A Brazilian in the Reich of Wilhelm II: Henrique da Rocha Lima, Brazil-Germany relations and the Instituto Oswaldo Cruz, 1901-1909*

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Abstract

This article follows the career of the Brazilian physician Henrique da Rocha Lima, one of the first to join the group of young researchers working at the Instituto Soroterápico de Manguinhos (Instituto Oswaldo Cruz). It describes his first voyage to Germany where he specialized in microbiology and pathological anatomy, training that shaped his subsequent professional identity. The tensions and dilemmas experienced by Rocha Lima provide an insight into what it meant to dedicate oneself to a scientific career in Brazil at the start of the twentieth century. They also reveal the importance of the relations with the German-speaking world for the experimental medicine that became established under the leadership of Oswaldo Cruz.

Keywords: Henrique da Rocha Lima (1879-1956); scientific careers; Instituto Oswaldo Cruz; transnational scientific relations; relations between Brazil and Germany.

As I looked to show in a recent work (Silva, 2011), Henrique da Rocha Lima was the leading promoter of medical-scientific relations between Brazil and Germany in the first half of the twentieth century. The identification with the country at the epicenter of the two global conflicts marking the last century, while boosting his international recognition and prestige, simultaneously cast a shadow over his professional career. The prize received from the Nazis in 1938 and his affection for the fatherland of Goethe and Wagner even after the Second World War led to assumptions concerning his political leanings. Rocha Lima allied himself with German medicine at a time when many of its representatives had embraced the political-ideological project that would lead to the horrors of genocide. This article examines the initial stages of Rocha Lima's career from his graduation at the Rio de Janeiro Faculty of Medicine in 1901, after which he headed to Berlin, to 1909 when he decided to settle permanently in Hamburg, where he achieved recognition as a researcher at the renowned Institut für Schiffs- und Tropenkrankheiten (Institute of Maritime and Tropical Diseases). The article describes the turbulent process through which he made the choices that would determine his scientific identity: the decision to pursue experimental medicine and the identification with German science and culture. It is not my aim here to project the origins of his itinerary onto the initial phase of his scientific career, as though this inevitably followed a linear course, traced in advance, or as though the outcomes of his actions were foreseen and ineluctable. My aim, rather, is to show how historical actors make choices within a field of historically determined possibilities, making it necessary for the historian to "reconstruct a space of the possible"[1] (Revel, 1998, p.26). Here we can make ample use of the definition of trajectory formulated by Bourdieu (1996, p.198), as "'a series of positions successively occupied by the same agent (or the same group) in a space which is itself constantly evolving and subject to ongoing transformations." As we shall see, the dilemmas faced by Rocha Lima were identical to those faced by an entire generation of scientists who fought to establish science as a professional activity at a time when it was not recognized as a self-referential practice (Sá, 2006). The tensions in his choices reflected impasses shared by his contemporaries and shed light on the wider social processes and contexts in which experimental medicine set down roots. The singularity of this figure, who gained prominence in one of the main centers of medical teaching and research, provides a striking illustration of the limits and possibilities of the scientific knowledge produced in a geographic context widely considered marginal at the level of international science.

Tracing the steps taken by the young Rocha Lima during the difficult moments of setting out on his professional life, we encounter the early development of a medical-scientific institution that would become a landmark in the institutionalization of the sciences in Brazil. The choices made at the start of his trajectory and the recognition of our protagonist are to a large extent related to his close relationship with Oswaldo Cruz and the creation of the Instituto de Patologia Experimental (Institute of Experimental Pathology), at Manguinhos[2] – which is why this article also examines the significant role played by Rocha Lima in the creation of the institute and the impact of his relations with the German-speaking world on shaping its research tradition. Here we shall explore his key role in the event recognized as crucial to the launch of Oswaldo Cruz's institutional project: the prize received at the 14th International Exposition of Hygiene in Berlin, in 1907.

Clinical practice or experimental medicine? The dilemmas of Rocha Lima in twentieth century Berlin

Born in Rio de Janeiro on November 24th 1879, Henrique da Rocha Lima was the son of a famous general practitioner of the Empire period, Carlos Henrique da Rocha Lima, one of the founders of the Polyclinic of Rio de Janeiro, and was trained at the Faculty of Medicine of what was then the Federal Capital. In 1901, the young recently graduated physician decided to head to Berlin, originally with the aim of following his father's footsteps and specializing in clinical practice. His study at the Colégio Brasil-Alemão (Brazil-German College) in Petrópolis and the fact that his father was linked to the Polyclinic, an institution based on the Austrian model, suggest that the germanophilia of our protagonist had a family background. In the final quarter of the nineteenth century, Brazilian medicine was heavily influenced by its Germanic counterpart, which had established itself as one of the most advanced in the world. The combination of teaching and research in German universities influenced the profile of medical training in general by stimulating scientific activity, associating it with teaching on one hand, and industry on the other. The German model would provide the blueprint for the reforms adopted by the Rio de Janeiro Faculty of Medicine in the 1880s (Edler, 1992). Its effects were still being strongly felt when Rocha Lima began studying. One of the most prominent figures at the Faculty, the Chair of Clinical Propaedeutics, Francisco de Castro, was fluent in German, a language he taught at the Superior War College, and kept close tabs on the advances of Germanic medicine, which he divulged in his lectures, as former students like Rocha Lima (1952, p.29) and Carlos Chagas (Kropf, 2009, p.55) recall.

As well as Francisco de Castro, there was a group of young physicians who would meet to read the texts found in the medical journals and manuals published in German. Known as the 'group of five Germanists,' it was made up of physicians from the General Polyclinic of Rio de Janeiro: Egydio Salles Guerra, Antônio José Pereira da Silva Araújo, Aureliano Vieira Werneck Machado, Alfredo Alves da Silva Porto and Oswaldo Cruz (Benchimol, 1999, p.414). Despite the interest in German medical texts, Oswaldo Cruz had specialized in microbiology between 1896 and 1899 at the Institute Pasteur in Paris. Just like in France, the new science of germs found a fertile soil for its development in Germany, where it became associated with the name of Robert Koch (Gradmann, 2010). As well as describing the pathogens of anthrax, tuberculosis and cholera, in 1884 Koch established the criteria deemed essential to identifying a germ as pathogenic agent and developed techniques such as the solid culture medium and photomicrography. Along with the advances in the identification of a series of disease-causing agents – the 1880s would become known as the golden era of microbial science – Germany would also see fundamental advances in comprehending immunity and biochemical phenomena, and in their practical applications, the most complete expressions of which were sorotherapy and chemotherapy, as represented by Emil von Behring and Paul Ehrlich (Gradmann, 2010).

Before leaving for Berlin, where renowned representatives of the science of Koch and Pasteur were teaching, Rocha Lima contacted Oswaldo Cruz, a renowned specialist in the procedures and canons of microbiology. In 1899, the year that he had returned from Paris, Cruz, along with Adolpho Lutz, a 'progeny' of Germanic medicine (Benchimol, Sá, 2004),

and Vital Brasil, had identified the outbreak of bubonic plague that struck Santos' harbor. The epidemic led the São Paulo government to establish an institute at the Fazenda Butantan to produce anti-plague serum and vaccines, a measure then followed by the mayor of Rio de Janeiro, who ordered the installation of a new institution in the Manguinhos region, where an old waste incinerator was located. Oswaldo Cruz assumed the post of technical director of the Manguinhos Sorotherapy Institute, soon afterwards transferred to federal government control (Benchimol, 1990). Rocha Lima's first impression of Oswaldo Cruz was hardly favorable. Many years later he would recall that his "somewhat strange figure," "his long black frock coat and weirdly shaped top hat, his profuse slightly greying hair and handlebar moustache, along with the circumspect air" had aroused an aversion in him, one "which I typically feel for any odd appearance, awakening intentionally calculated suspicion" (Rocha Lima 1952, p.28). Soon they became very close and Rocha Lima frequented Manguinhos for some months. The production of anti-plague serum and vaccines was run in parallel with research activities, conducted by young students interested in developing their end of course theses in medicine. The investigative practices combined the protocols of classic microbiology with those of the new medical specialty constituted at the turn of the century, referred to for the first time by the Scottish physician Patrick Manson, in 1897, as tropical medicine. He dedicated himself to researching diseases caused by complex microorganisms that depended on other beings for their transmission, the vectors, and which predominated mostly in hot climates. The conceptual framework of tropical medicine was based on the elucidation of how malaria is transmitted by mosquitos; first avian malaria, discovered by Ronald Ross in 1898, followed by human malaria, demonstrated by Giovanni Grassi, Amico Bignami and Giuseppe Bastinelli. The social significance of the new specialty was set by the 'constructive imperialism' of the end of the nineteenth century, in which the health of the colonizers was fundamental to ensuring the success of colonial enterprises (Worboys, 1996). It was no coincidence that the first schools of tropical medicine were founded in London and Liverpool. In the German empire, which had formed late and was keen to claim its share of 'dividing up the world,' tropical medicine found an official home at the Institute of Maritime and Tropical Diseases of Hamburg, created in 1900 and implanted close to one of the most active commercial ports in Europe (Wulf, 1994; Mannweiler, 1998; Brahm, 2002).

Research at Manguinhos was focused on the study of mosquitos, which had acquired medical importance primarily because of their role in malaria transmission. The British had led the effort to catalogue species around the world (Benchimol, Sá, 2006). Rocha Lima narrates that when he started to frequent Manguinhos, excursions to collect mosquitos from the swampy areas close to the Institute were common. One of his first contributions was to draw the wings of an *Anopheles* identified by Oswaldo Cruz (Rocha Lima, 1952). "In this work environment I was living my youthful dream of laboratory research, which my fantasy had so cherished" he would write (p.29) in a retrospective reading of his trajectory. As the option of laboratory work seemed unpromising, due to the few opportunities for being hired professionally, he set aside the 'fantasy' for now and travelled to Berlin to complete his studies in clinical practice, which seemed a much more generous and secure prospect in terms of obtaining a job and moving up the social hierarchy. Indeed this was the path chosen by the majority of newly trained physicians emerging from Brazilian medical colleges at that time.

When Rocha Lima arrived in Berlin in 1901, the city was at the height of its flourishing as the capital of Wilhelm II's empire. The construction of broad and elegant avenues and monuments signaled the Kaiser's pretensions to supremacy. In a letter to Hugo Werneck, his friend and colleague from the Faculty of Medicine, Rocha Lima (1 set. 1901) described his amazement at the spirit of order and discipline proverbially associated with Germanic culture. However he was having some problems learning the language, as he admitted in the same correspondence: "German is a hellishly difficult language… I admire those compatriots who arrive here and immediately embark on courses, claiming within a few months that they know German; because I myself have no hopes of ever knowing the language properly."

At the time Berlin rivalled Paris and Vienna as the main center for students and recent graduates wishing to complete their training in medicine. Institutions like the Charité Hospital were the venue for leading figures of medicine to lecture in specialties such as ophthalmology, surgery, pediatrics and hygiene. In the latter area, the disciples of Robert Koch held key posts, defining the directions taken by public health policy. The authoritarian German State had put to good use the measures for intervening in public space advocated by the science of germs. The Institute of Infectious Diseases had been running since 1891, founded by Koch and which would later take his name (Gradmann, 2010).

During his time in Berlin, Rocha Lima was tormented by the uncertainty of whether to pursue clinical practice, more auspicious, or to choose experimental medicine. He frequented the course on clinical surgery given by the renowned Carl Jakob Adolf Christian Gerhard and took classes with the hygienist Phillip Martin Ficker[3], from the Berlin Institute of Hygiene, to whom he became fairly close and who developed much of his career in Brazil. He also took courses in pathological anatomy, a branch of medicine with a long tradition in Berlin, since it was where Rudolf Virchow, one of the recognized founders of the modern specialty, had lectured. Virchow died while Rocha Lima was in Berlin, in 1902, denying him the chance to attend the classes of the scientist responsible for formulating the cellular theory. He had to make do with frequenting the course of his successor, Johannes Orth (Rocha Lima, 20 ago. 1902). "Orth may be no Virchow, but he is a talented professor, tireless and extremely well prepared," he commented to Hugo Werneck (Rocha Lima, 12 nov. 1902). Differently to Virchow, who had remained fairly skeptical and hesitant concerning the etiological model proposed by Koch's scientific work, Orth (1904, p.22) sought to harmonize bacteriology and pathological anatomy. "Pathological anatomy and bacteriology are not opposed sciences, but inseparable from each other. Every modern anatomopathologist must have a profound knowledge of bacteria," he claimed in lectures. His attempt to marry the two specialties certainly favored Rocha Lima, who built his scientific identity precisely at their point of intersection. For Martin Ficker (1940, p.XII), this was the distinctive trait of the Brazilian researcher, one that gave him a considerable advantage during a period when both fields were taking their first steps towards a joint approach to the phenomena of morbidity.

"My passion for microscopic things is no longer frustrated and I can happily spend the entire day between the microscope and vials of staining solutions," Rocha Lima (13 maio 1902) wrote enthusiastically to Werneck. However such enthusiasm soon gave way to worries about his professional future, since clinical practice offered a more secure career path. Were he to reflect deeply on the matter – he confessed to his colleague – "I would conclude that

pathological anatomy and bacteriology are no real use and that what matters is a practical branch of medicine" (Rocha Lima, 6 jul. 1902). Months later he would vent his feelings: "I had the urge to send bacteriology and pathological anatomy to the devil, immerse myself in a book of clinical medicine and attend the classes; in sum, abandon these crazy ideas and think seriously about life" (Rocha Lima, 12 nov. 1902). As the end of 1902 neared, so the anxiety over his career grow: though he had already decided to spend the end of his stay in Berlin "buried in the mysteries of pure science," he also lamented to Werneck that "I shall be left empty handed, with no prospects and no money" (Rocha Lima, 12 nov. 1902). The way out of the impasse came with an invitation from Oswaldo Cruz, in a letter dated December 17th 1902, to accept the job of supervisor at Manguinhos, a post he would take up alongside Figueiredo de Vasconcelos, with responsibility for overseeing the work of producing immunotherapeutics, research and training young medical students. Following disagreements, the baron Pedro Afonso had left the post of Director General of the Institute, which was then assumed by Oswaldo Cruz (Benchimol 1990, p.18). "If by chance you can agree to meet my wishes and if my good friend so desires to return to Manguinhos, it would be the realization of one of my most cherished dreams... I ask you kindly, were you to accept, to come as quickly as possible," Cruz wrote (17 dez. 1902). Rocha Lima did not accept the invitation immediately. He preferred to conclude his studies in Berlin and it was only on April 8th 1903 that he embarked on his return trip to Brazil. In his luggage he brought a collection of bacterial cultures and histological preparations, which would constitute the "original nucleus of Manguinhos" (Benchimol, 1990, p.27). Undoubtedly he crossed the Atlantic with a mixture of excitement to indulge his fascination with research and concern about his professional future. The initiatives for establishing careers and institutions in the area of experimental medicine were still fairly rare. However the new political and economic setting would favor the advance of medical research and the launch of the professional life of our protagonist.

Rocha Lima, yellow fever and the Manguinhos Institute

Rocha Lima's arrival in Rio de Janeiro coincided with the beginning of the urban remodeling works in the Federal Capital, one of the priorities of the Rodrigues Alves government which had assumed office in December 1902. The economic boom enabled the implementation of reforms designed to enable Rio de Janeiro to meet the new demands for the circulation of people and goods and enhance its role as the 'shop window' of a civilized country, an image that the elites aspired to present to the outside world (Benchimol, 2003). Urban reform was accompanied by sanitary reform, designed to combat the diseases that had made the Brazilian capital notorious as a pestilent city. Yellow fever was the main such disease. Oswaldo Cruz was appointed Director General of Public Health in March 1903, with discretionary powers to fight the *mal amarílico*. His focus would be on combating the *Stegomyia fasciata* mosquito, which, in 1900, had been proven to be the disease transmitter by a US medical-military commission based in Havana. The function of Director General of Public Health meant spending a lot of time away from the Manguinhos Institute. Rocha Lima took on the role of monitoring the Institute's scientific work and instructing the young

physicians who flocked there with the interest of specializing in the sciences of microbes and vectors (Aragão, 1950; Benchimol, Teixeira, 1993). The team soon expanded with the arrival of names such as Henrique Aragão, Alcides Godoy, Carlos Chagas and Arthur Neiva, who joined Antônio Cardoso Fontes, Henrique Figueiredo de Vasconcelos and Ezequiel Dias. Here it is worth citing Rocha Lima's comment (s.d.) in a letter to Oswaldo Cruz in which he reports on the progress of the Institute's work in his absence: "I started working with Dr. Neiva here two weeks ago, which has taken up a lot of my time, but once set on his way he will hinder me no longer, since he is a bright and very hard-working lad."

In the hard fight against yellow fever, Oswaldo Cruz made wide-ranging interventions in the urban space. Measures such isolating the sick, establishing health cordons and fumigating homes enabled rapid control of the disease. The mortality rate, which was 584 people in 1903, fell to 48 the next year, rose again to 289 in 1905, and then entered a downward curve: 42 dead in 1906, 39 in 1907, four in 1908 and, the following year, was officially considered extinct in the Federal Capital (Löwy, 2006, p.92). The campaign's success enshrined Oswaldo Cruz's national and international reputation. Even before announcing the extermination of the disease, the campaign, which was already being monitored on the ground by a commission of physicians from the Pasteur Institute in Paris, drew the attention of the Germans from Hamburg's Institute of Maritime and Tropical Diseases. In February 1904, Hans Erich Moritz Otto and Rudolf Otto Neumann disembarked in Rio de Janeiro. Armed with a high-powered Zeiss ultramicroscope, they undertook research at the São Sebastião Isolation Hospital on the vector of yellow fever and addressed the controversial question of its etiology.[4] The expedition was funded by firms linked to the coffee trade and by two of the most important shipping companies with lines between Hamburg and Latin America: Hamburg America Line and Hamburg Süd.[5] As Brahm shows (2002), their interest in yellow fever derived from the negative effect of the disease on trade, infecting its representatives in Brazil and causing problems with quarantine requirements. Otto and Neumann recorded with interest the measures used to combat yellow fever introduced by Oswaldo Cruz in Brazil, which were later applied by the former in the German colony of Togo (Brahm, 2002, p.28).

Otto and Neumann's expedition to Brazil can be considered the first significant moment in the scientific rapprochement between Germany and Brazil in the field of tropical medicine and between the Manguinhos Institute and Hamburg's Institute of Maritime and Tropical Diseases – a connection that has remained strong ever since (Silva, 2011).

At the end of 1904 and the beginning of 1905, Rocha Lima conducted – in the same Isolation Hospital where the Germans stayed – anatomopathological research on suspected victims of yellow fever. His observations led to the identification of lesions to the liver that he considered typical of the disease, arguing for its application in necroscopic examinations. Unsure about his conclusions, which contradicted what was taught by the foremost names in medicine at the time, like Miguel Couto, he would only publish a work on the subject in 1912, when he was already back in Germany (Rocha Lima, 1937). Full recognition of the diagnostic value of the lesions described by him would only come after 1929, following the reappearance of yellow fever in Rio de Janeiro and in the context of the wide-ranging campaign undertaken by the Rockefeller Foundation in Brazil in the 1930s (Benchimol, 2001; Löwy, 2006). Along with the identification of the agent causing epidemic typhus in

1916, the histopathological studies for yellow fever comprise Rocha Lima's most important scientific contribution.

During the period in which Oswaldo Cruz remained Director of Public Health, the work conditions at Manguinhos improved hugely (Benchimol, 1990). Resources from the federal government ensured the gradual transformations of the Institute's humble facilities into an imposing architectural complex, symbolized by the Moorish-style castle, began in 1905, which would only be finished in 1918, one year after Oswaldo Cruz's death. The laboratories were modernized and the library was equipped with national and international journals and books. The 'metamorphosis' of the Sorotherapy Institute into a medical research center lacked official approval. Buoyed by the success of the yellow fever campaign, therefore, Oswaldo Cruz presented the National Congress with a project to transform the profile of the institution, which, combined with the production of immunobiologicals, would assume the role of a research center studying the main infectious diseases affecting the Brazilian population. As well as legitimizing the research activities already taking place in practice, the project presented to the Legislature on June 30th 1906 proposed an increase in staff numbers, instituted a career plan for research and linked the Institute directly to the Ministry of Justice and Internal Affairs, without passing through the Directorate General of Public Health (Benchimol 1990, p.34). Oswaldo Cruz's aim was to create a group of staff dedicated to research and to establish solid scientific bases capable of ensuring the institution's development beyond the pragmatic and limited objectives that had led to its foundation. As the literature on the Manguinhos Institute attests (Aragão, 1950; Stepan, 1976; Benchimol, 1990; Benchimol, Teixeira, 1993; Cukierman, 2007), Oswaldo Cruz's project was only approved thanks to the positive outcome of the anti-malarial campaign and the plaudits received by the Brazilian delegation in Berlin at the 14th International Exposition of Hygiene, for which the connections made by Rocha Lima during his second trip to Germany, in 1906 and 1907, proved crucial.

Rocha Lima's second trip to Germany and the 'publicizing' of Manguinhos

In July 1906 Rocha Lima departed once again for Germany with the aim of complementing his studies with the backing of Oswaldo Cruz, who obtained diplomatic support from the Minister of Foreign Relations, the baron of Rio Branco (Paranhos Júnior, 22 jun. 1906), who sent the Brazilian representative in Germany a letter of presentation for Rocha Lima, "commissioned by the Manguinhos Institute and by the Interior Ministry to study pathological anatomy, sorotherapy and bacteriology in Europe." After passing through London and Paris, Rocha Lima met in Berlin with the former professor Martin Ficker, to whom he showed photographs of Manguinhos and samples of serums and vaccines. "[Ficker] is a good individual to make our institute known," he wrote to Oswaldo Cruz (Rocha Lima, 8 ago. 1906), presenting the theme that would predominate during this stay in Germany – the "publicizing of Manguinhos," that is, the effort to publicize the Brazilian institution and the activities developed there among Germans. His study plan was not predefined. One of the objectives was to enhance his knowledge of pathological anatomy with the pathologist Hermann Dürck[6], from the Institute of Pathology in Munich. Before travelling to the Bavarian capital, Rocha Lima went on a tour of biomedical research institutions. He sent Oswaldo

Cruz the detailed observations he made of their structure, mode of organizations, and the techniques used in research and production routines. He visited the Institute of Hygiene in Munich, the Institute of Infectious Diseases in Berlin and the Swiss Institute of Sorotherapy, directed by the renowned Wilhelm Kolle. He informed Kolle about the methods for fighting yellow fever employed in Brazil and the technique they had used in Manguinhos to produce the anti-plague serum. The most fruitful aspect of the visit to Bern – he remarked in a letter to Oswaldo Cruz (Rocha Lima, 7 set. 1906) – had been the chance to tell Kolle and his collaborators what was being achieved in Brazil, practically unknown abroad. He suggested the production of leaflets and albums of photos to publicize the work from Manguinhos with texts in German and a good visual presentation.

Months later Rocha Lima (7 nov. 1906), accompanied by Dürck, would visit the institute headed by Paul Uhlenhuth in Berlin, recording his observations and impressions in detail. "This place which goes by the modest name of a Bakteriologische Abteilung (Bacteriological Department) is one of the largest and best equipped institutes I have ever seen," he recounted in a letter. He frequented the course given by Uhlenhuth, and wrote the following:

> I had occasion to cultivate relations with everyone and show that we are not monkeys, always taking part in the discussions and always making interjections, which, fortunately always accepted, gave me two kinds of satisfaction – one intimate, seeing that we are not behind in our studies; another less modest, publicizing Manguinhos from the small technical issues to the biggest questions surrounding immunity (Rocha Lima, 7 nov. 1906).

This comment touches on an aspect that pervaded Rocha Lima's stay as a whole and that would become an integral part of his scientific identity. On completing his training at what was considered one of the leading international medical research centers, he was caught in a dilemma that marked an entire generation of Brazilian scientists and intellectuals: the hesitation "between the desire to civilize Brazil through the transposition of new western scientific and technological knowledge and the desire to develop an original scientific approach, combining recognition of the existence of a 'science of the center,' the only capable of legitimizing their work … and the aspiration to relativize its importance" (Löwy, 2006, p.18).

In Rocha Lima this tension was expressed in an attitude of self-affirmation: at the same time as he sought to highlight the excellence of the science produced in Rio de Janeiro suburb, the conviction grew that not everything in Germany was as superior as believed. In his encounters with those who saw themselves and/or were seen as representatives of a scientific and cultural avant-garde, this tension was raised exponentially and was manifested in remarks like the following, addressed to Oswaldo Cruz: "Kolle received me in most kind fashion … in sum, without that air of being brushed aside that is so common among these men when dealing with Brazilians and that I have sometimes observed even with some of our most illustrious compatriots" (Rocha Lima, 7 set. 1906).

Rocha Lima recorded equally favorable impressions of Hermann Dürck. Initially he was split between deepening his knowledge of pathological anatomy in Munich or taking courses in various specialties of experimental medicine. He asked Oswaldo Cruz what he believed best for Manguinhos (Rocha Lima, 5 out. 1906). The relation with Dürck, however, progressed so well that he ended up deciding to stay in Munich. "Spending three years desiring Berlin to end up

in Munich is not really what you could call lucky" (Rocha Lima, 3 dez. 1906), he complained to Oswaldo Cruz. Dürck granted him all kinds of facilities, such as unrestricted access to the museum of pathology and his ample collection of anatomopathological preparations. The Brazilian physician was satisfied to observe the interest shown by the German pathologist and his colleagues in his yellow fever preparations, which in fact ended up being displayed at a conference on tropical diseases, eliciting numerous references to Brazil. Showing the preparations represented a "more solid advert for Manguinhos than stories and figures," he emphasized to Oswaldo Cruz (Rocha Lima, 23 out. 1906).

Rocha Lima soon took on routine work in Dürck's laboratory, such as the analysis of material sent to the Institute and case autopsies, enabling him to deepen his knowledge of pathological anatomy. The sheer vastness of the field left him overawed: "With all the chances to learn ever more, I know ever less, pathological anatomy seems increasingly difficult to me, I have ever less hope of progressing beyond a tolerable paraffin cutter" (Rocha Lima, 3 dez. 1906). The Brazilian researcher won over Dürck's trust with their relation evolving to a personal level. In a letter to Oswaldo Cruz he recounts that they had become "good companions" (Rocha Lima, 10 maio 1907). "He is increasingly amicable with me and helps with everything. His frankness is captivating, so much so that I am aware of almost all his public affairs," he added in another letter (Rocha Lima, 7 mar. 1907).

Oswaldo Cruz (21 nov. 1906), for his part, kept Rocha Lima informed of the progress of work at Manguinhos, including the tensions already emerging between the young researchers belonging to the team. "The Institute's internal relations, however much I try to smooth over the difficulties, are becoming increasingly tense and all because of Aragão's vanity and the disdain that he displays [which] are making the current set up difficult to maintain," he confided to his collaborator. Such remarks suggest that the relation between Rocha Lima and Oswaldo Cruz differed from those Manguinhos's director had with the other researchers.

The tensions beginning to surface within the Manguinhos team were related among other factors to the increasing complexity and density of the research program. Some of the studies began to gain recognition for their authors. This was the case of the studies by Henrique Aragão (1907; 1908) on the life-cycle of the pigeon halteridium, a parasite similar to that of human malaria, and on chicken spirochetes, made in 1906 and 1907. The anti-malarial campaigns conducted from 1905 onwards through infrastructural works, such as hydroelectric plants and railways, would result in new facts concerning the epidemiology of the disease (Benchimol, Silva, 2008). The adaptation of prescriptions to local conditions based on knowledge published in the manuals of tropical medicine would also result in the opening up of new lines of research and in better understanding of the complex factors related to the incidence of those diseases that, like malaria, involved human hosts, parasites, vectors and the surrounding environment. Entomological studies enriched the body of knowledge on malaria transmitters. In one of these anti-malarial campaigns, Carlos Chagas would observe the phenomena that led him to the description of the new human trypanosomiasis, later baptized with his name (Kropf, 2009).

The authors of these studies of diverse aspects of infectious diseases made use of a variety of different sources of international medicine, prominent among which were the journals and manuals published in German. The titles divulged in the language of Goethe predominated

among the journals lining the library's reading room. The manuals published by the leading publishing houses of Leipzig enjoyed a prime spot on Oswaldo Cruz's shelves, next to the books in English, such as the famous *Tropical diseases: a manual of the diseases of warm climates* by Patrick Manson, and those in French like *Traité des fièvres palustres* by Laveran.

The expansion of Manguinhos' geographical and cognitive boundaries was matched by the development of the Institute's physical facilities. Oswaldo Cruz's attempt to obtain the legal framework for the transformation of the Sorotherapy Institute into an institute of experimental medicine along European lines was bogged down in Brazil's National Congress. The bill's transit through the public agencies was the subject of comments in his correspondence with Rocha Lima: "our Manguinhos, in the absence of incense and incantations, is buried in the portfolio of the Health Commission from which I have no hopes of exhuming it" (Cruz, 9 set. 1906). The project was criticized by parliamentarians, who for Rocha Lima (Rocha Lima, 5 out. 1906) displayed symptoms of "immorality," provoking in him "spasms of indignation and revolt." From Germany our protagonist rooted for Manguinhos to achieve recognition from the legislative authorities and wider society. Meanwhile he suggested that Oswaldo Cruz should pursue strategies capable of strengthening the Institute's legitimacy: "Manguinhos needs to dominate our medicine scientifically" (Rocha Lima, 19 dez. 1906), he insisted. In the lines written to Rocha Lima, we can accompany the anguish with which the director of Manguinhos followed the passage of his law bill and the distortion of the original design proposed for the institution: "Our bill was almost passed in the Senate ... Had there been one more day of sessions, it would have been approved," he wrote in January 1907 (Cruz, 21 jan. 1907). Four months later he wrote: "They want to transform it [the Manguinhos Institute] into a teaching establishment with a change in the funding – all in all, a devilish business" (Cruz, 29 maio 1907). As mentioned earlier, the arduous campaign to obtain approval for the project was only finally won after the success of the Brazilian participation at the 14th International Exposition of Hygiene in Berlin. Let us turn, then, to examine Rocha Lima's involvement in this event.

Rocha Lima and the Congress and Exposition of Hygiene in Berlin

In his very first letter to Oswaldo Cruz during his second journey to Germany, Rocha Lima (8 ago. 1906) mentioned the plans for an international exposition and congress on hygiene, due to take place in Berlin 1907: "I believe it will be an ideal chance for us to show what is done there and with Ficker I can obtain a reasonably large space in a good location; I shall write more on the subject later." In his reply of a month later, the director of Manguinhos asked his collaborator to study the question of the Exposition, "where, perhaps, we can participate" (Cruz, 9 set. 1906).

The following months would show Rocha Lima's intensive engagement in the attempt to make Brazilian participation in the event possible. His attention to the smallest details reveals his perfectionism and heightened critical sense, including his concern with the aesthetic dimension. He placed himself in the awkward position of a 'translator' who not only had to adapt the findings of Brazilian medicine to the language of German science, but also reconcile two very different logics – on one hand the Germans with their obsession for advance

planning, deadlines and rules, and on the other the Brazilians with their prevarications and delays founded on the deep conviction that everything would work out fine in the end. This conviction proved justified on this occasion, albeit at the cost of the psychological welfare of Rocha Lima, who ended up on the brink of hysteria.

He suggested that instead of many photographs and descriptions, they should present simple pictures with the equipment used in the yellow fever campaign, with elucidation of the production process for the anti-plague serum, maquettes of the infirmaries and fumigation services, and a display of the Institute's products. He proposed that they should not take a maquette of Manguinhos "since for this people the excess of decoration and ornamentation causes a fairly unscientific and somewhat ridiculous impression, since they quickly remark with a smile about how much money there must be in Brazil. If only it were possible for the Institute to have a less bizarre appearance!" (Rocha Lima, 5 out. 1906).

For Rocha Lima, three topics and objects deserved to be presented in Berlin: yellow fever, Manguinhos and the anatomopathological collection on yellow fever and the plague. In relation to the latter item, he remarked: "Here everyone is very interested in pathological anatomy and, then also, yellow fever is completely unknown, while the best collection on plague is Dürck's, which is highly inferior to our own" (Rocha Lima, 7 nov. 1906). In addition he set forth what he called "psychological considerations," the frankness of which is striking:

> I know very well the psychology of our milieu. Am I interested in this question and looking to interest yourself out of patriotism, the desire to take advantage of a good opportunity to raise the profile of Brazil and Manguinhos, the conviction that these questions which are now still current will soon lose their interest? Or is this interest propelled by selfishness? Am I not feigning such patriotism merely because of the relations and other facilities that I have here, with the exposition providing a convenient reason for me to stay longer than I intended? In this case I am, like yourself, committed to the organization of Manguinhos. Even Ficker's opinion is suspect, because it may the wish he has for my company, our friendship, etc., that have led him to be interested in our participation. So, once again, looking to follow your example: *thue recht und scheue niemand* (do right and fear no one). Whatever the case, there always remains something disagreeable and bitter-tasting about all this, and my wish is that people there in Rio think all this entirely unnecessary. I believe a definitive decision on the matter is desirable, and I insist especially on the fact of the government or Manguinhos or the Health Ministry provide the necessary resources, avoiding the expressions well-known among us, "We'll see what can be done" or "We'll have to find a way." In this case, it's all or nothing. (Rocha Lima, 7 nov. 1906).

Rocha Lima was aware of the importance of the Exposition as a showcase for the work being done at Manguinhos and as a gateway to international science. He knew that the key to the latter was to show their mastery of the local questions – the knowledge of yellow fever and its combat in Rio de Janeiro – which had to be shown in a way in line with the conventions of these international forums and divulged in the lingua franca of the period, namely German. In the eyes of Rocha Lima, the good relations established by him with the luminaries of German science made the present constellation of opportunities practically unique. For this to be possible, however, Oswaldo Cruz would have to obtain support from his political superiors to ensure that Brazilian participation in the event attained the

standards internationally recognized as 'good science.' The logic of science must prevail over the deviations and misadventures of politics, but, at the same time, it was in its shadow that individuals like Oswaldo Cruz fought to establish scientific research as a professional activity during that period. The negotiations with the main sponsor of scientific activity – the State – required presenting the applications of that knowledge to solving practical problems and/or the potential recognition that it would generate at international level.

In a subsequent letter Rocha Lima (21 jan. 1907) justified the frankness as being "dictated by my nature, by the somewhat intimate nature that our conversations usually take." And he added: "Please do not conclude that I am trying to boast about myself or exaggerate my merits." These concerns stemmed precisely from his impression "of having been too frank." He was doing everything in the name of Manguinhos, he emended.

The pressure began to mount on Rocha Lima when those involved in the organization of the Exposition demanded more than a signal of intentions from him. On January 9th 1907 he wrote to Oswaldo Cruz: "Ficker asked me about the reply that we would give to the invitation to the Exposition of Hygiene, because there are still very few places. I said that I knew nothing about it" (Rocha Lima, 9 jan. 1907). Almost a week later, Oswaldo Cruz (15 jan. 1907) replied that everyone at Manguinhos was busy preparing to present the work at the Berlin Congress: Godoy would tackle the question of serum dosage, Figueiredo Vasconcelos combating the plague, Aragão the new immunization processes, Chagas and Neiva the insect transmitters of diseases, José Gomes de Faria the paratyphus bacilli group, and himself the campaign against yellow fever. They were also making preparations for the exposition, organizing the photos, maquettes and products to be presented. Rocha Lima therefore informed Berlin of Brazil's likely appearance at the event. An official response sent directly to the organizers, along with information on the space needed, had become urgent he told Oswaldo Cruz (Rocha Lima, 21 jan. 1907). The plan was for the latter to travel to Germany to help with the organization in situ. Ficker himself (s.d.) wrote to the Brazilian, asking for information about the details of his voyage so he could meet him on arrival.

On January 30th Oswaldo Cruz (30 jan. 1907) confirmed Brazilian participation in the Exposition. He asked Rocha Lima to propose the space that needed to be reserved and also to tell him where the official reply should be sent. In response, Rocha Lima (2 fev. 1907) expressed his annoyance and worries about the lack of progress:

> I have at hand your letter of January 30th, which surprised me with the question it asks as to whether you should reply to Rubner, since I thought that the official reply had already arrived in Berlin, given the letters I wrote to you on the matter. I insisted, in accordance with the words of the invitation, that you state the space needed by ourselves, since I do not know what you intend to exhibit, nor I have authorization to make any kind of official communication. The most I was able to do was write a private letter to Dr. Hoffmann saying that it was very likely that we would take part, and that he should tell me the date by when the official reply needs to arrive, so that it could be telegraphed if urgent; his reply was delayed and when it eventually arrived here, I calculated that, judging by my letters, your response would already be on its way and it would not be worth telegraphing it therefore. In light of your letter, I am obliged to send a telegram asking for the official response to be sent urgently, stating the amount of space needed. It will be no surprise to learn that the little space that remained has

> shrunk further still in the meantime. Had you told me in your letters what you had decided to exhibit, which of my ideas you thought workable, anything at all about the subject in fact, I could send another private letter to Hoffmann asking to reserve a place; but I cannot write without some basis to go on.

Faced by all the uncertainty, he decided to go to Berlin to talk personally with Hoffmann – a military physician from the Kaiser Wilhelm Academy for Military Physicians[7] – who was on the Exposition organization committee. Rocha Lima learnt that the organizers were having to resolve space issues due to the large number of participants and demands. The Brazilians would be left with three meters of wall space and a table one meter wide. He insisted that they needed at least five meters, which would be possible – Hoffmann consented – if they provided a detailed official description of everything that would be shown. "Imagine the trouble I am in, lacking the faintest idea of what will be possible in terms of pictures, photographs or statistics. I regret that you have not written anything to me on the subject," he complained to Oswaldo Cruz. He would invent something and inform his superior. As a way of pressurizing him to speed up the process, Rocha Lima told him that the other invited delegations had already provided details of the material to be shown, obtaining better places as a result. "However, it has already been almost 6 months since I wrote to you about the matter," he added, underlining Oswaldo Cruz's responsibility for the delays and ambiguities. He asked him to define what would be presented and gave some suggestions concerning the new space limitations. "You cannot imagine how this uncertainty and lack of instructions afflicts me, because although convinced that I am making every effort for us not to appear in a bad light, I cannot console myself with this fact, since I sincerely desire that we do something notable," he confided. He admitted that he had been left with "irritated nerves" (Rocha Lima, 7 mar. 1907).

Martin Ficker and Max Rubner were also involved in organizing the Exposition and promised to obtain five meters of wall space, but they made the same demand as Hoffmann: the Brazilians would have to provide written details of what would be shown. Rocha Lima therefore sent a description of the material to be presented to the Exposition secretary. He also sent the description to Oswaldo Cruz and asked him to give his appraisal, "not just a simple 'okay,' but telling me what you intend to bring." The models should be made in advance, along with the enrolment in the Congress that would take place alongside the Exposition. He proposed that the Director of Manguinhos arrive in Germany as soon as possible in order to devote his time to the organization. Everything possible should be done to avoid appearing "in a bad light" and not leave him "up in the air" (Rocha Lima, 8 mar. 1907).

Oswaldo Cruz's situation in Brazil was far from comfortable. He had to fight continually against the lack of firm positions and slowness of the bureaucracies on which he depended to adopt any official stance: "As for the Exposition of Hygiene, despite the problems they are causing me, we have to make it a reality, so I ask you to ask for space and tell me what it will be and if possible send a floor plan of the rooms," he wrote on February 20th. As soon as it was approved by the Minister of Justice, he would send an official reply (Cruz, 20 fev. 1907). He was stuck between the tardiness of the authorities and the pressure from Rocha Lima, whose 'bilious' letters, as he described them, demanded attitudes and decisions from his superior. He understood the discomfort felt by his collaborator, who had to negotiate

with the Germans directly: "You are completely right to be angry that I have not yet officially accepted or declined the invitation." Explaining this delay, though, he added: "But what do you want? I only managed to obtain a response from the Minister in light of your telegram, though obtaining this reply still required considerable effort." He informed him that they intended to take part in the Exposition and left Rocha Lima the task of obtaining the best space possible. Due to the services that he was organizing to fight tuberculosis, he would only be able to leave Brazil in July 1907 (Cruz, 12 mar. 1907), exacerbating the anxiety of our protagonist, who had hoped to have Oswaldo Cruz's sooner to help with the preparations (Rocha Lima, 20 mar. 1907).

Various times Rocha Lima would justify the toughness with which he demanded a stance to be taken by Oswaldo Cruz and would apologize for "exceeding limits": "I think that all of this stems from my desire not to have to say later – I did everything possible – but that we came out of it well. If only my own responsibility was at stake, I would be tranquil" (Rocha Lima, 20 mar. 1907). He would do everything to avoid them making "a very bad impression at the Exposition."

Rocha Lima's apprehension (16 maio 1907) was made all the more acute by the lack of precise instructions on what should be displayed and the demands being made by the Exposition's organizers. It would be a major embarrassment – he prophesized – were the leaflets to describe objects that were not actually on display, "especially given the natural tendency of Europeans to treat us as insignificant," he added.

In July 1907, Oswaldo Cruz travelled to Europe, passing first through Paris and then heading to Berlin. Rocha Lima met up with him and Luiz de Moraes, the architect who had designed the Manguinhos buildings. After seeing that everything was progressing well, despite the various setbacks, he declared himself optimistic about Brazil's involvement: "Our places are the best possible and perhaps we can succeed in not making a bad impression," he wrote to Rocha Lima (Cruz, 30 ago. 1907). In fact events would confirm his optimism, as the Director of Manguinhos would himself relate in a letter written to his wife one day after the opening of the Congress and Exposition of Hygiene, which took place on September 23rd 1907: "The Congress opened yesterday. It has been a real festive occasion. Our exposition has been a total success. Everyone says that they would have thought it impossible for our work to have been possible in Brazil" (cited in Cukierman, 2007, p.330).

The Brazilian delegation, which exhibited in the General Bacteriology, Contagious Diseases and Prophylactic Vaccination sections, as well as Hospital Construction and Disinfection and in Hygiene, Disease and Mortality Statistics, was awarded the gold medal, presented by the German empress. Months later, Oswaldo Cruz was welcomed back home in the port of Rio de Janeiro as a national hero. In retribution for the plaudits obtained in the Old World, Brazil's National Congress finally approved the project for transforming the Sorotherapy Institute into a medical research center (Benchimol, 1990, p.36-37). In a letter to João Pedroso written while he was still in Germany, Oswaldo Cruz recognized Rocha Lima's merit in the success in Berlin: "Rocha Lima, with the excellent relations that he possesses here, obtained the best locations for us and engaged in painstakingly slow propaganda by word of mouth … that was how the battle was won" (cited in Cukierman 2001, p.582).

The project approved by President Afonso Pena in December 1907 assigned Manguinhos with official responsibilities, tasks that for the most part were already being carried out in practice. As well as research, the institution could offer specialization courses, mirroring the profile of the Pasteur Institute in Paris, based around teaching, production and research (Benchimol, 1990). The Institute, renamed the Oswaldo Cruz Institute the following year, was directly subordinated to the Ministry of Justice, assuming a status equivalent to that of the General Directorate of Public Health. As well as administrative autonomy, the new status guaranteed financial autonomy by liberating the commercialization of products developed at the institution. Consequently the income from the vaccine against blackleg, patented by Alcides Godoy, would guarantee funding for a series of improvements, including the recruitment of new staff. The funds led to the arrival at Manguinhos of the likes of Adolpho Lutz, Astrogildo Machado and the pathologist Gaspar Vianna. The new legislation also stipulated the creation of a scientific journal called *Memórias do Instituto Oswaldo Cruz*. The first issue came out in 1909, publishing articles in Portuguese and German until the First World War. Hence the channels of dialogue with German medicine were further boosted, having already intensified the year before and during subsequent years by the arrival of researchers from German institutions at Manguinhos.

German science at Manguinhos: Prowazek, Giemsa, Hartmann and Dürck at the Oswaldo Cruz Institute

According to Guerra (1940, p.370), visitors to the Brazilian stand at the Berlin Exposition were able to admire for the first time "anatomopathological exhibits of diseases unknown to many, hematophagic insects, microscopic preparations, the representation of complete evolutive cycles of protozoa that they knew only from reading." Certainly the scientists who passed through and took an interest interacted with those present. It is very likely that it was on one of these occasions that Oswaldo Cruz invited Stanislas von Prowazek[8] and Gustav Giemsa[9], the directors of the departments of protozoology and chemistry of the Hamburg Institute of Maritime and Tropical Diseases, to spend a period of time at Manguinhos. The invitation anticipated conducting studies with researchers from the Oswaldo Cruz Institute, the publication of the results in *Memórias* and the offer of courses to students. The Brazilian government covered the costs of travel and payment of the German scientists' salaries during their stay, planned for six months (Benchimol, 1990).

The names of Giemsa and Prowazek were already internationally renowned in their specialties. The name of the former had become known worldwide, designating the solution that he had developed to color blood protozoa, but that had also proven useful in visualizing other microorganisms and tissue components. Prowazek had produced a high number of works on protozoa and on basic cellular biology. He had succeeded Fritz Schaudinn – famous for his description of the spirochete bacterium causing syphilis – as director of the protozoology section. Prowazek deepened the studies of microorganisms similar to *Treponema*, correlating them with a kind of tropical ulcer and other pathologies. In addition he had associated intracytoplasmic inclusions, which he referred to as chlamydozoa, with diseases such as trachoma. These structures were also associated with scarlet fever, rabies and rinderpest (Mannweiler, 1998).

Prowazek's research at Manguinhos was related to the possible role of these formations in the pathogeny of smallpox, a disease that erupted into a virulent epidemic in Rio de Janeiro in 1908. He conducted these studies in collaboration with Henrique Aragão. The 'smallpox microbe' identified by them acquired considerable recognition at the time, having been the subject of a study published in the Munich medical weekly *Münchener medizinische Wochenschrift* and in *Memórias do Instituto Oswaldo Cruz*. Prowazek (1909) also studied the life-cycle of the agent of chicken spirillosis, demonstrating the tick's role as an intermediate host. He also researched free-living protozoa, an area of research continued later by Aristides Marques da Cunha and José Gomes de Faria. According to Aragão (1950) and Fonseca Filho (1974) this represented one of the most important long-term contributions of Prowazek's stay. In 1912, Giemsa would return to Manguinhos to study with Alcides Godoy and Cardoso Fontes the fish parasites and protozoa forming plankton in Guanabara Bay (Benchimol, Teixeira, 1993, p.29).

Prowazek also accompanied Arthur Neiva on a scientific expedition to the region on the border between the states of São Paulo and Mato Grosso. Part of the excursion's report is found in the archive of Hamburg's Institute of Maritime and Tropical Diseases. In the report, Prowazek (s.d.) describes with delight the route they had taken from São Paulo to the mouth of the Tietê River. He observed malaria in Bauru, noting that there the so-called tropical form had a milder evolution than the tertian form.

Gustav Giemsa's activities are less well documented. Just one work, produced in collaboration with Alcides Godoy, appeared in *Memórias*. The study involved the application of the method of ultrafiltration in the concentration of the anti-diphtheria serum produced at Manguinhos (Giemsa, Godoy, 1909).

During the period in which Prowazek and Giemsa were in Rio de Janeiro, another German researcher made a brief visit to the Oswaldo Cruz Institute: another researcher from the Institute of Maritime and Tropical Diseases in Hamburg, Ernst Rodenwalt, a military physician who had just recently returned from Togo in Africa. Rodenwalt (1957, p.54) described Manguinhos as an institute fitted with the most modern scientific equipment of the time. In relation to the team, he mentions that they had been trained in Europe and worked with "passionate devotion."

The stay of the researchers from the Tropeninstitut coincided with the discovery by Carlos Chagas of a trypanosome in a kind of blood-sucking insect known popularly as barbeiro on the construction sites of a railway where he had been sent to perform a malaria prophylaxis (Kropf, 2009). According to Sá (2005, p.314), Prowazek reported in Germany that forms of *Trypanosoma* observed by Chagas were very similar to intracellular haemosporidia in terms of schizogony and the period of intracellular life, as well as presenting no mobile forms of reproduction. Chagas published in *Archiv für Schiffs- und Tropen-Hygiene* the occurrence of two trypanosomes: *Trypanosoma minasense*, which he had found in monkeys, and *Trypanosoma cruzi*, a new kind discovered in the intestine of the barbeiro insect (Sá, 2005, p.314). As he himself stated, the studies of the life-cycle of the new trypanosome species had taken place under the supervision of Prowazek who, after returning to Germany, published a study systemizing the knowledge on trypanosomes. He referred to the work of the Manguinhos researcher as evidence that these protozoa developed in vectors, a controversial issue at the

time, even though the work of the researcher from the Berlin Institute of Infectious Diseases, Friedrich Karl Kleine, argued this hypothesis in the case of a sleeping sickness (p.315). In April 1909, Chagas would complete the cycle of the new trypanosome by isolating the organism in the blood of a child found in the same place where he had discovered infected barbeiro insects. He identified it as the pathogen of a disease, the clinical and epidemiological design of which would be determined over the following years through advances and setbacks, dilemmas and controversies, as Kropf points out (2009). Named Chagas disease, it would be considered Manguinhos's principal achievement and would assume significances closely related to the proposals for the intervention of the institute's researchers in public space (Kropf, 2009).

Amid the turmoil generated by the new 'discovery,' the German protozoologist Max Hartmann[10] arrived at Manguinhos. Linked, like Prowazek, to Fritz Schaudinn. Hartmann was a researcher from Berlin's Institute of Infectious Diseases, directed by Koch. Along with Prowazek, he had taken over the direction of the *Archiv für Protistenkunde* (Protozoology Archives) created by Schaudinn. At Manguinhos, Hartmann worked very closely with Chagas. Together they studied flagellates found in the feces of a turtle, an investigation that led to the identification of a new species of amoeba, which the German researcher named *Entamoeba testudinis* (Hartmann, 1910). They also made a wide-ranging inventory of the flagellates that they found in vials of fresh water taken from the Manguinhos swamps. The study of these protozoa aimed to verify the classificatory system that Hartmann had established with Prowazek, as well as some hypotheses proposed by Schaudinn, such as the nuclear duplication of the cells of these microorganisms (Hartmann, Chagas, 1910b). Amid the multitude of flagellates analyzed, they found an amoeba that presented a very particular form of nuclear division, which was the topic of another publication in *Memórias* (Hartmann, Chagas, 1910a).

The conceptions of Schaudinn's 'protozoology school,' represented by Prowazek and Hartmann, influenced the way in which Chagas described the life-cycle of the trypanosome involved in the new human pathology. As Kropf shows (2006), one of the confirmations of this fact is the interpretation that he gave to the forms encountered in the lungs of infected animals – he considered them to be stages in the parasite's schizogenesis, a characteristic that confirmed Schaudinn's hypothesis of the close relation between trypanosomes and haemosporidia. *Trypanossoma cruzi* lent support to Hartmann's suggestion to locate these two categories of protozoa under one new order – *Binucleatta* (Kropf, 2006, p.96).

In 1912 it was the turn of Rocha Lima's former professor, Hermann Dürck, to travel to Manguinhos to organize the anatomopathology service linked to the hospital that would be created along with the Institute. He remained there for six months, a stay that also failed to leave many records in the consulted sources. According to Fonseca Filho (1974), Dürck did not exert any significant influence on the direction taken by pathology at Manguinhos. By then Rocha Lima had already gained international recognition. In 1909, he had left for Germany, initially to occupy the post of Dürck's assistant at the Institute of Pathology of the University of Jena. He remained just eight months in Jena since he soon after transferred to Hamburg, where, at Prowazek's invitation, he became a researcher at the Institute of Maritime and Tropical Diseases, where he worked until 1927. The move away from Manguinhos and questions involving the extension of the license and the successor to the post left by Rocha

Lima provoked a rupture with Oswaldo Cruz, who wanted him to stay in Brazil. Hurt by Cruz's attitude, he continued to accompany attentively the conflicts involving his former colleagues and the complex correlation of forces that led to new realignments, related, among other aspects, to the hierarchy enshrined by the Institute's new statute (Benchimol, Teixeira, 1993). In later years, however, Rocha Lima would pursue a prolific scientific career, contributing to study of the pathology of yellow fever, as we have seen, as well as Chagas disease, *verruga peruana*/Carrión's disease, histoplasmosis and other cutaneous mycoses. He would gain international prestige, however, with the studies that led to the description of the etiological agent causing epidemic typhus, made during the First World War. After the conflict was over, he was named professor at the University of Hamburg, founded in 1919. His integration within the German academic community and close contacts with Brazilian physicians enabled him to work intensely to re-establish relations between German science and the outside world in the 1920s, shaken by the war. He suggested to the Berlin diplomats that the Oswaldo Cruz Institute could act as a center for German cultural propaganda in Rio de Janeiro, the link that could keep alive the attraction that his colleagues had for German medicine. In 1928, Rocha Lima returned to Brazil in order to join the Instituto de Defesa Agrícola e Animal (Institute of Agricultural and Veterinary Defense) founded by Arthur Neiva in São Paulo. In 1933 he assumed direction of the Institute and occupied the post until 1949, a period in which he consolidated the Institute on the national and international scientific stage, using the formula that Oswaldo Cruz had applied at Manguinhos: strengthening of ties with the local social sectors and an emphasis on internationalization (Stepan, 1976). He would die seven years later, discontent with the lack of recognition of his scientific contributions and marked by his association with Germany, whose identity would become indelibly linked to the barbarities perpetrated under national socialism.

Final considerations

The present work has explored the beginning of Rocha Lima's close relationship with the German-speaking world at a time when Germany was the main scientific center in the field of medical research. The dilemmas involved in his choices – whether clinical practice or a career as a researcher – were not exclusive to him. Many of his contemporaries, including the likes of Carlos Chagas, tried to reconcile the two spheres of activity for a while. In Brazil at the start of the twentieth century, scientific research was not an attractive and secure option as a professional career compared to clinical practice. Historically scientific activities in the country up until then had been either short-term initiatives or ventures that followed their own ramshackle course with minimal political and social support. Oswaldo Cruz's merit resided in his capacity to negotiate with the political and social authorities of his time to obtain the guarantees he needed to establish, in the suburbs of Rio de Janeiro, an institute dedicated to experimental medicine, assuring in return that the institute met the practical demands of the State and the other sectors involved in the project of republican modernization. The scientific agenda of the Manguinhos Institute involved the study, diagnosis and combating of local diseases, making eclectic use of the constant flow of new theories and protocols circulating at international level. Rocha Lima's work in the first years of his career reveal this search for

international legitimacy where knowledge of local problems provided the main means of gaining access to forums abroad. This 'double-sided' local-international aspect is essential to comprehending the factors that led to the success of Oswaldo Cruz's institutional project. Rocha Lima is the figure who personified the second facet in the most striking form. Rather than contradictory spheres, the national and international are constitutive dimensions of scientific activity. However they very often generate tensions and conflicts of loyalty.

The commitment with which Rocha Lima worked to enable Brazilian participation at the 1907 Exposition in Berlin revealed his capacity as an organizer, a trait that he would draw on at other moments of his professional career, such as the Rome missionary exposition in 1925, the organization of diplomatic visits and events and during the administration of the São Paulo's Biological Institute between 1933 and 1949. Whether in Brazil or in Germany, his activity as a scientist would involve from the outset the capacity to negotiate, reconcile interests and logics relating to distant cultural and social universes. It was the talent in dealing with the challenges that this imposed that made Rocha Lima the most active promoter of scientific relations between Brazil and Germany in the first half of the twentieth century.

NOTES

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[1] In this and other citations of texts from non-English languages, a free translation has been provided.

[2] Originally called the Instituto Soroterápico (Sorotherapy Institute) and created in 1900 by the municipal government of Rio de Janeiro in order to produce serum and vaccine against the bubonic plague, which threatened to invade what was then the Federal Capital. It was referred to as the Manguinhos Institute since it was sited on the Manguinhos Farm, the name of the latter derived from its location in an area of mangrove swamp. Reflecting the kind of research activities that had been conducted there from its outset, the institution was rebaptized the Instituto de Patologia Experimental in 1907, and renamed the Instituto Oswaldo Cruz in 1908, by the Afonso Pena government, in recognition of the prize obtained by Brazil in Berlin, as described later in this article. On Manguinhos, see Fonseca Filho (1974), Stepan (1976) and Benchimol (1990).

[3] Martin Ficker was born in Sohland in Spree on November 17th 1868. He trained in medicine at the University of Bresslau, where he was assistant to Karl Flügges at the Institute of Hygiene. At the time his work concentrated on research into air bacteriology. Between 1896 and 1901 he was assistant to Franz Hoffmann at the Leipzig Institute of Hygiene, where he presented his thesis for full professorship in 1898, "On the time of life and death of pathogenic germs." In 1902 he became departmental director at the University of Berlin Institute of Hygiene and the following year was named Professor of Hygiene at the same university. He published the 'Manual of Hygiene' with professors Max Rubner and Gruber between 1911 and 1923. In 1913 he was named director of the São Paulo Bacteriological Institute. Following the outbreak of war, he returned to Germany in 1917 where he took up the post of departmental director at the Kaiser Wilhelm Society, during which time he conducted studies on the anthrax toxin. He returned to São Paulo in 1923 where he founded a bacteriological laboratory that remained linked to the Kaiser Wilhelm Society, elevated to the rank of microbiological station of the Kaiser Wilhelm Society in 1925. He remained there until his death on November 22nd 1950. During this period he carried out research on leprosy (Jusatz, 1961, p.134-135).

[4] On the debate surrounding the etiology of yellow fever and the different theories employed to elucidate it, see Benchimol (2001).

[5] In German: Hamburg-Amerikanische Packefahrt-Actien Gesellschaft and Hamburg-Südamerikanische Dampfschiffahrts-Gesellschaft.

[6] Hermann Dürck was born in Munich on February 11th 1869. He studied with the renowned pathologist Böllinger, in Munich, and Hans Chiari, in Prague. He received his doctorate in Munich in 1892, and qualified

in anatomy and bacteriology in 1897. In 1902 he became extraordinary professor in the latter specialty. In 1909 he became director of the Institute of Pathology of the University of Jena. Two years later he returned to Munich where he assumed direction of the Pathological Institute, an annex of the Isar Hospital. In 1919 he became honorary professor of University of Munich. As well as studies on the histopathology of the plague and beriberi, he deepened the investigation on the histopathology of the nervous system. He described a granulomatous formation, baptized with his name, in the nervous system of patients with malaria (Gruber, 1959, p.163).

[7] In German: Kaiser Wilhelms-Akademie für das militärärztliche Bildungswesen.

[8] Stanislas von Prowazek was born on November 12th 1875 in Bohemia. He trained in natural sciences at the Universities of Prague and Vienna. He worked for a short period at the Trieste zoological station and, in 1901, at the Paul Ehrlich Institute of Experimental Therapy in Frankfurt. In 1903 he worked with Fritz Schaudinn at the Rovigno biological station. In 1905 he replaced Schaudinn at the protozoology laboratory of the Reich health service in Berlin. The following year he took up the post of director of the protozoology section of the Tropeninstitut in Hamburg, again replacing Schaudinn. He took part in the scientific expedition led by Albert Neisser to Java between 1906 and 1907. After staying at the Oswaldo Cruz Institute from 1908 to 1909, he participated in the expedition to Samoa, Sumatra and the Mariana Islands, during which he conducted studies on trachoma. In 1913 he was sent to Serbia with Carl Hegler to study epidemic typhus. The next year, in the company of Henrique da Rocha Lima, he went to Constantinople with the purpose of continuing the studies of this disease. The two men were once again selected, this time during the First World War, to fight the disease in a Russian prisoner camp in Cottbus. During the research, Prowazek contracted the disease and died in February 1915.

[9] Gustav Giemsa was born on November 20th 1867 in Blechhammer bei Slaventziz, in Upper Silesia. He graduated in pharmacy in Leipzig, specializing in chemistry, mineralogy and bacteriology. After working for some years in German West Africa, in 1900 he was appointed head of the chemistry section of the Institute of Maritime and Tropical Diseases in Hamburg, founded that year. As well as the staining method named in his honor, Giemsa focused on the use of chemotherapy on tropical diseases, highlighting his studies on quinine. In 1920 he was appointed *Privatdozent* of the recently founded University of Hamburg. He retired in 1933 and died in 1948 in Tyrol. His scientific output included more than 120 publications. (Biographic data taken from Mannweiller, 1998.)

[10] Max Hartmann was born in 1876. He trained in natural sciences at the University of Munich, obtaining his doctorate there in 1901. Between 1902 and 1905 he was *Privatdozent* at the Institute of Zoology of the University of Gießen. In 1903 he presented a thesis for full professorship on the modes of reproduction of organisms, a demonstration of what would be the main motif of his scientific production – theories of sexuality. Influenced by Fritz Schaudinn, he transferred in 1905 to the Institute of Infectious Diseases in Berlin, where he implanted the department of protozoology. In 1914 he moved to the same department at the Kaiser-Wilhelm Gesellschaft Institut für Biologie (Kaiser Wilhelm Institute for Biology) in Dahlem, Berlin, where he was director between 1933 and 1955. The importance of Hartmann's work for biology primarily relates to his contributions to understanding the mechanisms involved in reproduction and his theories of the sexuality of beings. His studies of protozoa were related to this aspect. He considered the study of these mechanisms simpler in unicellular organisms. He turned against vitalism and pure mechanicism and argued for the application of causal thought in biology. He died in 1962 (Dolezal, 1969).

REFERÊNCIAS

ARAGÃO, Henrique de Beaurepaire. Notícia histórica sobre a fundação do Instituto Oswaldo Cruz (Instituto de Manguinhos). *Memórias do Instituto Oswaldo Cruz*, Rio de Janeiro, n.48, p.1-50. 1950.

ARAGÃO, Henrique de Beaurepaire. Über den Entwicklungsgang und die Übertragung von Haemoproteus columbae. *Archiv für Protistenkunde*, Jena, v.12, p.154-167. 1908.

ARAGÃO, Henrique de Beaurepaire. Sobre o cyclo evolutivo do halterídeo do pombo: nota preliminar. *Brazil-Medico*, Rio de Janeiro, v.21, n.15, p.141-142. 1907.

BENCHIMOL, Jaime Larry. Reforma urbana e revolta da vacina na cidade do Rio de Janeiro. In: Ferreira, Jorge; Neves, Lucilia de Almeida (Org.). *Brasil republicano*: economia e sociedade, poder e política, cultura e representações. Rio de Janeiro: Civilização Brasileira. v.1, p.231-286. 2003.

BENCHIMOL, Jaime Larry. *Febre amarela, a doença e a vacina:* uma história inacabada. Rio de Janeiro: Editora Fiocruz. 2001.

BENCHIMOL, Jaime Larry. *Dos micróbios aos mosquitos*: febre amarela e

revolução pasteuriana no Brasil. Rio de Janeiro: EdUFRJ/Editora Fiocruz. 1999.

BENCHIMOL, Jaime Larry.
Manguinhos do sonho à vida: a ciência na Belle Époque. Rio de Janeiro: Casa de Oswaldo Cruz/Fiocruz. 1990.

BENCHIMOL, Jaime Larry; SÁ, Magali Romero.
Adolpho Lutz e a entomologia médica no Brasil. In: Benchimol, Jaime Larry; Sá, Magali Romero (Org.). *Adolpho Lutz*: obra completa. v.2, livro 3. Rio de Janeiro: Editora Fiocruz. 2006.

BENCHIMOL, Jaime Larry; SÁ, Magali Romero.
Adolpho Lutz: formação e primeiros trabalhos. In: Benchimol, Jaime Larry; Sá, Magali Romero (Org.). *Adolpho Lutz*: obra completa. v.1, livro 1. Rio de Janeiro: Editora Fiocruz. p.119-250. 2004.

BENCHIMOL, Jaime Larry; SILVA, André Felipe Cândido.
Ferrovias, malária e medicina tropical no Brasil da Primeira República. *História, Ciências, Saúde – Manguinhos*, Rio de Janeiro, v.15, n.3, p.719-762. 2008.

BENCHIMOL, Jaime Larry; TEIXEIRA, Luiz Antônio.
Cobras, lagartos e outros bichos: uma história comparada dos Institutos Oswaldo Cruz e Butantan. Rio de Janeiro: EdUFRJ. 1993.

BOURDIEU, Pierre.
A ilusão biográfica. In: Amado, Janaína; Ferreira, Marieta Moraes (Org.). *Usos e abusos da história oral*. Rio de Janeiro: Editora FGV. p.183-191. 1996.

BRAHM, Felix.
Die Lateinamerika-Beziehungen des Hamburger Tropeninstituts, 1900-1945. Dissertação (Mestrado) – Fakultät für Geisteswissenschaften, Universität Hamburg, Hamburg. 2002.

CRUZ, Oswaldo.
Carta a Rocha Lima. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 30 ago. 1907.

CRUZ, Oswaldo.
Carta a Rocha Lima. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 29 maio 1907.

CRUZ, Oswaldo.
Carta a Rocha Lima. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 12 mar. 1907.

CRUZ, Oswaldo.
Carta a Rocha Lima. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 20 fev. 1907.

CRUZ, Oswaldo.
Carta a Rocha Lima. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 30 jan. 1907.

CRUZ, Oswaldo.
Carta a Rocha Lima. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 21 jan. 1907.

CRUZ, Oswaldo.
Carta a Rocha Lima. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 15 jan. 1907.

CRUZ, Oswaldo.
Carta a Rocha Lima. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 21 nov. 1906.

CRUZ, Oswaldo.
Carta a Rocha Lima. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 9 set. 1906.

CRUZ, Oswaldo.
Carta a Rocha Lima. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 17 dez. 1902.

CUKIERMAN, Henrique.
Yes, nós temos Pasteur. Rio de Janeiro: Relume Dumará/Faperj. 2007.

CUKIERMAN, Henrique.
Estegomiias em conserva e micróbios de vinha d'alhos: o Brasil triunfa em Berlim. *História, Ciências, Saúde – Manguinhos*, Rio de Janeiro, v.7, n.3, p.569-586. 2001.

DOLEZAL, Helmut.
Max Hartmann. In: *Neue Deutsche Biographie*. v.8. Berlin: Duncker & Humblot. p.1-2. 1969.

EDLER, Flavio Coelho.
As reformas do ensino médico e a profissionalização da medicina na corte do Rio de Janeiro, 1854-1884. Dissertação (Mestrado) – Faculdade de Filosofia, Letras e Ciências Humanas, Universidade de São Paulo, São Paulo, 1992.

FICKER, Martin.
Homenagem. *Arquivos do Instituto Biológico,* São Paulo, v.11, n.1, p.XI-XV. 1940.

FICKER, Martin.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). s.d.

FONSECA FILHO, Olympio Oliveira Ribeiro da.
A Escola de Manguinhos: contribuição para o estudo do desenvolvimento da medicina experimental no Brasil. São Paulo: s.n. 1974.

GIEMSA, Gustav; GODOY, Alcides.
Sobre a ultrafiltração: pesquizas tendentes a obter a concentração do sôro antidifterico. (Über Filtration und Versuche, mit Hilfe derselben Diphterieserum zu konzentrieren). *Memórias do Instituto Oswaldo Cruz*, Rio de Janeiro, t.1, n.1, p.3-11. 1909.

GRADMANN, Christoph.
Krankheit im Labor: Robert Koch und die medizinische Bakteriologie. Göttingen: Wallstein. 2010.

GRUBER, Georg B.
Dürck, Hermann Ludwig Friedrich Franz. In: Neue Deutsche Biographie. v.4. Berlin: Duncker & Humblot. p.163. 1959.

GUERRA, Egydio Salles.
Oswaldo Cruz. Rio de Janeiro: Vecchi. 1940.

HARTMANN, Max.
Nova ameba intestinal, *Entamoeba testudinis* n. sp. *Memórias do Instituto Oswaldo Cruz,* Rio de Janeiro, t.2, n.1, p.3-10. 1910.

HARTMANN, Max; CHAGAS, Carlos.
Sobre a divizão nuclear da *Amoeba hyalina* Dang. (Ueber die Kernteilung von *Amoeba hyalina* Dang.). *Memórias do Instituto Oswaldo Cruz,* Rio de Janeiro, t.2, n.2, p.159-167. 1910a.

HARTMANN, Max; CHAGAS, Carlos.
Estudos sobre flagelados (Flagelatten-Studien). *Memórias do Instituto Oswaldo Cruz*, Rio de Janeiro, t.2, n.1, p.64-125. 1910b.

JUSATZ, Helmut.
Ficker, Philipp Martin. In: *Neue Deutsche Biographie*. v.5. Berlin: Duncker & Humblot. p.134. 1961.

KROPF, Simone Petraglia.
Doença de Chagas, doença do Brasil: ciência, saúde e nação (1909-1962). Rio de Janeiro: Editora Fiocruz. 2009.

KROPF, Simone Petraglia.
Doença de Chagas, doença do Brasil: ciência, saúde e nação (1909-1962). Tese (Doutorado) – Instituto de Ciências Humanas e Filosofia, Universidade Federal Fluminense, Niterói. 2006.

LÖWY, Ilana.
Vírus, mosquitos e modernidade: a febre amarela no Brasil entre ciência e política. Rio de Janeiro: Editora Fiocruz. 2006.

MANNWEILER, Erich.
Geschichte des Instituts für Schiffs-und Tropenkrankheiten in Hamburg, 1900-1945. Keltern-Weiler: Goecke und Evers. 1998.

ORTH, Johannes.
Die Stellung der Pathologischen Anatomie in der Medizin und der Pathologisch-Anatomische Unterricht: Festrede gehalten zur Feier des Stiftungs-Festes der Kaiser Wilhelms-Akademie für das Militärärztliche Bildungswesen am 2. Dezember 1904. Berlin: Otto Lange. 1904.

PARANHOS JÚNIOR, José Maria da Silva, barão do Rio Branco.
Carta a Francisco Régis de Oliveira. Fundo Rocha Lima. (Centro de Memória do Instituto Biológico, São Paulo). 22 jun. 1906.

PROWAZEK, Stanislas von.
Contribuição para o estudo do dezenvolvimento do Spirochaeta gallinarum. *Memórias do Instituto Oswaldo Cruz*, Rio de Janeiro, v.1, n.2, p.79-80. 1909.

PROWAZEK, Stanislas von.
Zur Mündung des Tieté. Hamburgo. Akte 2-8, Reiseberichte. Kongresse. (Arquivo histórico do Bernhard-Nocht-Institut für Tropenmedizin). Datilografado. s.d.

REVEL, Jacques
Micro-análise e construção do social. In: Revel, Jacques. *Jogos de escalas*: a experiência da microanálise. Rio de Janeiro: Editora FGV. p.15-38. 1998.

ROCHA LIMA, Henrique da.
Com Oswaldo Cruz em Manguinhos. *Revista Anhembi*, São Paulo, v.6, n.16, p.27-55, 1952.

ROCHA LIMA, Henrique da.
Rückblickende Betrachtungen über die Entwicklung der Histodiagnose des Gelbfiebers. In: *Festschrift Bernhard Nocht zum 80. Geburtstag....* Hamburg: Institut für Schiffs- und Tropenkrankheiten. p.497-512. 1937.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 16 maio 1907.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 10 maio 1907.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 20 mar. 1907.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 8 mar. 1907.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 7 mar. 1907.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 2 fev. 1907.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 21 jan. 1907.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-CI-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 9 jan. 1907.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 19 dez. 1906.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 3 dez. 1906.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 7 nov. 1906.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 23 out. 1906.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 5 out. 1906.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 7 set. 1906.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). 8 ago. 1906.

ROCHA LIMA, Henrique da.
Carta a Hugo Werneck. Fundo Hugo Werneck. (Centro de Memória da Faculdade de Medicina/ Universidade Federal de Minas Gerais, Belo Horizonte). 12 nov. 1902.

ROCHA LIMA, Henrique da.
Carta a Hugo Werneck. Fundo Hugo Werneck. (Centro de Memória da Faculdade de Medicina/ Universidade Federal de Minas Gerais, Belo Horizonte). 20 ago. 1902.

ROCHA LIMA, Henrique da.
Carta a Hugo Werneck. Fundo Hugo Werneck. (Centro de Memória da Faculdade de Medicina/ Universidade Federal de Minas Gerais, Belo Horizonte). 6 jul. 1902.

ROCHA LIMA, Henrique da.
Carta a Hugo Werneck. Fundo Hugo Werneck. (Centro de Memória da Faculdade de Medicina/

Universidade Federal de Minas Gerais, Belo Horizonte). 13 maio 1902.

ROCHA LIMA, Henrique da.
Carta a Hugo Werneck. Fundo Hugo Werneck. (Centro de Memória da Faculdade de Medicina/ Universidade Federal de Minas Gerais, Belo Horizonte). 1 set. 1901.

ROCHA LIMA, Henrique da.
Carta a Oswaldo Cruz. Rio de Janeiro. Fundo Oswaldo Cruz. BR RJCOC OC-COR-C1-11. (Departamento de Arquivo e Documentação/ Casa de Oswaldo Cruz/Fundação Oswaldo Cruz, Rio de Janeiro). s.d.

RODENWALDT, Ernst.
Ein Tropenarzt erzählt sein Leben. Stuttgart: Ferdinand Enke. 1957.

SÁ, Dominichi Miranda.
A ciência como profissão: médicos, bacharéis e cientistas no Brasil (1895-1935). Rio de Janeiro: Editora Fiocruz. 2006.

SÁ, Magali Romero.
The history of tropical medicine in Brazil: the discovery of *Trypanosoma cruzi* by Carlos Chagas and the German School of protozoology. *Parassitologia,* Roma, n.47, p.309-317. 2005.

SILVA, André Felipe Cândido da.
A trajetória científica de Henrique da Rocha Lima e as relações Brasil-Alemanha (1901-1956). Tese (Doutorado) – Casa de Oswaldo Cruz, Fiocruz, Rio de Janeiro. 2011.

STEPAN, Nancy.
Gênese e evolução da ciência brasileira. Rio de Janeiro: Artenova. 1976.

WORBOYS, Michael.
Germs, malaria and the invention of mansonian tropical medicine: from 'diseases in the tropics' to 'tropical diseases. In: Arnold, David (ed.). *Warm climates and western medicine*: the emergence of tropical medicine, 1500-1900. Amsterdam: Rodopi. p.181-207. 1996.

WULF, Stefan.
Das Hamburger Tropeninstitut, 1919 bis 1945: auswärtige Kulturpolitik und Kolonialrevisionismus nach Versailles. Berlin: Reimer. 1994.