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Steven Palmer
University of Windsor

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CHAPTER 2



Shifting Sands of Cuban Science, 1875–1933

Steven Palmer

The principal cast in the production and politics of mainstream Cuban science did not change much between 1875, when a dynamic group of young creoles began transforming research practice in Havana in the waning years of the first war of independence, and the 1920s, when their last representatives passed away.¹ The U.S. occupation and the birth of the republic allowed many scientists to return home from exile, but most had only been gone for a year or two to avoid the war or to establish a role for themselves in the independence movement. The new republic harbored few new scientists of note. Of the one hundred Cuban scientists featured in a recent biographical dictionary, only nine began their research careers between 1895 and 1920 (and five of these in the social sciences). Twenty-five of the previous generation—those whose research had begun between 1870 and 1890—made the cut (seventeen of them were in medicine or related fields, and most of the rest in the natural or pure sciences).² What the occupation and the republic did transform was the political arrangement of scientific institutions, agendas, and practices: their position of power relative to one another, their relationship to the state, and their significance within creole political culture.

The U.S. occupation acted as a prism. It diffracted Cuban scientific energies that had been relatively concentrated in laboratory-based medical research prior to the outbreak of the war of independence in 1895, generating a spectrum of new projects in the republic that, if at certain points vibrant, was dispersed.³ Moreover, if in the late colonial period many Cuban scientists enjoyed great proximity to the defining research and debates in their field, the science done

in the republic was more parochial. There were a number of reasons for this shift. Before the war of independence and U.S. occupation, Cuban science was structured by a creole anti-colonialism in which cultivating a sovereign research capacity was felt to be key. After 1902, with the Platt Amendment giving the United States the right to intervene in the event that Cubans did not effectively manage epidemic diseases that might threaten the United States, scientists and experimental institutions were enlisted to shore up Cuban political sovereignty in a way that valued the reproduction of existing testing and administrative techniques over research autonomy and innovation. In this context scientific service could bring significant political rewards, including appointment to senior state offices. At the same time, especially among physicians, local commercial opportunities during the first two booming decades distracted energies that might otherwise have gone to research. Over the same period, as the resources required for experimental ventures increased with the complexity of much research, it became harder for individual or institutional Cuban actors to compete with, or to collaborate on even terms with, or to get noticed by U.S.- and European-based scientific initiatives. The two areas of greatest innovation in Cuba's republican science were eugenics and agronomy, both domains of inquiry that promised to provide elements for a new creole hegemony.

Of course, these are only the most visible trends in a changing scientific ecosystem that was extremely rich and variegated both before and after independence. I will try to illustrate them by looking primarily at the shifts in the power, agenda, and institutional involvement of two main actors, both creole men from the world of medicine, running through the late colonial era, the U.S. occupation, and the first two decades of the republic: the ophthalmologist Juan Santos Fernández y Hernández (1847–1922), who was at the epicenter of Cuban scientific life during the late colonial era, and the physician, medical bacteriologist, and tuberculosis expert Diego Tamayo y Figueredo (1852–1926), who played a pivotal role in reconfiguring scientific power during the U.S. occupation and early republic. I will follow this with a look at examples of innovative experimental practice that dotted the intellectual landscape of the republic, in particular that of the primate collector and breeder Rosalía Abreu. Their stories show that science and scientists were at the heart of creole politics, both before and after independence. They also demonstrate the strong continuity in scientific leadership that, incredibly, lasted almost half a century and even continued to condition scientific practice and politics through the Machadato.

Searching for Scientific Sovereignty

From 1875 to 1898, Cuban science was not just clustered in the domain of medicine; it was increasingly concentrated in a vanguard group of creole physicians led by Juan Santos Fernández.⁴ Born in 1847 on the Atrevido sugar mill in Bolondrón, Matanzas, Santos Fernández was one of a number of extraordinary scientists spread around the Atlantic world in the second half of the nineteenth century who were children of Matanzas or Cuatro Villas sugar plantation owners. They were at once hugely privileged beneficiaries of the colonial slave-based sugar economy and inherently dissident vehicles of creole desire for political autonomy and nationhood. Indeed, Santos Fernández was not so different in profile from the eight first-year University of Havana medical students sent to the wall for a student prank in November 1871 during the first war of independence. Their mock execution was a symbolic acknowledgment by colonial Spanish society that creole doctors were the emerging leaders of the imagined political community of independent Cuba.⁵ Fearing some such trouble, in 1870 Santos Fernández's parents had taken their two boys out of medical studies at the University of Havana after their first year and sent them to Spain.

At Madrid's San Carlos school of surgery, alongside many liberal-thinking medical students from South America, Santos Fernández gravitated toward a famous professor of anatomy, Pedro Velasco, and was later captivated by the surgical acumen of Spain's leading ophthalmologist, Francisco Delgado Jugo, originally from Venezuela. Both maestros were part of the Liberal camp in the turbulent Spanish politics of the 1860s and 1870s, as well as directors of the Spanish Anthropological Society, founded in 1869 in Velasco's home (which doubled as his private museum of anthropology). Santos Fernández became an enthusiastic member. After a period of study in Delgado Jugo's Madrid Ophthalmic Institute, he specialized in Paris under the meteoric Xavier Galezowski before completing his doctorate in medicine at the University of Barcelona.⁶ Returning to Cuba in 1875, Santos Fernández set himself up at Prado 3, in the heart of the capital's fashionable new district, and within two years was a leader of the creole intellectual avant-garde.

Within months of his return he founded a medical newspaper, the *Crónica Médico-Quirúrgica de la Habana*, and assembled a de facto medical society of some renown to act as its contributing staff. One of those on the masthead was Luis Montané, who had also just returned from Paris after making a name for himself as a brilliant disciple of the medical anthropologist Pierre Broca. Santos Fernández avoided seeking a place in the university faculty, with its scholastic politics and traditional horizons of teaching, but he did

immediately bid on a seat in Havana's Royal Academy of Sciences and was admitted in 1875 on the basis of his doctoral thesis on diseases of the eye (the similarly precocious Montané was admitted the same year). In 1877, with wartime restrictions on creole assembly still in effect, he surprised many by receiving permission from the colonial authorities to establish the Cuban Anthropological Society, whose inaugural session was held in his apartments on the Prado. The society is usually recalled as the creature of Montané, but Santos Fernández was just as significant an agent in its founding: aside from the fact that he had formed a special relationship with Joaquín Jovellar, the captain general of Cuba, after operating successfully on his daughter's eyes, he apparently had accepted a mission from his Madrid mentors to found a Cuban chapter of the Spanish Anthropological Society.⁷

The *Crónica Médico-Quirúrgica* and the coterie of physicians behind the Anthropological Society are two clear expressions of the dynamic medical universe that took shape in Havana in the aftermath of the Ten Years' War. The number of licensed doctors practicing in nineteenth-century Cuba was always large by Latin American standards. Cuba had hosted many skilled medical practitioners since the early nineteenth century, an anomaly produced by the expanding demand for medical and hospital services on ships, in garrisons, and on slave plantations.⁸ In 1887 almost one thousand physicians and surgeons practiced in the island, and by 1899 there were five hundred medical doctors in the city of Havana—at one licensed practitioner for every five hundred inhabitants, one of the highest ratios of physicians per capita in the world.⁹ Over 80 percent of them were Cuban-born, in many cases homegrown products of the university medical school.¹⁰ Funes has noted the crossing of a threshold of organizational necessity during the 1880s and 1890s, with new associations and organized initiatives springing up with great regularity and variety, though again with leadership clearly exercised by medical doctors.¹¹ According to Pedro Pruna's history of the Royal Academy of Sciences (1861–98), all but two of the nineteen figures he identifies as the academy's "guiding group" (based on a point-scale evaluation of administrative and academic contributions) were doctors of medicine.¹² The most active in this group over the entire period, in his calculation, was Juan Santos Fernández.

Perhaps because most analysts of the creole intellectual culture and nationalism have literary studies and political history orientations, medical doctors and other scientists have been left out of portraits that emphasize the artistic, social essayistic, and lawyerly constitutional elements that underlay the Autonomist cause. The role of the *Revista de Cuba*, founded in 1877 by

the lawyer and leader of the Autonomous Liberal Party, José Antonio Cortina, is often seen as the exemplary expression of this new creole liberalism.¹³ Santos Fernández's *Crónica Médico-Quirúrgica* (founded two years earlier) should be read as its pure and applied scientific counterpart. It served an ebullient potential readership that, especially once one considers the rapid expansion in the practice of pharmacy at the time, counted in the thousands. The ambitions of his medico-political project grew apace, especially after 1881 when he married Teresa González de Aguilar, the daughter of the Countess of San Ignacio and heir to the Toca fortune. Now involved in managing sugar capital on both sides of the family, Santos Fernández faced the planter class's conundrum of the 1880s — “threatened with extinction,” in the words of Pérez, with the end of slavery in sight, sugar prices low, and the island in the throes of depression. How to reinvent a creole ruling class in a rapidly changing, increasingly capital-intensive and corporate political economy and how to do so in a way that enhanced claims for Cuban autonomy within the Spanish colonial system?¹⁴ His answer was novel and audacious: with echoes of the early nineteenth-century creole reformer Arango y Parreño as described by Moreno Fraguinals, Santos Fernández undertook or sponsored a series of voyages to identify new technology and incorporate it into his medical enterprise.¹⁵ He sought a transmutation of the sugar mill into the research laboratory, using sugar capital to build a bacteriology and vaccine research institute according to the model and methods of the Pasteur labs.

Science historian José López Sánchez identifies 1885 as an “eclosion,” or coming of age year for Cuban science. Five new scientific periodicals (for the most part medical in nature) saw the light of day, joining the *Crónica Médico-Quirúrgica*, the *Anales* of the academy, and the periodical of the Society for Clinical Studies (founded in 1881).¹⁶ The Instituto Histo-bacteriológico y de vacunación antirrábica de la *Crónica Médico-Quirúrgica de la Habana* also had its origins in 1885. Bacteriology and the hunt for vaccines were the “big things” of the 1880s, promising substantial prestige and power in national as well as scientific politics. The Instituto's first administrator, Eduardo Plá, later recalled that in October 1885 the editorial board and contributors of the *Crónica Médico-Quirúrgica* were sitting around the newspaper office discussing the significance of the recent cable announcing Pasteur's breakthrough in producing an effective rabies vaccine for humans. They began to imagine a radical possibility: “to import the benefits of the Pasteurian method to our *patria*, at the same time bringing it the Glory of being the first country in America to put it into practice.” Santos Fernández decided to seize the moment and finance the creation in Havana of a complex medical research

facility where “professors and students could familiarize themselves with the discoveries of the modern science of bacteriology, which promises to shed light on many points in the still dim field of intertropical pathology.”¹⁷

The Cubans were instantly on top of the momentous announcements coming from Paris by virtue of the telegraph, but they also had special connections to the inner world of Pasteur’s experimental methods. Pasteur’s main physician ally in the rabies experiments, Joseph Grancher, was married to the immensely wealthy Cuban sugar heiress Rosa Abreu, and his chief clinician, the eminent Paris urologist Joaquín Albarrán, was also the Cuban-born son of a sugar planter. In 1885 both were corresponding members of the editorial board of the *Crónica Médico-Quirúrgica*.¹⁸ In April 1886, Santos Fernández went to New York to purchase equipment. Again according to Plá, once the installation of the lab had begun, “it became apparent that we needed to send one of the pioneering group to Paris to study the method in its tiniest details at the side of the illustrious maestro.”¹⁹ The following month, Santos Fernández sponsored a journey to Paris by two young members of the *Crónica* circle, Diego Tamayo and Francisco Vildósola, to train at Pasteur’s laboratories. In August, Albarrán presented the two to Pasteur in his provisional facilities on the rue Vauquelin. After a three-month program of intense study, they returned to Cuba, reproducing strains of rabies vaccines from Pasteur’s labs as they traveled.²⁰

For the Cubans, Paris was a very practical matter of networks outside of Spanish colonial ones that allowed them direct access to resources: allies, training missions, methods, and living laboratory organisms that could be carried to Cuba and inoculated, magically animating their bacteriological technology with Pasteurian power. Creoles now had quasi-therapeutic powers to prevent a specific and feared disease in stricken Cubans that the Spanish colonizers did not possess; they had scalar powers to see and record and analyze and identify potential pathogens in a vast domain of Cuban microbiological matter that the Spanish colonial regime had no access to; and they had established a technology and a network for publication and dissemination of their new products, to be circulated, evaluated, and reciprocated in a new international network of science in which Spain was far from a dominant player. In May 1887, over three hundred eminent creoles crowded by invitation into the Quinta de Toca, the fabulous mansion on Reina that Santos Fernández had acquired through marriage, to see a modern medical laboratory unveiled and observe the production and inoculation of Pasteur’s marvelous new vaccine for rabies. Among the expectant guests were representatives of every instance of Cuban creole cultural power: the

Royal Academy of Sciences, the Sociedad Económica de Amigos del País, the university, the literary and scientific societies of the capital, the Military Sanitary Corps, the militia, the medical-pharmaceutical corps of Havana and Matanzas, and ten newspapers. At the end of Santos Fernández's welcoming address, the luminaries solemnly signed an *acta de constancia*, constituting themselves in an "extraordinary Junta," a declaration of creole scientific sovereignty.²¹

The Santos Fernández group now made its final ascent on the summit of scientific power and authority in the island. Instituto scientists (a dozen or more of the most accomplished researchers in Cuba could be found at its benches at any given time) took the lead in commissions and expeditions to discover the source of livestock and crop diseases. They also formed the core of the commission appointed by the Spanish governor in 1889 to study what they declared to be an epidemic of glanders (an equine disease transmissible to humans, especially in dense urban concentrations of people and horse-drawn coaches and carts). The Instituto labs were used by both local and foreign luminaries to settle an important international debate over the germ of yellow fever. Diego Tamayo, the Instituto's star bacteriologist who had been on the original training mission to Pasteur's labs, made an international reputation for himself with his cautious lab work and collaboration with high-profile researchers like George Sternberg, a leader in U.S. bacteriology who would become surgeon general of the U.S. Army in 1893.²²

The First Medical Congress of the Island of 1890 (a "national" medical congress in all but name) was a remarkable expression of the ascendancy of the Instituto, with its research associates not only among the principal organizers but also accounting for a plurality of the eighty-seven papers presented.²³ The *Crónica Médico-Quirúrgica* had doubled its production schedule from monthly to biweekly to account for the volume of research being written up for publication under its prestigious brand. The Instituto was awarded the public contract to attend to bromatological and forensic analysis, and by 1893 the Santos Fernández faction had gained control of the Academy of Sciences. Its fortunes tied to the hopes of the Autonomist program, this enterprise was positioned to assume the hoped-for mantle of "national" medical research center and semiautonomous public health advisory unit, a private initiative with an organic connection to a public academic body (the Academy of Sciences).²⁴ By this time the Santos Fernández group had lost Tamayo, who resigned in anger in early 1891 claiming that the original spirit and group impetus of the Instituto project had been lost.²⁵ Nevertheless, the lab enjoyed commercial success with its services and biologics,

and in February 1895 its researchers triumphantly announced that they had developed an effective diphtheria antitoxin. These triumphs were eclipsed by the outbreak of the 1895 war of independence. Neither the Instituto's science nor its political influence prospered in a context of polarized and populist belligerence, and the lab would find itself sidelined in the reconstruction of Cuban scientific life under the U.S. occupation.

The Return of Diego Tamayo

After the stabilization phase under General John R. Brooke came to an end and General Leonard Wood took over the government in December 1899, the U.S. occupation became peculiarly medical in nature. Wood himself was a physician, and his tenure in Havana began with an extraordinary effort to sanitize the city by dousing its streets and diluting its fetid port waters with oceans of disinfectant.²⁶ Among the principal targets of this epic sanitizing program was yellow fever, whose source remained a mystery, though it was still strongly believed to be bacterial and likely, then, to be endemic in the putrid organic morass of the capital. The failure of this emblematic effort to reduce the incidence of yellow fever was followed by the splash of a dramatic and entirely novel medical research project in which Cuba's colonial science played a leading role. Through a complex transaction whose dynamics remain the subject of considerable and heated debate among historians of medicine, two of the most important research clusters in the history of tropical medicine—a Cuban one led by Carlos Finlay and a U.S. military one led by Walter Reed—combined their knowledge of mosquitoes and yellow fever epidemiology. The Reed team was able to carry out an elaborate series of experiments at a U.S. military encampment outside Havana to test the proposition, first proposed by Finlay as early as 1881, that yellow fever was transmitted by the *Culex* mosquito.²⁷

The famous results showed definitively that the mosquito was the main issue in yellow fever prevention, and this led to a sanitary engineering program in Havana that eradicated yellow fever from the city in the space of one year. Because of the international profile of these experimental findings and their enormous political implications for development in the tropics (demonstrated in short order in the isthmus of Panama), the episode quickly became the basis for a struggle on the part of virtually every influential physician in Cuba, including former rivals of Finlay like Santos Fernández, to ensure that Carlos Finlay was recognized as the key scientist in the unraveling of this research puzzle. The sense that Finlay's role was given short shrift by Reed and in international medical reportage of the scientific triumph be-

came, overnight, the central symbol of Cuban medical nationalism, and it remains so to this day.

The politics and symbolism of the glamorous Finlay-Reed affair were crucial to the shifts in Cuban science during the second half of the U.S. occupation, but a second drama pitting Diego Tamayo against Juan Santos Fernández, one that has gone essentially unnoticed in Cuban history, was just as fundamental in redrawing the landscape. On taking charge in 1899, Wood established a “creole cabinet” to broker the reconstruction of Cuba, and he appointed Santos Fernández’s estranged protégé, Diego Tamayo, to the crucial position of Cuban minister of the interior. This was a portfolio that charged him with overseeing the civilian side of health and sanitary matters.²⁸ Tamayo, originally from an important family from eastern Cuba, had strong connections with creole elites in the capital. He was an internationally respected scientist who had shared laboratory benches with members of Pasteur’s famous research team as well as with Sternberg. Tamayo was, moreover, a former Autonomist who had abjured at the proper time, gone into exile, and joined the Revolutionary Junta as soon as war broke out in 1895. Wood encouraged and enabled Tamayo’s election to the Constituent Assembly in 1900, where he would play a key role in helping convince the assembly to acquiesce to the Platt Amendment. Wood also appointed Tamayo to the presidency of the Cuban Academy of Sciences when it was refloatated in 1900 as a republican institution-in-waiting. Given the history between Tamayo and Santos Fernández, this was a serious affront to the power and honor of the latter who had been president of the academy when it lowered the Spanish flag and relinquished its royal status in 1898.

The response of the Santos Fernández group came during the Third Pan-American Medical Conference, held in Havana in late 1900 and early 1901 with delegates from throughout the Americas in attendance. The announcement that the mystery of yellow fever transmission had been solved caused a sensation, and the Santos Fernández group seized the opportunity to conduct a public relations campaign in a journal of popular hygiene published by one of its researchers. The cover of the January 1901 issue of *La Higiene* sported the caricature of a triumphal Carlos Finlay flying astride a giant mosquito, with an admiring chorus of smaller *Culex* winging along beside (see figure 2.1). Its pages contained a profile of Cuba’s premier scientific facility, Santos Fernández’s Instituto, a research laboratory still waiting for a sign from the new authorities on its future role. A month later the cover of *La Higiene* featured the Instituto’s leading researcher, Juan Dávalos, reverentially and pointedly caricatured as Quijote on a glanders-ridden Rocinante:



Figure 2.1 Cuban physicians extol Finlay, *La Higiene*, 1901. Courtesy of the Rare Books Library, University of Havana.

here was the heroic figure of the “Cuban bacteriologist” who had been the first person to identify the glanders germ in Cuba and had battled against the disease during the Spanish empire along with others of the Instituto (see figure 2.2). Although the U.S. authorities had introduced regulations to eliminate diseased horses from the capital as early as May 1900, both animal and human glanders were still endemic in the city. The accompanying article, “Glanders and the Intervention” was extremely critical of the U.S. occupation authorities. “The Intervention Government has taken control of city sanitation,” and though they found hideous abuses by the owners of stables and horse-drawn transportation concerns, the “Chief of interventionist Sanitation” had not acted. “Glanders continues to take its course, the same with the Americans as with the Spaniards [in the late 1880s]. The truth is that the Intervention Government only cares about yellow fever, as though Cuba must be forever the exclusive patrimony of those foreigners who have no acquired immunity. Neither the TB hitting our children nor the glanders that shames us in the eyes of civilized peoples enter into the calculations of our non-Cuban governors.”²⁹

The challenge was pointed, but so was Wood’s response: Tamayo was named to head a Special Commission for the Extinction of Glanders and



Figure 2.2 A quixotic Juan Dávalos celebrated for his work on glanders, *La Higiene*, 1901. Courtesy of the Rare Books Library, University of Havana.

Animal Tuberculosis. While Gorgas has gone down in history for overseeing the elimination of yellow fever from Havana during 1901, Tamayo's success in eliminating glanders during the same period of time was, for the Cuban audience of professionals, probably more decisive in consolidating the scientific and public health legitimacy of the occupation authorities and their Cuban interlocutors. The creole medical profession had seen the Santos Fernández group make the fight against glanders, during the late 1880s and 1890s, the defining struggle against the irrationality of Spanish colonial control. Tamayo's success, using the tools placed at his disposal by the occupation authorities, showed that the new regime was more than capable of responding to the shortcomings of Spanish colonial public health. Tamayo's strict enforcement of regulations concerning the keeping, reporting, and quarantining of sick animals, complemented with an offer of compensation for each suspicious animal culled, seems to have made the difference in the eradication of glanders from Havana by the end of 1902.³⁰ This was a signifi-

cant victory for the U.S. occupation government and for those Cubans in the sanitary world who backed it.

Cuba's best physicians clamored to get on board and participate in the U.S. hygienic mission, seeing it as the practical materialization of the anti-colonial scientific agenda.³¹ But they soon saw that they were collaborating in something quite distinct. Whereas, under the anticolonial banner of the Santos Fernández group, hygienism had been part of a rationalist discourse that also envisioned a sovereign Cuban scientific capacity for research and innovation, under the banner of the United States and in the context of the republic, it was the organizing principle of a discourse of sanitary administration using established techniques that was explicitly decoupled from any notion that the island would have state-backed centers of original medical research. Indeed, Santos Fernández's power base, the Instituto, was seriously weakened by the occupation regime when, in 1901, Tamayo and Wood promoted the creation of a new official state laboratory, the Laboratory of the Island of Cuba. Renamed the National Laboratory in 1902, it displaced much of the public function and all of the public authority that the Instituto together with the academy had fulfilled in the 1890s. Wood and Tamayo added insult to injury by hiring away Dávalos, the Instituto's senior microbiologist. The very figure the Instituto group had trumpeted on the cover of *Higiene* as a Cuban scientific hero working in their employ now became director of bacteriology at the National Laboratory and brought with him a number of the other specialists who had staffed the Instituto.³² There is no clear date marking the demise of the Instituto Histo-bacteriológico. It was still the principal private producer of vaccines and sera in the republic in 1915, and it continued to function as a private laboratory, but it never recaptured its centrality to scientific research in the republic.³³ Santos Fernández and his project lost out in the politics of the U.S. intervention, relegated to the margins in the reconstruction of medical and scientific power under the occupation and early republic, stripped of power and personnel, drained of recognition and momentum in each domain of action.

Cuba and the New Tropical Medicine

The Cuban medical community rebounded quickly after 1898: by the census of 1907 there were 1,240 physicians practicing in Cuba (almost equaling the number of lawyers), over 1,000 of them creoles. The national average of one schooled and titled medical doctor for every 1,600 people—quite high in Western terms—was matched by a dense urban concentration in Havana: 511 doctors attended 300,000 residents of the capital (1:600).³⁴ By 1919 the num-

ber of practicing physicians and surgeons in the capital had risen by a third to 684, just ahead of the pace of growth in the city's population, and another 300 were established just outside the city in Havana province.³⁵ The University of Havana's medical faculty was relaunched in conjunction with the U.S. model of the teaching hospital, and Cuban medicine was soon among the leaders in Latin America in medical specialization, something reflected in the growing numbers of professional associations and journals in specialized fields. The center of Cuban medicine, Havana, experienced a proliferation of medical research actors and spaces, but their focus became much more politico-administrative and commercial, much more oriented toward the application of basic sanitary science and clinical and hospital care, with few "pure" research clusters.

Finlayism had instantly become a symbol of the integrity and promise of Cuban medical science, but the sudden power won by U.S. sanitary discourse and tropical medicine—in good measure due to the yellow fever breakthrough in Cuba—was such that it subsumed the program of medical research in Cuba during the first two decades of the republic. Cuba's most important established medical scientists were motivated to throw themselves into the task of organizing and carrying out basic public health measures, beginning with the enlistment in 1900 of more than a hundred eminent Havana doctors to map and sanitize the streets and slums of the capital. They continued to work on basic sanitary management during the cleansing of the city of mosquito breeding grounds, and then carried on staffing the new apparatuses of sanitary administration in the early republican governments. Symptomatic of this shift from innovative research to basic application was the appointment of Finlay as director of sanitation in 1907, a tradition of appointing the most brilliant of Cuban medical researchers to senior politico-administrative public health posts that carried on through the 1920s. To some degree, this was a factor of age and the logical tendency for mature scientists to move into managerial posts and seek public roles. More than this, however, it came of raising Cuban public health to a vital matter of state sovereignty by virtue of Article 5 of the Platt Amendment. Cuba concentrated its most competent scientific minds—especially those recognized as such in the United States—in keeping the island free of diseases the United States considered matters of its own national security. Ironically, in this sense, maintaining political sovereignty through applied science came at the expense of building up a sovereign science.

By the same token, it became clear to established and emerging Cuban medical researchers that resources and recognition would come most readily

in the area of tropical medicine. Between 1898 and 1902 medical research on diseases or conditions in countries located in the tropics radically reconfigured the discourse of tropical medicine. On the British side, the key manifestations of this shift included the creation of a Colonial Medical Service by the British Colonial Office (1898); the publication of the “bible” of tropical medicine, Patrick Manson’s *Tropical Diseases: A Manual of the Diseases of Warm Climates* (1898); the announcement of the work of Ronald Ross on the role of mosquitoes in the transmission of malaria (1898); and the creation of the London and the Liverpool Schools of Tropical Medicine (1899). On the United States’ side were the medical and health apparatuses established in the country’s newly acquired tropical colonies—Puerto Rico, the Canal Zone, the Philippines, and of course occupied Havana.³⁶

Within a very short period of time, then, two great empires—one in mid-life, the other declaring itself dramatically for the first time—created institutional circuitries of medicine and sanitation for their imperial spheres of influence and electrified them with a scientific discourse coterminous with imperial dominion. Obviously, the moment did not emerge from nothing. Medical researchers whom we might see as engaged in “tropical medicine” had been active throughout Britain’s colonies since the seventeenth century, and if the United States was a new player in this game, French, German, and Spanish scientists had been at it for a very long time. But something fundamental had changed. What had been a multi-polar endeavor, with heterogeneous and individual actors, shifted very suddenly toward an Anglo-American apparatus of network-based and institutionalized research, codification, classification, agenda setting, and application. The work of the Reed Commission and Gorgas’s sanitary regime in Havana would be a spectacular confirmation of this shift, and the U.S. ability to tackle successfully the disease obstacles of the Panamanian isthmus through sanitary engineering a spectacular demonstration of the practical power of Anglo-Saxon tropical medicine.

This was the vehicle for two powerful dual-national figures, John/Juan Guiteras and Aristides Agramonte, to reintroduce themselves into Cuba after long absences where they created new nodes of medical research. Of course, neither was a stranger to Cuban scientific life. Originally from Matanzas, while pursuing opportunities in Philadelphia where he had studied medicine, Guiteras had been appointed by the United States as a member of the 1879 joint Spanish-U.S. Yellow Fever Commission, and his connections with Cuban science and society had remained strong; Agramonte was in a sense a younger version of Guiteras, a protégé of U.S. Surgeon General Sternberg

who had been sent to Cuba on a special yellow fever research assignment that complemented the work of the Reed team. University reforms enacted by the occupation government led to the creation of a chair in Intertropical Pathology at the University of Havana in 1899, and the position was promptly awarded to Guiteras. Agramonte, a member of the Reed team, also created a power base for himself with a university chair in Bacteriology and Experimental Pathology, and following the spectacular outcome of the yellow fever experiments, he assumed a leading role in the island's scientific life. Both Guiteras and Agramonte would later serve as ministers of public health.

But they did not carry on the previous discourse of Cuban tropical medicine. The shift can be illustrated by looking at Guiteras's *Revista de Medicina Tropical*, which he began publishing in 1900 under a new banner of tropical medicine defined in the metropolises of the Atlantic empire, particularly London and Washington. The network described on the masthead of the first issue is another good expression of the shift in scientific networks in Cuban medicine following 1898. His collaborator in the journal was Emilio Martínez, director of the Clinical Laboratory, a rival to Santos Fernández's Instituto. Carlos Finlay figured as a writer, while the list of collaborators included three men who had been central to the scientific project of the Instituto but who were on their way to new appointments under the occupation government: Juan Dávalos, Eduardo Lainé, and Tomás Coronado.³⁷ Also figuring in the group were Agramonte as well as Enrique López, Santos Fernández's principal commercial-professional rival as a cutting-edge ophthalmologist in Havana.

In his presentation of the first issue, Guiteras proposed that with the growth of subdivisions in medical science, tropical medicine should become the specialty of "our country, due to its climate, its topographical and ethnic conditions."³⁸ He specifically inserted this project (emerging "in the last five years") into the Anglo-American ascendancy over a French-based anatomoclinical and bacteriological tradition that had grounded Cuban medical research in the late nineteenth century and linked the project to the emergence of parasitology as a discipline. Guiteras endorsed the reaping of Cuba's comparative advantage in terms of the interest of the new colonial powers in solving problems relating to the colonization of the tropics. He proposed a move to parasitology over bacteriology because it is more applied, and inserted his tropical medical program into the contemporary race science by suggesting that Cuban researchers pursue the lessons of the most recent Liverpool trips to Africa and the work of Koch showing that the population of "Negros" were actually carriers of malaria.³⁹

It is notable that Santos Fernández had already moved away from this essentialist mode of racism characteristic of the new current of tropical medicine. Over his first two and a half decades of practice, Santos Fernández had accumulated clinical data on some 5,531 subjects deemed to be of African descent (3,003 “Negros” and 2,528 “mulattos”). In his summary analysis of the data, *Enfermedades de los Ojos en los Negros y Mulatos* (Diseases of the eye in Negros and mulattos) presented to the 1900 International Medical Congress in Paris, he argued that there were no new or special diseases in determinate races; indeed, his immense database demonstrated the opposite: everyone suffered the same diseases of the eye regardless of race.⁴⁰ This Paris paper was an early announcement of the kind of reformulation of categories that would characterize postcolonial Cuban racism—a shift that has been part of a major recent historiographical discussion.⁴¹ Virtually all the works on this subject emphasize the way that Cubans of African ancestry were denied citizenship and scripted into a U.S. and Western European-influenced eugenic narrative that focused on atavism. Yet Santos Fernández was precisely moving away from a notion of pathologies native to different races. Instead, his racial vision of the “vision of race” was more in keeping with the dominant Lamarckian eugenic currents in Latin America—that is, the conjuring of a *cubanidad* that would come from the gradual absorption of those of African ancestry into the general population pool.

His racialized medical research project reminds us that the intellectual process of this reformulation predated independence and was the product of the internal development of Cuban science (including its anthropological vector) using Cuban data.⁴² Santos Fernández certainly remained a leading creole voice in favor of immigration from Spain, and he was part of an important faction in Cuban eugenics.⁴³ His predilection, however, was based more on the logic of a “whitening” *mestizaje* (race mixture) and a belief that Spaniards were more suited to improving Cuba, having acquired greater “civilization.” This was a very different current of racism than the more genetically and tropical medicine-based racist essentialism expressed at this time by Cuban intellectuals such as Fernando Ortíz and Guiteras. As Alejandro de la Fuente has shown, by the second decade of the republic both these latter two would also move away from their early essentialism, in the case of Guiteras to a position almost identical to that of Santos Fernández, and in the case of Ortíz to an ever deeper engagement with Afro-Cuban cultural forms and an embrace of “Afro-cubanidad.”⁴⁴

In the two decades following 1898, a handful of private laboratories devoted to clinical diagnostics were created, and five state labs began to operate,

all under the wings of different ministries, in particular the two main ones devoting their services to the Department (after 1909, Ministry) of Health. The public labs were overtaxed and burdened with analyzing specimens of direct consequence to public administration to the point that they could not even keep up with routine work.⁴⁵ This was a constant complaint of Cuba's leading scientific actors in the early republic. When Agramonte and Guiteras were asked to provide bacteriological confirmation of the existence of plague in 1912, for example, they could not complete their analysis of specimens collected from a cadaver because the official laboratories had had their funds "distracted" and so did not have the proper equipment for the job, "and we were forced to omit this very important detail from our investigation."⁴⁶ Indeed, one might say the same thing for the energies of all the titans of Cuban medical research after 1898: their science was "distracted" into government sanitary administration work and into service defined by the agenda of U.S. tropical medicine. Even Guiteras and Agramonte, who cultivated successful international scientific reputations through the 1920s, carried out their most significant work as consultants in yellow fever for the Rockefeller Foundation in other countries. (Ironically, Cuba no longer had any clinical research advantage in yellow fever, having eradicated the disease.)

The shortcomings were not lost on the country's medical elites for long. In 1917, the Academy of Sciences paid homage to Juan Santos Fernández, its long-serving president, on his seventieth birthday. The heart of the affair were speeches by former collaborators at the Instituto Histo-bacteriológico. The master of ceremonies, Jorge Le Roy y Cassá, one of the most important social and political intellectuals in the early republican community of Cuban medical doctors, observed that events had vindicated the medical research model that Santos Fernández had built in the late colonial era and then seen displaced by the war of independence and a republican birth under U.S. tutelage. Le Roy y Cassá noted that whenever the Cuban Department of Health required specialized research on particular problems, its facilities were so overburdened with the mundane matters of sanitary and legal laboratory analysis that they had no capacity to carry out the work, and neither did the new labs at the university. He concluded, "Given the character and tendency of science, today more than thirty years ago it is useful and necessary to have a research center that is free, without the obligations of teaching institutions and official centers, where old and young, maestros and disciples, might find the manner to perfect their knowledge and devote themselves to the good of the nation and of humanity."⁴⁷

New Wine in Old Bottles

Funes has called the first two decades of republican Cuban science a time of “expansion and continuity” of processes begun in the late colonial era, though broadening in scope into new disciplines and specializations. While scientific research had hardly been monochromatic in the last quarter of the nineteenth century, central issues in medicine were at the core of scientific debate: from clinical practice and specialization, to epidemiology, bacteriology, vaccines, and serology. This changed during the U.S. occupation. Cuban scientific research—still overwhelmingly dominated by creole men—became an eclectic affair that generated a number of novel projects, especially in the areas of agronomy, botany, and zoology, with medical research more or less confined to a thoroughly reframed field of tropical medicine.⁴⁸ Each of the nine scientists listed in García’s biographical dictionary who began their careers after the late 1890s worked in a separate field, and seven of them worked outside the field of medicine. Although the Academy of Sciences was reconstituted in the republic, and medicine retained its dominant role in membership and debates, the institution was neither reinvested with the responsibilities of an official or consultative body for the state, nor given any authority to make scientific policy decisions. These powers were dispersed into different state bodies, many of which developed their own limited research capacity. This dispersal also had an expression in the appearance of new specialized societies and journals, especially in the area of medicine that appeared in the fifteen years after independence.⁴⁹

One of the most significant institutions of republican science was the Estación Experimental Agronómica de Santiago de las Vegas, founded in 1904 to pursue research on Cuban crops in the context of a need to rebuild the Cuban sugar industry following the devastation of the independence wars.⁵⁰ It was built through close consultation with the U.S. Department of Agriculture on the model of U.S. agricultural research stations, and its first two directors were from the United States. This did not prevent the station from becoming a crucial node in a growing Cuban network of agronomists and botanists, and staff appointments soon “Cubanized” the station. The highly politicized nature of these appointments disrupted research continuity over the first fifteen years of operation. In the 1920s, however, after the 1917 appointment as director of Mario Calvino (the father of novelist Italo Calvino, who was born on the station), there was both a scientific revival and a program of practical popular outreach to Cuban farmers.⁵¹ The autodidact botanist Juan Tomás Roig y Mesa had a long, if fitful, career at the station,

and in 1928 he published under its auspices one of Cuba's classic tomes of popular science, the *Diccionario botánico de nombres vulgares cubanos*.⁵² The station also developed links with the Atkins Garden for research on tropical botany and agriculture, established on the Soledad estate outside Cienfuegos as a joint venture between the philanthropic planter and Bostonian Edwin Atkins and Harvard University—another venture that transmuted the sugar plantation into a research station.⁵³ The Atkins Garden flourished in the late 1910s and 1920s and became accessible in a variety of ways to Cuban researchers, but it was also an expression of how the new scientific institutions of the republic could be dependent on U.S. research institutions and models and even formally subordinate to a U.S. agenda.⁵⁴

Of course, not all new science fit this mold. The scientific universalism to which the academy had always aspired, as Rolando García Blanco has noted, “began to be taken on by the University” according to the new model unveiled by the military government in June 1900.⁵⁵ For someone like Santos Fernández, who had always staked out his territory outside—and against—the scientific jurisdiction of the university as a moribund, scholastic space, this cut further into his influence, and he could only stand on the outside looking in as the university was recharged with modernist vigor. But not all of his generation or inclination faced the same fate. His old collaborator in the founding of Cuban anthropology, Luis Montané, was invited inside the university structure. Montané's career path recapitulated an important shift in the nature and purpose of creole scientific practice from the late years of Spanish colonial rule to the second decade of rocky republican politics. Alejandra Bronfman has explored this rebirth of Cuban anthropology in 1900, given impetus by the occupation authorities who created a Department of Anthropology and Anthropometric Exercises as part of their university reform project.⁵⁶ Montané devoted himself increasingly to anthropological, botanical, and zoological research in a broadly conceived and vaguely defined “political laboratory.” Bronfman looks at Montané's role in the combined process of pathologizing and criminalizing Afro-Cuban physiologies and cultural forms. He played no small role in constituting a scientific discourse that served as a reference point and sounding board for the series of disturbing, racist moral panics in early republican Cuba over the alleged kidnapping and murder of “white” children by practitioners of Afro-Cuban religious ceremonies.

Montané also played a role in a world-historical moment in Cuban zoology during the first republic, one stemming from the eccentric genius, international contacts, and great wealth of Rosalía Abreu. Abreu revived and re-

configured late colonial medical research energies in an entirely novel space of republican science: the Quinta Palatino, an estate housing primates that she built on the outskirts of Havana where she became the first person in the world to breed chimpanzees successfully in captivity. In 1915 Montané was called to Abreu's "finca de los monos" (monkey farm) to witness the birth of Anumá, el "chimpance criollo" (the creole chimpanzee) and the first chimp in the world to be bred and born out of the wild.⁵⁷ The paper he presented on the subject to the Cuban Society of Natural History "Felipe Poey" (a new republican space of science founded in 1913) attracted the attention of leading U.S. eugenicist and psychologist Robert Yerkes, who had it translated into English and published in the *Journal of Animal Behavior*.⁵⁸ Hoping to establish a primate research facility of his own, Yerkes was acutely interested in Abreu's methods. Notably, Abreu initially made contact with Yerkes, who was at that time a Harvard-based researcher, through Harvard botanists who were in Cuba developing the Atkin Gardens.

Abreu was in many ways an extraordinary figure, not least because she was a rare Cuban woman who was able to carve a niche for herself in national or international science, even if that niche was inevitably cast in terms of the "eccentric amateur."⁵⁹ The early republican era was arguably more closed than the late colonial era to women in science. This is evident in the trajectory of Laura Martínez de Carvajal, the first woman to graduate from the University of Havana medical school (1888), who became the scientific collaborator of her husband, the ophthalmologist Enrique López, on the brilliant three-volume *Oftalmológica Clínica*. Yet, following López's 1901 death from tuberculosis, Martínez de Carvajal withdrew completely from medical practice and research, secluding herself on an estate outside Havana where she directed a school for disadvantaged girls.⁶⁰ Abreu likewise set up her estate on the outskirts of Havana (and, notably, also ran there a trade school for poor girls), but she was hardly a recluse. Instead she hosted one of the country's most important salons, a coterie aligned with leading factions of Liberalism (Luis Estevez, the first vice president of Cuba was her brother-in-law, and Alfredo Zayas lived for a time at the Quinta Palatino during the Menocal regime). Abreu's interests in animal collecting and the creation of a menagerie during the first few years of the republic transformed gradually into a more systematic focus on collecting and then, quite extraordinarily, breeding primates. While universally recognized for her pioneering feat (one she repeated on many occasions before anyone else had deciphered primate breeding needs), Abreu's status in the history of primatology is problematic due to her reluctance to document her ideas or techniques or publish them

in scientific fora. Even so, her work has recently been the subject of close attention by zoologist Clive Wynne, who calls her “the founder of the study of captive apes.”⁶¹

Although she sketched out a highly original agenda on the outskirts of republican science, Abreu was herself typical in having been part of the inner circle of the Atlantic medical research world of late colonial Cuban science. She was the sister-in-law of Grancher and had lived in the Paris house of Grancher and her sister, Rosa. In 1885 she married Domingo Sánchez Toledo, a Cuban expatriate who was a leading Paris physician and close confidant of Grancher.⁶² She had been, then, a member of the close-knit Pasteurian family during the heyday of its international medical triumph. While it remains unclear how Rosalía Abreu came to study primates, her ideas about breeding and observing animals in captivity were almost certainly formed, at least in part, by her experience of experimental animals kept at the Pasteur Institute.⁶³ In this sense, her more formal entrée into the scientific world as wealthy and innovative primate breeder in early republican Cuba was simply another instance of the shift of a creole medical research establishment with sugar riches and strong French networks into a new mode and guise. Like Santos Fernández, she created an urban estate that transmuted sugar wealth into a research station whose concerns overlapped with emerging areas of biosciences, though given the republican context she cultivated contacts with scientific networks in the United States.

More work on Abreu is needed to discover what relationship her program had to Cuban political and intellectual life, although there are evidently a number of possible connections between her project to breed, study, and develop techniques for stable social hierarchies using captive African primates and the creole concern to find a way to contain politically an Afro-Cuban citizenry perceived to be dangerous, volatile, primitive, and not yet fully socialized. Certainly Yerkes’s interest in developing a primate research facility as the basis for the new discipline of psychobiology has been read by Donna Haraway as an “intersecting construction of nonhuman primates as pets, surrogate children, endangered species, research animals, colonial subjects, and wild animals.”⁶⁴ Haraway cites Yerkes’s book as a particular expression of this. *Almost Human* documents Yerkes’s two-month visit in 1924 to study Abreu’s estate and her primate management and breeding practices. After a long exchange of correspondence and visits with Abreu, during which they explored the possibilities of establishing his own primate laboratories as an extension of Abreu’s estate, Yerkes finally received a large grant from the Rockefeller Foundation to create the Yale University Laboratories of Primate

Biology and the Anthropoid Breeding and Experiment Station in Florida, though he was fortunate to get the core of Abreu's collection as a donation to the Yale facility following her death in 1929. Thus Abreu's Quinta Palatino combined a multitude of strands in late colonial medical, anthropological, and natural history research, from both sides of the Atlantic, to establish an unlikely satellite of psychobiological modernism in republican Havana.

The Fernández Group (Slight Return)

New patterns of Cuban science took shape in the republic. No longer would medical research rule the roost; no longer would creole enterprise and scientific eminence provide a simultaneously official and unfettered state and sovereign scientific agenda to public power. And no longer would the axes of this scientific network run through Paris, Madrid, and Barcelona. Instead, the more common pattern would see actors institutionally entrenched in the university (and other centers of learning) working with private research initiatives that were linked to U.S. scientific networks. Diego Tamayo's career followed a typical path for the new scientific leadership. His cabinet role came to an end in 1905, but his political aspirations continued, and he was elected to the Senate in 1908, the same year that he launched his journal of national hygiene, *Vida Nueva*—at once a vehicle for disseminating a discourse on the intrinsic connection between fomenting hygiene and maintaining sovereignty, and a means for advertising the Tamayo Clinic and its medical product line. He became Cuba's foremost expert on tuberculosis, and in 1919 he was appointed rector of the University of Havana, receiving his own homage from the Academy of Sciences in 1922. He hastened to send a copy of the brochure made for the occasion to his old friend and colleague Leonard Wood, then occupying the governor's chair in Manila's Malacañan Palace. Wood wrote a warm note of congratulations and thanks in return, saying that it brought back "many pleasant recollections of old days in Cuba and your efficient and loyal service in the great work we did there."⁶⁵

Of course, these were tendencies rather than sudden and total shifts—Luis Montané retired to Paris in the early 1920s to live the final chapter of his life as president of the French Society for Anthropology. Indeed there was a strong residual pull toward France and Spain in these years, itself reflective of the eclecticism of the era. And it was in the context of this eclecticism that the Santos Fernández project reformulated itself, in part by disaggregating and redeploying its energies in a way that mirrored and anticipated the diffracted field of Cuban science in the republic. First, at the dawn of the republic, Santos Fernández reclaimed the presidency of the Academy of Sciences.

Tamayo had likely ceded the space willingly once the retooling process of the occupation had come to an end and with it the need to dominate spaces of scientific leadership—even retrograde ones like the academy—for defensive reasons if nothing else. While the Academy had lost its élan and was even the butt of ridicule among a younger generation of physicians, Santos Fernández retook the position as part of a strategy to embrace associationism for its own sake. During the early republic the medical patriarch became a kind of one-man civil society, organizing national and international conferences in medicine, public health, and medical journalism. He also founded medical associations, including the Colegio de Médicos Cubanos, the first attempt at an island-wide professional association, and other groups like the Cuban Society for the Protection of Animals. He began self-consciously to knit a hispanoamerican network with a society and a periodical focused on hispanoamerican ophthalmology that linked practitioners in Spain, Cuba, Mexico, and Argentina. The same kind of “retreat to specialty” characterized his Cuban professional project, as he transformed the *Crónica Médico-Quirúrgica* into a medical periodical focusing on ophthalmology and expanded his practice by taking on his nephew, Francisco María Fernández, who had completed an ophthalmology specialization in the United States.⁶⁶

While Santos Fernández enjoyed some final years of acclaim and homage, it was his nephew who was able to combine these ingredients to attain political power. Francisco María shared the established practice with his uncle, co-edited the *Crónica*, became an important organizer of medical conferences, was elected to the Academy of Sciences in 1921 while his uncle was in his very last year in the president’s chair, and soon became a member of the executive himself—treasurer from 1923 to 1926, vice president from 1926 to 1929, and president from 1929 to 1933. His father had risen to be chief of the Liberal Party in Matanzas, and Francisco María used this regional power base to get himself elected to the Chamber of Deputies in 1925 as a representative for Matanzas.⁶⁷ He acquired an international profile as one of Cuba’s most outspoken eugenicists, culminating in his role as founder of the Cuban League of Mental Hygiene and principal organizer of the First Pan-American Conference on Eugenics and Homiculture in 1927. By the time he welcomed delegates to Havana, he was Machado’s minister of health, which did not stop him from subsequently complementing his ministerial power with a Pan-American diplomatic post stemming from the 1927 congress: he served as president of the Pan-American Office of Eugenics and Homiculture from 1927 until 1933, and housed the agency’s office in Havana’s Ministry of Health.⁶⁸

Thus it would be a mistake to see the residual institutions and activities pursued by Juan Santos Fernández as insignificant to the constitution of scientific or political power in the republic. Not for nothing was his nephew simultaneously an elite practitioner of ophthalmology, editor of a medical periodical, president of the Academy of Sciences, minister of health, convenor of a Pan-American congress, and president of a Pan-American bureau with considerable international cachet. Nevertheless, with Francisco María Hernández's 1933 flight into Miami exile upon the fall of Machado, we might consider that a long period of creole scientific life, first articulated in the 1870s by a coterie of ambitious young researchers led by his uncle, had finally come to an end. To avoid seeing this legacy of Santos Fernández as purely reactionary, however, it is worth pointing out that the Colegio de Médicos, which he cofounded in 1910–11 as part of his ceaseless associationist impulse, metamorphosed in 1925 into the Cuban Medical Federation (FMC), an association that would become a critical forum of Cuban civil society during the Machado period. Not coincidentally, Francisco María Fernández, who was also president of the FMC in 1929, had to face the challenge of a radical faction, *Renovación*, formed as a result of the physicians' strikes of 1927–28. Medical students and physicians emerged as one of the most trenchant opposition groups to Machado—what Ross Danielson has called a “medical insurgency”—and their role in the dictator's overthrow culminated in 1933–34 with the tantalizing rise to power of the physician, professor of medicine at the university, and member of the Academy of Sciences, Ramón Grau San Martín.⁶⁹

Notes

1. I use the term *science* to refer to the natural and physical sciences including medicine. While, especially in the area of medicine, Cuba was a land rich in the circulation of practices linking orthodox and unorthodox practitioners, it was also a country with a formally constituted and populated domain of self-styled scientific practice and exchange, and this is the relatively elite and in some sense official domain that concerns me here. Thanks are due to Reinaldo Funes for constant support and great feedback, and to Olga Lidia Pérez Moreno, archivist of the Estación Experimental Agrónomica de Santiago de las Vegas, INIFAT, and Magalys Reyes and Graciela Guevara of the Museo de Historia de las Ciencias “Carlos J. Finlay,” Havana.

2. García Blanco, ed., *Cien figuras de la ciencia en Cuba*.

3. A recent overview is Fernández Prieto and García González, “Ciencia.”

4. Pedro Pruna describes him as the “promoter and patron of various important scientific enterprises.” Pruna, *La Real Academia de Ciencias de la Habana*, 25.

5. Le Roy y Gálvez, “Ubicación social de los ocho estudiantes fusilados en 1871,” 3, 11; and Le Roy y Gálvez, *La inocencia de los estudiantes fusilados en 1871*.
6. On Delgado Jugo and Galezowski in the history of ophthalmology, see Gorin, *History of Ophthalmology*, 187–91, 217; and Hirschberg, *The History of Ophthalmology in Eleven Volumes*, 10: 243, and 11, part 1-c: 632–38; on Velasco and Delgado Jugo and their role in Spanish medical and intellectual politics, see Pulido Fernández, “Pedro González Velasco,” 35–65; and García del Real, *Historia de la medicina en España*, 1032. On Santos Fernández in Madrid, Santos Fernández, *Recuerdos de mi vida*, 1: 85–134.
7. Pruna and García González, *Darwinismo y sociedad en Cuba, siglo XIX*, 100–101n40.
8. López Denis, “Disease and Society in Colonial Cuba, 1790–1840,” 72.
9. Funes, *Despertar del asociacionismo científico en Cuba*, 45.
10. Mena, *Historia de la medicina en Cuba*, 251–56.
11. Funes, *Despertar del asociacionismo científico en Cuba*.
12. Pruna, *La Real Academia*, 24–25.
13. García Mora y Naranjo Orovio, “Intelectualidad criolla y nación en Cuba, 1878–1898,” 125.
14. Pérez, *Cuba under the Platt Amendment, 1902–1934*, 5–7.
15. Moreno Friginals, *El ingenio: Complejo socio-económico cubano*.
16. López Sánchez, *Carlos J. Finlay*, 284.
17. Plá, “Memoria anual de los trabajos del Laboratorio Histo-bacteriológico e Instituto Anti-rábico de la Crónica Médico-Quirúrgica de la Habana,” 294.
18. Roussillat, *La vie et l'oeuvre du Professeur Jacques-Joseph Grancher*, 74–75; Gelfand, “11 January 1887, the Day Medicine Changed: Joseph Grancher’s Defense of Pasteur’s Treatment for Rabies,” 698–718; Legout, *La famille pasteurienne*. Albarrán was Pasteur’s clinician, observing and caring for those undergoing treatment for rabies at the clinic under his direction at the Enfants malades; see Legueu, *Albarran, Joachin (1860–1912)*, 145–59; and Sanjurjo D’Arellano, *Inauguration du Pavillon Albarran a l’Hôpital Cochín*.
19. Plá, “Memoria anual,” 294.
20. Tamayo, “Correspondencia de París,” 606–9.
21. An Acta de la Sesión Inaugural read, “reunidos, previa invitación, en la morada del Dr. D. Juan Santos Fernández, los señores que firman á continuación, se constituyeron en Junta extraordinaria para proceder á la solemne inauguración del 1H-B de la CMQ”; reproduced in Plá, *Memoria anual*. On the inauguration and early history of the Instituto, see Díaz-Arguelles, *El Laboratorio Histo-bacteriológico e Instituto de Vacunación Antirrábica*.
22. Tamayo, *Les microbes de la fièvre jaune*. On this conjuncture, see Palmer, “Beginnings of Cuban Bacteriology,” 445–68.
23. Funes, *Despertar del asociacionismo científico en Cuba*, 124–30; *Actas del Primer Congreso Médico de la Isla de Cuba* (n.p., n.d.).
24. The process is covered in Pruna, “National Science in a Colonial Context,” 412–26.

25. His resignation letter is Tamayo to Santos Fernández, March 22, 1891, 101362—DTF C03—Archivo del Museo de las Ciencias Carlos J. Finlay, Havana, ff. 2–3.
26. The sanitary dimensions of the U.S. occupation, including an excellent assessment of the work of the Reed Commission, are re-created thoroughly in Espinosa, *Epidemic Invasions: Yellow Fever and the Limits of Cuban Independence*, 73–95.
27. There is considerable literature on this subject, including Stepan’s own iconoclastic intervention, “The Interplay between Socio-Economic Factors and Medical Science,” 412. The Cuban point of view is presented most fully in López Sánchez, *Carlos J. Finlay: His Life and Work*, while the best global view of the hunt from a Latin American perspective is Benchimol, *Dos microbios aos mosquitos*. Delaporte, *The History of Yellow Fever*, is very ungenerous regarding Finlay’s role in this process and makes no mention of the Instituto.
28. Based on his May 1902 parting letter of appreciation for Tamayo’s work, Wood framed that work in terms of “a great reorganization of municipalities, readjustment of municipal boundaries” and enactment of new municipal regulations (101305 DTF C05 Archivo del Museo Finlay). A measure of the extraordinary historical neglect suffered by Diego Tamayo is a recent encyclopedic history of the occupation that misidentifies him as a lawyer: Rodríguez García, *Cuba, Las Máscaras y las sombras*, 427.
29. *La Higiene* 2, no. 41 (February 20, 1901): 490.
30. “El muermo y su historia,” *La Higiene*, November 30, 1901, 839, notes that there had been only three cases since the creation of the commission and gives it high praise. In his memoirs, Santos Fernández states that glanders “continued until the U.S. intervention, which quickly made it disappear” (*Recuerdos de mi vida*, 1: 326).
31. The new enthusiasm is discussed by one from Santos Fernández’s inner group who began to work with the U.S. occupation sanitary authority (Delfín, *Treinta años de medico*).
32. Staff listing, Cuba. Laboratorio de la Isla de Cuba, *Informe de los trabajos realizados en la isla de Cuba*, 14.
33. Fernández Benítez, “Instituciones científicas creadas en Cuba con posterioridad a la guerra de independencia,” 45. Díaz-Arguelles, *El Laboratorio Histo-bacteriológico*, 17, claims that the lab did not formally cease to exist until 1960 when it was collapsed into the Instituto de Higiene following the Cuban Revolution.
34. *Censo de la República de Cuba bajo la administración provisional de los Estados Unidos: 1907*, 301, 545–46, 575.
35. *Censo de la República de Cuba Año de 1919*, 281, 666, 674.
36. Worboys, “Germs, Malaria, and the Invention of Mansonian Tropical Medicine,” 181–207; Farley, *Bilharzia: A History of Imperial Tropical Medicine*; Anderson, *Colonial Pathologies*; Stern, “Yellow Fever Crusade.”
37. *Revista de Medicina Tropical* 1, no. 1 (1900): frontispiece.
38. Guiteras, “Prefacio,” 1.
39. Guiteras, “Consideraciones generales,” 3–4.
40. Santos Fernández, *Enfermedades de los Ojos en los Negros y Mulatos*.

41. Bronfman, *Measures of Equality*; Helg, *Our Rightful Share*; Palmié, *Wizards and Scientists*.

42. Palmié's take on this, in *Wizards and Scientists*, seems to reproduce one imperial trope concerning intellectual transmission by proposing that scientific racist ideas originated in U.S. and European metropolises and later were taken to the periphery, and another related trope by suggesting that technical and intellectual expressions of the native colonial elite are simply mimicry and lack authenticity or originality.

43. Naranjo and García, *Medicina y Racismo en Cuba*, 12.

44. Guiteras, "Estudios demográficos," cited and discussed in Fuente, *A Nation for All*, 179.

45. Fernández Benítez, "Instituciones científicas creadas en Cuba con posterioridad a la guerra de independencia," 43–51.

46. Report to Session of October 25, 1912, Academy of Sciences, p. 2, in Expediente Académico de Aristides Agramonte, Carpeta 4, Archivo de la Academia de Ciencias, Museo Carlos J. Finlay de las Ciencias, Havana.

47. Le Roy y Cassá, "Homenaje al Dr. Juan Santos Fernández," 194–95.

48. Funes, *Despertar del asociacionismo científico en Cuba*, 215–35.

49. The trend is most evident between 1909 and 1920 when specialty journals appeared in such areas as pediatrics, otolaryngology, internal medicine, obstetrics and gynecology, dentistry, and veterinary science.

50. Martínez Viera, *La Estación Experimental Agronómica de Santiago de las Vegas*.

51. "Informe sobre los labores de la Sección Botánica, 1904–1922," Legajo 368, Expediente 29, Botánica, Archivo de la Estación Experimental Agronómica de Santiago de las Vegas, Instituto de Investigaciones Fundamentales en Agricultura Tropical "Alejandro Humboldt," Santiago de las Vegas, Cuba; and McCook, *States of Nature*, 50–55.

52. Martínez Viera, *Juan Tomás Roig*, 40–42.

53. On the links between the Estación Experimental and the Atkins Garden, see Fernández Prieto and García González, "Ciencia," 486–87.

54. McCook, *States of Nature*, 56–60.

55. García Blanco, *Cien figuras de la ciencia en Cuba*, 44.

56. Bronfman, *Measures of Equality*, 6–7.

57. In this usage, *creole* simply means born in Cuba.

58. Montané, "A Cuban Chimpanzee," 330–31.

59. Kirrill Rossianov, for example, describes Abreu as a "wealthy Cuban pet-lover and amateur researcher": "Beyond Species," 277–316. For a more popular culture treatment of early women ape specialists, see Hahn, *Eve and the Apes*.

60. Lara, *Laura Martínez de Carvajal y del Camino*.

61. Wynne, "Rosalia Abreu and the Apes of Havana," 289–302.

62. Estrade, *La colonia cubana de París*, 282.

63. Robert Yerkes's biography of Abreu, based on interviews conducted over two months at the Quinta Palatino in 1924, makes no mention of her Pasteurian connections, nor even of the name or occupation of her former husband. Her entire interest in

breeding chimpanzees and maintaining them in captivity is said to be based on a chance to keep a pet monkey while she was a child. Yerkes, *Almost Human*.

64. Haraway, *Primate Visions*, 42.

65. Wood to Tamayo, April 8, 1922, 101385 CTF 004, Archivo del Museo Finlay.

66. Palmer, "A Cuban Scientist between Empires," 110–17.

67. Information from the Francisco María Fernández Papers, FMF, Archivo del Museo Finlay.

68. De la Fuente, *A Nation for All*, 45; García González and Álvarez Peláez, *En busca de la raza perfecta*, 169–226.

69. Danielson, *Cuban Medicine*, 103–6.