

The Historical Antecedents of the UPR School of Tropical Medicine

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This article deals with the historical antecedents of the University of Puerto Rico (UPR) School of Tropical Medicine (STM) under the auspices of Columbia University. It presents a general view of the social, institutional and conceptual factors that were correlated with the establishment of the STM. The authors start by examining the historical continuities and discontinuities present during the imperial transitions between Spanish colonial and U.S. military medicine at the turn of the 20th century. The clarification of these changes is important for the proper understanding of the emergence of tropical medicine in Puerto Rico, marked by the identification of the biological determinant of the so called “peasants’ anemia.” The essay focuses on two institutional precursor events: the Puerto Rico Anemia Commissions (1904-1908) and the Institute of Tropical Medicine and Hygiene (1912-1914). Their nature and work paved the way for the establishment of the STM. The notions of tropical medicine and diseases are considered as historical concepts. The support of the Rockefeller Foundation to several significant public health activities in Puerto Rico is also examined. Finally, the social and health conditions which prevailed at the time of the creation of the STM have been summarized. In general, the article provides a sense of historical context deemed essential to understand the emergence and evolution of the STM. [*PR Health Sci J* 2016;35:53-61]

Key words: Colonial medicine, Military medicine, Public health, Anemia campaigns, Rockefeller Foundation

The main purpose of this article is to provide contextualization for a series of historical articles about the scientific and educational contributions of the University of Puerto Rico (UPR) School of Tropical Medicine (STM), under the auspices of Columbia University (1926-1949) (see “An Introduction,” in this issue). This essay focuses on the historical antecedents of the UPR STM, and serves various aims: a) sets out pertinent continuities and discontinuities of the imperial transitions at the turn of the 20th century; b) marks a series of historical events and social conditions relevant to understand the emergence of the STM; c) concentrates on the distinct milestones of preceding institutional events: the Puerto Rico Anemia Commissions (PRACs) and the Institute of Tropical Medicine and Hygiene (ITMH); and d) initiates a reflection to be addressed further in the upcoming series of articles related to the notions of tropical medicine and diseases as historical concepts.

Imperial transitions: Colonial medicine during the 19th century

Throughout the nineteenth century the Spanish Government assumed, in more active but still ineffective ways, the responsibility of protecting the health of larger parts of the population. Some of the important accomplishments were the establishment of local Boards of Health (1813-14), mostly

active during epidemics, and a general Superior Board of Health that enacted the Sanitary Regulations of 1841 (maritime) and 1886 (more ample); and the creation of the sub-delegations of pharmacy (1839), medicine and surgery (~1839-1847; midwives in 1850; dentistry in 1855) and, much later, veterinary, for the regulation of health professions. A military hospital in the capital (in operations since 1782) played an important role in the progression of health sciences during the century. Diverse measures were designed to control epidemics such as smallpox, yellow fever, and cholera on the Island. The most important achievement of Spanish colonial medicine was the implementation of smallpox vaccination at the crossroads of the 18th and 19th centuries (1).

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The authors have no conflicts of interest to disclose.

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In the second half of the 19th century, several physicians recognized the importance of the microscope and laboratory tests. The publication of medicine and pharmacy gazettes at the end of the century fostered the exchange of medical ideas and information as never before. However, intellectuals were aware of the shortcomings of government interventions and the scarcity of resources available to address the most basic health needs of a largely rural population. Many physicians and health officers understood this regrettable situation, since many towns lacked such services. The vast majority of physicians diagnosed diseases based almost exclusively on clinical interviews (2).

The development of an agrarian economy, based mainly on sugar and coffee exportation and on the use of slave and forced labor, including the incremental political enforcement of control and disciplinary actions, generated an increase in mortality rates. It also produced economic surpluses that the government used for the construction of roads, lazarettos, charitable asylums, and urban schools which benefited only a small percentage of the population. Along with the occurrence of droughts (e.g., 1827, 1840s), major epidemics (e.g., cholera, 1855-56, with 30,000 deaths), and hurricanes (e.g., 1867), a complex constellation of social, economic, and political factors may explain the public health deterioration that occurred in the 19th century. As historian Fernando Picó says, “the march of sugar and coffee was associated with higher mortality rates” (3).

Imperial transitions: Public health and military medicine (1898-1900)

Public health policy in Puerto Rico during the first years of U.S. military control was characterized by a lack of cultural sensibility in the imposition of sanitary measures, which brought about tension between local needs and outside expertise (4). The early public health policies implanted in Puerto Rico may be characterized as pragmatic and based on the experience of the U.S. progressive reformers of the late 19th century: sanitation, hygiene, and urban regulation; in the tropical colonies this meant the “burden of cleansing” (5). Under military rule (1898-1900), public health issues were dealt through emergency measures. In 1899 a board of health was established to oversee public health and enact its first sanitary code. According to a report of the P.R. Surgeon General of 1900, “sanitation here resolved itself down to its simplest form, ‘policing’” (6). Military government on the Island ended in 1900, when the U.S. Congress enacted a ‘transitory’ law that remained in effect until 1917, and that



Field hospital in Bayamon, PRACs. Ashford BK, Gutiérrez Igaravidez P. *Uncinariasis (Hookworm disease) in Porto Rico: A medical and economic problem.* Washington D.C.; Govt. Print. Off., 1911: Image:147. Photographer unknown. Ca. 1910. Unknown copyright restrictions. Contributing Library: Francis A. Countway Library of Medicine. Digitizing Sponsor: Open Knowledge Commons and Harvard Medical School

placed the people of Puerto Rico under a government run primarily by presidentially appointed U.S. civilians (7).

In 1901, more than two years after annexation, the Secretary and Treasurer of the P.R. Superior Board of Health, William F. Smith, rendered a picture of the minimal health organization in operation across the Island, which consisted mainly of a local board in each municipality presided by the town’s major. “But many of these [towns] are mere hamlets in a woeful state of dilapidation and dirt,” he stated. In ‘theory,’ Smith said, every town “employs one or more physician to look after the sick poor, but in practice at present one-half of the island is absolutely without any public medical service” (8).

Analogous to other places, the military occupation of Puerto Rico was accompanied by the need to protect the foreign military forces from diseases endemic to the tropics (9). The main sanitary achievement of the time was the massive military smallpox vaccination program of the population. There is no evidence of the notion of tropical medicine in Smith’s report, and Bailey K. Ashford’s announcement (24 November 1899) of the identification of the biological determinant for anemia was not mentioned. The colonial officer did mention uncinariasis and nematode, but Ashford’s name was omitted. Interestingly, a cautionary note on relapse, which later would become a major sanitary issue, was introduced: “The disease is amenable to treatment... but, of course, a relapse occurs as soon as the patient returns to a life with his former environment.” However, the officer did emphasize that there was a military campaign of smallpox vaccination (“a gigantic task”) (10).

The 1902 published report (Oct 1898-April 1900) of the military governor, Brigadier General Davis, described the

vaccination program: early in 1899 “the vaccination of the entire population was undertaken... and during the period from March 1 to June 30 about 860,000 persons were vaccinated;” vaccination continued until 31 December 1900 adding 20,000 more persons; and “the effect of this general vaccination of the people has been most marked.” The Governor’s report mentioned Assistant Surgeon Ashford and his “demonstration” of uncinariasis but, curiously, it expressed some doubts about the identity of the disease: “It is also probable that many of the deaths reported as due to anaemia are really caused by malaria” (11).

Ashford’s demonstration of uncinariasis was propitiated by a catastrophic tropical event: hurricane San Ciriaco (8 August 1899), which devastated the Island and dismantled the coffee economy. According to a poetic and tragic image by historian Fernando Picó, this hurricane, “closed the stage of the ancient society from the times of Spain in Puerto Rico” (12).

Institutional preludes

Anemia, considered the first cause of death by disease in Puerto Rico in the last decade of the 19th century (ca. one third of all deaths), generally was linked with rural poverty and meager socioeconomic conditions. An understanding of a new scientific paradigm was flourishing on the Island at that time, as in other parts of the world, which was initiated by the bacteriological revolution. Pathogenic organisms were identified as the cause of many diseases for the first time in medical history (13). In Puerto Rico this new concept would replace eventually the common idea that anemia was caused by environmental factors, malnutrition, and adverse effects of climate (i.e., excessive exposure to heat and humidity). The change in perspective was not a homogeneous process. However, the PRACs’ health campaigns and the establishment of the ITMH introduced new concepts and points of view about the origin, treatment and prevention of many infectious and parasitic diseases (14).

A. The Puerto Rico anemia commissions (1904-1908)

The U.S. government distributed food, medicine, clothing, and supplies to the people of Puerto Rico in response to the devastation produced by hurricane San Ciriaco. It was then that doctor Ashford was assigned to set up an ambulatory hospital in Ponce (26 August 1899). During his tenure there, he initially encountered “thousands suffering from a severe diarrhea and typhoid fever,” but what he found later was an “epidemic of pernicious anemia,” associated popularly to lack of food. After microscopic examination of patients’ feces, Ashford enthusiastically announced (24 November 1899), that he had “proven the cause of many pernicious, progressive anemias of this Island to be due to ancylostomum duodenale.” Thus, he proclaimed that the cause of the anemia suffered by agricultural laborers or jíbaros was a parasitic disease (15).

Ashford went on to “cure” nineteen anemics in Ponce’s field hospital (November 1899 series) with thymol (a naturally occurring class of compounds with strong antimicrobial

attributes), and immediately sent an article to the Surgeon General of the Army, who authorized its publication in the *New York Medical Journal* (14 April 1900). However, more comprehensive studies were still needed to prove the ‘parasite-anemia’ relationship, and initially his premise did not “attract the slightest attention to the meaning of his finding.” Ashford returned to Washington, D.C. in late 1899, and, according to his own story, he carried the *Ankylostomum* worms to elucidate their zoological identification with his former professor, Dr. Charles W. Stiles. In 1902, Stiles announced the identification of a new species (first called “*Uncinaria americana*,” later “*Necator americanus*”) (16). This episode became a scientific controversy and a case of a priority dispute (i.e., “peripheral precedence”) (17).

Ashford decided to return to Puerto Rico to “awaken both Porto Ricans and Americans in the insular government to action” on the possibility of eradicating the disease. In 1902-1903 he joined forces with Dr. Walter W. King (U.S. Public Health and Marine-Hospital Service) and studied a series of 100 cases at the Tricoche Hospital of Ponce. The findings were published in the *American Medicine* journal (5, 12 September 1903). A month later, they requested that the P.R. Superior Board of Health and the Health Director take action to address the anemia public health issue. In December 1903 Ashford spoke before the Puerto Rican Medical Association annual meeting (at Ateneo de Puerto Rico) on “Anemia in Porto Rico,” to demonstrate that the disease was a scientific and a medical problem. He presented new clinical findings, and highlighted the immediate benefits to the patients and the positive socioeconomic effects that the medical knowledge could have for the progress of the Island. The case was made for a unicausal view of the disease, initiating what would become one of the public issues the future PRACs would have to face in the years to come. The presentation also asserted that poverty was not the real cause of anemia. The paper was defended by Dr. Agustín Stahl y Stamm, a “lifelong scientist” (a Bayamón physician and intellectual who excelled in several sciences, notably botany) (18).

Ashford and King believed that the medical profession and society would support their findings. The idea of a public health campaign against anemia was positively covered by the Island’s newspapers, who also attributed to poverty most of the ills suffered by anemic laborers. The new publication, the Ateneo’s conference and the requests addressed by both military doctors to U.S. health officers, finally attracted the attention and support of the Governor, who provided funds to initiate the anemia campaigns “after four years and more incessant clamor for recognition of the true cause of Porto Rican anemia” (19).

The PRACs campaigns were massive, and took place from 1904-1908. The Commission’s work began in Bayamón, where Dr. Pedro Gutiérrez Igaravidez (health officer, and director of the Bayamón Municipal Hospital) joined the PRACs (Ashford and King) as one of its directors, and where Dr. Agustín Stahl took charge of the field station. However, in 1904, the main Commission (Ashford, King, and Gutiérrez) decided to move

the campaign to Utuado, a municipality located in the central-western mountainous coffee region of the Island (heartland of the jíbaros). Stahl continued to run the undermined Bayamon station. In 1905-1906, the PRACs established the central dispensary and field hospital in Aibonito, and placed two large stations in Lares and Utuado, all mountainous municipalities (20). After two years of work, Ashford was transferred to Pennsylvania and King was assigned to Washington, D.C. (21). Doctor Gutiérrez Igaravidez assumed the leadership of the Commission, joined by doctors Isaac González Martínez (credited with discovering bilharzia in P.R., 1904) and Francisco Seín Seín (a municipal physician of Lares) as commissioners (22).

The PRACs developed a dynamic and systematic method of work at the anemia stations. Every person who attended the clinics was asked to bring a sample of their stools in a matchbox. Initially, peasants regarded this procedure as offensive (23). The samples were examined under the microscope and a diagnosis was delivered; later, other laboratory tests were performed. Hookworm patients received medication at a field dispensary. They also were counseled and advised to continue treatment (24). Overall, the campaign's operations included a field hospital and a clinical station (with laboratories and a dispensary), a clinical summary of each patient, specimens and prescriptions, and a prophylactic talk (educational and preventive). An educational pamphlet was published in 1905. The Commissions gained the support of local physicians and town majors, who then became sponsors. The annual reports of the PRACs served as scientific and program documentation, dissemination, and education. Community participation was marked by the creation of a "defense league."

In June 1908 the Legislature did not allocate funds for the Commission's next term. Their work was disrupted for political reasons. Although members of the Legislature recognized the value of the PRACs work, nationalistic and fiscal concerns were raised, and statistics also were showing that anemia was no longer the 'scary' disease it had been in previous years. The PRACs became one of the sub-bureaus in the Department of Health, first as the Anemia Dispensary Service and later as the Tropical and Transmissible Disease Prevention Service. Ashford and Gutiérrez Igaravidez claimed that overall the PRACs and its successors (1904-10) treated more than 300,000 patients in 59 dispensaries (25). The work of the Commissions demonstrated that a system of medical services and public health was feasible.

The keynotes of the Commission's campaigns prevailed: treatment of all infected persons, the education of the working class (lectures and pamphlets), and a request for the complete reform of public health services to implement sanitary measures across the Island. Nonetheless, the initial view of unicity (later modified by the distinction of primary and secondary causes), uncinariasis' malnutrition effects (accepted medical knowledge), and the sanitary issues of persistent relapse by reinfection and soil pollution (recognized very early on by the Commission), haunted the leadership at the time and was

pervasive in the evaluation of the PRACs' work for years to come. The socioeconomic factors of lack of latrines and work shoes (poverty!) later became the principal targets of public health actions.

Lucy Peña Carro mentions that through years of work, the Commissioners came to understand that anemia would not be eradicated without social improvements (26). Nicole Trujillo Pagán asserts that the campaign "was an intervention centered on the island's physicians" which "fostered a collective identity" around the medical specialty of tropical medicine (27). José Amador states that the "explosion in popular participation and mobilization of popular expectations in the pursuit of health is one of the most enduring--albeit less recognized--consequences of the campaign" (28).

B. The Institute of Tropical Medicine and Hygiene (1912-1924)

The ITMH is now considered an institutional precursor or a formative stage within a historical process that began with the PRACs and gave way to the birth of the School of Tropical Medicine (1926). However, its founding members defined the Institute as the 'end stage' of a process that paved the way for research, study, and treatment of diseases 'peculiar to the tropics.' Nonetheless, it may be argued that the ITMH was basically a well-conceived research center and that its leadership intended to establish a comprehensive academic institution. Since 1906, the visionary and grandiloquent idea of a 'School of Tropical Medicine' as 'Puerto Rico's destiny' was already in Ashford's mind (29).

A number of factors were critical in the development of the Institute. First, the Governor appointed the staff in charge, and for the first two years the Commissioner of Health, Dr. W. F. Lippitt, undertook the administrative and financial affairs of the ITMH. However, doctors Lippitt and Gutiérrez Igaravidez had serious 'disagreements,' and as a result, the Governor, Arthur Yager, gave total autonomy to "Dr. Ashford and his Puerto Rican colleagues," thus allowing them to run the Institute (30).

Second, the previous PRACs leadership rejoined to develop a research center in accordance with the prevailing trends in tropical medicine. That was the case of doctors Gutiérrez Igaravidez, Ashford, González Martínez, King, and Seín. They were joined by other prominent community physicians. Doctor Gutiérrez Igaravidez was selected as director of the nascent institution because of his experience managing the anemia campaigns. For this reason, he was sent to study the organization and administration of several European centers of tropical medicine, including London and Liverpool (31).

Third, the ITMH addressed important social issues, like the diagnosis and treatment of epidemic diseases and the promotion of public health. Their work focused on three core aspects: research expeditions in rural areas, experimental trials of various laboratory tests, and strategies aimed at training health professionals, particularly health officers and

inspectors. They dedicated three months to perform field studies, three to educate health personnel, and four to do research analysis and laboratory studies. The ITMH offered courses in medicine and health education, including basic sciences like epidemiology and bacteriology, and preventive medicine. Students who had completed twenty lessons could earn a certificate after taking an examination. This certification enabled graduates for employment or a better qualified job in the area of health services (32). These are clear examples of the goal of conceptualizing the institution as a research and academic center, and integrating tropical medicine and public health.

The diffusion of acquired knowledge allowed the members of the Institute to share ideas and experiences in the field and ‘validate their findings.’ Journals such as the *Boletín de la Asociación Médica de Puerto Rico*, and overseas periodicals like the *Revista de Medicina Tropical de la Habana* and the *New Orleans Medicine and Surgery Journal* published articles by members of the ITMH on several tropical diseases. The Institute used experimental animals for research and established a specialized library. The UPR, MSC, Conrado F. Asenjo Library, is considered the heir of its collection (33).

In 1923 the P.R. Legislature established a commission to explore and evaluate the possibility of creating a medical school for the study of local diseases.

Historical concepts

One of the aims of the series of articles is to develop a research scheme that considers and portrays key ideas and notions as historical concepts. That is, they seek to examine how conceptualizations like tropical medicine and tropical diseases change or stabilize with time, and how they subtly vary in meaning as determined by representations of different communities and actors. The objective of focusing on the fundamental concepts underlying and informing a distinctively historical age is to gain further understanding of events, beliefs and practices, to search for hidden meanings and controversies, and to uncover unanswered questions (34).

For example, in the paradigmatic case of anemia, the initial unproblematic characterization at the time of Ashford’s identification of the biological determinant of the disease as a “demonstration,” was later viewed as a scientific “discovery,” contrasting viewpoints that evolved into an actual controversy. Interestingly, the different laws enacted for the creation of



A view of the sanatorium for tuberculosis patients. San Juan, Puerto Rico. Photographer Atilio Moscioni Chesí. Between 1898 y 1917. Collection of photographs by A. Moscioni. Biblioteca Digital Puertorriqueña de la Universidad de Puerto Rico

the PRACs were very brief and just mentioned the disease as tropical anemia or uncinariasis. Ashford’s group preferred the term “uncinariasis” to refer to “hookworm disease” (U.S.) or “ancylostomiasis” (Old World), in recognition to the identification of a New World species (which sets forth the precedent dispute of past and present times). Their early characterization of the “true cause” of the P.R. anemia was later modified in response to persistent public concerns. However, they still were able to stress that the other causes that aggravated or were concomitant to the disease could only figure as secondary and never as part of the same category. Also, the early and stable definition of anemia as a medical and public health issue was labeled at the end as a medical and economic problem, but it only meant that its “extermination is largely a matter of money.” PRACs reports reflect, in a very limited way, that if the population wore shoes, and soil pollution was addressed, it would be the way to avoid the first sign of the infection: ground itch. The eradication of the disease was a constant goal. The counterarguments of poverty and malnutrition are still in need of further study.

Uncinariasis was defined as a specific infectious disease of tropical and inter-tropical countries, with other endemic foci in temperate zones, where conditions of temperature and humidity enable the development of the larva (PRACs, First Report, 1 December 1904). This notion of tropical diseases emphasizes its geographical distribution, and the warm and humid climatic nature of the regions. In the 1906 preliminary report (1 January 1906), two additional notions were added to the geographical dimension, namely, countries that have

colonies in the tropics and countries that have mines in temperate climate zones (35).

At the ITMH, the notion of tropical medicine was enunciated in simple but practical terms by director Gutiérrez Igaravidez's characterization as the study of the diseases typical of tropical climates and the means for their prevention or avoidance (36). In Columbia's announcement for the opening of the first academic term (1 October 1926) of the STM, tropical diseases were characterized more subtly as "the study in a tropical environment of that large ill-defined group of disorders known as tropical diseases, and at the same time to observe the influence of exotic conditions on diseases in general" (37). In a sense, this last conceptualization merged two main European traditions of 'tropical' (English) and 'exotic' (French) diseases (38), while referring with caution to those 'ill-defined group of disorders.'

The Rockefeller Foundation (1908-1920s)

The story of historical antecedents needs to highlight the role that the Rockefeller Foundation (RF) played in several significant public health activities in Puerto Rico and throughout the world. In 1910 an RF's representative, Dr. Wickliffe Rose, came to the Island to study the results of the PRACs campaigns (39). Ashford was invited to give a series of lectures in the U.S. on hookworm and the P.R. campaigns. These exchanges influenced the decision of the RF to implement a similar strategy for the eradication of hookworm in southern U.S. (initially, under the leadership of Charles Stiles), which later became a model for launching RF's international philanthropic initiatives. It seems that the PRACs contributions have remained largely 'underappreciated' (40).

Since 1919 the RF provided expert assistance and funds to the P.R. Health Department (HD) in several public health campaigns (anemia, malaria, and plague) (41). The RF left its legacy on the Island through its support to the development of municipal health services; improvement of public clinical laboratories; training for health professionals; grants for scholarships and study abroad; research support in biomedicine, epidemiology and health status; institutional development and health administration; and direct funding to the HD, the STM and the UPR (42). These initiatives provided critical support for the development of an advanced public health infrastructure in Puerto Rico. However, there also were negative aspects: inconsistencies in the recognition of Ashford and the PRACs achievements; the silence and confabulations around the controversial case of Cornelius Rhoads; the use of the Island for questionable biomedical experiments; and the participation of intervening economic interests in the selection of places and regions for health activities. The important role of the RF in international health during the first half of the 20th century is still the subject of historical and scientific studies (43). Its role in Puerto Rico, however, remains for the most part largely unexamined (44).

Social and health conditions (1898-1927)

During the first two decades of the 20th century, the land and its people became the focus of what would be known as

the "cañaverlization" of Puerto Rico, or the "ascent of sugar." The nationalistic urges and unrest prevalent in 1917, during War World I, brought about notable changes in the political colonial system. Congress enacted the Jones Act, which imposed U.S. citizenship upon often unwilling political leaders. The statute created an elective bicameral legislature prompting widespread growth in political participation. Despite apparent advances in the realm of civic representation, the era of colonial tutelage continued: the governorship remained a presidential appointment and the governor's cabinet still required approval by the U.S. Senate. This economic era has been characterized by the predominance of land monopoly, absentee ownership, and monoculture, with the emergence of a large class of seasonally employed field workers. The 1920s were marked by deterioration in the social and economic conditions. During the first three decades of U.S. rule, although there were health care gains, poverty and degradation accentuated health problems. The period between 1915 and 1919 saw a climate propitious for labor and social unrest (45).

The Puerto Rico Health Department was created in 1912. Many municipalities provided (or intended to provide) charity medical care to indigent patients in public hospitals and through physicians' assistance. The scarcity of physicians, the dire financial state of most cities and towns, and the dispersal of the population throughout the rural areas translated into absent or ineffective medical care. Antibiotics were still in the future, federal government assistance for the poorest emerged in the 1930s, and meager socioeconomic conditions had caused a further decline in living conditions for the working class (46).

The STM was established in the midst of a reorganization of the HD in which models were adopted to provide public health services and primary care at the local level, while maintaining centralized supervision. The Department organized a system of health dispensaries in 1923 to provide clinics in maternal and child welfare, and prevention of tuberculosis and venereal diseases. These services were modeled after a clinic that was set up in San Juan by the American Red Cross in 1921. Because of their high demand, the HD recognized the need to expand health services at the municipal level. The dispensaries were viewed as a way to improve sanitary work across the Island and "to create an attitude of good will in the minds of the people" toward the Department's efforts. By 1928, 25 dispensaries had opened in 13 towns. Different bureaus at the central office in San Juan were responsible for their coordination. As the number of dispensaries increased, a lack of integration at the central level became a challenge (47).

In 1925, the Assistant Commissioner of Health, Dr. Antonio Fernós Isern (Health Commissioner, 1931-33, 1942-46; Resident Commissioner U.S. Congress, 1946-64), and Dr. H.H. Howard of the Rockefeller Foundation visited several state health units in the U.S. This provided the alternative of adopting a model of 'municipal health units' with stronger centralized standards, guidelines, planning, and uniformity, to perform health prevention and health maintenance activities-

-the 'modernization of health services.' The first units were established in Río Piedras in October 1926 and in Yabucoa in March 1927. Funding came from the HD, the RF and the municipalities. The implementation plan resumed in other municipalities after an evaluation period. By 1937, there were 76 units, at least one in each of the Island's municipalities (48).

According to historian José G. Rigau-Pérez, the principal cause of death in 1927 was pulmonary infections: a combination of tuberculosis (3,734 deaths), bronchopneumonia (1,375), bronchitis (1,164), and pneumonia (1,019). The second most common causes of death, diarrhea and enteritis (6,000), were mostly prevalent among small children. Thus, pulmonary infections, and diarrhea and enteritis accounted for nearly half of the deaths (13,292 of 30,500, or 43.6%). Malaria followed with 1,910 deaths, almost surpassing deaths due to cardiovascular diseases (1,358) and cancer (576) combined. Uncinariasis caused 623 and tetanus 548 deaths. Rigau mentions that these figures are "typical of populations that have not undergone the so-called 'epidemiological transition,'" because of lack of adequate food, housing, and education, and inadequate sanitation and public health services (49).

The burdens of poverty and diseases lumbered the majority of the people at the time of the establishment of the STM.

Conclusions

On the imperial transitions between Spanish colonial and U.S. military medicine, (50) there are several differential continuities: a) the main achievements of both empires were the implementation of smallpox vaccination; b) health codes were important as general policies, but difficult to implement; c) health municipal units were minimal organizations, more effective on special circumstances (e.g., epidemics) or on larger urban environments; and d) distinct economic epochs may be correlated with analogous health status deterioration of comparable rural populations. On historical discontinuities, health events in different time frames seem to be decisive; main examples are the bacteriological revolution and tropical medicine, with positive (e.g., anemia campaigns) and negative implications (e.g., sanitary cleansing). Pico's fractured era tropical image is highly suggestive.

This essay has shown some of the historical connections that distinct milestones of preceding institutional events (PRACs and ITMH) have with the forthcoming STM, but specific encounters and interactions will be further explored on subsequent articles. These institutional events helped to define communities of medical scientists and demarcate the fields of public health and tropical medicine. The HD was initiating the modernization of health services in 1926, the year that the STM opened its doors. The sociocultural impact of the emergence of the UPR (1903) has not been included because of space constraints. However, it will be the focus of the next article on education. The historical series on education and science will continue to address or uncover unanswered questions. To have

a proper sense of historical context is essential to be able to examine a collaborative exemplar of the modernity of medical science in Puerto Rico.

In history, to place the story within a comprehensive social background is fundamental. It recognizes the need to make an effort, at least, of trying to understand the past respecting its particularities. Ashford's demonstration of uncinariasis in 1899, contextualized by a catastrophic tropical event and the presence of the chronic and endemic peasants' anemia, seems decisive in the development of tropical medicine in Puerto Rico. The historical issue of the social and ideological constructions of the representations of peasants' identity around the time of the anemia campaigns is in need of further study. Two advanced historical theses are useful: a) that the campaign "was an intervention centered on the island's physicians" which "fostered a collective identity" around the medical specialty of tropical medicine (Nicole Trujillo Pagan), and b) that the "explosion in popular participation and mobilization of popular expectations in the pursuit of health is one of the most enduring... consequences of the campaign" (José Amador). The local need of training physicians and Columbia's convenience of acquiring an overseas laboratory in tropical medicine opened up the opportunity for a singular and prolific collaboration between two sociocultural distinct universities. This historical contextualization enriches the view to capture the creative and dynamic environment present at the UPR School of Tropical Medicine and to explain the story of a case of modern science in a neocolonial tropical context.

Resumen

Este artículo trata sobre los antecedentes históricos de la Escuela de Medicina Tropical (EMT) de la Universidad de Puerto Rico, bajo los auspicios de Columbia University (1926-1949). Se expone una visión panorámica de los factores sociales, institucionales y conceptuales que sirven de contexto para el establecimiento de la EMT. De inicio, los autores examinan las continuidades y discontinuidades históricas que se evidencian en las transiciones imperiales entre la medicina colonial española y la medicina militar estadounidense de finales del siglo 19 y principios del 20. Es importante explicar estos cambios para entender el desarrollo de la medicina tropical en Puerto Rico que se inicia, principalmente, con la identificación del determinante biológico de la llamada 'anemia de los campesinos'. El artículo describe los dos acontecimientos institucionales que estuvieron directamente asociados con el surgimiento de la EMT: las Comisiones contra la Anemia de Puerto Rico (1904-1908) y el Instituto de Medicina Tropical e Higiene (1912-1914). La naturaleza y las actividades de estas instituciones permiten que se consideren como eventos precursores. Las nociones de medicina tropical y de enfermedades tropicales se analizan en el ensayo como conceptos históricos. También se examina el papel de la Fundación Rockefeller en el desarrollo de la salud pública en Puerto Rico. Finalmente, se resumen las condiciones sociales y salubristas que prevalecían en la Isla antes de la fundación de la Escuela. En general, el artículo

presenta el contexto histórico que se considera esencial para entender el surgimiento y la evolución de la EMT.

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