The early training of Antônio Luis Cavalcanti de Albuquerque de Barros Barreto: an itinerary to the international health

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Abstract

The article analyzes the education and training of the physician Antônio Luis Cavalcanti de Albuquerque de Barros Barreto, who studied at both the Rio de Janeiro Faculty of Medicine and Oswaldo Cruz Institute and who promoted the Rockefeller Foundation's project in Brazil. An examination of a will, oral accounts, Barros Barreto's medical thesis, and newspaper reports reveals characteristics of the class of 1913 at the Oswaldo Cruz Institute Specialization Program and shows how these students engaged in the foundation's international health initiatives. The text demonstrates how the idea of partnering with the foundation fueled controversies, impelled negotiations, and led to concessions in states where the foundation had yet to establish its presence, as in Pernambuco.

Keywords: Oswaldo Cruz Institute; Rockefeller Foundation; international health; medical career; Antônio Luis Cavalcanti de Albuquerque de Barros Barreto (1892-1954)

Medical careers and international health

According to Bourdieu (1983, p.122), science is a system of objective relations between acquired positions, that is, a field of competitive struggles. Within this universe, we find social subjects who endeavor to implement science projects that are at the same time social, political, and intellectual. Biographical analyses of intellectual and scientific careers can thus offer an opportune tool for shedding light on individuals' roles in certain fields. Through such studies, we can ascertain the social origins of these actors and the pathways traveled in the legitimation of theoretical frameworks, methodologies, and models for fighting and eradicating diseases. Studies like those by Queiroz (1991) and Candido (2001) have become classics in how we comprehend life accounts. According to Bourdieu (2006, p.183-185), such studies seek to uncover the logic governing a person's professional pathway and lend meaning to it, however artificial this might be; furthermore, the approach is not free from the risk of producing a rhetorical illusion or commonplace representation of existence.

This article analyzes early moments in the training and career of the physician Antônio Luis Cavalcanti de Albuquerque de Barros Barreto, a native of Pernambuco who moved to Rio de Janeiro in the early twentieth century to study medicine. The focus is first on his experiences at two educational spaces: the Rio de Janeiro Faculty of Medicine (Faculdade de Medicina do Rio de Janeiro, or FMRJ) and particularly the Oswaldo Cruz Institute (Instituto Oswaldo Cruz, or IOC). The analysis then shifts to the debate he sparked in the Pernambuco press when, as an IOC assistant, he wrote a series of articles publicizing the Rockefeller Foundation's proposed initiatives, before traveling to Johns Hopkins University to study sanitary administration and public health in 1921. The choices he made and the posts he held over the course of his career strengthened his ties to the field of international health while distancing him from other areas of medicine, such as clinical practice.

The earliest endeavors in the realm of international health came in response to the wave of pandemics that assailed the world in the first half of the nineteenth century, prompting various governments to undertake a series of coordinated actions. In 1851, European countries began organizing international sanitary congresses to define quarantine norms and standardize isolation measures for passengers suspected of carrying cholera. The proliferation of such diseases as yellow fever and bubonic plague, accompanied by new scientific discoveries, demanded increasingly complex, well-coordinated efforts (Cueto, 2015, p.17).

Cueto and Palmer (2016) argue that international health grew out of interactions between Latin American nation-states and other Western nations, like the United States. The process involved the Rockefeller Foundation (RF), an agency that was a part of US foreign policy, in the form of an informal public health arm. The RF concerned itself with health systems in various nations and with the fight against *ancylostomiasis*, a rampant rural disease caused by hookworm. The foundation provided the prime model for the wholly "international" health apparatus that emerged following World War II, when the nation-state became a global norm. For these same authors, some of the leading scientists in the

history of international health, such as Carlos Chagas and Marcolino Candau, forged their careers within a network of scientific and institutional development efforts involving the United States and Latin America (Cueto, Palmer, 2016, p.121-124).

Several sources were used in this study. These included a will and a prenuptial agreement, which speak to the social origins of the Albuquerque de Barros Barreto family; Barros Barreto's résumé, available at the Bahia Academy of Letters (Academia de Letras da Bahia, or ALB), of which he was a member since 1948; the medical thesis he wrote while at the IOC and defended at the FMRJ; a series of articles published by him in the Recife periodical *Jornal Pequeno*, signaling the benefits of a potential cooperation agreement between the state of Pernambuco and the RF; and anonymous replies to these articles, published in the newspaper *Ordem*. Lastly, the profile of the class of 1913 of the IOC Specialization Program (Curso de Aplicação) is illuminated by an interview with Olympio da Fonseca Filho, given as part of a project by the Getulio Vargas Foundation's Center for Research and Documentation on the Contemporary History of Brazil (Centro de Pesquisa e Documentação de História Contemporânea do Brasil, or CPDOC).[1]

A young man on his way to Rio de Janeiro

Antônio Luis Cavalcanti de Albuquerque de Barros Barreto was born to Ignácio de Barros Barreto and Thereza Maria Cavalcanti de Albuquerque de Barros Barreto on May 11, 1892, on Engenho do Meio plantation in the parish of Várzea on the outskirts of Recife, which is where he spent his childhood and youth. Much of the family's assets had been passed down to his mother when she married, in the form of an advancement on her inheritance (Maranhão, 1881). As the niece of the Viscountess of Suassuna, Thereza received one-fifth of the sugar plantation, a part of the Pombal Mansion, the Gurgeia property, slaves, and other real estate, in addition to other items. In April 1894, her uncle, the Baron of Muribeca, also bequeathed her, under voluntary partition, a house valued at one *conto-de-réis*, real estate, cars, wagons, cattle, horses, and a sum of money, valued in total at 112:547$554 (Barreto, 1923).

All assets were managed by Ignácio de Barros Barreto, who held a law degree and was also a liberal deputy under the Empire and federal deputy under the Republic. He purchased machinery for the plantation, then called Usina do Meio da Várzea, and also bought rolling and fixed stock for more than eight kilometers of railway. The plantation went from the status of *engenho* to *usina* as a result of the economic transformations then making themselves felt in Brazil's Northeast, most markedly in the final thirty years of the nineteenth century. *Engenho* owners in Pernambuco modified the state's production park, playing a role in the modernization of production and engendering the emergence of *usinas*. Before this, most *engenhos* were traditional *banguês* that produced dark sugar and did not use the best available sugar production technology, although alternatives were available even before the advent of the Republic. When the central *engenhos* appeared, sugar production underwent modernization, especially in the industrial phase. These mills differed from *usinas* in that they represented a reconciliation of traditional relations of farm production with more modern sugar manufacturing techniques (Andrade, 1989,

p.15; Oliveira, 2011, p.11-13). During the last thirty years of the nineteenth century and first thirty of the twentieth, *usina* owners enjoyed great success; they eliminated *banguês*, absorbed all available land, and surpassed central *engenhos*.

The development of industry in São Paulo and the introduction of the sugar beet to Brazil forced Pernambuco and other states to engage in dialogue for the first time. The pursuit of alternative distribution outlets inaugurated the first mercantile network between the Northeast and Center-South. This in turn contributed toward improvements to the transportation system and encouraged innovations in production, including the introduction of steam engines and sugar bagging (Oliveira, 2011, p.25). Ignácio de Barros Barreto's investment in railway stock is an example of upgrades that *engenho* owners made in order to modernize production and thus maintain a competitive edge and ensure smoother distribution on the domestic market. The advent of *usinas* had spurred the birth of private railways, which were connected to official railways. The Usina da Várzea do Meio was established in 1904 and operated until 1933-1934. It supported the family and appreciated in value over the years.

Antônio Luis Cavalcanti de Albuquerque de Barros Barreto's family belonged to the Pernambuco elites in the late nineteenth and early twentieth centuries. His mother descended from Portuguese nobility and his father was a member of the lettered, economic elites. According to Andrade (1989, p.13), Pernambuco's elitist sugar society concentrated wealth in the hands of an oligarchy that dubbed itself "landed nobility." Comprised of people with ties to only a few families, these elites stood in contrast with the huge mass of slaves and freedmen who were bereft of any assets whatsoever, plus a small intermediary group. This oligarchy traced itself to three origins: the family of the first provincial lord (*donatário*) and his wife, the "Albuquerques;" the descendants of the first migrants, who formed bonds with this family in the sixteenth century; and the new immigrants who arrived in the eighteenth and nineteenth centuries. These immigrants generally built their wealth through commerce and managed to penetrate this closed society by buying sugar mills or through marriage. In 1923, the patriarch of the Albuquerque family named as his executors his wife, his son Antônio de Barros Barreto (then 31), and the Baron of Suassuna. He used the opportunity to call upon the baron to continue his friendship and protective relationship with his children, for which they were grateful, and recommended that his children always heed the advice of that "great friend" when it came to serious family or business matters (Barreto, 1923).

Thanks to the social position enjoyed by the Albuquerque de Barros Barreto family group, one of his children – also named Ignácio – was able to earn a degree in naval engineering, while the young Antônio could travel to the federal capital to study medicine. According to Cueto and Palmer (2016, p.73), among various economically privileged groups in Latin America in the mid- and late nineteenth century, it was not unusual for individuals to move to other cities to study medicine, contributing to the development of international health. Such was the story of Barros Barreto, who moved from the plantation in Recife to Rio de Janeiro, an environment propitious to early teaching and research in tropical medicine. His involvement with the RF project gave him the opportunity to

travel, become familiar with international health experiences, and equip himself to lead Bahia's public health reform.

Among other physicians who left home for their higher education was Carlos Chagas, born on a small coffee farm in Minas Gerais. After moving to Rio de Janeiro, he made an international name for himself and became one of the country's leading public health figures. He also provided guidance to the subsequent generation of students, who were to occupy strategic positions in Brazilian sanitation – a generation to which Antônio de Barros Barreto belonged.

The young Pernambuco student finished high school, obtained an undergraduate degree in letters and sciences in December 1910, and enrolled at the FMRJ that same year. He was only 18 when he began his academic and professional life in Rio de Janeiro, then federal capital. Other members of the Pernambuco branch of the Barros Barreto family also worked in the field of medicine and lived in Rio de Janeiro, possibly influencing his decision to train in the country's political and economic center. Two examples are João de Barros Barreto, who was born in 1866, graduated from the FMRJ in 1888, and in 1900 stepped into chair number 56 of the National Academy of Medicine (Academia Nacional de Medicina, or ANM); and João de Barros Barreto Filho, whose academic career was similar to Antônio de Barros Barreto's. Antônio and João worked together and co-authored research published in the *Anais do Primeiro Congresso Brasileiro de Higiene*. Both were RF fellows in the United States in the 1920s and upon returning to Brazil received institutional and political support for their work. Historiography has paid greater attention to João de Barros Barreto Filho, given his public postings and notable work as director of the National Department of Public Health (Departamento Nacional de Saúde Pública, or DNSP). Antônio has been mentioned briefly in a few studies (Benchimol et al., 2009; Batista, 2017; Castro Santos, 2004).

Early training: The Rio de Janeiro Faculty of Medicine and the Oswaldo Cruz Institute

When Antônio de Barros Barreto commenced his medical studies, the FMRJ had already benefitted from the 1879 educational reform and related enactment of the Free Education Act (Lei do Ensino Livre), which contributed to the recognition of parasitology. Following the reform, new laboratories were opened for classes that required technical training, and this in turn required the importation of sophisticated scientific equipment. Edler (2011, p.209-210) mentions that Oswaldo Cruz was among the students who profited from the acquisition of over fifty-five microscopes, subscriptions to countless foreign medical journals, and the purchase of recently released books from various branches of medicine. From the earliest days of the course, in 1886, Cruz had shown an interest in books on microscopy. At the microbiology laboratory, attached to the hygiene and mesology class, he was able to acquire technical skills in a completely renovated, well-equipped academic environment that helped open the way for many new graduates of medicine. His generation saw bacteriology no longer as a problematic field of scientific investigation but as a field that had been validated through research in helminthology,

protozoology, and laboratory sciences. A growing contingent of medical students were skeptical about the paradigm of medical climatology that had long held sway at medical institutions in Brazil and worldwide. The new generation believed instead that microbiology could legitimately formulate and answer questions about the etiology and pathogeny of serious diseases.[2]

The reforms led by the professional elites in Rio de Janeiro and Salvador over the course of the 1870s should be seen as reflecting the broad movement then revolutionizing the theoretical and institutional foundations of knowledge in the Old World. Prevalent clinical tradition, based on general knowledge, came up against medical specialization, restricted to a specific set of phenomena. This fed into the establishment of a new teaching program, tied to experimental research, experimental physiology and pathology, microscopy, and parasitology. From that point on, research presented new content that signaled the advance of medical specialization and the expansion of areas of study, both in terms of diagnosing etiology and pathogeny and in terms of therapeutics aimed at specific areas of the body. Schools of medicine were no longer seen as mere medical societies but as natural places for developing research (Edler, 2011, p.212, 221).

When Barros Barreto enrolled at the FMRJ, he thus found himself in an environment favorable to the advancement of his field of research. While the Free Education Act had delineated disciplines and areas, it had also laid the ground for deeper investigations of parasitology. As a student, Barros Barreto enjoyed the advantages offered by the FMRJ, although he would go on to have a richer experience in the field of bacteriology and tropical diseases at the IOC Specialization Program, in 1913 and 1914, with an emphasis on microbiology and medical zoology.

Understanding the role that the IOC played in the training of young medical professionals means knowing the history of the institution itself, a topic that has already been studied (Benchimol, 2001, 2005; Benchimol, Teixeira, 1993). The early twentieth century was a period vital to the consolidation of the IOC as a center for the investigation of tropical diseases. Originally called the Federal Serum Therapy Institute (Instituto Soroterápico Federal), the organization was set up on the former Manguinhos Farm following the arrival of the bubonic plague in Brazil, through the port of Santos. In its drive to replace sera and vaccines imported from the Pasteur Institute in Paris, the institute became South America's first great center for experimental medicine, thanks especially to Oswaldo Cruz, who had attended the Pasteur Institute's microbiology course and spent time at the Municipal Toxicology Laboratory in Paris (Benchimol, 2005, p.71; Benchimol, Teixeira, 1993, p.3-18). The IOC had already gained international visibility when it was transformed into the Institute of Experimental Pathology (Instituto de Patologia Experimental) and made a federal agency. After winning a gold medal at the 14th International Congress on Hygiene and Demography for its yellow fever display, it was renamed the Oswaldo Cruz Institute.

Regarding the reception of germ theory in Brazil, Jaime Benchimol argues that there were two generations of "Pasteurians." The first emerged in response to the discovery of the vaccines against avian cholera (1880) and carbuncles (1881), which spread germ theory

around the globe. Intent on tracking down the etiological agent of yellow fever, Domingos José Freire (1843-1899), a Brazilian, announced the discovery of a microbe called *Criptococcus xanthogenicus* through analogy with the bacterium of carbuncle, whose spores had been discovered in the graves of animals killed by the illness. Furthermore, it was believed that sodium salicylate could cure the disease (Benchimol, 2005, p.57-58; 2001, p.31-38). The discovery of this alleged organism fueled controversies between Brazilian and foreign physicians, likewise resolved to discover the yellow fever "bacillus." At that time, the key feature of scientific production was the use of Pasteurian theory to identify the bacterial agents that scientists were attempting to classify as causal agents of numerous diseases.

The second generation of microbiologists was tied to Oswaldo Cruz's initiatives and to a radical shift in the approach to yellow fever, while public opinion was convinced that the causal agent was a bacillus. This transformation took place around 1880-1881, when Juan Carlos Finlay, a Cuban, introduced his hypothesis of disease transmission by a mosquito. In 1900, Finlay demonstrated it to the US team headed by Walter Reed. This explanation acquired greater consistency after Ronald Ross discovered the life cycle of the avian malaria parasite in the *Culex* mosquito in 1898 and Giovanni Grassi, Amico Bignami, and Giuseppe Bastianelli revealed the life cycle of the human malaria parasite in mosquitoes of the genus *Anopheles* in 1899 (Benchimol, 2005, p.71-73). In 1900, Walter Myers and Herbert E. Durham, of the newly founded Liverpool School of Tropical Medicine, a major European center for the dissemination of the principles of tropical medicine, journeyed to Brazil to investigate yellow fever, with the general idea that the disease was transmitted by an insect host, a notion that gained traction with the news out of Cuba. In Brazil, this process influenced the field of bacteriology, whose practitioners began exploring the notion of vectoral transmission of disease.

While the debate was being waged over means of transmission, professionals and students seeking to specialize in bacteriology and tropical medicine were doing work at the IOC and obtaining multidisciplinary training. Benchimol (2005, p.86; 2001, p.54) and Benchimol and Teixeira (1993, p.20) have shown that research, teaching, and the production of sera and vaccines were not separate activities. While researchers had to attend to the society's pressing health issues, they had freedom in choosing their objects of study. The authors argue that Oswaldo Cruz wanted those involved in his "kindergarten for science" (*jardim de infância da ciência*) – as he referred to his researchers, all under the age of 30 – to attain the self-confidence needed to conduct their own original research. It was within this environment that young medical students from different regions of Brazil came to the institute's laboratories and did original work. Antônio de Barros Barreto developed and refined his skills at this scientific kindergarten, a space for professionalization designed and led by Cruz.

A few years before Barros Barreto joined the IOC, however, the institute had undergone a reform that led to institutional hierarchization and put a focus on the training of specialists. Laboratories were divided up and job duties stratified (Benchimol, Teixeira, 1993, p.26). This process changed not only laboratory practices but also the way teaching was structured. Classes were fully institutionalized in 1908 and attracted ever more

students and professionals keen on researching tropical diseases, and many came from the FMRJ. According to Bianca Cortes (1993, p.125-136), there were two phases to teaching at Manguinhos from 1902 to 1917. The first ran from 1902 to 1908, when there were three main figures. One was the apprentice, who began his work after passing an interview with the director; his focus was on serum and vaccine production and he assimilated theoretical and technical knowledge and learned how to clean and prepare the animals used in experiments. A second category was the intern, who was guided in the investigation of a given topic by a more experienced researcher. The third figure was the doctor, who finished his program of classes and then joined the IOC staff.

The second phase began after teaching activities were officialized under Decree Law 1.802, of December 14, 1907 (Brasil, 1907), which established the Institute of Experimental Pathology. However, the profile of students remained unchanged. As more students took an interest in classes, and research work at the IOC grew more complex, the argument was posited that teaching activities should be organized in the form of the Specialization Program. Many of those who had studied at Manguinhos became advisors to the new students enrolling in the course.

To apply, the candidate had to present a letter of interest to Oswaldo Cruz. Olympio da Fonseca Filho had been keen on laboratory work ever since enrolling at the FMRJ, and in 1912 he was working at Professor Hildegardo Noronha's lab there. Pacheco Leão, also on the FMRJ faculty staff, encouraged him to enroll at the IOC, telling him that if he really wanted to devote himself to research, he should go to Manguinhos; the professor then provided him with a letter of introduction. But when Fonseca Filho got there, the director told him he could only enroll in 1913, since the 1912 class was full (Fonseca Filho, 2010, p.11).

The class of 1913, of which both Barros Barreto and Fonseca Filho were part, was the sixth group to enter the Specialization Program after it was officialized at the IOC in 1907. Twenty students applied (Image 1),[3] but only ten were accepted. More than half the students were physicians unable to master the mathematics portion of the course, and this eliminated a number of them. The class of 1913 took fourteen months to complete the course, while earlier groups had done it in only six or eight months. Classes were held at the new facilities in the Moorish Castle. Faculty members included Henrique Figueiredo de Vasconcelos; Alcides Godoy, a specialist in physical chemistry and mathematics and a disciple of the renowned German physical chemist Ernst Rodenwaldt, who taught the first course (Fonseca Filho, 2010, p.11; see also Cortes, 1993, p.139); and Carlos Chagas, who, exceptionally, gave the entire protozoology program for this class. Chagas was then enjoying great prestige due to his 1909 discovery of what is now known as Chagas disease (Fonseca Filho, 2010, p.14).

Image 1: Barros Barreto and the class of 1913 at the IOC (Centro de Documentação/COC/Fiocruz)

In addition to Barros Barreto and Fonseca Filho, the class of 1913 included such names as Joaquim Vidal, Bento Oswaldo Cruz, Mario Dutra e Silva, João Florêncio Gomes, Cássio Miranda, João Tavares, Raymundo Paes, Pereira Filho, and Carlos Burle de Figueiredo.[4] Some held posts as assistants at the IOC, where they continued conducting public health research, developing sanitation projects, and aiding the advance of Brazilian science during the 1910s and 1920s. Fonseca Filho held many of the same posts as Barros Barreto. He too worked as an IOC assistant, head of the IOC Mycology Section, and an inspector with the Federal Sanitary Commission on Yellow Fever (Comissão Sanitária Federal da Febre Amarela) in Bahia in 1920 (Lima, s.d., p.5-11).

Barros Barreto had demonstrated his aptitude for research in tropical medicine while attending Specialization Program classes in microbiology and medical zoology. In 1914, Oswaldo Cruz invited him to continue researching at the IOC and write his thesis there. Many students wrote their medical theses for the FMRJ at Manguinhos after finishing the Specialization Program, primarily because they enjoyed free access to laboratories. As IOC director, Cruz often changed the direction of young researchers' thesis proposals. Fonseca Filho, for example, submitted a proposal that was analyzed by Cruz and Aristides Marques da Cunha, a disciple of Henrique Aragão and specialist in protozoology. The two men reached the conclusion that Fonseca Filho should switch topics, tackling instead a proposed program on parasitic flagellates of humans and animals. Since the field was so vast, they suggested he focus on flagellates of humans and mammals; new discoveries soon followed (Fonseca Filho, 2010, p.15). Fonseca Filho uncovered a species of human parasite,

which he named *Anterómonos hominis*. His thesis made an immediate impact; its abstract was published at the Pasteur Institute and in the *Tropical Diseases Bulletin*.

The thesis submitted by Barros Barreto to the FMRJ on November 20, 1917, and defended on December 12 of the same year, was entitled "Revisão da família *Subulurinae*, Travassos 1914" (Review of the family *Subulurinae*, Travassos 1914). He wrote it while working at the IOC Helminthology Section and dedicated it "To the memory of Oswaldo Cruz: the master," as a "Respectful tribute from his disciple A.L.C.A. de Barros Barreto" (Barreto, 1918). Cruz had passed away in February 1917, and his disciple used this opportunity to recognize the role the scientist had played in shaping his research:

> At Manguinhos, after completing the course in Microbiology and Medical Zoology, our efforts were guided by the beneficent hand of Oswaldo Cruz in matters related to Helminthology, a rich and vast field, where much has yet to be accomplished in terms of systematics and even more so in researching and elucidating questions in biology and ecology. It was therefore easy to identify within the realm of Nematology problems that excite a scholar's curiosity and enable the production of original work (Barreto, 1918, p.9).

In conducting this research, Barros Barreto read the work of the Tropicalist School of Bahia, especially Otto Wucherer's studies on *ancylostomiasis* and human filariasis, published in *Gazeta Médica da Bahia* starting in 1866. In the area of filarial diseases, he also became familiar with the work of Silva Lima, Felício dos Santos, Silva Araújo, Victorino Pereira, and especially Severiano de Magalhães, leaders in experimental medicine. Barros Barreto explained he had a special appreciation of Magalhães because the scientist's helminthology research had rightfully earned him a noteworthy place among the most esteemed parasitologists of his era (Barreto, 1918, p.10). Magalhães added his voice to the discussion of "Arabian elephantiasis," later named filariasis by late nineteenth-century specialists in parasitology. While professor at the FMRJ, Magalhães made an important discovery that helped solve the problem. Studying cases at Santa Casa da Misericórdia hospital, he located two bodies of worms, one male and one female, in the left ventricle of a deceased boy and identified them as *Filaria bancrofti* (Edler, 2011, p.240).

Barros Barreto complained about what he called the "almost total abandonment" of concerns related to helminthology and parasitology. He underscored the role of Adolpho Lutz, whose work had enriched South America's helminthological literature. He also criticized the fact that few readers truly appreciated the valuable work done by Lutz. However, these studies by Lutz were not published in Brazil but rather in the *Centralblatt für Bakteriologie,-Parasitenkunde und Infektions-krankheiten* (Barreto, 1918, p.11).

Lutz was a major researcher of Brazilian tropical medicine and had undergone broad international training, at Leipzig, Strasbourg, and Prague. His career can be roughly divided into three phases (Benchimol, 2003, p.14-15). In the first, from 1881 to 1882, he worked as a clinician while also publishing a good number of original articles on the cases he treated. He visited various regions of Brazil, Europe, the United States, and Oceania and worked with a number of fields, such as helminthology, protozoology, bacteriology, clinical medicine, therapeutics, and veterinary medicine. He spent the second phase, from 1893 to

1908, as head of the Bacteriological Institute of São Paulo (Instituto Bacteriológico de São Paulo). The third phase began when he joined the IOC staff in Rio de Janeiro, where he devoted himself completely to research and became the key link between Bahia's Tropicalist medicine and post-Manson medicine (Benchimol, Sá, 2003, p.287-288).

Lutz, the master of Brazilian medicine, explored many issues, including *Ancylostoma duodenale*, leprosy, *Schistosoma mansoni*, cholera, and typhoid fever. He brought a substantial trove of zoological knowledge to Manguinhos and had a hand in building its biological collections and training young physicians (Benchimol, 2003, p.71), such as Barros Barreto, who, when writing his thesis, relied on Lutz's experience and on a small part of the material he had collected during his travels.

When the IOC was founded, one section was devoted to the study of helminths, not only of human parasites but also of parasites that feed on animals. José Gomes de Faria, who had also trained with the Specialization Program, led the section. His work helped the institute earn a name in helminthology, with an emphasis on the morphology, systematics, and biology of *Ancylostoma*. The physician was succeeded by Dr. Lauro Travassos, who had gathered most of the material that Barros Barreto used in his doctoral research from places as diverse as Rio de Janeiro, Ilha Grande, Pernambuco, Alagoas, and Sergipe. The material covered numbers 1,070 to 1,134 of the IOC Helminthological Collection. Travassos lent Barros Barreto much assistance in organizing his thesis and kindly answered questions that arose during the investigation, which entailed some 500 autopsies. The study found and described two species of nematodes (Barreto, 1918, p.12).

Barros Barreto was busy with other activities as well during the time he trained and conducted research at the IOC. He was an intern at the army hospital (Hospital Central do Exército) and, after passing a competitive public exam, was accepted into the FMRJ dermatological and syphilis clinic and also to serve as an academic aid (*auxiliar-acadêmico*) at the Rio de Janeiro Public Assistance Service (Serviço de Assistência Pública do Rio de Janeiro). He published original research in *Brasil Médico* as a contribution to the standardization of the species classification of helminths. He was awarded the title "Student Laureate" at the FMRJ, granted to students who passed more than two-thirds of their classes with the grade of "distinction" ("*distinção*," or 10 out of 10) and who earned no grade of "basic" ("*simplesmente*"), according to the 1901 Regulations. He received only two grades of "fully" ("*plenamente*," or 9 out of 10), earning "distinction" for all other classes during his medical studies (ALB, 1947, p.1).

In addition to his exchanges with helminthology specialists, Barros Barreto developed a close relationship with Carlos Chagas, then IOC director. He thanked Chagas twice in his thesis, for the fatherly advice and undeserved praise accorded by him. According to Fonseca Filho (2010, p.15), it was unusual for more personal relationships to develop between teachers and students. Their contact was generally limited to the classroom, and then each then went off to his own laboratory. Yet we cannot overlook the fact that Oswaldo Cruz spent the 1910s striving to forge a cohesive team dedicated to proving Chagas disease, which was chosen as the flagship in the drive to cement the IOC as a protozoology institute. This process helped draw researchers together professionally, but it quite likely had an impact on personal connections as well.

First identified in rural Minas Gerais, Chagas disease took center stage in the 1910s as "Brazil's disease." In her analysis of the controversy and questions surrounding its discovery, Simone Kropf (2009) argues that this case shows how heavily Brazilian scientists relied on the theoretical framework of European tropical medicine in constructing knowledge that gained specific meaning in the Brazilian context of the day, in the form of original contributions to the field. When the veracity of Chagas's discovery was challenged, it mobilized Chagas and other IOC researchers, who sprang to the defense of the idea that the study of tropical pathologies should be for the benefit of the nation (Kropf, 2009).

Although Chagas's discovery would be contested on other occasions, the discourse about "Brazil's disease" had gathered momentum. Those in the public health movement with a medical background played a major role in perpetrating the image of the Brazilian people as abandoned, and this at times kindled a significant reaction in the press (see Sá, 2009b, p.336).

In 1912, the physicians Belisário Penna and Arthur Neiva had led an IOC medical and scientific expedition to the country's North and Northeast, and the 1916 release of their report had a big hand in spreading the ideas of the physician Miguel Pereira, who labeled Brazil a "vast hospital" (Sá, 2009a, p.184).

The Brazilian government had organized a series of scientific expeditions during the 1910s to explore far-lying regions unknown to most residents of the country's large urban centers and to foster greater national integration. The roots of this project trace to the Empire, but such initiatives accelerated under the Republic and acquired new expression. The notions of "incorporation" and "scientific knowledge" were wed in the push to conduct nosological surveys and fight diseases in places meant to be settled and populated (Sá, 2009a, p.186). The students and researchers at the IOC saw the impact made by the information gleaned from these journeys, so Barros Barreto and his colleagues were aware that the sanitation of Brazil was a paramount need.

In the first decade of the twentieth century, students often hesitated between a career practicing medicine or one conducting research at a fledgling institute where there were as yet no concrete guarantees about professional growth; but as career prospects broadened, laboratory training and research became a more attractive avenue for new students (Cortes, 1993, p.109). From the 1910s to 1920s, many students and researchers at Manguinhos also spotted the chance to make a nationally known name in research by investigating tropical medicine and discovering pathologies and vectors. As a step along this path, they worked hard to perform well in the Specialization Program. According to Fonseca Filho (2010, p.14), he, Pereira Filho, and Cássio Miranda – members of the class of 1913 – took complete notes on all of Carlos Chagas's classes and then dictated then to others during coffee breaks. They were eager to assimilate this content because they knew it would set them apart from others and be a vital factor in the discoveries they dreamed of making.

In 1916, Barros Barreto took a competitive written, practical, and oral exam for the position of IOC assistant. He was one of fifty candidates, all physicians with vast experience in scientific research, and he ranked among the top. He was immediately hired for the position, which he held until 1921 (Image 2). He then took a series of exams for the post of health inspector with the DNSP and scored first among eighty-one. As an IOC assistant,

he participated in scientific commissions like the one on Research on the Etiology of Yellow Fever in Northeast Brazil (Pesquisas sobre a Etiologia da Febre Amarela no Nordeste Brasileiro). As many other new graduates of the institute, he was on his way to numbering among the notable physicians of his generation (ALB, 1947, p.1).

Image 2: Barros Barreto's registration as IOC Assistant (Centro de Documentação/COC/Fiocruz)

Assistant at the Oswaldo Cruz Institute and early work with the Rockefeller Foundation

The 1913 class of the Specialization Program can be noted for its involvement in a new project to eradicate hookworm disease in various countries around the world, through the Rockefeller Foundation's international health enterprise (see Fonseca Filho, 2010; Barreto, 23 fev. 1918, 25 fev. 1918). In 1913, the US agency created the International Health Commission (IHC)[5] with the goal of eradicating this tropical disease in undeveloped countries. A pilot project was conducted in Central America and the Caribbean, starting with British Guiana, Costa Rica, Guatemala, Panama, and Trinidad. Steven Palmer (2015) has called this the "origin" of the project developed in Brazil in 1916.

The RF arrived in Brazil precisely at the moment when sanitation was a growing national concern. As elsewhere, the agency worked directly with local authorities in an effort to enhance ongoing initiatives. According to Faria (1995, p.109-110), agency representatives found themselves in a country that already boasted substantial experience in biomedical research and had its own research centers, like the IOC and the Butantan Institute, and so they partnered with Brazilian scientists in defining goals and action plans. Important researchers at Manguinhos, such as Belisário Penna and Arthur Neiva, contributed greatly to the foreign agency's initiatives. Neiva felt the Brazilian mission would benefit the country's professionals in this field, particularly by producing new scientific knowledge and generating experience with public health campaigns and medical education.

Adolpho Lutz accompanied the visit by Bailey K. Ashford, of the US Army Medical Corps. Lutz, like Carlos Chagas, supported the RF approach. Moreover, IOC physicians wanted to ensure that Brazil's engagement with international health, in partnership with the US agency, would ground itself in, and follow the path of, the federal public health system model that had been developed over the previous ten to fifteen years by visionary Brazilian physicians (Palmer, 2015, p.22-24).

Researchers with ties to the IOC not only assisted the RF in Brazil; they were also major spokespeople for its international health project. The interests of the public health movement and of the agency converged in the treatment of hookworm infection and disease. As an IOC assistant, Barros Barreto had the opportunity to return to his native state to head up the laboratory at the Federal Sanitary Commission on Yellow Fever (ALB, 1947, p.1). One of his actions was to disseminate incipient RF work in Brazil and introduce Pernambuco's elites to the agency's method for fighting hookworm disease, also known as uncinariasis and "*opilação*" (oppilation; literally, crowding or obstruction). In February and March 1918, Barros Barreto wrote a series of five articles for the Pernambuco newspaper *Jornal Pequeno*, under the title "Profilaxia da Ancilostomose" (Preventing ancylostomiasis). The local elites were to voice their disagreement through anonymous replies published in the Recife periodical *Ordem*.

It is worth noting that when the RF implemented its initiatives, it would usually first approach the editors of local papers and ask them to publish articles explaining, and backing, the work of the anti-hookworm brigades. If a newspaper owner balked, space could simply be purchased in the paper (Palmer, 2015, p.161). The director of *Jornal Pequeno*, Thomé Gibson, kindly ceded first-page space for an overview of this innovative project (see Barreto, 25 fev. 1918).

Analyzed as a whole, the articles written by Barros Barreto (Barreto, 23 fev. 1918, 25 fev. 1918, 27 fev. 1918, 2 mar. 1918, 5 mar. 1918) could serve as a kind of tutorial meant to inform the public about the advantages of the procedures advocated by the RF. All five texts began with the same epigraph, by Belisário Penna: "Cleaning up Brazil means peopling it, enriching it, and moralizing it" ("Sanear o Brasil é povoá-lo, enriquecê-lo e moralizá-lo"). These words were the motto of the Pro-Sanitation League of Brazil, founded that same year. Barros Barreto's use of this quotation reflects his links to the public health project of the second decade of the twentieth century, which was developed by IOC researchers, as shown by Hochman (1998). At the same time, one should also not overlook the fact that

when the Pernambuco physician embraced these proposals, it also facilitated opportunities for his professional growth.

In the first article, published on February 23, 1918, Barros Barreto analyzed the RF's arrival in Brazil and the benefits afforded Rio de Janeiro under this partnership, an experience much like that in other countries, such as the Guianas, Egypt, and the United States. He wrote that Brazilian political leaders were finally waking up to matters of rural hygiene, and he applauded Manuel Borba, governor of Pernambuco (1915-1919), for his intended plans to combat hookworm. While Barros Barreto said he did not want to tell the government what means it should use to combat this endemic disease, he indicated which eradication approach he considered best:

> Far be it from me to suggest what measures should be adopted, or preach on the subject, or attempt to argue the primacy of the concepts of this or that school of Tropical Pathology. I merely want to recount, in simple, unpretentious language, how the State of Rio de Janeiro has been affected by the Rockefeller Foundation, a useful, charitable association of humanitarian intentions, liberating the people of this auspicious State from the dreadful octopus whose horrible tentacles frustrate efforts to foster agricultural and industrial progress, rendering wholly inefficacious the most promising endeavors aimed at strengthening the economy of this unit of the Federation (Barreto, 23 fev. 1918).

Barros Barreto's mention of "this or that school" of tropical medicine was an allusion to the British school, whose lodestar was Patrick Manson, and to US tropical medicine, disseminated by the RF, each of which had its own model and thus its own method for fighting diseases like verminosis. This distinction would be referenced in the subsequent articles.

Steven Palmer (2015) has described the new experimental method proposed by the RF. Called the "intensive method," its goal was to eradicate hookworm in a designated area through systematic surveillance, census surveys, physical examination, and drug treatment of all people within its borders. The method employed extensive self-assessment and a Fordist conception of labor organization aimed at achieving maximum "cost and cure" efficiency (see Palmer, 2015, cap.4). Those were the terms in which the first article painstakingly described the method.

Barros Barreto wrote that the agency's first step toward the eradication of the endemic disease was a survey to count carriers of the worm. To this end, a temporary service was created and its leadership entrusted to Lewis Wendell Hackett, International Health Board (IHB) representative in Brazil; other team members were Fonseca Filho, Barros Barreto's former classmate in the Specialization Program and also an IOC assistant; two microscopists; and a half dozen health inspectors (Barreto, 23 fev. 1918). Fonseca Filho traveled to several towns in the state of Rio de Janeiro, did microscopic examinations of stool samples, and promoted lectures in accessible language, with projections depicting the impact and morphology of the hookworm, its habitat, and its ways of life. He also summarized how the disease expressed itself and showed how it stunted a carrier's growth. Following 6,000 microscopic checks for hookworm eggs, Fonseca Filho concluded that 85% of the population suffered from hookworm disease. Barros Barreto (23 fev. 1918)

believed the figure would be no lower in his home state, bringing to 800,000 the number of afflicted Pernambucans.

In a second text, published two days later, Barros Barreto explained how the RF had set up offices in Rio de Janeiro following its thoroughgoing survey of the number of hookworm sufferers. The agency opened a central department in Niterói and a first branch in Rio Bonito, in the Baixada Fluminense region, one and a half hours outside of Rio de Janeiro, as we are also informed by Faria (1995, p.120). Hackett led the department, while Carlos Burle de Figueiredo replaced Fonseca Filho as head of the Rio Bonito branch.

Figueiredo continued giving lectures and publicizing the initiative. Trading medication for stool samples, he put the RF plan into action in the state of Rio de Janeiro. Containers indicating patient's name and age were distributed and then collected the next day and given to the microscopists, who would then observe egg types. They diluted the sample in a bit of water and placed it on a 10cm slide; if the result was negative, they prepared a second and, if necessary, third sample. After use, the slides were dipped in a weak solution of formalin and then in alcohol. Through this process, Figueiredo concluded that the rate of endemic hookworm disease in the municipality of Rio Bonito was 94% (Barreto, 25 fev. 1918).

A thread running through Barros Barreto's second article was the question of what medication to use in the fight against hookworm. He wrote that the main substances were oil of chenopodium, thymol, and beta-naphthol. At the 7th Medical Congress, held in Belo Horizonte in 1912, Álvaro Osório de Almeida had recommended making tablets of the latter. Barros Barreto argued that, whatever drug was used, it should be administered four or five times at ten-day intervals. After the first two doses, the patient should be tested again; if the results were positive, he should then take the remaining doses. In the case of oil of chenopodium, the IHB recommended that the last three doses be replaced with thymol. Figueiredo had tested all three drugs and determined that beta-naphthol was not as effective, especially as compared to oil of chenopodium, whose main competitor was thymol. Once these vermifuges had been administered, the number of cases of hookworm infection gradually decreased (Barreto, 25 fev. 1918).

The goal of the third article was to provide a more in-depth explanation of treatment methods and compare the British method, which recommended the administration of thymol, the installation of latrines, and the wearing of shoes, with the US method, which recommended the same things but also applied a "corrective measure" in the case of those who did not submit to treatment (Barreto, 27 fev. 1918) – although Barros Barreto offered no details about this measure. He said that unless the government were to provide cheap, affordable footwear, no one could demand that these people wear shoes, given that they barely earned enough to feed themselves, toiling ten hours a day in Brazil's arid *sertão* region. He also explained that workers could dip their feet in tar or pitch and then in sawdust or sand to avoid contact with the ground.

As to sanitary facilities, Hackett had concluded that only three types of latrines were acceptable. The first was a latrine with a pipe that fed into a biological tank or city sewer. The second, for use in swampy areas where a permanent pit could not be dug, was a hole covered by a removable receptacle. The third and last, for use in very sandy soil, was a simple

hole one meter in diameter and two meters deep, covered by a platform with a seat, built to keep flies out. An affordable seat could be made using a wooden box (Barreto, 27 fev. 1918). These guidelines served as the basis for Law 2.462, which was passed by the Rio de Janeiro state legislature in 1917. While he did not suggest it outright, Barros Barreto clearly wanted to demonstrate that similar initiatives could be taken in Pernambuco.

Having completed his task of informing the public about the benefits of partnering with the RF and of its method for fighting hookworm disease, Barros Barreto devoted his fifth article to the question of funding. He wrote that a branch similar to the one in Rio Bonito cost 60 *contos-de-réis* a year; that Minas Gerais had already requested RF services and was at that moment defining an action plan; that São Paulo, through Public Health director Arthur Neiva, had sent health inspectors to visit RF initiatives and subsequently opened three local departments and a branch, plus a post using public funds and a section maintained in part by the US agency and in part by the state. He also wrote that it was hard to believe a state like Pernambuco could not afford to earmark a few dozen *contos-de-réis* for solving rural hygiene problems, given that the government had raised wages for all civil servants by 20%, reformed the road system, and invested in municipal beautification works, among other projects (Barreto, 2 mar. 1918).

The series on hookworm formally ended on March 2, 1918. Two days later, however, the newspaper *Ordem* published an anonymous note entitled "Combate à ancilostomíase" (Fighting ancylostomiasis), which defended the state government. The writer claimed that Barros Barreto had visited the state's Hygiene Directorate (Diretoria de Higiene) and collected data from health inspectors Arsenio Tavares and João Rodrigues and doctoral candidate Ildefonso de Oliveira. Furthermore, the note said that the state had already tested stool samples from more than five hundred sufferers in different places around the state and that the hygiene commissary had visited and written detailed reports about Camaragibe, Várzea, and the islands of Itamaracá and Pina (Combate..., 4 mar. 1918). The note questioned how the physician could claim it was hard to believe the state could not afford a few *contos-de-réis* every year to fight rural hygiene problems. As the anonymous author saw it, the state's sanitation project had already gotten off the drawing board and, while the service was not yet completely organized, it was on its way. The writer also said that Barros Barreto was contradictory, and he predicted that the scientist would not have a successful career.

Generally speaking, the federalist regime, which granted autonomy to states and municipalities in the administration of such areas as education and health, engendered resistance to projects that might "threaten" this new status quo, as shown by Batista (2017) in an analysis of the state of Bahia-federal government agreement and of the work accomplished by the Inspectorate for Leprosy and Venereal Disease Prophylaxis (Inspetoria de Profilaxia da Lepra e Doenças Venéreas). Other political groups, especially the supporters of José Joaquim Seabra, were unhappy about the opening of the Under-Department of Health and Public Assistance (Subsecretaria de Saúde e Assistência Pública), headed by Barros Barreto and subordinated directly to Góes Calmon (Batista, 2017, p.79-80).[6]

In this regard, Castro Santos (1998) points out that the RF, under an agreement (*convênio*) with the federal government and states, signed a separate agreement (*acordo*) with Bahia

to provide funding and medical personnel for *ancylostomiasis* treatment in 1920. But the federal government soon expanded its role in the region, replacing Bahia in the *convênio* in April 1921. Furthermore, in December 1921, a physician from the DNSP was appointed to head up an RF commission in Bahia state. Public health actions were thus increasingly centralized in federal hands. In 1924, Barros Barreto became a federal employee while heading up state health in Bahia. He also developed a Sanitary Code (Código Sanitário). The creation of the Under-Department of Health and Public Assistance (transformed into the Department of Health and Public Assistance in 1927) reflected a concentration of power in the hands of the state government to the detriment of municipalities. According to Castro Santos, three things factored into this: Barros Barreto's appointment as head of both the Federal Rural Prophylaxis Service (Serviço de Profilaxia Rural Federal) and the State Sanitary Service (Serviço Sanitário Estadual) and, later, Department of Health (Secretaria de Saúde); the merely bureaucratic role assigned to advisors on the State Public Hygiene board (Higiene Pública Estadual), who had been working since the 1910s but at that moment were mere aids to the DNSP; and the end of independent municipal regulations, which in large part clashed with state and federal laws (Castro Santos, 1998).

While the criticism fired at Barros Barreto in the note published in the *Ordem* in 1918 did not question the foundation's proposed model, it did oppose interference from a foreign agent in a new public health project that might jeopardize what the state was already doing. The criticism about inadequate funding of public health initiatives added fuel to the fire.

The next day, Barros Barreto asked for space in *Jornal Pequeno* so he could reply to some of the points raised in *Ordem*. He admitted paying a visit to the Pernambuco public health department but reaffirmed that he could not reveal any of the scant information obtained there (such as the plan to do away with tuberculosis), because it had been given to him practically in secret. He also argued that the state plan had not yet come to fruition, leaving him with the impression that funds were scarce (Barreto, 5 mar. 1918).

Barros Barreto wrote that he had no reason to be the governor's enemy and that, had he wanted to cause a stir, he could have divulged the data presented in the report by state sanitary inspector Arsenio Tavares, who was his friend and who had highlighted his articles so well. Lastly, regarding the doubts raised about his career, he said he had trained at the IOC, a school "where scientific integrity is held as the prime standard of conduct" (Barreto, 5 mar. 1918).

The final chapter of this controversy came when *Ordem* published extracts from a report by Dr. Belfort Duarte, who, according to the paper, was a respected physician. The report, which had been submitted to the head of public health in Rio de Janeiro, concerned the expedition by an RF commission through northern Brazil, via Pernambuco. The document stated that the expedition had reached Recife on the anniversary of the Republic and had, on the following day, visited the Hygiene Directorate, led by Dr. A.A. Pereira de Lyra, who provided the commission with all necessary information. They had also visited the agency tasked with eliminating yellow fever breeding grounds. The report concluded: "In the capital of Bahia, this service, in the opinion of Dr. Carter [member of the IHB], is being conducted well ... 'In Recife, it is excellent, according to Dr. Carter'" (Diretoria..., 9 mar. 1918; emphasis in the original). RF services would only open in Pernambuco in July 1920,

as shown by Castro Santos and Faria (2003, p.80).

Final considerations

Following the trail of Antônio Luis Cavalcanti de Albuquerque de Barros Barreto's professional history, this article has identified similarities among students in the Specialization Program during early years of training at the IOC. Many of these students had studied at the FMRJ and then gone to the institute to deepen their knowledge in the field of bacteriology. They shared the hope that they would become beacons in the field of tropical medicine.

Economic considerations were important for young students from other states who wanted to attend classes at this training center and engage in such work as the production of sera and vaccines. The fact that Barros Barreto was born into Pernambuco's agrarian elites at the turn of the nineteenth to twentieth centuries was central to his career. The professional paths of contemporaries like Olympio da Fonseca Filho suggest that many students wanted training that went beyond clinical practice.

Specialization Program students at the IOC conducted research on tropical diseases while receiving the encouragement of researchers who traveled through the *sertão* regions and were eager to contribute to Brazilian science. Once the institute began working with the RF, these young doctors took part in the US agency's earliest initiatives in Brazil. Some, like Figueiredo, worked directly for the foundation; others took up the mission of disseminating its international health project, even if this generated discussions about the legitimacy of the scientific field and of political power.

After the clash between Barros Barreto and the anonymous letter writer in *Ordem*, the Pernambuco physician investigated the use of Noguchi's serum during a trip in the company of Ecuadorian physician Wenceslao Pareja y Pareja, Noguchi's key collaborator in Ecuador, and General Theodore C. Lyster, as recounted by Jaime Benchimol and collaborators (2009). Thus, Barros Barreto was increasingly involved with international health. In 1921, he left Brazil to pursue an RF fellowship. When he returned, he held central sanitary posts in different regions of the country. This period of Barros Barreto's life merits greater study and will be the focus of future research.

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NOTES

[1] Sources from the Rockefeller Archive Center (RAC) are not used in this text, which centers on the early training of Barros Barreto and his first professional activities (1910-1918), before the scientist's time as an RF fellow in 1921. However, these archives may prove useful at a later moment to shed light on the training that Brazilian physicians received in the United States and the experiences of RF fellows in the first half of the twentieth century.

[2] Edler (2011, p.107) describes the consolidation of tropical parasitology in Brazil as a process that left

behind the old climatological tradition born from the research program put in place by medical geography in the second half of the nineteenth century. According to Edler, this change was neither an abrupt shift inside a new discipline, nor was it restricted to a few "enlightened" doctors. To the contrary, the process transpired in parallel with a proliferation of competing etiological hypotheses, against a backdrop of gradual refutation of various metereopathologies. Edler demonstrates the role played by medical periodicals like *Gazeta Médica da Bahia* and *Revista Médica do Rio de Janeiro* in disseminating knowledge on bacteriology and tropical parasitology.

[3] Barros Barreto is the fourth student seated in the first row, left to right. He is wearing a bowtie.

[4] The names of class members can be found in the Base Arch, Casa de Oswaldo Cruz (COC), below the class photograph (Alunos do..., 1913).

[5] The International Health Commission became the International Health Board in 1916 and the International Health Division in 1927.

[6] This agreement was signed in 1921 by José Joaquim Seabra, governor of Bahia during 1912-1916 and 1920-1924. Following the victory of Francisco Marques de Góes Calmon, Seabra hurled a barrage of attacks at the new governor, with the support of the Salvador press.

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