

The Work of US Public Health Service Officers in Puerto Rico, 1898-1919

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The history of the US Public Health Service (PHS) is usually presented in terms of diseases or discoveries; this article examines twenty years' activity in one location. When the United States invaded Puerto Rico in 1898, the Marine Hospital Service (now PHS) took responsibility for foreign quarantine, inspection of immigrants, and medical care for merchant seamen. Its officers evaluated the sanitary conditions of port cities, helped reorganize local disease surveillance and control, and investigated endemic diseases (e.g., hookworm-related anemia) and epidemics (e.g., bubonic plague). After World War I and pandemic influenza, and the greater self-government allowed Puerto Rico by Congress in 1917, PHS officers withdrew from routine local sanitary actions. A narrow geographic focus (Puerto Rico), to examine PHS activity over time (1898 to 1919) provides a richer picture of the agency's impact, and reveals how the sum of disease control activities affected the development of an area's health status and institutions. The duties and, importantly, the personal initiatives of PHS officers in Puerto Rico, such as WW King, produced lasting impact on scientific institutions and administrative, professional, and health care practices. [*P R Health Sci J* 2017;36:130-139]

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The history of the US Public Health Service (PHS) is usually presented in terms of diseases or discoveries, rather than locations. In historical accounts and at present, the PHS is largely an invisible agency in Puerto Rico. Therefore, I will provide some record of the activities in its first twenty years of operation on the Island and federal-local relations at the time, with emphasis on the routines of that era, both similar and dramatically different from ours, and the administrative (then) and archival (now) importance of Public Health Reports and the Surgeon General's Annual Reports. PHS officers displayed much personal initiative, so this is not primarily an account of the work of the agency (as I have published before), (1) but an account of the work of its officers.

Puerto Rico is a mountainous Caribbean island, measuring 110 by 40 miles. At the time of the Spanish American War (1898), its population (one million) included a majority of landless agricultural laborers, dispersed in rural areas. San Juan, on the north coast, is the political capital, but Ponce, in the south, was the largest city and the commercial leader. The two succeeding decades mark the United States government's initial efforts to transform Puerto Rico from a foreign country into an American possession (2). The period was no less eventful for the history of medicine. The germ theory of disease proved to be another motive for change everywhere. The recognition of new causes and efficient diagnostic, curative, and preventive

methods, aligned with political and economic interests, radically altered the health of individuals and populations, urban landscapes, health care systems, and government involvement in public welfare.

The PHS developed from the Marine Hospital Service (MHS), established in 1798 under the Department of the Treasury to provide medical care for merchant seamen. After 1889, the physicians, scientists and technical experts in the MHS were commissioned as officers, who wore a uniform and held a rank (assistant surgeons, passed assistant surgeon, surgeon) up to its director, a surgeon general. In 1893, Congress assigned foreign quarantine responsibility (regarding both passengers and cargo) to the MHS. Officers were routinely assigned "tours of duty" of variable duration in major port cities and land frontiers of the United States. The PHS put a premium on mobility, so that after the first personnel regulations (1873), officers were not appointed to serve in a specific location, but subject to change of station, according to the needs of the moment (3).

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In 1898, the requirements for applicants included American citizenship, age 21-30 years, graduation from a recognized medical school, and testimonials as to character. Candidates endured a physical examination, a two-day written examination (autobiography included), a morning examining patients, and an afternoon interview about “adaptability” and general knowledge. The starting annual salary was \$1,600, and the total cost of the ordinary and full-dress uniforms was over \$500 (4). (For most of the period covered here, multiplication by a factor of 30 would give a minimum approximation to 2014 dollars (5). In the following decades, Congress repeatedly changed the Service’s name, expanded its jurisdiction, and eventually created specialized agencies to fulfill the different functions (6).

Because of their concern for quarantine duties, these officers were well educated in the most recent developments in infectious diseases. Although few in number (only 187, physicians, in active duty in 1917), their mobility, the “portability of their federal medical expertise”, promoted the integration and standardization of public health in the country (7). Officers were also detailed to foreign ports to assist the US consul in relation to immigrants and quarantine (8). To keep this dispersed force coordinated, the agency’s weekly journal, *Public Health Reports*, published regulations, personnel assignments, disease-related news, and research carried out by officers. For that reason, *Public Health Reports* and the annual reports of the PHS are the more frequent primary sources of information on PHS activities used in this article. Other sources include archival documents, newspapers, magazines and medical journals of the period, and the comprehensive history of the agency written by RC Williams, one of its officers, and published in 1951 (3).

Pedro Del Valle-Atilés, Arthur H. Glennan – assessment, implementation, adaptation

The US Army invaded Puerto Rico in the final month of the Spanish American War and found a relatively healthy island for its troops (9). Nevertheless, there was concern about the spread of yellow fever or other diseases when soldiers returned home or moved between the new territories, so the MHS assigned medical officers to Cuban and Puerto Rican ports under the control of the US forces (10). In January 1899, President McKinley further stipulated that, “since the quarantine service herein provided is for the protection of the islands of Cuba and Porto Rico as well as the protection of the United States against both, the expenses arising therefrom will be charged at present both against the revenues of these islands and the epidemic fund” (11). Before any MHS officer settled in Puerto Rico, the US Army appointed local physicians as maritime sanitary inspectors for the ports engaged in international trade (12). The MHS in San Juan hired Dr. Pedro Del Valle-Atilés (1860-1937), graduate of the University of Michigan School of Medicine, 1891. He would eventually work for the PHS, on contract, for thirty-one years (13).

Arthur Henry Glennan (1853-1926), the first MHS commissioned officer assigned to San Juan, arrived on

December 21st, 1898 (14). His reports show extraordinary activity in one year: establishment and oversight of a quarantine station and its personnel (30-50 ship inspections per month in San Juan alone) (15), site visits to the other principal ports, answering queries from the continent (16), and participation in overhauling the new territory’s sanitary institutions. In his rush, he suffered mishaps, as when he stepped into a ship’s open coal hole and broke a rib (17), and when he was left stranded in a small island off the eastern coast of Puerto Rico, after the transport failed to return to pick up the inspecting party (18).

On June 29, 1899, the military governor established a Superior Board of Health comprised of six physicians: three in uniform (Army – Board president, Navy, MHS – Glennan), and three civilians (two Puerto Ricans and a Pennsylvanian) (19). Glennan and his successor, Claude H. Lavinder (previously acquainted with Puerto Rico through his work in Army transport ships and the Ponce quarantine station) (20) were very involved in the Board’s work, which established rules for sanitary matters, such as disease reporting and medical licensing, and established greater control and supervision of the hygienic activities of municipalities (21).

On August 8, 1899, a category 4 hurricane, the most crippling natural disaster in the island’s history, devastated Puerto Rico. It caused over 3,000 deaths, and provoked widespread famine (22). It also damaged the quarantine buildings at Isla de Cabras (at the mouth of San Juan bay), so Glennan persuaded the military governor to assign the island of Miraflores (inside the bay) for such purposes, and restore the other location as a leper colony (23). Shortly thereafter, Miraflores became the local equivalent of New York’s Ellis Island, when the War Department resolved that in Puerto Rico, as in the United States, the inspection of alien immigrants would be performed by medical officers of the MHS (24). For years, the Service also rented an office in the city, near the harbor area. In fiscal year 1912-1913, spacious accommodations were provided, by presidential order, in the Navy Arsenal, and five new buildings were constructed in Miraflores (25). (They can still be found behind the San Juan Convention Center, on a hill overlooking the bay.)

Glennan and his successors (Lavinder – 1900, Henry S. Mathewson – 1900-1902) saw the island as a foreign location, and described its principal harbor cities in *Public Health Reports* with a mixture of admiration and repulsion regarding the towns’ siting, infrastructure and population densities, and an underlying anti-Spanish bias. For Glennan, the situation of San Juan “and the sanitary engineering problems connected therewith are ideal, despite the incrustated filth and hereditary habits of the people” (26). When he reported the annual mortality for the city of Arecibo, he added “These figures were ascertained by making the additions, a matter of wonder and curiosity to the local officials” (27). Nevertheless, Dr. Del Valle and other local physicians (e.g., Alemán in Arecibo) were retained as quarantine contract officers.

In the civil government established by Congress (Foraker Act, April 12, 1900), the governor, his cabinet and the Supreme Court justices were all federal appointees, but a Delegates’

Assembly was elected by popular vote (28). Public health matters were addressed disjointedly by a director of hygiene and insular and municipal boards of health, in a structure that changed repeatedly until 1912 (29). In further disconnect, quarantine stations (nine ports) would follow MHS regulations, under the supervision of the San Juan quarantine officer (30).

The fundamental responsibility of foreign quarantine was the prevention of imported infections and their export to the continental United States. The principal fear was yellow fever. At a time when its cause was suspected to be related to “filth”, the screening of passengers and baggage coming from infected ports was laborious and non-specific. Immune passengers were allowed to land, but non-immunes were detained for six days’ observation. (Immunity was established by a history of an attack of the disease, or ten years’ residence in an endemic location.) Baggage was inspected in a disinfection room, and if not sterilized and sealed before departure, was autoclaved with formaldehyde. This would shrink and harden rubber and leather items, so they were separately sprayed with formalin (31). Within a year of the Foraker Act, these routines were discarded. The demonstration in Cuba of the role of the *Aedes aegypti* mosquito as vector of yellow fever changed the outlook on disease and the daily routine of every physician (32). By 1901, vessel inspections in San Juan included the examination of water tanks, liable to harbor mosquitoes (33).

The new civil government was immediately confronted with an epidemic of excess mortality after the 1899 hurricane, not only as its most pressing health problem, but as a test of the beneficence of the American administration, with repercussions beyond the Island (34). Charles Allen, the first civilian governor, made public his opinion that “the question of Cuban annexation will depend ... upon our success or failure in Porto Rico” (35). The average annual mortality rate for Ponce in the 1890s was about 36 per thousand (36). In July 1900, the secretary of the Board of Health estimated that it had reached 123 per thousand, mostly due to anemia or gastrointestinal afflictions (37). (For comparison, it was 20 in Suffolk County, MA – Boston – and New York City; 23 in Washington, DC; 27 in New Orleans; and 25 in Dade County, FL – Miami) (38). Ponce became “the Mecca of the sick and destitute” from “every nook and corner of the island” (39). The US Army established a provisional tent hospital under the direction of Dr. Bailey K. Ashford (1873-1934). In November, 1899, he discovered that infection with hookworm, an intestinal parasite he called *Ankylostoma*, accounted for most cases of anemia in his patients, displaced farm laborers (40). Ashford’s subsequent efforts against hookworm have often been presented as the first sanitary campaign on the Island. Sanitary work did not start in 1899, but, as often occurs, a great crisis (the hurricane), produced great changes in public health.

Walter W. King – quarantine, anemia, neurasthenia

Late in 1899, a new MHS officer, Dr. Walter Wood King (1875-1950) took charge of the quarantine station in Ponce (41). In 1901, Ashford invited him to collaborate in a study

of anemia patients. For Ashford, the MHS officer “was very matter-of-fact, sensible, and had a quaint sense of humor. [...] He was honest to a fault, absolutely faithful always, and brave. [...] They referred to us as Don Quixote and Sancho Panza” (42). The comparison was due to their figures, but King’s humor, as used confidentially with Ashford to deride an opponent, could be fierce (and disproportionate, to a current-day reader) (43). His loyalty was proven through two decades of scientific collaboration and strategizing to move Army, PHS, and Puerto Rican bureaucracies, and social and professional allies. A competitor indicated that King also possessed a “smooth ‘governmental’ fashion” (44). Much later (1926), the US Consul General in Paris, France, reported that “Doctor King possesses the happy faculty of meeting every conceivable demand that can be placed upon him professionally” (45).

In 1902 a federal law renamed and reorganized the MHS as the Public Health and Marine Hospital Service, and gave it responsibility for Marine Service hospitals, domestic, foreign, and insular quarantine, sanitary reports and statistics, and scientific research (46). That year, King was assigned to San Juan. His move and later absence on a prolonged detail or leave resulted in “cameo appearances” in Puerto Rico by two notable PHS officers. The Ponce assignment was covered by Joseph Goldberger (1874-1929), later famous for his demonstration that pellagra was due to a nutritional deficiency. In October 1902, he came to Puerto Rico after a bout of yellow fever in Tampico, Mexico, and wrote to his family that “the trip set me up fine”, but the wagon ride from San Juan to Ponce “nearly killed me.” In addition to quarantine duties, he studied the local varieties of mosquitoes, and hatched larvae in a laboratory (47). Ashford tried to convince him to join in “an attack on hookworm, but Joe refused to be seduced: he wanted to play with filaria” (48). In April 1903, Goldberger was transferred back to Mexico (Veracruz) (49).

At about this time, Leslie L. Lumsden (1875-1946), whose epidemiologic studies in 1933 served to identify a mosquito as the vector for St. Louis encephalitis, was briefly in charge of quarantine in San Juan. On June 17, 1903, he sent a report indicating that mosquito populations were smaller than in cities of the southern states and with a greater relative abundance of *Aedes aegypti* (50).

In 1904, after some maneuvering by Ashford and King, the government of Puerto Rico assigned funds for an Anemia Commission, directed by the two uniformed physicians and a Puerto Rican, Dr. Pedro Gutiérrez Igaravidez. A field hospital was established next to the municipal hospital of Bayamón (near San Juan) in March and April 1904, and from May to August in Utuado (in the west central mountain area) (51). King reported to the Surgeon General that of 5,500 cases of anemia examined, all but ten were due to uncinariasis (hookworm) (52). The expedition was repeated the next year in a different mountain location (Aibonito), where the organization described for the line of patients resembles the method for inspecting immigrants at Ellis Island, a procedure with which King, as PHS officer, would have been familiar (53).

In 1906, both Ashford and King were transferred off-island. That year, King published an article in the *Journal of the American Medical Association* on tropical neurasthenia (54), an especially feared condition of colonial administrators, characterized by fatigue, forgetfulness, irritability, mental exhaustion, poor digestion, lack of ambition, and aversion to exercise (55). At that time, the condition was attributed to the oppressive effect of hot, humid weather on hard-working white, northern folks. Later, in the 1920s, it was attributed to internal psychological ambivalence and conflict. Historian Warwick Anderson has raised the possibility that in the Philippines, this represented a reaction to the conflicted role northerners played in their colonial environment (56).

In contrast to prevalent beliefs, but with little insight into structural context, King derived the problem not only from the difference in climate, but also from the (to him) limited amusements available – theater in a different language, few public parks and outdoor sports, small circle of acquaintances, and monotonous diet – while alcoholic or sexual excess accelerated nervous exhaustion. Deep into the article, King suddenly revealed “During a moderate attack I lost about fifty pounds in three months,” but made no further mention of his experience. As in the contemporary literature reviewed by Anderson, clinical study provided no insight into political or social disorder. It is astonishing that, after seven years in Puerto Rico, King would offer no recommendation to learn the language and interact with the locals, which would have provided access to broader cultural and social occasions.

King was detailed to Montana, to study Rocky Mountain spotted fever. From April to June, 1906, he proved, experimentally, transmission of the disease by ticks, and, for a few months, worked at the Service’s Hygienic Laboratory in Washington, DC. In an unexplained change of career track, King was then transferred, first to Angel Island, San Francisco, to work on plague control, later to Ellis Island, New York, and by 1910, Naples, Italy, assigned to duties related to the cholera epidemics at that port (57).

Samuel B. Grubbs – routines and plague

King’s successor in San Juan, Milton Foster, was replaced in 1909 by Samuel Bates Grubbs (1871-1942) (58). He had served in Army transport ships in 1898 and in Cuba as quarantine officer, in Europe and Mexico for bubonic plague prevention and control efforts, and at the Hygienic Laboratory (in charge of animal care) and several Marine Hospitals. He is the only officer mentioned in this article who published an (incomplete) account of his career. He provided inestimable details on routines and colorful anecdotes, but often without specific dates or context (59).

Shortly after arrival, Grubbs requested authorization to be reimbursed for travel in an automobile (60). He periodically inspected the quarantine stations in trips that, by the coastal roads, covered over a hundred miles.

I asked for nothing but gasoline, but there was no authority to buy it. I could hire a carriage at \$12.00 a day but an automobile

could not be officially recognized. [...] Nevertheless, I used my own machine, bought my own gasoline, and said nothing about it. The government saved money – and I traveled in comfort (61).

Two of his inspection reports, on printed standard forms, can be found in the National Archives, with information on the contract officers (Acting Assistant Surgeons), their families, use of uniform, and details of the local quarantine operations (62).

Grubbs showed little interest in research, but with several neighbors, including an entomologist, formed “The Anti-Mosquito League.” This was probably in 1911, when the government of Puerto Rico initiated large-scale mosquito abatement efforts (63). The League eschewed assistance from the Department of Hygiene, and printed a short bulletin, hung posters on telephone poles with the life cycle of the mosquito, and gave lectures with lantern slides. The lectures, directed to community members and especially children, included shows of live mosquito larvae, and participants were asked to “bring to each meeting live mosquitoes or wiggle-tails in water.” A Boy Scout leader organized “mosquito hunts” on Saturdays” (64).

Grubbs was interested in clinical care (eye, ear, nose, and throat diseases) so he opened a private practice. He admitted in his memoirs it was unusual for medical officers in the federal government to be allowed to practice, but claimed that the English-speaking, United States-born residents were so numerous “that it was necessary for the government doctors to take care of them.” He cited (by position, not name) the examples of the Naval Surgeon and the Army Surgeon. He held eye clinics at Presbyterian Hospital, but occasionally saw patients at the Service’s office, where, for reasons not mentioned, a box of dynamite was delivered (65). The undated anecdote may coincide with the 1909-1910 impasse between the Puerto Rico legislature and the colonial federal administration, so it was perhaps a political statement against the federal agency, rather than a personal attack (66).

One of the major challenges for the PHS in the early twentieth century was the spread of bubonic plague around the world, and epidemics in port cities of the United States (67). Plague is a bacterial disease transmitted by fleas, that produces swollen lymph nodes (“buboes”), commonly in the groin, axillae or neck. Without antibiotic therapy (unavailable in 1912) lethality may reach 60%. When a fatality in San Juan, on June 14, 1912, was considered a possible case of plague, the structures necessary for sanitary response were already in place, a rare occurrence in public health. Scientific knowledge of the disease and its control methods had solid foundation, and the PHS was undergoing modernization. A 1912 law gave the Service its present name and expanded the mandate for investigations on sanitation, sewage, and pollution (68). The Island had just reorganized its Department of Hygiene, and doctor Isaac González Martínez (1871-1954), director of its Laboratory, was experienced with plague epidemics, having participated in the Spanish commission that studied the Oporto (Portugal) outbreak in 1900 (69).

Sadly, the government lost credibility with its first announcements, perhaps from lack of experience (both governor and Commissioner of Hygiene were off-island), and certainly by a misguided emphasis on paternalistic reassurance over factual knowledge. On June 17, separate reports by Grubbs and by WR Watson (acting director of Hygiene) were made public, indicating that suspected cases of plague had been investigated: “the possibility of such pestilence invading Puerto Rico is very remote” (said Grubbs), and “the rumor of these cases being bubonic plague is most absurd” (said Watson) (70). (In his memoirs, Grubbs only recalled that “we urged everyone not to become frightened”) (71). The following day, Dr. González Martínez reported positive preliminary results. On June 19, the acting governor officially recognized the presence of bubonic plague in San Juan, and requested additional assistance from the PHS (72). The public’s reaction (recalled by Grubbs in his memoirs) was illustrated in a newspaper cartoon: a procession of automobiles leaving the city, all carrying a flag with the word “mieditis” (fear-itis). Behind the cars, an open chicken coop is being abandoned by the flying chickens. The title of the drawing (with quotation marks to denote irony) is “Prudent sanitary measures” (73).

On June 30, it was agreed that all work related to the eradication of plague would be turned over to the PHS, although the US Army, the federal Secret Service, and the Puerto Rico Department of Health also played large roles (74). The last case occurred on September 13, 1912. Most patients (51 of a total 55) were residents of the municipality of San Juan. All cases were of the bubonic type, and 36 (65%) died (75). The manner in which plague was introduced on the island was not identified, but the source of infection was thought to be the Canary Islands (76). There was strong public criticism of the quarantine service (77), but in contrast to previous experiences in the continental United States (78), there was little tension between the local and federal governments. All high officials of the insular government were federally appointed, and the PHS had devised efficient methods for plague control in San Francisco in 1907 (79). Even so, the legal standards for rat proofing buildings were first formulated in Puerto Rico (80).

Grubbs sailed from San Juan for his new assignment (Providence, RI) on December 25, 1912. He claimed his wife had a system for surviving frequent moves:

When making a change of station, nothing was altered until after I left. [...] When the time to go came, I walked out of the house alone taking a grip [travel bag] or two. Packing then began. It could be done leisurely (81).

Walter W. King again – tropical medicine, epidemics, war

Walter W. King returned to San Juan as chief quarantine officer in September 1913 (82). In Naples, he had performed his cholera surveillance duties in an environment so hostile that, early on (by July, 1911), he received a death threat from the *Camorra*, the local mafia, and required the protection of armed guards (83). In San Juan, he was additionally detailed for duty with his friends Ashford and Gutiérrez at the Institute

of Tropical Medicine and Hygiene of Puerto Rico. The Institute operated by three distinct phases: three months of teaching, including the instruction of sanitary officials and inspectors; three months of expeditionary work in the interior mountainous districts; and six months of research work in San Juan. The site selected for the clinic and tent hospital in 1913 was again Utuado, where the 1904 Anemia Commission worked. The clinic saw about 625 patients daily. The description of the line of patients is, as in 1905, reminiscent of the method for inspecting immigrants at Ellis Island (84).

Throughout this time, Dr. Pedro Del Valle continued as deputy director of the quarantine station in San Juan, and lived on station grounds, in Miraflores. Other ports were also attended by Puerto Rican physicians, on temporary appointments. Nevertheless, King, vitally interested in research, wrote to Surgeon General Rupert Blue on February 6, 1915, requesting an assistant, stating that Ashford was “ahead” of him in the scientific work, and inviting Blue to come see the Institute. Blue only offered to send a commissioned officer as soon as one was available (85). As a result, King’s investigations at this time focused on the clinical and epidemiologic characteristics of diseases that were of major concern to his agency (trachoma, dengue, meningococcal meningitis, smallpox) without experimental or clinical laboratory research (86).

In mid-September 1915, an outbreak in San Juan attracted widespread notice ... due to its having been miscalled and persistently reported as yellow fever by the surgeon of the army post, and due to the number and prominence of some of its victims. Various lines of business narrowly escaped serious harm; foreign governments threatened quarantine against Porto Rico, and in one instance did require precautionary measures to be taken (87).

The disease was clinically diagnosed, and Puerto Rican physicians did not agree with the military physician’s opinion. The governor asked for King’s independent investigation, and he diagnosed dengue. The controversy was settled by visiting experts, PHS Assistant Surgeon General Henry R. Carter, US Army Surgeon General William C. Gorgas, and Dr. Mario Lebrede. Carter had discovered the extrinsic incubation period of yellow fever, Gorgas had supervised the elimination of the mosquito from Havana and the Canal Zone, and Lebrede had ample experience with the disease in Cuba. They concurred with King’s evaluation (88). Unexpected evidence came from Carter, a “certified immune” from yellow fever, who became seriously ill with dengue in Puerto Rico (89).

The Surgeon General kept his promise to King, and assigned another officer to San Juan in 1916. Assistant Surgeon Carl Michel worked quickly; in one year, he studied the use of hydrocyanic gas for fumigation, conducted research on sprue, met his wife, had his first-born child, and saved enough swimmers from drowning in San Juan Bay and the waters off Parque Borinquen that he was decorated twice by the federal government. In 1917, due to the war, he was detailed to cruise European waters aboard the Coast Guard cutter *Itaska* (90).

Shortly before the United States entered World War I in 1917, Congress reorganized the structure of Puerto Rican government and extended American citizenship to island residents, which carried the obligation of military enlistment. On October 6, 1917, the federal government established War Risk Insurance, a program for compensations, hospital care and pensions for disabled soldiers or, in case of death, their relatives, and to convey to families part of the salary of recruits (91). Medical care was provided in the PHS hospitals (92). In Puerto Rico, Dr. King was appointed district supervisor. He participated in the establishment of the local Chapter of the American Red Cross, whose volunteers were the operational staff for War Risk Insurance. Nevertheless, food was scarce, thousands of families lost their breadwinner to the armed forces draft, and dependents received funds with great delay (93).

Towards the end of 1917, King became chief of quarantine in the previously Danish Virgin Islands, just purchased by the United States; by August 1918 he was back in Puerto Rico (94). In October, earthquakes and a tidal wave devastated the west coast (95), at the time that influenza spread throughout the island. The PHS hired the physicians who were being discharged from military service at the end of the war, and allowed the Department of Hygiene to assign them to the towns where no medical care was available (96).

The medical examination of men subject to the military draft (ages 21 to 30), presumably the strongest members of the workforce, had revealed a population handicapped by malnutrition and disease: 30 per cent were rejected, a “physiologically naked” population (in the words of a local physician) (97). From October 1918 to February 1919, the influenza epidemic caused over 260,000 cases in Puerto Rico, (21 % of the population) with almost 11,000 deaths due to influenza and pneumonia (98). The crude mortality rate for influenza in Puerto Rico was estimated at 865 per hundred thousand population. In the United States, it is estimated at 524-643 per hundred thousand (99). The year 1918 has been labeled “a vintage year for misery” in Puerto Rico (100). In effect, both 1917 and 1918 are associated with the highest annual mortality rates of the century, over 30 deaths per thousand population (101).

The growth of the Puerto Rico Department of Hygiene after 1912, the greater measure of internal autonomy allowed in 1917, and the end of the First World War signaled the withdrawal of PHS officers from routine sanitary action. In March 1919, Congress made PHS responsible for the care for all returning veterans, not just the disabled (102). Dr. King transferred out of the Island in May, and was succeeded as chief quarantine officer by Passed Assistant Surgeon Carl Michel (103). His arrival was noticed in the press, both for his previous and more recent heroics (flying a hydroplane to reach patients in coastal North Carolina communities stricken by influenza) (104). Michel was also detailed to the Institute of Tropical Medicine, and in 1921 was assigned to Tampico, to assist the Mexican authorities during an outbreak of bubonic plague, just before plague struck San Juan a second time (105).

Discussion

Public health work in Puerto Rico in the early twentieth century was focused on the control of communicable diseases, and was carried out with meager fiscal, institutional, and scientific resources. Although the same could be said for many locations at the time (in proportion to each country’s wealth) the situation in Puerto Rico was peculiar; related in many ways to its recent status as a colony of the United States. The island’s government was supposed to be responsible for local health issues, but federal and territorial authorities were, in fact, intermixed in the Foraker Act. In addition, and in response to both scientific developments and the interest of the US government, laws and institutions dedicated to public health work changed frequently, both in Puerto Rico and the United States. The PHS attended to foreign quarantine, but, as related here, also played an important role in the investigation and control of local epidemics.

Historians who have examined the public health efforts in Puerto Rico at the beginning of the twentieth century seldom mention the PHS and often confuse it with the military. This is ironic, given the great authority of its officers and their overwhelming administrative and scientific resources, compared to the insular health agencies. The lack of clarity in jurisdictional borders and constant redefinition of agencies enabled PHS officers to fulfill their responsibilities and also obtain agency support for their personal initiatives – King with *uncinaria*, the Institute of Tropical Medicine, and many publications on other diseases; Goldberger, Lumsden, and Grubbs, with mosquito-related work; Michel also at the Institute of Tropical Medicine. At the same time, the diffusion of responsibilities regarding public health created confusion, as when Grubbs and the interim governor publicly discounted the possibility of plague the day before the insular laboratory (ably led by Dr. González-Martínez) reported a positive culture; and when an Army physician insisted on the diagnosis of yellow fever against the opinion of local authorities and the PHS officer (King). The response to plague invoked a massive response from the federal government. Its beneficence was mostly oriented with its priorities, and the lack of federal-local tensions seen in Puerto Rico, in comparison to other plague eradication efforts, was not a measure of consensus, but of colonial dependence.

When I conducted research for this article, the political and professional relationships under the military government and the Foraker Act seemed incomparable to present-day situations. The events of recent months, under the stress of the Zika epidemic, have again revealed the tensions inherent to Puerto Rico’s subordinate colonial role: the severe limitations of the Department of Health in comparison to the technologic and fiscal resources of federal agencies, the federalization of public health response, and the conflicts between local experts and community leaders, and the federal officials.

The PHS and its officers in this period saw Puerto Rico, if not as a colony, at least as a foreign location. The agency denied Pedro Del Valle and the physicians of his generation

entry into the Commissioned Corps (106). It was not until the Second World War that Puerto Rican physicians on the island were commissioned as officers. (The first female officer was commissioned in 1932, and the first African American, in 1943.) (107) Glennan (1899) expressed disdain in what he described, and even King, at least in 1906, was blinded by his language and cultural assumptions. It is possible that PHS predominance and exclusivity provoked resistance or even resentment. Grubbs mentions a box of dynamite sent to his office (ca. 1910). His published memoirs end before the last plague epidemic in Puerto Rico (1921), when the PHS sent him to offer to take over the control activities. The Commissioner of Hygiene refused categorically, indicating that the Department had competent staff to carry out the work; Grubbs was unable to win the support of governor Yager and other authorities. The PHS was allowed responsibility only for quarantine procedures and rat-control measures along the waterfront (108). A Puerto Rican official later remembered a picnic at the end of that outbreak to “celebrate being allowed to combat an epidemic” (109).

In such a parceled, conflicted context, it is a surprise that early PHS activities in Puerto Rico left a significant legacy. The Anemia Commissions, the Institute of Tropical Medicine, and the system to care for war veterans preceded present-day municipal health centers, the University of Puerto Rico School of Medicine, and the Veterans Administration Hospital. Cohesive public health and medical care infrastructures would have evolved anyway as the twentieth century developed, but the actual origin of the path depended on contingency (hurricane San Ciriaco; the presence of Ashford, and later King, in Ponce); hard work (Ashford's discovery and pertinacity; King's interest in research and the organization of mass clinics, and later the Institute of Tropical Medicine); and undoubtedly, the interest of PHS officers in administratively (Glennan) and scientifically (King) addressing the health problems they found in Puerto Rico.

The exhaustive history of the PHS to 1950, written by one of its officers, documents more activity in Puerto Rico than in Hawaii, the Philippines or Cuba from 1898 to 1919. Still, he only mentions quarantine (its formal establishment, 1900), anemia work and the Commission (1901-1906), plague, rat proofing houses and ships, and hydrocyanic acid gas fumigation studies for ships (1912-1913), and the trachoma survey (1913) (110). This barely gives an idea of the breadth, comprehensiveness, and long-term significance of the agency's work in Puerto Rico. The use of a narrow geographic focus to examine the institution's work over time provides a richer picture of its impact, and reveals how the personal initiatives of its officers and the sum of disease control activities affected the development of an area's health status and institutions (111).

Resumen

La historia del Servicio de Salud Pública de los Estados Unidos (US Public Health Service - PHS) usualmente se presenta en términos de enfermedades o descubrimientos; este artículo

examina veinte años de labor en un lugar. Cuando el ejército de Estados Unidos invadió a Puerto Rico en 1898, el Marine Hospital Service (ahora PHS) asumió la responsabilidad de cuarentena internacional, inspección de inmigrantes y atención médica para los marinos mercantes. Sus oficiales evaluaron la condición sanitaria de las ciudades portuarias, ayudaron a reorganizar los mecanismos locales de vigilancia y control de enfermedades e investigaron enfermedades endémicas (como la anemia producida por uncinariasis) y epidémicas (como peste bubónica). Tras la primera guerra mundial y la pandemia de influenza, y el mayor ámbito de gobierno propio que el Congreso le permitió a Puerto Rico en 1917, los oficiales del PHS se retiraron de la actividad sanitaria local. Un enfoque geográfico restringido (Puerto Rico) para examinar la actividad del PHS a lo largo del tiempo (1898 a 1919) provee una perspectiva más rica del impacto de la agencia federal, y revela cómo la suma de actividades de control de enfermedades afectó el desarrollo del estado de salud y las instituciones de un área. Las tareas oficiales y, señaladamente, las iniciativas personales de oficiales del PHS en Puerto Rico, como WW King, produjeron un impacto duradero en las instituciones científicas y las prácticas administrativas, profesionales, y de cuidado de enfermos.

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103. United States Public Health Service. Annual Report of the Surgeon-General of the Public Health Service of the United States for the fiscal year 1919. Washington, DC: Government Printing Office, 1919:47, 149. From 1920 to 1926, King was stationed in Europe (Trieste, London, Paris), coordinating the PHS assistance to US consuls and shipping companies after the First World War. He was then assigned to the US Coast Guard and retired from the US Public Health Service on January 1st, 1933. He died at the Marine Hospital, Baltimore, MD, on October 9, 1950; see King-OPF. An exchange of letters, perhaps the last, with Ashford, suggests continuing friendship, despite no communication for years, see Ashford BK (San Juan, PR). Letter to: King WW (Washington, DC). 1931 Nov 10. Located at: Caja 44, doc. 61, Colección Ashford, Biblioteca Conrado Asenjo, Recinto de Ciencias Médicas, Universidad de Puerto Rico. King WW (Washington, DC). Letter to: Ashford BK (San Juan, PR). 1931 Dec 4. Located at: Caja 1, doc. 94, same Colección Ashford.
104. *Puerto Rico Ilustrado* (San Juan, PR), 1919 May 24 (unnumbered pages).
105. United States Public Health Service. Annual Report of the Surgeon-General of the Public Health Service of the United States for the fiscal year 1919. Washington, DC: Government Printing Office, 1919:149, 151; Michel eventually became Assistant Surgeon General in 1943, as Chief Medical Officer of the Coast Guard, a post he occupied until his death in 1946, see Williams, USPHS, 414, 420, photo opposite p. 489, 498.
106. Michel C. (San Juan, PR). Cable to: SG Blue (Washington, DC). 1919 Aug 26, in response to Dr. Pedro Del Valle's inquiry about commission in Reserve, 1919 April 23, 1919 (not in file).
107. Williams, USPHS, 493; First African American commissioned in the USPHS passed away; CAPT James C. Eason, Jr. COA [Commissioned Officers Association] *Frontline*, March 2012: 1, 12.
108. Link VB. A history of plague in the United States. *Public Health Monograph no. 26* (Public Health Service Publication no. 392). Washington, DC: Government Printing Office; 1955:80-81; Grubbs, Fumigation of vessels; United States Public Health Service. Annual Report of the Surgeon-General of the Public Health Service of the United States for the fiscal year 1921. Washington, DC: Government Printing Office, 1921:215-9; United States Public Health Service. Annual Report of the Surgeon-General of the Public Health Service of the United States for the fiscal year 1922. Washington, DC: Government Printing Office, 1922:185; Puerto Rico, Commissioner of Health. Report of the Commissioner of Health of Porto Rico 1921. (From the Report of the Governor of Porto Rico, 1921, Bureau of Insular Affairs, War Department) Washington, DC: Government Printing Office 1923; 84-86.
109. Morales Otero P. *De lo agudo a lo crónico*. San Juan (PR): Biblioteca de Autores Puertorriqueños; 1963:84-86.
110. Williams, USPHS, index entries for Puerto Rico compared to other territories or states (not even considering the extensive index entry for San Juan, PR).
111. Another example, Fortune R. A century of adventure in Northern health: The Public Health Service Commissioned Corps in Alaska, 1879-1978. Landover (MD): PHS Commissioned Corps Foundation; 2006.