be understood in light of the fact that this was his first experience in yellow fever control.

For example, Hanson required that all cases of yellow fever be removed at once to the *lazareto*, the isolation hospital. This measure was not really effective because generally the patient was identified and isolated only after a number of mosquitoes might have bitten him. Hanson required fumigation of houses where yellow fever victims had fallen sick, an expensive and useless measure that killed only the adult mosquitoes. A difficult measure to carry out was the prohibition against public meetings after 6 P.M., including meetings held in churches, cinemas, and schools. Hanson prohibited these gatherings in the belief that people congregated stimulated the spread of the disease.

Hanson met firm resistance from some local physicians who questioned his diagnosis, merchants who challenged his quarantine measures, and residents who were unwilling to replace periodically their water stores.[28] A number of prominent physicians were willing to believe that the disease was a case of malaria or a severe form of it, blackwater fever, conditions whose control would not have required the regulations Hanson imposed. They pointed out the clinical fact that in most of the cases diagnosed as yellow fever there was no marked jaundice or the classic black vomit. Because of their lack of experience with yellow fever, the Piura physicians did not accept the well-established fact that those two characteristics occur only in severe cases.

For their part, Piura merchants resented the strict quarantine regula-

25. The best analysis of the period 1890–1930 is Manuel Burga and Alberto Flores Galindo, *Apogeo y crisis de la República Aristocrática* (Lima: Ediciones Rikchay Perú, 1980).

26. Michael J. Gonzales, *Plantation Agriculture and Social Control in Northern Peru, 1875–1933* (Austin: Univ. of Texas Press, 1985), 25; and Rory Miller, "The Coastal Elite and Peruvian Politics, 1895–1919," *Journal of Latin American Studies* 14 (1982), 97–120.

27. Manuel Burgos Cabrejos and Jennie Bayona Bracamonte, "Historia social y desarrollo agrario de Piura (1900–1935)," *Alternativa* 5 (1987), 38–50.

28. "A título de saneamiento," *La Industria* (Piura), May 4, 1920, p. 2.

tions, because Peruvian and Chilean steamers bound for Panama canceled their customary calls at the northern port. And the citizens resented fumigation, isolation of the sick, and prohibition of religious services as well as the emptying of their water tanks.

It proved difficult to ask the inhabitants to clean their tanks daily, a practice that would have eliminated the *Aedes aegypti* larvae, which lived in domestic water tanks rather than in swamps or ponds.[29] Water was one of the most valuable possessions along the desert coast of northern Peru. It was carefully preserved in earthenware vessels, called in Spanish *tinajas* and *botijas,* which held water for drinking, washing, cooking, and other purposes.[30] Some of these receptacles were equipped with protective screening, but most were not. They provided fertile breeding spots for *Aedes*. The water supplies were scant and muddy. To save water, a very slow and difficult practice evolved: water was strained through a cloth, and the cloth was searched for larvae.

People resisted Hanson's measures by hiding many cases of yellow fever from the sanitation authorities. Patients and their families feared the isolation hospital, which they perceived as simply a place to die. During the nineteenth century, hospitals in Peru served mainly the urban poor and the very sick, only a small percentage of whom recovered from their illnesses. Fumigation, moreover, was resisted because it damaged furniture and destroyed other valuable possessions in the home.

With limited funds and without personnel experienced in yellow fever control, Hanson could do little. He contracted yellow fever himself before the work was completed, and returned to the United States. A few days before his departure the Peruvian government asked him to take up a more elaborate and lasting campaign for the general sanitation of the coast. The yellow fever epidemic was extending now, in 1920, to the neighboring department of Lambayeque, south of the region previously infected. Hanson requested such a high salary that he was convinced his proposal would be rejected.[31] However, stopping in Panama, he learned that the government had agreed to his salary requirement.

The hiring of Hanson by the government of Augusto B. Leguía (1919–1930) was not a casual event. Leguía thought that the development of the country depended on foreign capital and technical methods. He was quoted as saying: "My hope is to put an American in charge of every

29. W. G. Downs, "The Story of Yellow Fever Since Walter Reed," *Bulletin of the New York Academy of Medicine* 44 (1968), 721–27.

30. According to Gorgas there was "not a drop of water wasted." William C. Gorgas, diary excerpt, Sept. 18, 1919, RAC, RFA, RG 12.1, Diaries.

31. The salary was one thousand dollars per month. Gil Cárdenas to Prefecto de Lambayeque, Lima, May 21, 1921, ADL, Prefectura del Departamento de Lambayeque, Ministerio de Fomento–Dirección de Salubridad, Year 1921.

branch of the government's activities."[32] He took every opportunity to show his desire for American help in commercial and financial matters as well as technical assistance. In addition to Hanson, Leguía hired other Americans to direct the educational, agricultural, and sanitary activities of the country.[33]

When yellow fever attacked the northern coast, the Peruvian state had not yet developed a coherent set of responses to epidemic disease, let alone a public health bureaucratic apparatus. Leguía relied on foreign expertise, arguing that local sanitary resources were inadequate. The Public Health Board, a governmental organization created in 1903 as a section of the Ministry of Development, was handicapped with an inadequate budget and no full-time personnel. In the Peru of the 1920s, public health activities were directed by busy clinicians in their spare time.

Provincial and rural Peru also lacked trained physicians, because of several factors. In a country where medicine was becoming a professional occupation only in Lima, young doctors avoided rural and provincial locations. The San Marcos Faculty of Medicine, for many years the only medical school in Peru, was reorganized in the late nineteenth century; its orientation was urban and clinical, with little attention to training and research in public health.[34] This explains why, during the epidemic, many university-trained provincial doctors were more interested in establishing a complete diagnostic picture of the sick individuals than in understanding the epidemiology of the population.

Upon his return to Peru early in 1920, Hanson found that Paita, then with about 3,500 inhabitants, had an active outbreak of bubonic plague that overshadowed the yellow fever situation. Deaths in Paita over a period of several weeks reached the level of one to five a day.[35] Bubonic plague was endemic to Paita and many other coastal towns. Garbage thrown in the streets; flimsy bamboo huts, where fishermen stored the dried catch under their beds; and open sewers encouraged the breeding of rats and their fleas, the vector for bubonic plague.[36]

Hanson decided on a radical solution for both diseases: the total recon-

32. J. A. Sterling to Secretary of State, Lima, Nov. 29, 1921, NA, Records of State Relating to Internal Affairs of Peru 1910–1929, Political Affairs, Roll 4.

33. For a study of the relations between Leguía and the U.S. government, see José Luis Renique, "La burguesía peruana y la penetración imperialista 1920–1930," *Socialismo y Participación* 33 (1986), 47–64.

34. A study of medical education in Peru in the early twentieth century appears in Marcos Cueto, *Excelencia científica en la periferia: actividades científicas e investigación biomédica en el Perú 1890–1950* (Lima: CONCYTEC, 1989), 51–81.

35. Hanson, *Pied Piper*, 57.

36. An analysis of bubonic plague in Peru in the early twentieth century appears in C. R. Eskey, "Epidemiological Study of Plague in Peru with Observations on the Antiplague Campaign and Laboratory Work," Lima, Sept. 31, 1931, NA, United States Public Health Service, Foreign Governments—Peru, file 0425, box 37.

struction of Paita. Justifying his proposal to burn the town, Hanson argued that only six houses "were fit for reconditioning, or in fact for human habitation, according to the standards of living in the United States."[37] Hanson's aim was not only to ratproof the buildings but, more important, to transform Paita into an ideal healthy port serving as a sanitation model for other Peruvian towns.[38] The concern for controlling epidemic outbursts in Latin America during the early twentieth century has been related to the desire to increase productivity and to eliminate the economic effects of quarantines, port closures, and chronic infectious diseases in export-producing regions.[39] Hanson's plan, however, suggests that another important motivation was the dissemination of a sanitary ideal inspired by the living standards and sanitary achievements of the urban United States. William Gorgas, who was visiting Lima at the time, had some doubts about razing Paita because the action was not absolutely necessary for sanitation. Nevertheless, Gorgas and Leguía finally agreed to Hanson's plan.[40]

The plan included the incineration and rebuilding of all residences in Paita, the reimbursement of owners for property lost, and the relocation of families into barracks, where the families could rent space.[41] The work was undertaken by the Foundation Company, an independent concern of U.S. engineers. Under Hanson's direction, the Foundation Company began to destroy the houses in the poorest section of Paita—arousing such resistance that only a few blocks, about 10 percent of the town, were incinerated.[42]

In 1920 Leguía signed a fifty-million-dollar authorization placing the Foundation Company in charge of all the large public works in Lima and 32 other urban centers.[43] New streets, roads, sewage systems, potable water systems, and docks were constructed by the company, which lent the government the funds at 10 percent interest.[44] The Foundation Com-

37. Henry Hanson, "La campaña sanitaria en Piura," *El Comercio* (Lima), May 16, 1920, p. 8.

38. Henry Hanson, "The Sanitation of Paita," *The West Coast Leader* 9:436 (1920), 2.

39. See E. Richard Brown, "Public Health and Imperialism: Early Rockefeller Programs at Home and Abroad," *American Journal of Public Health* 66:9 (1976), 897–903; and Saúl Franco-Agudelo, "The Rockefeller Foundation's Antimalarial Program in Latin America: Donating and Dominating," *International Journal of Health Services* 13:1 (1983), 51–57.

40. According to Gorgas the action would be "such an object lesson to Peru." Gorgas, diary excerpt, Mar. 18, 1920, RAC, RFA, RG 12.1, Diaries.

41. In the early 1960s these barracks were demolished because they had become the unhealthiest section of Paita. Jaime Abad Coloma, Paita municipal librarian, interview with the author, Paita, Sept. 21, 1989.

42. An account of this resistance appears in "A título de saneamiento."

43. Ministerio de Fomento, *Anales de las obras públicas del Perú* (Lima, 1920), 300.

44. Gorgas, diary excerpt, Mar. 6, 1920, RAC, RFA, RG 12.1, Diaries.

pany carried out similar work in other Peruvian cities, such as Arequipa, Cuzco, and Ayacucho.[45] These efforts strengthened the already highly centralized form of government that characterized Leguía's rule. All work was carried out under the authority or supervision not of local political entities, but of the national government.

Late in 1920, it was determined that in spite of local efforts, both yellow fever and bubonic plague were still making headway. In Catacaos, a predominantly Indian town some six miles north of Paita, an active epidemic of both plague and fever flourished in addition to many cases of smallpox, dysentery, typhoid, and measles, with the death rate mounting each day. According to Hanson, "we out of necessity had to concentrate on the plague and the fever, which were the two most virulent diseases, and had no time to bother with the others."[46] The yellow fever epidemic had already spread south to Lambayeque, which had a dense, nonimmune population and a high *Aedes* index.

The migration restrictions Hanson had imposed proved of small value. Too many individuals tried to escape the epidemic by flight to uninfected areas. In addition, people traveled frequently by land to other localities to sell crafts during religious celebrations.[47] This activity served only to disseminate yellow fever to communities "protected" by troops, who failed to enforce the land quarantine. According to Hanson, "If an influential individual comes along and offers the officer in charge of the squad five *soles* or a pound, it usually is '*pasa señor.*'"[48]

While Hanson was working in Peru, the Rockefeller Foundation sent a new commission to confirm Noguchi's findings on yellow fever. The group worked independently of Hanson and included Noguchi himself, Gorgas, and Gorgas' son-in-law, the sanitary engineer Colonel William D. Wrightson. Leguía would name Wrightson director of the Peruvian Public Health Board in May 1921.[49]

Hanson and the now renamed International Health Board of the Rockefeller Foundation were finally to join forces. Early in 1921 the foundation sent a cablegram to the Peruvian authorities offering financial support and

45. Robert A. Lambert, "Medical Education in Peru, 1926," RAC, RFA, RG 1.1, ser. 331, box 3, fol. 19, pp. 27–28.

46. Hanson, *Pied Piper*, 54.

47. Early in 1921 the mayor of Paiján complained that in spite of the land quarantine, his town was suffering an invasion of people from the north who came to attend an important religious procession. Telephone call, Alcalde Antonio Arriaga, Paiján, Jan. 25, 1921, ADLL, Concejo Provincial de Trujillo, oficios 1921, leg. 829.

48. Hanson to Rose, Lima, June 18, 1921, RAC, RFA, RG 5, International Health Board/Division, ser. 1.2, box 117, fol. 1573. A typical case was described in "Cómo cumple su función el cordón sanitario," *La Reforma* (Trujillo), Mar. 8, 1921.

49. J. A. Estrella Ruiz, "La sanidad peruana en cincuenta años: apuntes para su historia," *Salud y Bienestar Social* 6 (1953), 92.

expert personnel to realize an extensive campaign against yellow fever.[50] Leguía immediately accepted the aid, and Hanson was designated as the representative of the Rockefeller Foundation in Peru.

An Authoritarian Campaign

The Rockefeller Foundation's first payment was $5,000, with the stipulation that the Peruvian government would reimburse 50 percent of the total cost of the campaign.[51] By the end of the campaign Hanson had spent $115,000 from the foundation.[52] In an interview with Leguía, Hanson complained that the government had contributed only a few hundred dollars.[53]

Hanson made a special effort to forestall the public opposition he had encountered previously. As a result, he garnered a great deal of power to enforce his sanitary measures. A governmental resolution announced that Hanson was in charge of all the sanitary activities from Callao to the northern frontier of Peru. With this authority, he could take over any steamer, and he could place under his authority all medical personnel and provincial authorities.[54] At one point he controlled a cavalry of 40 and a cruiser with sailors and marines docked at Paita. As Hanson described his position, "I have arranged an almost absolute autonomy (or dictatorship) in all matters pertaining to the campaign."[55]

Hanson's authoritarianism was reminiscent of Leguía's dictatorial methods. During the epidemic, Peru was also weathering a domestic political crisis. Leguía had become president by means of a coup d'état in July 1919, following an election disputed with a member of the Partido Civil. Congress subsequently confirmed and legalized Leguía's position. He persecuted and deported his enemies and showed his firm intention to maintain power at any cost. Under his government the leaders of the Partido Civil were kept out of positions of political authority but were allowed

50. Leguía first asked the foundation to undertake the yellow fever campaign in Peru early in 1920. A positive answer to his request did not arrive until 1921. Leguía to Gorgas, Lima, Jan. 14, 1920, RAC, RFA, RG 5, International Health Board/Division, ser. 1.2, box 97, fol. 1336.

51. William H. Wrightson to Director del Tesoro, Lima, Feb. 15, 1922. AGN, Lima, Dirección de Salubridad Pública, leg. 810-136.

52. "Statement of Money Deposited with the Equitable Trust Company of New York by the International Health Board and Checks drawn on this account in Peru by Doctor Henry Hanson, up to March 31st, 1922," RAC, RFA, RG 5, International Health Board/Division, ser. 1.2, box 139, fol. 1836.

53. Hanson cited the interview in a letter to Rose, Lima, June 6, 1921, RAC, RFA, RG 5, International Health Board/Division, ser. 1.2, box 117, fol. 1573.

54. Hanson to Rose, Lima, Mar. 17, 1921, Ibid.

55. In the same letter he added, "It is the only way to get things done in a country like this." Hanson to Rose, Lima, June 6, 1921, Ibid.

to retain their extensive economic interests. His government pursued its modernization goals through a close association with American interests but little regard for democratic expression, and massive expenditures on public works and government bureaucracy.

Leguía's government, in the process of legitimizing and expanding its power, developed a complex, extensive, and unprecedented collaboration between American medicine and the Peruvian state. Leguía relied heavily on the economic, technological, and scientific resources of the United States to carry out his sanitary policies. Provincial physicians and institutions played a subsidiary role. Only a few physicians from Lima shared Hanson's point of view and worked under his direction.[56]

In April 1921, yellow fever jumped the land quarantine and moved south into the department of La Libertad, where new cases developed rapidly. Soon the whole department as far south as Trujillo, the capital, was infected. By then, the epidemic covered the two departments of Lambayeque and La Libertad, stretching from the southern boundary of Piura to the northern boundary of Ancash, an area of about 500 miles along the coast by 50 to 75 miles wide.[57] In this area, which included about one hundred towns, the *Aedes* index was high—from 60 to 100 percent.[58] In the east the spread of the epidemic was stopped by the Andes, with elevations at which the *Aedes* could not thrive.

Thus the northern coastal plain was then the only part of Peru subject to the yellow fever infection. In this area clusters of towns along rivers, with no dispersed rural population, provided an ecology that facilitated the spread of the epidemic. These ribbons of dense population furnished an abundant feeding ground for *Aedes*. The disease threatened to spread to Lima and Callao, which had suffered severe yellow fever outbreaks during the nineteenth century. The main object of the sanitary campaign was to prevent the propagation of the disease from the northern departments toward the central region and the south coast.

Hanson's strict measures provoked a revolt in Ferrañafe, a rice-growing town of small and middle-sized landowners 12 miles from Lambayeque's capital, Chiclayo. Early in February 1921, 104 cases of yellow fever were officially reported in a population of ten thousand.[59] An assistant to Hanson

56. Referring to Leguía's political clique, Gorgas stated in his diary: "The Peruvians are in deadly earnest about sanitation." Gorgas, diary excerpt, Mar. 22, 1920, RAC, RFA, RG 12.1, Diaries.

57. According to Hanson the campaign was so extensive it demanded preparation "as if for war." Hanson to Robert Kirk, Lima, Apr. 15, 1921, RAC, RFA, RG 5, International Health Board/Division, ser. 1.2, box 117, fol. 1573.

58. Hanson, *Pied Piper*, 124.

59. J. H. White to Rose, Lima, Sept. 27, 1921, RAC, RFA, RG 5, International Health Board/Division, ser. 1.1, box 56, fol. 812.

prohibited all public gatherings. The local physician and the owner of the cinema protested, and a defiant priest held services, including a religious procession. A mob of about two hundred, called together by the ringing of the church bells, broke down the door of the sanitation office and fired on the doctors and others employed in the campaign.[60] Doctors and staff escaped through the skylight to the roof. The situation remained tense until the prefect of the department could rush in a trainload of troops. But they were of little value, because shortly after their arrival yellow fever broke out among the soldiers, and many of them died.[61] As a result, Hanson decided to abandon Ferrañafe to its fate and place his forces "where they will be of more value."[62]

Hanson concentrated on the major locations threatened with yellow fever rather than working for its elimination where it was well established. He justified this procedure by arguing that he did not have enough personnel to cover all areas and that in smaller towns yellow fever would eliminate itself without sanitation. Hanson anticipated that in smaller towns, over time all susceptible individuals would either die or survive and acquire immunity. In large cities, thousands of births, as well as the influx of visitors and migrants, meant that a substantial number of susceptible individuals constantly augmented the population. Thus a prophylactic campaign was developed only if the town was large or was geographically situated to propagate the disease to uninfected places. As a result, many towns, villages, and estates were left for the fever to assault them.

With the Rockefeller Foundation's assistance Hanson began to use Noguchi's serum and vaccine. A Rockefeller Foundation report lists the names and ages of 526 persons from Paiján and Trujillo, two coastal communities in La Libertad, as having been inoculated with the Noguchi vaccine.[63] As explained earlier, in the late 1920s it was established that the vaccine was useless, and those people vaccinated in 1921 could still contract yellow fever.

Yet the experience acquired in the 1918 Guayaquil campaign yielded other, more effective measures. During 1921, Hanson applied an ingenious method that had first been tested in Guayaquil. After experiment-

60. A report of the revolt appears in L. Chuman to Prefecto de Chiclayo, Ferrañafe, Jan. 24, 1921, ADL, Concejo Provincial de Ferrañafe, Libro de Correspondencia, 1920–1921.

61. "El estado sanitario de Ferrañafe, motín del pueblo contra los médicos," *La Industria* (Trujillo), Feb. 4, 1921, p. 2.

62. Hanson to Rose, Lima, May 25, 1921, RAC, RFA, RG 5, International Health Board/Division, ser. 1.2, box 117, fol. 1573.

63. "Relación de las personas inoculadas con la vacuna 'Noguchi' en la ciudad de Trujillo"; "Relación de las personas inoculadas con la vacuna 'Noguchi' en el distrito de Paiján," Sept. 23, 1921, RAC, RFA, RG 1.1, ser. 331, box 3, fol. 18.

ing with six different species of fish, Hanson observed that some small fish could eat the larvae of the *Aedes* that bred in containers. Several local fish were found to be very active larvivores: the *mojarra*, the *chalcoque*, and the most suitable, the *life* (*Aequidens rivulatus*, *Lebiasina bimaculata*, and *Pygidium punctulatum*, respectively).[64] They were harmless to humans and existed in great numbers in Peruvian rivers.

The solution was simple: capture many small fish and put them into domestic water tanks. Sanitation officials could then simply renew the provision of fish on their inspection tours. Each inspector was accompanied by a boy carrying a pail of the fish to be distributed. At first a few residents hesitated to allow fish to be placed in their favorite *tinajas*, fearing that fish excretions would contaminate the water. But the use of fish for larvae control became the key measure in the rest of the campaign. Moreover, it seemed to have a lasting effect, which suggests that it did not encounter much opposition.[65] During 1921 alone, seven hundred thousand house visits were made and a higher number of fish distributed.[66] Taking into account that fumigation and isolation procedures wasted energy and money, this simple, yet cheap and efficient method practically ended the epidemic of yellow fever in northern Peru.

To distribute the fish Hanson organized a complex system involving one hundred sanitation workers. Towns were divided into districts, each in the charge of an inspector and a squad. The workers covered their entire district in seven days, examining every water container to ensure that no mosquitoes were breeding. When mosquitoes were found, the receptacles were emptied, all adherent eggs were removed, and larvivores were placed in the new water. Finally, on Sundays, Hanson and the inspectors made rapid surveys of the critical towns. Hanson kept a detailed daily record of funds expended, premises inspected, and water containers treated. Hanson was constantly prepared to confront his critics, who accused him of irresponsibly spending vast amounts of money.[67]

The campaign against yellow fever in the department of La Libertad, and especially in the province of Trujillo, was more successful than the preceding campaigns in Piura and Lambayeque because of Rockefeller money and technical assistance and the experience gained by the sanitation workers. By September 1921 the worst of the epidemic was over,

64. International Health Board of the Rockefeller Foundation, *The Use of Fish for Mosquito Control* (New York: Rockefeller Foundation, 1924), 52.

65. In September 1989 in Motupe and Monsefu, two towns near Lambayeque's capital, Chiclayo, the author found the system still in use for controlling malaria and other diseases.

66. Henry Hanson, "Preliminary Report on the Recent Yellow Fever Epidemic in Peru, 1922," RAC, RFA, RG 5, International Health Board/Division, ser. 2, box 36 (no fol.).

67. "A título de saneamiento."

and Hanson affirmed that the *Aedes* index had fallen to less than 3 percent.[68] By early 1922, Hanson had controlled the situation in all towns north of the department of Lima, and no more cases of yellow fever were reported.[69] Colonel Wrightson resigned as the director of public health in March 1922, and Hanson was appointed in his place until July of that year, when he returned to the United States. At the same time, the International Health Board of the Rockefeller Foundation withdrew from Peru. The Rockefeller Foundation did not stage another major public health campaign in Peru until the 1940s, when it concentrated on controlling malaria with extensive use of DDT.

Hanson estimated that a total of 15,000 cases had resulted in 1,500 deaths for the whole 1919–1921 epidemic of yellow fever in Peru.[70] According to Hanson, the department of Lambayeque alone had 10,000 cases. During the worst of the epidemic, some Lambayeque localities, such as Olmos, Motupe, and Ferrañafe, totalled between 8 and 20 deaths a day.[71] Hanson's figures were based not on the actual number of recorded cases but on a statistical calculation that called for multiplying the daily number of reported cases by 10.[72]

Complete records were not kept, because Hanson maintained that once the infection was known to be present in a town, the ensuing campaign would focus on eliminating the larvae, and it would matter little whether all cases were reported or not. In addition, accurate reporting was virtually impossible; on the rural estates the managers were reluctant to give correct statistics, and in many small places where yellow fever was known there was no means of ascertaining the extent. Hanson's mortality figures are not surprising considering that mortality from yellow fever is usually relatively low—between 5 and 10 percent of *all* cases (not merely all clinically diagnosable cases).[73]

Since 1922, the Pacific coast of South America has remained free of yellow fever. The epidemic played a marginal role in the development of urban population patterns of coastal Peru. It did, however, highlight shortcomings in public health and living conditions in many parts of the coast, and it led to official actions that began to control the endemic char-

68. In Guayaquil the index had been about 2 percent when yellow fever disappeared. Henry Rose Carter to H. S. Reed, Lima, June 9, 1921, RAC, RFA, RG 5, International Health Board/Division, ser. 1.1, box 56, fol. 805.

69. Hanson to Reed, Lima, Aug. 4, 1921, RAC, RFA, RG 5, International Health Board/Division, ser. 1.2, box 117, fol. 1574.

70. Hanson, *Pied Piper*, 145.

71. Hanson, "Preliminary Report."

72. Hanson to Rose, Lima, Apr. 5, 1921, RAC, RFA, RG 5, International Health Board/Division, ser. 1.2, box 117, fol. 1573.

73. George K. Strode, ed., *Yellow Fever* (New York: McGraw-Hill, 1951), 397.

acter of some infectious diseases. In addition, social responses to a sanitary campaign imposed and carried out by foreign physicians gave yellow fever control a new significance. The fight against the fever was seen by many provincials as an imposition from Lima and the United States, and as a violent alteration of the traditional way of dealing with illness.

Control and Responses

Hanson never got the majority of the Peruvians he worked with to fully cooperate, and he was frequently attacked by the local newspapers. Departmental prefects and municipal authorities saw the arrival of a foreigner invested with power by the government in Lima as an infringement on their authority, and they resisted the loss of their political prerogatives. Hanson's campaign played an important role in the expansion of state authority over coastal cities and helped to create the basis for the development of a national system of public health. That system—which emerged only in the late 1930s—tried to follow the lines of medical professionalism in the United States. In a country with few trained physicians, this system excluded the assistance of other practitioners such as herbalists and Indian healers.

Among the opponents of Hanson's measures were the merchants, who advocated the lifting of all port and commercial restrictions. Trujillo's chamber of commerce strongly believed that Hanson was responsible for the decision of Panamanian authorities to impose a quarantine of several days on all steamers coming from Peruvian ports.[74] Many local Peruvian authorities minimized the situation so that reports of an epidemic would not affect coastal commerce. Some members of the local elites protested the strict water-purification measures as a particular inconvenience, given the great quantities of water they stored in their homes. Curiously, Hanson's success in Trujillo to a large extent generated this opposition. He stopped the progress of the fever so quickly that the people never saw or experienced a serious epidemic.

The more articulate opposition to Hanson came from some members of the small but locally prestigious community of provincial physicians.[75] Many physicians were concentrated in the main provincial cities and on the large rural estates, serving the middle and upper sectors of society.[76]

74. Agustín Ganoza to Alfredo Pinillos, Trujillo, Jan. 29, 1921, ACCT, Correspondencia Recibida, vol. 1921–1922.

75. An example: "La fiebre amarilla en Ferrañafe: reportaje al Dr. Pagador," *La Reforma* (Trujillo), Feb. 4, 1921.

76. Testimony of the difficulties encountered by a rural doctor in coastal Peru can be found in Miguel Salas Asencios, *Impresiones de un médico rural* (Chiclayo: Tipografía Peruana, 1941).

The few state-supported medical positions in the provinces were part-time appointments with nominal salaries. These doctors had little experience in preventive medicine and worked mainly with sick individuals. In contrast, Hanson concentrated on the protection of the healthy by eliminating the disease vector.[77] Local physicians made a special effort to discredit the diagnosis of yellow fever, arguing that Noguchi's causal agent could not be found in patients' blood.[78] They were wrong in trying to match an ideal clinical picture to every patient. Paradoxically, at the same time, they became the defenders of the "latest" scientific discovery, Noguchi's *Leptospira icteroides*, as a means to oppose Hanson's epidemiological methods.

The strong nationalism that emerged among the working and middle classes of northern Peru in the 1910s and 1920s provided another reason for the local opposition to Hanson's approach. Nationalism increased when the world sugar economy began regaining its pre–World War I equilibrium. Sugar profits declined, and workers on most north coast estates clamored to maintain wage levels.[79] In La Libertad's Chicama valley a significant number of the most important sugar cane growers were immigrants or foreigners.[80] In 1921, a general strike crossed the valley in solidarity with the workers of one estate. At Casa Grande, a hacienda of 25,000 workers owned by a German corporation, the strikers would not permit the imposition of any of the sanitary measures recommended by an "American physician."[81]

According to Peter Klarén, the history of confrontation between workers and immigrant estate owners helped to set the scene for the formation in the 1920s of the Alianza Popular Revolucionaria Americana (APRA).[82] Many of the unions formed in the cane fields and mills were integrated into the APRA, which launched an active campaign against imperialism and social inequality. Some of its main leaders, including Victor Raúl Haya de la Torre, came from middle-class families of Trujillo ruined by the social dislocation produced by modernization.[83] Taking into account the

77. According to Trujillo's Dr. M. Heli Uceda, the campaign was unilateral because it concentrated on the mosquito with little regard for the sick. Uceda, "A propósito de la fiebre amarilla, apostillas a la exposición del director de la campaña antimalírica," *La Industria* (Trujillo), June 18, 1921, p. 2.

78. Uceda, "La salubridad en Trujillo," *La Reforma* (Trujillo), June 9, 1921, p. 2. Dr. Uceda wrote eight articles against Hanson in Trujillo's newspapers.

79. Gonzales, *Plantation Agriculture*, 176.

80. In 1918 the Chicama valley produced 43 percent of all sugar harvested in the country. Carlos Bachmann, *Departamento de Lambayeque, monografía histórico-geográfica* (Lima: Impresiones Torres Aguirre, 1921), 242.

81. Hanson, *Pied Piper*, 131.

82. Klarén, *Modernization, Dislocation and Aprismo.*

83. Even Trujillo's Dr. Uceda used nationalistic arguments to oppose "foreign sanitation." "La salubridad en Trujillo, las restricciones sanitarias son absurdas e innecesarias," *La Reforma* (Trujillo), July 20, 1921, p. 2.

strong debate Hanson's measures generated in Trujillo's newspapers, it is plausible to argue that nationalist concerns in this locality did not grow solely from economic and social inequalities but also from perceptions of the instrumentation of hygiene. The Rockefeller Foundation's sanitary campaign influenced how workers drew the boundaries between foreign and national.[84]

It proved difficult for Hanson to enforce his authority over the common people because of their long persistence in bad health habits. In addition, Hanson had trouble invoking authority based on Western medicine and science when, in provincial Peru, many people rarely called a physician for any sickness. The majority of the people resorted to native healers and herbalists or took care of themselves through self-medication. For centuries in many northern localities Western medicine had been absent, and the inhabitants practiced a system of medicine based on magic, empiricism, and religion.[85] This system persisted because it contained a sufficient number of effective therapies, such as massage, bloodletting, and cauterization. Moreover, it was part of a culture that perceived health, disease, and society as strongly interrelated.[86]

The American sanitation team made little effort to deal with or understand the local opposition and dissent. In their view, in any country there would always be a number of people who opposed sanitary measures. An editorial in a Trujillo newspaper complained of the Americans' silence and arrogance: "Dr. Hanson persists in doing us good in his own way. No explanations, he says, because they take away time."[87] A stronger article in the same newspaper criticized the disgusting and counterproductive "autocratic system" of sanitation.[88]

Generally, and in spite of the protests, Hanson showed little "desire" to explain his measures or to get involved in debates with local physicians "around matters that have been established and confirmed about 25 years ago."[89] Hanson eventually tried to disseminate the romantic goal set by the Rockefeller Foundation of eradicating yellow fever from the world. Trying

84. For a general discussion of this topic in other societies, see Roy MacLeod and Milton Lewis, eds., *Disease, Medicine and Empire, Perspectives on Western Medicine and the Experience of European Expansion* (London: Routledge, 1988).

85. The persistence of this system in the north is analyzed in Javier Macera, "Medicina tradicional y curanderismo en las comunidades de Morrope y Salas," *Alternativa* 11 (1989), 117–35.

86. See Luis Basto Girón, *Salud y enfermedad en el campesino peruano del siglo XVII* (Lima: Universidad de San Marcos, 1977); and Joseph W. Bastien and John Donahue, eds., *Health in the Andes* (Washington: American Anthropological Association, 1981).

87. "La dictadura amarílica," *La Reforma* (Trujillo), June 18, 1921, p. 2.

88. "El manifesto de ayer," *La Reforma* (Trujillo), June 15, 1921, p. 2.

89. Hanson, "El problema de la fiebre amarilla," *La Industria* (Trujillo), June 16, 1921, p. 2.

to overcome the resistance of Casa Grande's strikers, he argued that the resistance was "obstructing a world project . . . [that] no longer was an affair which concerned Peru alone."[90] The argument must have seemed odd in a region where the majority of deaths were caused by tuberculosis, dysentery, smallpox, and other infectious diseases.

Yellow fever was an important factor in the American conceptualization of indigenous society. In a personal account of his work in Peru, Hanson wrote: "Superstitious, ignorant and seemingly satisfied, the rank and file of the natives of Lambayeque, as everywhere in Peru, were resentful of any effort to direct or change their mode of life."[91] Inspired by the sight of a yellow fever cemetery, an American assistant to Hanson wrote a poem reflecting the persistent conflict between the American physicians and the population:

> Shame, Shame to those who daily fought
> The knowledge that science so dearly bought,
> Nor lifted a hand to save a life,
> But added fuel to the fires of strife,
> The battle is won and the Gringo fain
> Would return to the land, from whence he came.[92]

American physicians worked under the assumption that in a "backward," nonscientific culture, disease should be managed without reference to the perceptions and opinions of the patients. The attitudes and responses of the people were treated as primitivism to be brushed aside.[93] The Americans showed no interest in securing the people's active understanding and participation in public health and in the permanent application of hygiene to living habits. Paradoxically, Hanson's haughtiness and unwillingness to debate with local physicians was, in many cases, based on scientific mistakes, such as Noguchi's *Leptospira* and some outdated epidemiological methods. Not being an expert on yellow fever, Hanson replicated many of the common errors of nineteenth-century campaigns. Nevertheless, the "backward" local physicians utilized "modern" science to support their views, citing the failure to find *Leptospira* in yellow fever patients during the epidemic as an indication that the disease was of a different nature.

By the 1930s the limits of this kind of epidemic-fighting campaign had

90. Hanson to Rose, Lima, Sept. 24, 1921, RAC, RFA, RG 5, International Health Board/Division, ser. 1.2, box 117, fol. 1574.

91. Hanson, *Pied Piper*, 107.

92. Ibid., 111–12.

93. The emergence of this kind of public health approach in the British colonies is discussed in David Arnold, ed., *Imperial Medicine and Indigenous Societies* (Manchester and New York: Manchester Univ. Press, 1988).

become apparent to the world's scientific authorities. The romantic age of medical heroes and their sweep methods of controlling epidemics in tropical countries was passing. Hanson's yellow fever campaign did not set the model for succeeding Rockefeller interventions in Peru, and the hostile reactions that characterized it were less evident in subsequent Peruvian health policy.[94]

With the aim of raising the standards of local health practitioners, in the early 1940s the Rockefeller Foundation launched a new policy that emphasized the reorganization of medical education and the support of basic science in certain Latin American medical schools.[95] As a result, there was some shift from curative to preventive medicine, more attention to endemic disease, and a greater recognition of the role nutrition played in health.[96] Most Latin American public health boards, however, continued to apply technical, self-contained policies to complex public health and medical problems that involved cultural and environmental aspects of society. Hanson's campaign left a contradictory legacy. Despite all the opposition he encountered, many Peruvian health officers later replicated the main features of his work: authoritarianism and overconfidence in technological solutions.

94. Eventually Peru would conform to other Latin American responses to the Rockefeller Foundation, which helped to promote pro-American sentiment and overcome nationalism. See Solórzano, "The Rockefeller Foundation in Mexico."

95. The new policy is analyzed in Marcos Cueto, "The Rockefeller Foundation's Medical Policy and Scientific Research in Latin America: The Case of Physiology," *Social Studies of Science* 20:2 (June 1990), 229–55.

96. Arnold, *Imperial Medicine*, 21.