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Introduction: Hegel and Plague in the Backlands

In early September 1897, Euclides da Cunha saw the backlands (the *sertão*, in Portuguese) for the first time.[1] The term *sertão*/backlands was ambiguous at the time of Cunha and remains so in Brazil, having at least three main meanings. Historically, it refers to the hinterland of the country. But the term also implies a sort of imagined rural and backward space. In this second connotation, the backlands could metaphorically mean not only the hinterland, but also the Brazilian coast. Finally, the term can refer to the phytogeographic area of semi-desertic characteristics, also known as *caatinga* or the Brazilian semi-arid region, located in the northeast of Brazil. In what follows, I will be implying this last meaning when talking about the backlands, without denying the importance of other meanings or their entanglements.[2]

Cunha had been sent to the backlands by the *Estado de São Paulo* newspaper to cover what would turn out to be the last act of the bloody war of Canudos (1896–1897).[3] Canudos was a settlement of more than 5000 dwellings. Its inhabitants created a community at the margin of the law while waiting for Doomsday.[4] Canudos was ruled by Antônio Conselheiro, a fanatical monarchist according to the Republican authorities, a prophet according to his followers.[5] Probably fearing Conselheiro's influence spreading further around the backlands and dragging more workers from neighboring farms, local landowners tried to destroy the settlement at the end of 1896, first with the police and then with the provincial army, but both expeditions failed.[6] The federal authorities in Rio de Janeiro intervened in February 1897, dispatching an army lead by the infamous Colonel Moreira Cesar, who ended up killed at the doors of Canudos.[7] What was until then a rebellion in a recondite corner of Bahia thus began to threaten the unstable early Brazilian Republic, proclaimed in 1889.[8] As a result, Rio de Janeiro sent almost half of the Brazilian army and its modern cannons against Conselheiro's followers.[9] The siege lasted for weeks, but on 5 October 1897, Canudos fell.[10] The army killed most of the men, dispersed the women and orphans around the backlands, then burned down Canudos in an effort to erase any trace of the events.[11]

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This endeavor proved futile. In 1902, Cunha published his masterpiece *Os Sertões* (translated in English as *Rebellion in the Backlands*), perhaps one of the most influential books ever written in Brazilian Portuguese, reconstructing in a unique style, mixing scientific jargon and baroque prose, the War of Canudos.[12] The book is divided into three parts, each portraying an antithesis. In *A Terra* [The Land], Cunha contrasts the exuberant tropical Brazilian coast with the semi-desertic backlands, recurrently plagued by droughts. In the second part, *O Homem* [The Man], he discusses how these two spaces forged antinomic "races": a mixed, modern, but neurasthenic one around the coast, and a backwards, rural, but brave and "authentic" one in the backlands: the *sertanejos*. In the third part, *A Luta* [The Fight], Cunha depicts what he sees as the inevitable clash between these two "races" and these two Brazils. In this confrontation, the *sertanejos* emerge as heroes while the modern Brazilian army shows its barbarous face.[13]

Os Sertões is utterly Hegelian in its dialectic depiction of Brazilian history. Nonetheless, the only clear mention of the German philosopher in the book appears when Cunha discusses how the backlands seemed to slightly challenge Hegel's geographic division of the world into deserts/plains, valleys, and coast.[14] According to Hegel, deserts and plains, such as the Arabian Desert and Siberia, pushed societies that inhabit them to a perpetual state of nomadism and patriarchy, and even if new ideas could emerge there – Islam, for example – they could not find an intellectual refinement in those spaces. The valleys, such as those formed by the Ganges and the Euphrates rivers, allowed the establishment of centers of civilization. Finally, the coast, exemplified by the Mediterranean basin and Western Europe, offered "the means of connecting the world together, and of maintaining the connection", and there trade and civil freedom flourished.[15] But, Cunha noticed, Hegel did not mention the backlands and its specificities.[16] In the dry season, this looked like a desert, but in the rainy season, the region appeared as a "fertile orchard".[17] This seasonality influenced the *sertanejos's* way of life. If the rains came regularly around the years, small farms could thrive. However, if drought lasted for several years, the *sertanejos* were pushed to abandon their lands and migrate to the coast, returning as soon as the rains recreated the conditions for farming and husbandry. Therefore, Cunha concluded, the backlands were an original geographic entity within Hegel's framework, a sort of transitional stage between deserts and valleys. Consequently, Cunha depicted the *sertanejos* as a transitional element, situated between nomadism and the first stages of an agrarian society.[18]

Cunha's Hegelian approach of portraying the backlands as a sort of civilizational or intellectual backwater became influential in the discourses for the modernization and sanitation of the backlands and other rural parts of the country in the first half of the twentieth century, as highlighted by several historians and sociologists of science and medicine.[19] However, few studies have tried to criticize this understanding, presenting the inhabitants of the backlands – the *sertanejos* – as active agents in the production of

knowledge. On the other hand, a crucial insight of Cunha's is sometimes forgotten by Brazilian historians. The backlands are not like other Brazilian rural spaces, and this is because of the semi-desertic environment.

In this chapter, I dialogue with this complex intellectual tradition about the backlands. On the one hand, I nuance the longstanding imaginary of the backlands as a sort of intellectual desert by focusing on the role the region and its inhabitants played in the emergence of medical knowledge on one disease in particular: plague. On the other hand, I discuss how the perceived particularity of the backlands as a semi-arid region was mobilized by medical experts to explain plague epidemiology in that region.

The history of plague in Brazil in the first half of the twentieth century revolved around two dynamics: first, a geographical "interiorization" – that is, a dislocation of plague outbreaks from the ports around the coast to cities and small villages in the backlands;[20] and second, a geographic and institutional expansion of the federal anti-plague infrastructure, which happened in tandem with the centralization of the Brazilian state under the regime of President Getúlio Vargas (1930–1945).[21] As Simone Luna shows, the years between 1941 and 1955 represented a turning point in these two processes. The idea that plague was endemic to the backlands then became consolidated among the Brazilian Ministry of Health and, accordingly, a federal apparatus to fight plague took shape in the form of the Serviço Nacional de Peste (National Plague Service).[22]

In this chapter, I discuss two moments situated immediately before and after the period discussed by Luna, the years 1939–1941 and 1957–1965. These two intervals correspond to the invention and fall of the idea of rural plague in Brazil, a process connected to the missions of two foreign experts – the Chilean Atilio Macchiavello Varas and the Argentinian José Maria de la Barrera.[23] The administrative impacts of the first mission are deeply discussed by Luna and briefly by Celso Tavares in his study of sylvatic plague in Brazil in the 1960s.[24] The conclusions of de la Barrera's mission are also summarized by Tavares.[25] I am less interested in the administrative impacts of these reports, and more in *what* Macchiavello and de la Barrera concluded about plague in Brazil and *how* they reached their conclusions. By *how*, I understand, first, the interactions with a varied range of Brazilian actors spanning from doctors to lay people, such as peasants and hunters.[26] Second, by *how*, I understand the epidemiological reasoning that both Macchiavello and de la Barrera deployed in their respective reports. In other words, I will follow their arguments and conclusions step by step. By examining and comparing the ways whereby Macchiavello and de la Barrera arrived at somewhat opposite conclusions, I will argue first that the semi-desertic characteristics of the backlands were understood by both experts, although in different ways, as essential to the endemicity of plague in that region. Second, I will argue that, despite its semi-desertic characteristics, the backlands were far from an intellectual "desert". Instead, the *sertanejos* and the Brazilian doctors working there were as central as the foreign experts to

the production of knowledge about plague in Brazil in the second and third quarters of the twentieth century.

Macchiavello's Mission (1939–1940)

Born in 1902 in the northern Chilean city of Antofagasta and graduated in medicine at the University of Chile in 1926, Atilio Macchiavello Varas (henceforth Macchiavello) had his first contacts with plague in his hometown, where he fought an outbreak of the disease in 1930 as sanitary health officer (*Inspector Técnico Sanitario*).[27] Anti-plague measures applied in Antofagasta went in tandem with other port cities in the world, being essentially centered on destroying rats by means of poisons and traps.[28] The experience acquired on this outbreak led Macchiavello to be commissioned by the Chilean government, in partnership with the Pan American Health Organization (PAHO), to visit ports in Peru and Ecuador, and to study their respective anti-plague services.[29] Partly based on his report, on 30 July 1932 a national anti-plague service was created in Chile with Macchiavello at its head.[30] As a result of this experience, in 1934 Macchiavello was granted a fellowship by the Guggenheim Foundation to spend twelve months at Harvard studying preventive medicine and public health.[31] Upon his return from the United States in 1937, Macchiavello was appointed General Director of Health (*Director General de Sanidad*) of Chile; a position he held until 1939, when he became a PAHO travelling expert (*experto viajero*). In this new role, he was sent first to Ecuador and then to Brazil.[32]

Macchiavello's mission in Brazil lasted from 20 August 1939 to 29 September 1940, and encompassed several localities, most of which were in the backlands of the states of Ceará, Paraíba, Pernambuco, Alagoas, and Bahia.[33] The backlands encountered by Macchiavello in 1939 were certainly different from that of the War of Canudos. The region had been progressively connected with the rest of Brazil in the first decades of the twentieth century, namely to the Amazon and to the South, where the *sertanejos* became the workforce behind the exploration of rubber and the incipient industries, respectively.[34] But some of the regional characteristics that made Cunha awestruck remained in the late 1930s. The backlands continued to be affected by recurrent droughts, as that of 1915 immortalized by Rachel de Queiroz in another classic of Brazilian literature, which destroyed crops, killed cattle, and forced the *sertanejos* to migrate.[35] Moreover, fights for land, social banditry, and messianic movements constantly threatened the stability of the region.[36]

When Macchiavello arrived in Brazil, he immediately sought the help of Brazilian doctors. The interactions with Brazilian doctors occurred both during Macchiavello's travels across the backlands, when he was accompanied by local experts, and in academic meetings.[37] Among the doctors encountered by Macchiavello, two merit closer attention. The first was Oscar Pereira de Britto, who co-authored a chapter with Macchiavello in

his official report and guided him in the backlands of Pernambuco.[38] Like Macchiavello, Britto had spent one year studying medicine and public health in the United States, at Johns Hopkins with a Rockefeller Foundation fellowship.[39] Upon his return to Brazil in early 1927, Britto became the director of the Inspetoria Rural de Erradicação da Peste em Pernambuco (Rural Service for the Eradication of Plague in Pernambuco), created in April of that year and based in the city of Triunfo, in the backlands of the state of Pernambuco.[40] Plague had killed more than one thousand people in Triunfo between 1925 and 1926, the deadliest outbreak of the disease in Brazilian history.[41] The mission of the service Britto directed was to eradicate the disease from Triunfo and potentially from other rural areas of the Pernambuco state. In his role, Britto oversaw studies of the local fauna of rats and fleas and led an anti-rat campaign in Triunfo and its surroundings, centered on the disinfection of fences and dry walls, as those structures were believed to harbor rats.[42] In 1930 the Inspetoria Rural de Erradicação da Peste em Pernambuco was dismantled for political reasons, and plague continued to ravage rural parts of Pernambuco.[43]

The second doctor of importance was Marcello Silva Junior, who met with Macchiavello in the state of Ceará.[44] Originally from the southern region of Brazil, Silva Junior was sent by the Departamento Nacional de Saúde Pública (National Department of Public Health) to study the persistence of plague in the state of Ceará in 1935. After a few weeks of research, mainly in the backlands of that state, he produced a long report blaming rats as the main culprits for keeping the disease endemic in the region, but he wondered whether other animals, namely wild rodents such as the *mocó* and the *preá*, could also be implicated in the epidemiology of plague in the backlands.[45] This study allowed Silva Junior to be hired by the *Serviço Antipestoso* (Anti-Plague Service), the first federal agency targeting the plague, created in 1936.[46]

Drawing upon an stablished scientific paradigm in Brazil and around the world, Brazilian plague experts like Britto and Silva Junior considered that plague was spread by rats, and that the bubonic form of the disease – the most common in the country – was transmitted to humans by the rat flea.[47] Therefore, the sanitary actions these doctors advised and implemented were centered on destroying rats.[48] Moreover, it was a common belief among those doctors working in the backlands that the widespread custom of *sertanejos* of amassing large quantities of grains and goods inside their houses attracted rats.[49] Therefore, the Brazilian experts commonly preached the importance of keeping rats at bay from human habitations by improving the buildings and educating the population on the risks caused by these animals.[50]

A more controversial point among Brazilian experts concerned the role of wild rodents and their ectoparasites in the backlands plague epidemiology. Around the world, the circulation of the plague bacillus among several fauna of wild rodents had been studied since 1894.[51] In 1928, the Portuguese doctor Ricardo Jorge defined as sylvatic plague the plague enzootic among wild rodents without the concurrence of rats.[52] In other words, the bacillus

was perpetuated among wild rodents without domestic rats necessarily being involved. In Brazil, in studies carried out between 1927 and 1929, Britto had found no proof that wild rodents played a role in the plague outbreaks in Triunfo.[53] Almost ten years later, Silva Junior, having carried out experiments in the city of Crato (Ceará state), affirmed that rats got infected with plague from the wild rodent known as *preá*, thus demonstrating in his opinion that sylvatic plague existed in Brazil.[54] This assertion was not shared by other Brazilian plague experts, and one of the goals of Macchiavello's mission was precisely to ascertain whether sylvatic plague existed in Brazil.[55]

Demonstrating the existence of sylvatic plague could be a fraught enterprise, particularly in places such as the backlands, where wild rodents and rats were believed to cohabit, which made it harder to ascertain whether a plague infection among wild rodents was dependent on a previous infection among rats. In order to solve this puzzle, the doctors discussing the existence of sylvatic plague in Brazil prior to Macchiavello's arrival examined the question in two ways. First, in the backlands, it was only from wild places – known generally as *serras* (mountain ranges) – that rats seemed to be absent. As a result, if it were possible to demonstrate that wild rodents in the *serras* were carrying plague, then the existence of the sylvatic plague could be ruled as fact.[56] The second way of reasoning about sylvatic plague was applied to places where rats and rodents were believed to share habitats, as was the case in the outskirts of Crato, where Silva Junior conducted his research.[57] If it were possible to show that wild rodents were dying of plague *prior* to a plague epizootic among rats in those peri-urban spaces, this would suggest that they were likewise infecting the rats and not the other way around. However, different reasons complicated the observation both in the *serras* and in the fields, especially the fact, noted by Macchiavello, that black vultures (*urubus*), a common scavenger in the backlands, usually ate dead rodents before they could be collected.[58]

Therefore, any study about plague's ecology in the backlands required not only the help of doctors, but also that of the lay people of the region, the *sertanejos*. Among the *sertanejos* who usually informed Brazilian doctors and foreign experts, hunters were essential for the study of plague in the *serras* and in other wild areas: they knew the ground and the animals, and were the first to spot any anomalous dying.[59] Peasants, on the other hand, were essential for the study of plague in the places where rats and rodents coexisted, because they could potentially observe epizootics among these animals and indicate which epizootic started first. During his stay in Brazil, Macchiavello visited several rural habitations in the backlands, accompanied by Brazilian doctors.[60] When visiting these spaces, the Brazilian doctors and the Chilean expert usually inspected buildings to see whether they were rat-proofed; in some places, they collected rats and fleas and carried out experiments on these animals, and discussed the epidemiological situation of the area with the *sertanejos*.[61]

In short, when Macchiavello arrived in the backlands in 1939, he found a space full of plague expertise, both because Brazilian doctors had been

studying the disease for years, and because the *sertanejos* knew the rats and rodents of their region and observed some of their behaviors at first hand. This widespread and variated expertise would be reflected in Macchiavello's report.

Macchiavello's Report: Brazilian Rural Plague (1941)

Macchiavello wrote extensively about his mission in Brazil. His first studies were published in 1939 and 1940 as articles in Brazilian scientific journals, and presented in talks at scientific conferences in Brazil.[62] They were also communicated to Brazilian authorities in confidential reports.[63] In May 1941, a condensed version of Macchiavello's research was published in the *PAHO Bulletin*.[64] A few months later, the official report was finally released, also under the auspices of PAHO, entitled *Contribuciones al estudio de la peste bubonica en el Nordeste del Brasil* (Contributions to the study of the bubonic plague in the North-East of Brazil).[65] Macchiavello's report was 331 pages long, contained no figures, maps, or graphics, and was written in Spanish, including an English summary.[66] The report was divided into fourteen chapters spread over three parts: (1) bubonic plague general epidemiology; (2) clinic and special epidemiology of human plague; and (3) experimental plague.[67] In what follows, I will focus on Chapter 1, entitled "Epidemiologia de la peste bubonica en el Nordeste del Brasil" (Epidemiology of the bubonic plague in the North-East of Brazil), as it summarized and explained the other chapters of the report.

This introductory chapter was divided by Macchiavello into six main sections. In the first, he briefly stated the problem that had occasioned his mission: the persistence of plague, "with distinctive characters", in north-eastern Brazil.[68] The four following sections, divided into the "landscape" (*terreno*), "medium" (*medio*), "production and economy" (*produccion y economia*), and "biological factors" (*fatores biologicos*), described the climatic, geographical, social, economic, and ecological characteristics of the backlands, the main region affected by plague in Brazil. Macchiavello painted the backlands as a rural area devoted to the production of maize, castor beans, and cotton, constantly affected by droughts, which caused misery and pushed the *sertanejos* to migrate.[69] Given the widespread poverty, Macchiavello noted, the majority of the houses in the backlands were very simple, built with mud and hay, and most of them contained rats' nests in their external and internal parts, making these dwellings "one huge hiding place or lair [for rats]".[70] In addition to this link with poverty, the presence of rats inside houses was explained as a direct consequence of the semi-desertic characteristics of the backlands. According to Macchiavello, instead of selling the products of their labor, the peasants commonly kept most of the harvested grains and goods inside their homes, "in foreseeing the hard times to come" – such as droughts.[71] Thus, the house became a "granary and warehouse of attractive products to the rats".[72] Henceforth, in Macchiavello's

reasoning, the specific climatic conditions of the backlands were responsible for the creation of a particular intimacy between rats and humans – an intimacy that in turn kept plague endemic in that area.

After presenting these four elements, Macchiavello affirmed in the last section of this first chapter that "rural plague is the biggest problem of the Northeast".[73] Nonetheless, contrary to what one could expect, he did not conceptualize what "rural plague" meant. He only presented bits of information and characteristics that would allow one to grasp what he meant by this term. The main point of Macchiavello's argument was that in contrast to cities – in Brazil, Chile, and elsewhere – where plague progressively decreased and even disappeared, in the backlands it remained endemic, affecting people living in habitations located at times at distance from one another, and in areas of scattered population.[74] To explain this difference, Macchiavello argued that "in big cities all phenomena related to plague develop within a rat population [*comunidad murina*] that is more or less stable, more or less permanent in its elements, in other words, in a closed population [*comunidad cerrada*]".[75] According to Macchiavello, the characteristics of cities prevented or hampered the introduction of new rats; therefore, immunity against plague progressively increased among this closed population of rats, bringing the disease to an eventual end.[76] This theory seems odd if one considers that cities – mainly ports – were seen in the first half of the century as the places most at risk of plague, precisely because rats circulated from one port city to another via ships.[77]

Continuing his reasoning, Macchiavello affirmed that by contrast to the cities, in the backlands rats constantly moved from one rural property to another in search of food, especially during periods of drought and, conversely, non-immunized rats constantly entered this "open" space.[78] To prove this constant migration of rats into and within the backlands without a proper system for tracking their movements, Macchiavello resorted to the *sertanejos*, pointing out "that it is frequent to hear that prior to an outbreak of human plague, bands of rats from the fields had arrived in the rural properties".[79] In other words, the constant migration of rats within the rural area of the backlands, perhaps the central point of his argument about the endemicity of plague in that region, was not observed by him, but by his *sertanejo* informants.

Macchiavello and the Brazilian experts who accompanied him also observed directly, or were told by their *sertanejo* informants, that rats and even wild rodents died in what were at times massive epizootics.[80] However, according to Macchiavello, in no case could he "prove that these epizootics, when caused by plague, exist *in the absence of the rat plague*".[81] In other words, whereas it was possible to state that wild rodents could contract plague, this infection seemed dependent on a previous infection among rats.

The existence of these periodic epizootics among rats gave rise to the question of where plague "survived" in the backlands when its spreaders had disappeared as a result of these mass ratfalls. This led Macchiavello

and his collaborators to focus on fleas, the main vector of plague among rats and humans according to a worldwide accepted paradigm since the first decade of the twentieth century.[82] Thanks to experiments carried out in a few rural properties, they observed that after abandoning dead rats, fleas survived in rat holes inside human habitations, which offered them a fresher and cooler environment when compared with the dry and hot overground of the backlands.[83] Once the rains returned to the region, "a favorable external environment for the circulation of fleas hidden in the [rats] nest" was created.[84] Fleas could thus move freely, or be carried by rats, potentially entering into contact with humans.[85] Among the fleas studied by Macchiavello and the Brazilian experts collaborating with him, in only two did they find the plague bacillus.[86] Combining this meager result with the above-stated observations about rats, and with established knowledge about plague epidemiology around the world, Macchiavello concluded that it was "to the rat-flea complex, and not to one of the two elements separately, to whom pertains the privilege of perpetuating the plague in the rural zones [of the backlands]".[87] In other words, Macchiavello concluded that the epidemiology of plague in the backlands was identical not only to that of other regions in Brazil that had been affected by plague previously, but also to most of the places affected by the disease around the world.

Nevertheless, no examination of plague epidemiology in Brazil would be complete without discussing sylvatic plague. If its existence were proved, then plague epidemiology in the backlands would be significantly different from that in the Brazilian ports, for instance. To start with, Macchiavello slightly changed the hitherto established definition of the problem in Brazil. Instead of an enzootic among wild rodents in general, by sylvatic plague (*peste selvatica*), he understood a plague infection among wild rodents living in a single environment: the jungle (*selva,* in Spanish). However, insofar as studies on plague lacked in Brazilian forested zones, Macchiavello judged that it was impossible to ascertain whether a truly sylvatic plague existed.[88] The only zones in Brazil in relation to which Macchiavello could discuss an infection among wild rodents were cultivated fields and semi-wild areas adjacent to them, named by him as "*campestre*s" and "*silvestres*" respectively[89] Macchiavello affirmed that, in those areas, it was possible to find several species of wild rodents, such as *preás*, *mocós*, and *cotias*.[90] Moreover, along with Hélio Paracampos, his Brazilian laboratory assistant, he ascertained that *preás* and *mocós* could contract and die from plague in the laboratory.[91] Nonetheless, as stated above, he and his collaborators could not find any proof that these species, in nature, died of plague outside epizootics among rats. This led Macchiavello to conclude that "plague [epizootics] did not start in the *serras*, but from the ground".[92] In other words, the epizootics began among rats and then touched the wild rodents, and not the other way around. Therefore, wild rodents in the backlands were not the reservoir of plague – unlike, for instance, gerbils in South Africa or ground squirrels in California.[93] As in Brazil, a plague infection among wild rodents was still

dependent on a previous infection among rats. Macchiavello was therefore able to conclude that *campestre* or *silvestre,* or *selvatica* plague, did not exist in Brazil.[94] However, Macchiavello cautioned, this situation could change, and plague could slowly advance toward the forested zones of Brazil: "a danger in potential" because there the disease could assume the characteristics of a "reservoir of plague" [*peste de reservório*].[95] This ominous forecast could be nonetheless hindered by "studies, adequate organization, and efficient work".[96]

To sum up, Macchiavello's rural plague followed the scheme below. The backlands constituted a climatic-economic-social-ecological homogenous medium encompassing different Brazilian states. Rats were abundant there, given the widespread habit of stocking great quantities of food inside non-rat-proofed houses due to drought. Rats moved freely from one habitation to another, a phenomenon repeatedly observed by the *sertanejos*. When they travelled, rats carried their fleas with them. At times, rats died in epizootics, in most cases caused by plague. Fleas, a few of them contaminated with the plague bacillus, abandoned dead rats and took shelter inside houses, a fresher environment – especially during a drought. When the rains returned to the backlands, the fleas abandoned their lair in search of a new host. If the fleas were contaminated, and if they found a rat, then the plague cycle among rats would restart. If they encountered a human, there was a chance of causing an outbreak. And finally, if they encountered a wild rodent, an epizootic among the latter became likely. But this epizootic among wild rodents in the backlands would have the tendency of extinguishing itself before a plague reservoir could be established among these animals.

In short, Macchiavello's reasoning in terms of rural plague was different from that of de la Barrera in Argentina. As discussed by Christos Lynteris in this volume, de la Barrera conceptualized rural plague almost as synonymous with wild rodent plague, due to the supposed absence of rats in the epidemiology of plague in rural areas of Argentina. In the Brazilian case, rural plague functioned in opposition to a wild rodent plague, as rats and fleas occupied the center of Macchiavello's reasoning. The *rural*, in the case of Brazilian rural plague, denoted spatial differences in comparison with "urban plague" – represented by the open circuit of the backlands – whereas, in the Argentinian case, *rural* also implied a difference in the ecology of plague – that is, the absence of rats.

Macchiavello's ideas concerning the existence of a rural plague and an absence of sylvatic plague in Brazil were met with agreement from most of his Brazilian counterparts.[97] If Macchiavello was successful, it is worth noticing that he did not bring anything entirely new or not previously discussed by Brazilian doctors regarding the epidemiology of plague in the backlands. Instead, he offered to them, with the weight of his role as a PAHO expert, a double target that could easily be translated into political terms: anti-rat actions could not only bring plague under control, but could also prevent the constitution of a sylvatic plague reservoir, "whose eradication would be

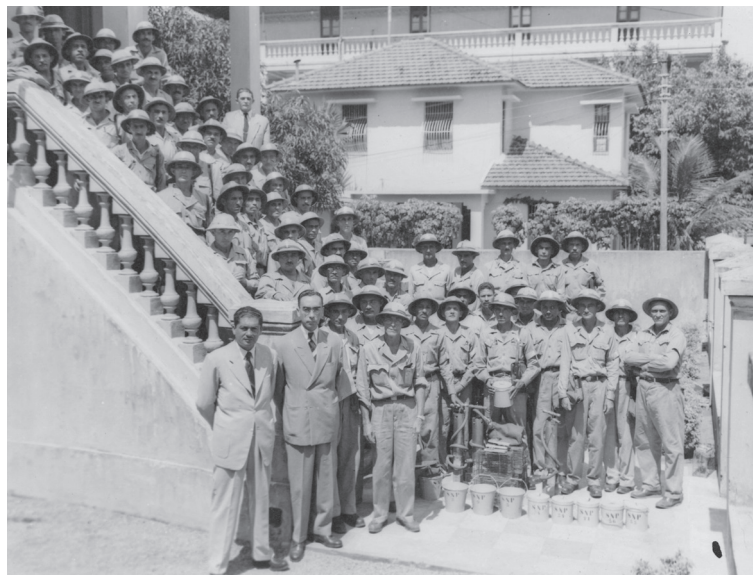

Figure 8.1 Brazilian Plague National Service. The image description reads: "1st. National Plague Service District, Pernambuco Sector Headquarters, Recife District Health Guards, Celso Arcoverde de Freitas, District Chief, Saul Tavares de Melo, Pernambuco Sector Chief". c. 1941. Casa de Oswaldo Cruz, Fiocruz. CE-GI-02-V2-001.

impossible".[98] As shown in detail by Luna, the administration of the Serviço Antipestoso used Macchiavello's reasoning to push for a restructuring and expansion of the fight against plague in Brazil, which materialized in 1941 in the creation of the Serviço Nacional de Peste (SNP).[99] The SNP (1941–1956) applied a sort of military and vertical approach against plague, focusing on aggressive anti-rat actions, such as direct destruction, poisoning, trapping, and even the use of flamethrowers (Figure 8.1 gives a glimpse of this military structure).[100] During its reign, the study of and the fight against plague in the backlands became an exclusive affair of Brazilians – SNP doctors and health guards – a situation that slightly changed after 1956.

De la Barrera's Mission: Macchiavello's Rural Plague Debunked (1957–1965)

During the 1940s, plague remained a sanitary problem in Brazil, only declining in the early 1950s – perhaps thanks to the strengthening of anti-rat actions by the SNP, but also due to the introduction of antibiotics.[101] Indeed, only four human cases were confirmed in 1956, the year the SNP was dismantled.[102] Following the end of the service, its personnel were absorbed by the newly

created Departamento Nacional de Endemias Rurais (National Department of Rural Endemics, DNERu), which while surveying and controlling plague in its endemic foci mainly had other priorities.[103] In effect, most of the former members of the SNP began to work on other diseases, such as malaria and trachoma.[104] Nevertheless, the termination of the SNP did not signal an end of plague studies in Brazil. Instead, it enabled new discussions made possible thanks to the collapse of the institutional infrastructure that sustained the previous intellectual framework proposed by Macchiavello.

The crack in the rural plague framework can be first noticed in the research of Alberto Gonçalves Neves, a former member of the SNP who by then was attached to DNERu. In September 1957, Neves published in *O Momento* (a medical journal of Pernambuco) a series of five papers later assembled and reprinted by the DNERu as a memoir under the title of "*O problema da peste dos roedores silvestres no Nordeste do Brasil*" (The problem of the wild rodent plague in the North-East of Brazil).[105] Neves' study was based on observations in a few rural properties in the states of Ceará in 1954 and Pernambuco in 1955, when the SNP was still operational. In these rural properties, Neves or some *sertanejo* informants observed that epizootics among wild rodents were followed by smaller epizootics among domestic rats, which was contrary to what Macchiavello had observed in 1939–1940.[106] Moreover, Neves and his collaborators noticed that human plague infections in a few cases followed the manipulation of dead wild rodents.[107] To explain these facts, Neves affirmed that plague was probably circulating among wild rodents independently from domestic rats, which meant that wild rodents were likely at the origin of infections among both rats and humans.[108]

To sustain his hypothesis, Neves criticized Macchiavello's idea of a closed population of rats in the cities and an open population of rats and rodents in the rural zones.[109] To Neves, "the conceptualization that the population of small mammals of rural zones is an open population, is an assertion not acceptable".[110] According to him, the population of rodents seemed sedentary in the backlands, and even when a migration was observed, plague outbreaks did not follow suit.[111] Later in his text, Neves nuanced this statement, affirming that domestic rats were "nomadic" in the backlands.[112] Indeed, according to Neves, the SNP regularly caught domestic rats into the fields or even into wild spaces.[113] In some of these captured rats, it was possible to find ectoparasites commonly present in wild rodents, such as the flea *R. B. Jordanis*.[114] Conversely, in some wild rodents caught by the SNP, the rat flea was identified.[115] Given the evidence, Neves hypothesized that the rats interacted with wild rodents in the fields and even in wild spaces, possibly contracting plague through shared ectoparasites, then bringing the infection to human habitations.[116] Although Neves' reasoning pointed towards wild rodents as the reservoir of plague in the backlands, and domestic rats getting infected from them and not the other way around, he cautioned that his hypothesis was based only on "ecological proofs" and "on epidemiological investigation".[117] In effect, a "conclusive proof" that wild rodents in

nature were affected by plague independently from rats, which could only be confirmed by the laboratory, was still lacking.[118]

It was in this context of the decline of plague in Brazil, the end of the SNP, and fissures in Macchiavello's framework that PAHO decided, in early 1957, to commission the Argentinian José Maria de la Barrera to study the disease in Brazil. As shown by Lynteris in this volume, de la Barrera had been central to fostering the idea of rural plague in Argentina in the 1930s, which was different from Macchiavello's rural plague, as I highlighted above. Moreover, from 1954 de la Barrera was a travelling expert for PAHO, visiting Peru, Bolivia, and Ecuador on missions to study plague and the role played by wild rodents in the endemicity of the disease in those countries.[119]

De la Barrera's mission in Brazil lasted from early April 1957 to February 1958.[120] He visited the states of Pernambuco, Ceará and Bahia, where he established thirteen "bases" (*estações de trabalho*), most of them located in the backlands.[121] Upon his return to Buenos Aires, de la Barrera experimented with fleas collected in Brazil until September 1958, when his mission could be considered concluded.[122] While in Brazil, de la Barrera counted on the help of significantly fewer doctors than Macchiavello, which could be connected with the reduction of the importance attributed to plague in the country after 1956. In his report, the Argentinian doctor only named three Brazilian doctors, including Neves and the rodent expert João Moojen from the Museu Nacional in Rio de Janeiro, who classified the animals that de la Barrera collected. In addition to these actors, de la Barrera also stated that he had in each of the thirteen "bases" the help of two "guards" (probably former members of the SNP) in capturing rats and rodents; a few indices suggest that he likewise interacted with hunters and farmers.[123]

Contrary to Macchiavello, who wrote several articles during his stay in Brazil, de la Barrera was extremely laconic about his mission. The main source is his official report, originally written in Spanish, and translated in Portuguese and submitted to PAHO in April 1960.[124] In October of that year, PAHO's direction forwarded the report to the Brazilian Ministry of Health requesting authorization to publish it partially or integrally, a request that was apparently declined.[125] Therefore, the typescript version in Portuguese became the only accessible source of de la Barrera's mission for both PAHO and Brazilian experts.[126]

De la Barrera's report bears a resemblance to Macchiavello's own report – which is not surprising given that the Argentinean doctor had read the latter – and with Cunha's *Os Sertões*, a book we cannot ascertain he knew or had read.[127] Indeed, de la Barrera's report begins with a section called *O Terreno* (The ground), where he depicted the semi-arid characteristics of the backlands, before moving to the section *O Habitante do Sertão* (The inhabitant of the backlands), in which he repeated the shared belief that the droughts shaped the character of the *sertanejos*. In this part, he also noticed the already mentioned habit of the *sertanejos* of stocking great quantities of food inside their houses, a habit observed by de la Barrera also in rural

areas of Argentina (see Lynteris, Chapter 6 of this volume), which attracted rats.[128] Moreover, de la Barrera remarked that in addition to living inside poor rural houses, as Macchiavello had pointed out, rats also made their nests in "the house's external facilities, or in the dry-walls or other hiding points in the surroundings".[129] As mentioned above, the external part of the *sertanejos* houses had been deeply pathologized since the late 1920s at least, and was reminiscent of the main areas of sanitary intervention during the SNP times.[130] Thus, we can notice a convergence here between de la Barrera's expertise and that of the health guards and doctors who worked with him.

Despite some resemblances, de la Barrera's report is much less ethnographic in scope when compared with Macchiavello's, being less concerned with examining the social habits of the *sertanejos* or human–rat interactions and more interested in discussing the relationships between wild rodents and domestic rats. When starting his examination about these relationships, de la Barrera stated three established facts about plague epidemiology in Brazil with which he completely agreed: (1) plague was a problem of rural settings; (2) plague among humans appeared in domestic spaces where rats were abundant; and (3) the infection of the rats and wild rodents was observed in the rural settings.[131] On the other hand, two points seemed controversial to de la Barrera. First, he asked, "Was the infection of domestic rats a consequence of the plague among wild rodents, in other words, did an autonomous plague exist among the latter?"[132] Second, de la Barrera asked, "How did the infectious contacts happen between the two faunas [i.e. the domestic rats and the wild rodents]?"[133] In other words, de la Barrera accepted the role of the rat in the epidemiology of plague in the backlands as incontestable, but the question of whether the rats were infecting the wild rodents, as Macchiavello had concluded almost twenty years prior, or the wild rodents were infecting the domestic rats, as Neves suggested in 1957, remained open. In sum, de la Barrera judged that the backlands context was different from that of the rural spaces where plague was present in Argentina, because there, according to de la Barrera's works, rats did not play any substantial role (see Lynteris, Chapter 6 of this volume).

Developing his reasoning, *contra* Macchiavello, de la Barrera noted that rats did not seem to wander long distances in the backlands, but lived in a very delimited area.[134] To prove this point, he mentioned his own research in the backlands, where the maximum distance from houses he found rats was 1200 meters, a unpublished study of Neves communicated to de la Barrera by the Brazilian doctor, and an ecological research conducted by a team of the Johns Hopkins University on rats in Baltimore, published in 1951, suggesting thus that this phenomenon was not limited to the backlands.[135] De la Barrera also noted, probably based in the research of Neves, that in the backlands, "sylvatic fauna [*fauna silvestre*] approached the human habitation enough so that the Rattus [sic], in its nocturnal wanderings, and without going too far, entered in contact with it [the sylvatic fauna] or its nests, and as a consequence, with its fleas".[136] These contacts between rats and wild

rodents appeared to be facilitated during the backlands dry season, because the "rains isolate the house from the *silvestre* infection" and, as a result, "human plague was more frequent during the dry season".[137] In short, if we try to sketch a panorama of the influence of the drought upon humans and animals in the backlands, one could say that the semi-desertic characteristics of the backlands not only forged a new race, as Cunha had written, or a particular intimacy between rats and humans, as proposed by Macchiavello, but also influenced interactions between wild rodents and domestic rats, according to de la Barrera.

All these precedent observations of de la Barrera could fall in the categories of ecological and epidemiological proofs, as put by Neves, of the wild rodents being the real reservoir of plague in the backlands. But de la Barrera provided a small bacteriological proof of a plague infection among wild rodents in nature. This part of his mission took place in the locality of Brejinho, in the city of Triunfo, where he identified the presence of the plague bacillus in three specimens of dead wild rodents.[138] Nonetheless, this discovery did not prove that the infection among these rodents did not come from rats. Therefore, to convince his readers that the infection among the wild rodents was independent from rats, the Argentinian expert presented three more observations: (1) other wild rodents were found dead in Brejinho and, even though they were not examined bacteriologically, their deaths indicated that plague was widespread among them; (2) in the houses of Brejinho, no epizootic among rats was detected, which suggested that the epizootic among wild rodents was not preceded by an epizootic among domestic rats in that locality; and (3) among the rats captured inside the houses in Brejinho, none presented signs of a plague infection, which excluded them as the possible culprits for infecting the wild rodents.[139]

Taking these bacteriological, epidemiological and ecological observations into consideration, which suggested that plague could circulate among wild rodents in the backlands without a previous infection among the rats, but also taking in consideration the established fact that rats played a role in the epidemiology of plague in that rural region, de la Barrera concluded that plague in the backlands had "the double character of being murine and sylvatic. There are sufficient proofs that the first is a consequence of the second."[140] In other words, sylvatic plague existed in Brazil, but rats also participated in the epidemiology of plague in the backlands. Indeed, according to de la Barrera, domestic rats got infected from wild rodents, bringing the plague bacillus into houses, and from the fleas of the domestic rats, humans became infected. In the conclusion of his report, he proposed a new typology to explain this particular situation of plague in the backlands, a typology that mixed ecological relations and spatial categories.[141] De la Barrera argued that if humans contracted plague by way of domestic rats without any previous epizootic detected among wild rodents, then this should be considered a case of "murine plague".[142] However, if humans contracted plague by way of domestic rats and a previous epizootic among wild rodents had been noticed,

this should be considered a case of "murine plague of sylvatic origin".[143] Finally, if humans contracted plague directly from wild rodents – by manipulating carcasses, for example – this should be a case of "sylvatic plague".[144]

At PAHO, de la Barrera's report became an important source for rethinking plague epidemiology in Brazil, being intensively quoted in a 1965 synthesis on plague in the Americas by Robert Pollitzer and Karl Meyer.[145] The two US experts agreed that Macchiavello's hypothesis about the "rat–flea complex" should be considered "outdated", and that "regarding the ecology and epidemiology of plague in Brazil, one must first of all fully agree with de la Barrera's contention that an entrenchment of the infection in wild rodents and Lagomorpha has become the *fons et origo mali* [*sic*, evil's source and origin]".[146] In Brazil, by contrast, de la Barrera's report had only a small impact. As shown by Tavares, it was only after the Plano Piloto, organized in the late 1960s in the city of Exu (backlands of Pernambuco), under the direction of Marcel Baltazard, a plague expert of the Pasteur Institute of Paris, that the existence of a sylvatic plague infection was finally admitted by the Brazil Ministry of Health.[147] Until today, the backlands is a *focus* of the sylvatic plague, but the disease has not caused human cases in Brazil since 2005, with the last death being registered in 1986.[148]

Conclusion

In this chapter, I have examined the emergence of rural disease knowledge in Brazil by stressing a triple relationship between a rural space – the backlands – and the production of knowledge about one disease – plague. First, I showed how the backlands became an object of inquiry for Brazilian and foreign plague experts, highlighting how this rural region was understood as distinct from other spaces of Brazil, and therefore with a particular plague epidemiology. Second, I showed that the backlands were not only an object of knowledge, but also a place where new knowledge could emerge. Indeed, both Macchiavello and de la Barrera constructed their conclusions about backlands plague epidemiology because they stayed for one year in the region, observing humans and their relationships with rats and wild rodents, and trying to understand the habits of these animals and their interactions. Third, I argued that Macchiavello and de la Barrera constructed their respective epidemiological reasoning about plague in the backlands thanks to their interactions with actors working and/or living there. In sum, in this chapter I showed the emergence of the rural as an object of knowledge, of the rural as a space of knowledge production, and of rural communities as agents in the production of knowledge. Therefore, the emergence of rural disease knowledge, in the case examined in this chapter, occurred not only as a cognitive achievement by foreign experts, or as the consequence of doctors visiting and working in rural settings, but also thanks to the interactions between these experts with rural communities and the inclusion of their knowledge in new epistemological frameworks.

By insisting in this final point, in this chapter I have made a case for understanding rural populations – in this case, the *sertanejos* – as actors in the construction of knowledge about diseases in rural settings. Nonetheless, this assertion should be seen with caution, since the knowledge of the *sertanejos* could appear contradictory, as the information about rat migration within the backlands suggests. Rat migration was a phenomenon witnessed by several people, according to Macchiavello, but it was never observed, according to Neves and de la Barrera. Therefore, the scientific corpus about plague in the backlands should be seen as a product of different forms and processes of expertise by different actors – the foreign experts, the Brazilian doctors, and the *sertanejo*s – but not necessarily as a synthesis; rather, it should be viewed as a selection. In other words, whereas a knowledge attributed by Macchiavello to the *sertanejos* was central in the epidemiological framework he developed, historians have no first-hand access to this knowledge.

Accepting that the backlands, the Brazilian doctors working there, and the *sertanejos* were central to the production of knowledge on plague in Brazil, and more generally in South America, could lead us back to Cunha and then to Hegel. Even though most Brazilians have never read *Os Sertões*, they probably know one sentence from the book, "the backlands will turn into the beach, and the beach will turn into the backlands", as this was repeated with some modifications in movies and popular songs.[149] The sentence is a millenarian prophecy attributed by Cunha to Antônio Conselheiro, the leader of Canudos, which could be read as an announcement of the coming end of times.[150] In this chapter, I have made a case to metaphorically turn the backlands into a Hegelian coast – in other words, a region open to the outside world where new ideas can emerge, here about plague epidemiology in a rural semi-arid space.

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Notes

1 Costa, *Cronologia resumida da Guerra de Canudos*.
2 On the different iterations of *sertão*/backlands categories, see, among others, Abreu, *Capitulos de história colonial (1500–1800)*, Chapter 9; Amory, "Historical Source and Biographical Context in the Interpretation of Euclides da Cunha's Os Sertões"; Lima and Hochman, "Pouca saúde, muita saúva, os males do Brasil são".
3 Cunha, *Os Sertões*, 7. In this paragraph, I follow Cunha's version of the events, as his book became canonical to understand the War of Canudos. A good chronology of the War of Canudos can be found at Costa, *Cronologia resumida da Guerra de Canudos*. For a historiographical analysis of the war, see Hermann, "Canudos".
4 Cunha, *Os Sertões*, 179–210. On the size of Canudos, see ibid., 576.
5 Ibid., 148–190.
6 Ibid., 218–274.
7 Ibid., 277–337.
8 Ibid., 341–344.
9 Ibid., 348–351.
10 Ibid., 576.
11 Ibid., 576.
12 On Cunha's book and its influence, see among others Amory, "Historical Source and Biographical Context in the Interpretation of Euclides da Cunha's Os Sertões"; Freyre, *Perfil de Euclides e outros perfis*; Hecht, *The Scramble for the Amazon*.
13 Cunha, *Os Sertões,* 578.
14 These ideas were developed by Hegel in his lectures on the philosophy of history, presented in Berlin in 1820, and later organized into a book. See Hegel, *The Philosophy of History*.
15 Ibid., 88–101.
16 Cunha, *Os Sertões*, 58.
17 Ibid., 60.
18 Ibid., 58–62.
19 Lima and Britto, "Salud y Nación"; Hochman, *A era do saneamento*.
20 Parreiras, "Notas e estudos sobre a peste no Nordeste do Brasil, problema nacional," Fundação Getúlio Vargas, GC h 1940.03.11, Almir de Castro, "Atividades de profilaxia antipestosa do Departamento Nacional de Saúde do Ministério da Educação e Saúde 1937–1941" (31 October 1942), 1–2.
21 Luna, *O Serviço Nacional de Peste*. On this broader process of centralization of the public health in Brazil: see Hochman, *A era do saneamento*.
22 Luna, *O Serviço Nacional de Peste*.
23 Macchiavello, *Contribuciones al estudio de la peste bubonica;* Museu Nacional, Setor de Vertebrados, José Maria de la Barrera, "Relatório sobre a peste no Brasil" (April 1960).
24 Tavares, *Análise do contexto*, 48–50; Luna, *O Serviço Nacional de Peste*, 118–128.
25 Tavares, *Análise do contexto*, 51–53.
26 *Caçadores* and *camponeses/fazendeiros*, in Portuguese, *cazadores* and *campesinos*, in Spanish. It is worth mentioning that most of the peasants were

also hunters, and vice versa. On these two social groups and their collaboration with the foreign experts, see Macchiavello, "Epidemiologia de la peste bubonica", 25 and 58–59.

27 Macchiavello, "Ensayo sobre classificacion de las pulgas".
28 Macchiavello, "Estudio sobre las ratas del puerto de antofagasta".
29 Macchiavello and Contreras, *Estudios sobre peste bubonica*, 114.
30 Ibid., 114.
31 Ortiz, *Medicalización y política internacional en el Ecuador del siglo XX*, 235.
32 Ibid., 235–238.
33 Macchiavello, "Prólogo", 10.
34 Oliveira, *Noiva da revolução/Elegia para uma re(li)gião*. Cunha also wrote about sertanejos in the Amazon in an unpublished book. See: Cunha, "À margem da história"; Hecht, *The Scramble for the Amazon*.
35 Queiroz, *O quinze*.
36 Oliveira, *Noiva da revolução/Elegia para uma re(li)gião*.
37 Furthermore, the doctor Hélio Paracampos acted as Macchiavello's direct collaborator, overseeing the laboratorial work of the mission. For a list of Macchiavello's collaborators, see Macchiavello, "Prólogo", 9–10.
38 Macchiavello et al., "Peste rural en el Nordeste del Brasil".
39 Rockefeller Archives Center, RF/FA426/09/305/B08/Brito-O/25032. Anon., "Britto, (Dr) Oscar Pereira de. (Brazil)".
40 Britto, *Serviço de Erradicação da Peste em Triumpho*.
41 Ibid., 15.
42 Ibid.: Britto, *I-Estudos e investigações do index pulicideo em Pernambuco. II-A erradicação da peste em Pernambuco*.
43 Mello, "Departamento de Saúde Pública de Pernambuco," 769; Parreiras, "Notas e estudos sobre a peste no Nordeste do Brasil".
44 Macchiavello, "Prólogo", 11.
45 Silva Junior, "Peste no Ceará".
46 Silva Junior, "Peste silvestre no Ceará," 95–97; Fundação Getúlio Vargas, GC h1940.03.11, Ernani Agricola, "Divisão de Saúde Pública" (27 July 1940).
47 Mattos, "Peste".
48 Britto, *Serviço de Erradicação da Peste em Triumpho*; Motta, "O problema da peste no Estado da Parahyba"; Silva Junior, "Peste no Ceará".
49 Britto, *Serviço de Erradicação da Peste em Triumpho*, 11; Silva Junior, "Peste no Ceará", 182.
50 Britto, *Serviço de Erradicação da Peste em Triumpho*, 20; Motta, "O Problema da Peste no Estado da Parahyba;" Silva Junior, "Peste no Ceará", 182.
51 See, for instance, McCoy, "Some Features of the Squirrel Plague Problem"; Pirie, "Plague on the Veld"; Nikanoroff, "Union des Republiques Socialistes Sovietiques".
52 Jorge, "Les faunes régionales des rongeurs". For a historical examination of this concept, see Silva, "Between Deserts and Jungles".
53 Britto, *Serviço de Erradicação da Peste em Triumpho*, 14.
54 Silva Junior, "Peste silvestre no Ceará".
55 Macchiavello, *Epidemiologia de la peste bubonica*, 18.
56 Silva Junior, "Peste no Ceará", 181.
57 Silva Junior, "Peste silvestre no Ceará", 1937.
58 Macchiavello, *Epidemiologia de la peste bubonica*, 52.

59 On hunters spotting epizootics, see Museu Nacional, Setor de Vertebrados, José Maria de la Barrera, "Relatório sobre a peste no Brasil" (April 1960), 58.
60 The rural properties of the backlands where usually referred as *sítios* and *fazendas*. *Sítios* usually meant small or medium properties dedicated to the cultivation of crops – such as maize, cotton, coffee, and sugar cane – and where small herds of goats and cattle were kept, whereas *fazendas* implied large properties dedicated to creating cattle. Both *sítios* and *fazendas* comprised several buildings, which generally hosted the different families who lived and worked in the *sítio/fazenda*. For this differentiation between *sítios* and *fazendas*, see Museu Nacional, Setor de Vertebrados, José Maria de la Barrera, "Relatório sobre a peste no Brasil" (April 1960), 28–29.
61 Macchiavello, *Epidemiologia de la peste bubonica*; Macchiavello et al., "Peste rural en el Nordeste del Brasil"; Macchiavello, Paracampos, and Freitas, "La pulga".
62 Macchiavello, "Prólogo", 9–10.
63 Fundação Getúlio Vargas, GC h 1940.03.11. Evandro Chagas, "Exposição Feita ao Superintendente do Serviço de Estudo das Grandes Endemias, pelo Dr Atilio Macchiavello, em Nome do Dr John Long, Representante da Oficina Sanitaria Panamericana no Brasil para o Problema da Peste Humana" (1 July 1940).
64 Macchiavello, "Investigaciones sobre peste en el Nordeste Brasileño".
65 Macchiavello, *Contribuciones al estudio de la peste bubonica*.
66 According to Macchiavello, there were plans to include graphs and photos, but the idea was aborted given the logistics problems caused by World War II. Ibid., 5.
67 Macchiavello alone signed the three chapters contained in Part B and the four chapters of Part C. In Part A, he was the sole author of Chapters I and VII. Each of the five remaining chapters of Part A were co-signed by Macchiavello with one or more Brazilian doctors. See Macchiavello, *Contribuciones al estudio de la peste bubonica*.
68 Macchiavello, "Epidemiologia de la peste bubonica", 13.
69 Ibid., 31.
70 Ibid., 38.
71 Ibid., 46.
72 Ibid., 46.
73 Ibid., 69.
74 Ibid., 69–73.
75 Ibid., 75.
76 Ibid., 75.
77 Engelmann and Lynteris, *Sulphuric Utopias*.
78 Macchiavello, "Epidemiologia de la peste bubonica", 75.
79 Ibid., 81.
80 Ibid., 18.
81 Ibid., 18. In italics in original.
82 Macchiavello, Paracampos, and Freitas, "La pulga," On the role of the flea of the rat in plague epidemiology, see Simond, "La propagation de la peste"; Advisory Committee for Plague Investigation in India, "XV. Further Observations on the Transmission of Plague by Fleas". For a historical interpretation of these events, see among others, Audoin-Rouzeau, *Les chemins de la peste*; Lynteris, "In Search of Lost Fleas"; Silva, *O baile dos ratos*.

83 Macchiavello, "Epidemiologia de la peste bubonica", 86; Macchiavello, Paracampos, and Freitas, "La pulga", 155–156.
84 Macchiavello, Paracampos, and Freitas, "La pulga", 154.
85 Ibid., 154.
86 Ibid., 157.
87 Macchiavello, "Epidemiologia de la peste bubonica", 75.
88 Ibid., 50 and 101.
89 Ibid., 50.
90 Ibid., 68–69.
91 Ibid., 96.
92 Ibid., 93.
93 Pirie, "Plague on the Veld"; Meyer, "Sylvatic Plague".
94 Macchiavello, "Epidemiologia de la peste bubonica", 94–95 and 103.
95 Ibid., 103.
96 Ibid., 103.
97 Fundação Getúlio Vargas, GC h 1940.03.11. Evandro Chagas. "Exposição feita ao superintendente do Serviço de Estudo das Grandes Endemias, pelo Dr Atilio Macchiavello, em nome do Dr John Long, representante da Oficina Sanitaria Panamericana no Brasil para o problema da peste humana" (1 July 1940); Almir de Castro, "Atividades de profilaxia antipestosa do Departamento Nacional de Saúde do Ministério da Educação e Saúde 1937–1941" (31 October 1942). An exception among the Brazilian experts was Silva Junior, who started a public controversy with Macchiavello about the existence of the sylvatic plague. On this polemic, see Tavares, *Análise do contexto*, 48–49; Luna, *O Serviço Nacional de Peste*, 124–127.
98 Fundação Getúlio Vargas, GC h 1940.03.11, Almir de Castro, "Atividades de profilaxia antipestosa do Departamento Nacional de Saúde do Ministério da Educação e Saúde 1937–1941" (31 October 1942), 2.
99 The SNP was officially divided into four circumscriptions. The first circumscription included most of the current region of the North-East; the second comprised the State of Bahia; the third covered the city of Rio de Janeiro and the states of Rio de Janeiro and Minas Gerais; and the fourth covered the State of São Paulo, with a particular focus on the city of São Paulo and the port of Santos. This division shows therefore that the problem of plague was mostly in the hinterland of Brazil, but not exclusively, and the ports still represented a space of concern. See Fundação Getúlio Vargas, GC h 1940.03.11, Almir de Castro, "Atividades de profilaxia antipestosa do Departamento Nacional de Saúde do Ministério da Educação e Saúde 1936–1943" (29 November 1943), 11–16; Luna, *O Serviço Nacional de Peste*.
100 Museu Nacional, Setor de Vertebrados, Serviço Nacional de Peste. "Boletins de captura de pequenos mamíferos" (1944); Museu Nacional, Setor de Vertebrados, Serviço Nacional de Peste."1a Circunscrição. Setor Recife. Area de 6kms em torno dos focos de peste no Distrito Triunfo. Triunfo" (1950); Freitas, "Notícia sobre a peste no Nordeste;" Freitas, *Histórias da peste e de outras endemias*; Luna, *O Serviço Nacional de Peste*.
101 Pan American Health Organization, *Plague in the Americas*, 45.
102 Ibid., 45.
103 On the studies on plague post-SNP, see Museu Nacional, Setor de Vertebrados, José Maria de la Barrera, "Relatório sobre a peste no Brasil" (April 1960),

146; Museu Nacional, Setor de Vertebrados, João Moojen de Oliveira, "Faits et observations écologiques de la peste rurale au Brésil" (21 April 1965); Pan American Health Organization, *Plague in the Americas*, "Brazil"; Freitas, "Peste".

104 Freitas, "Peste", 130.

105 I could not find the publication in *O Momento*, only the memoir published by DNERu. See Neves, *O Problema da peste dos roedores silvestres no Nordeste Brasileiro*.

106 Ibid., 4.

107 Ibid., 5.

108 Ibid., 12.

109 Ibid., 10–12.

110 Ibid., 12.

111 Ibid., 12.

112 Ibid., 18.

113 Ibid., 6.

114 Ibid., 6.

115 Ibid., 6.

116 Ibid., 6 and 18.

117 Ibid., 1.

118 Ibid., 2.

119 De la Barrera's whereabouts in South America from 1954 to 1956 can be closely followed thanks to his correspondence with Karl Jordan and Franciscus Smit, both in charge of the Rothschild's flea collection at the Natural History Museum at Tring, UK. See Natural History Museum Archives (London), Smit Corrrespondence, BA-BL, DF 340/2, Barrera, Prof José Maria de la Barrera (I). José Maria de la Barrera, "De la Barrera Correspondence with Karl Jordan and Franciscus Smit" (1954–1956).

120 I estimate de la Barrera's date of arrival, as the first flea collected in Brazil and sent to the Natural History Museum at Tring dates from 9 April 1957. See: Natural History Museum Archives (London), Smit Corrrespondence, BA-BL, DF 340/2, Barrera, Prof José Maria de la Barrera (II), Anon, "Polygenis Bohlsi Jordani Costa Lima 1937, Brazil" (1958).

121 Museu Nacional, Setor de Vertebrados, José Maria de la Barrera, "Relatório sobre a peste no Brasil" (April 1960), 4.

122 Ibid., 116.

123 Ibid., 5 and 25.

124 Ibid., front page.

125 Ibid., front page. There is no information about the report's translator. Perhaps this lack of diffusion could be explained by bad timing, as the official report encountered the Brazilian Ministry of Health in the last days of Juscelino Kubitschek's presidency, followed by the very short term of Jânio Quadros, whose resignation in August 1961 plunged Brazil into political chaos, eventually leading to the coup d'état of 1964.

126 Bancroft Library, Karl Meyer's paper, 76.42 cz, Carton 86, Folder Plague South America, Robert Pollitzer, "Letter to Karl Meyer" (3 August 1962). I consulted a typescript version that belonged to Celso Arcoverde de Freitas, one of the main Brazilian plague experts. I am very thankful to professor João Alves de Oliveira, from the Museu Nacional, Rio de Janeiro, for allowing me to consult Freitas's version of de la Barrera's report.

127 Museu Nacional, Setor de Vertebrados, José Maria de la Barrera, "Relatório sobre a peste no Brasil" (April 1960), 151.
128 Ibid., 29. Nonetheless, contrary to Macchiavello, de la Barrera did not establish a direct relationship between droughts and the *sertanejo* habit of stockage.
129 Ibid., 86–87.
130 Britto, *Serviço de Erradicação da Peste em Triumpho*, 23; Freitas, *Histórias da peste e de outras endemias*, 75–76.
131 Museu Nacional, Setor de Vertebrados, José Maria de la Barrera, "Relatório sobre a peste no Brasil" (April 1960), 123.
132 Ibid., 123.
133 Ibid., 123.
134 Ibid., 87.
135 Ibid., 87.
136 Ibid., 88.
137 Ibid., 39.
138 Ibid., 101.
139 Ibid., 108.
140 Ibid., 141.
141 As de la Barrera admitted, his classification was partially influenced by a new typological framework of the sylvatic plague proposed by Macchiavello. On this, see Macchiavello, "Estudios sobre peste selvatica en America del Sur;" Museu Nacional, Setor de Vertebrados, José Maria de la Barrera, "Relatório sobre a peste no Brasil" (April 1960), 143.
142 Museu Nacional, Setor de Vertebrados, José Maria de la Barrera, "Relatório sobre a peste no Brasil" (April 1960), 145.
143 Ibid., 145.
144 Ibid., 145. However, de la Barrera considered the term "sylvatic plague" misleading and problematic. Epecially in Portuguese and Spanish, it could sound like a sort of jungle plague.
145 Pan American Health Organization, *Plague in the Americas*, 44–69.
146 Ibid., 52 and 64.
147 Tavares, *Análise do contexto*.
148 Ministério da Saúde Brasil. *Manual de vigilância e controle da peste*, 27 and 29–30; Fernandes et al., "Rodent Hosts and Flea Vectors in Brazilian Plague Foci".
149 In the original, "*o sertão vai virar praia e o praia vai virar sertão*". See Cunha, *Os Sertões*, 169. The sentence appeared as "the backlands will turn into the sea, and the sea will turn into the backlands" [*o sertão vai virar mar e o mar vai virar sertão*], for instance, in the movies *Deus e o Diabo na Terra do Sol* (1964), directed by Glauber Rocha, and *Guerra de Canudos* (1997), directed by Sérgio Rezende, and in the song *Sobradinho* (1977), by the artists Sá and Guarabyra.
150 Cunha, *Os Sertões*, 169.

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