

**Vagabond Microbes, Leaky Labs and Epidemic Mapping:
Alexandre Yersin and the 1898 Plague Epidemic in Nha Trang**

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On 18 August 1898, Alexandre Yersin (1863-1943), a young doctor, who since 1895 had been directing the Institut Pasteur in the Annamite coastal town of Nha Trang in French Indochina, wrote in his biweekly letter to his mother, Fanny:

‘Dear mom, for a month now, we have in Nha Trang some cases of plague amongst the natives; very rare ones, fortunately. I at first believed that this epidemic was caused by some vagabond microbe that had escaped from the laboratory, but I am almost certain now that there has been plague for two years in Quinhon, a place near Nha Trang, where it may have been imported from China’.¹

The outbreak in question, small in its demographic impact, is one that has gone unnoticed by the growing corpus of work on the third plague pandemic, when between 1894 and 1959 plague struck ports, cities and towns across the

¹ Alexandre Yersin to Fanny Yersin, 18 August 1898. Archives Institut Pasteur, YER.COR.1 Lettres de Yersin à sa mère 1897-1905 no 4. Yersin à sa mère 22 lettres 18/01/1898 au 21/12/1898 Nha Trang Tourane (henceforth YER.COR.1); all translations from the French are mine.

globe leaving 12 million dead.² Whereas it is similarly ignored in the numerous biographies of Yersin, the incident is nonetheless noted by Sokhieng Au in her monograph on French colonial medicine in Cambodia, where she briefly examines the Nha Trang outbreak and the trouble it caused Yersin, as an example of the controversies and scandals surrounding Pasteurian medicine in South-East Asia.³ This article does not, however, simply aim to describe the Nha Trang plague epidemic for the first time in detail, but rather to examine the way in which Alexandre Yersin (who in 1894 had discovered the plague bacillus) employed epidemic mapping as a means of distancing the source of the event from himself and his laboratory. In so doing, my aim is to re-examine epidemic cartography as a process of epidemiological reasoning, to underline the work-in-

² Myron Echenberg, *Plague Ports. The Global Urban Impact of Bubonic Plague, 1894-1901* (New York: New York University Press, 2007).

³ Sokhieng Au, *Mixed Medicines: Health and Culture in French Colonial Cambodia* (Chicago: The University of Chicago Press, 2011). For example, the controversy is ignored in the key biography of Yersin: Henri H. Mollaret and Jacqueline Brossollet, *Alexandre Yersin. Un pasteurien en Indochine* (Paris: Belin, 2017 [1985]). In the 1922 publication of the Institut Pasteur in Indochina marking the centenary of Louis Pasteur's birth, the outbreak would be presented as yet another opportunity for a series of breakthroughs including, counterfactually, the verification of 'the role of rats and fleas in the propagation of plague'; P.- Noël Bertrand, ed., *Les Instituts Pasteur d'Indochine, Centenaire de Louis Pasteur 1822-1895* (Saigon: Imprimerie Nouvelle Albert Portail, 1922), 65.

progress character of epidemic mapping, and to stress how distance in this case operated not simply as an analytical tool, but also as a device whose aim was to ward off the source of the epidemic from the man who had discovered its causative agent.

Interest in the history of disease cartography has led to the formulation of new analytical frameworks through which epidemic maps may be examined. As Marta Hanson has argued, recent scholarship has mostly focused on disease maps as “persuasive graphics”, namely visual rhetorical strategies that promote an argument, a viewpoint, general public awareness, or the goals of a specific institution’.⁴ Key to epidemic maps, from this perspective, is how they visualise ‘a possible causal relationship’.⁵ ‘Maps are arguments about disease’, argues Tom Koch in his acclaimed monograph on disease mapping: ‘They are workbenches on which we craft our theories about the things that cause health to fail, imaging data collected in this or that disease outbreak’.⁶ If, following proponents of critical cartography like Jeremy Crampton, ‘Maps *make* reality as much as they represent it’, this is done through what Koch has identified as a form of spatial thinking: the ‘conjunction of analytic presentation and experimental

⁴ Marta Hanson, ‘Visualizing the Geography of the Diseases of China: Western Disease Maps from Analytical Tools to Tools of Empire, Sovereignty and Public Health Propaganda, 1878-1929’, *Science in Context*, 2017, 30, 219-280, 220.

⁵ *Ibid.*, 220

⁶ Tom Koch, *Disease Maps. Epidemics on the Ground* (Chicago and London: The University of Chicago Press, 2011), 12.

argumentation in a visual exposition'.⁷ Koch thus sees disease maps as experimental systems, in Hans-Jörg Rheinberger's sense of the term, which bring things together so that scientifically intelligible and actionable signifiers of disease may be generated. At the same time, Mark Monmonier has underlined that maps are often 'more effective, if not more common, as persuasive graphics than as research tools'.⁸ Stressing its propagandistic role, Monmonier's analysis thus reinforces a focus on the authority of disease mapping, and draws attention to the ways in which the communicative efficacy of such maps depends on the graphic manipulation of trust.⁹ Tools of both research and propaganda, as Hanson has argued, epidemic maps do 'complex work ranging from analytical tools to clarify yet unknown causal relationships to post-facto legitimating devices as tools of empire and nation for expanding governmental control over human and non-human populations'.¹⁰

⁷ Jeremy W. Crampton, *Mapping: A Critical Introduction to Cartography and GIS* (London: Wiley Blackwell, 2010), 18; Koch, *Disease Maps*, 13.

⁸ Mark Monmonier, 'Maps as Graphic Propaganda for Public Health', in David Serlin, ed., *Imagining Illness: Public Health and Visual Culture* (Minneapolis: University of Minnesota Press, 2010), 108-125, 109.

⁹ See also: Candice A. Welhausen, 'Power and Authority in Disease Maps: Visualizing Medical Cartography through Yellow Fever Mapping', *Journal of Business and Technical Communication*, 2015, 29, 257-283.

¹⁰ Hanson, 'Visualizing the Geography of the Diseases of China', 222.

Although recent historical work on disease maps has provided crucial new perspectives on the importance of cartography for epidemiological reasoning and public health intervention, these studies generally focus on maps as finished products. Maps examined are in the main published images, and as such the end-products of medical cartography.¹¹ The nature of these sources thus limits our understanding of epidemic mapping, for it does not allow us to see it as a dynamic process that both unfolds and transforms as an epistemic and graphic practice in the course of a given disease outbreak. By contrast, this article turns its attention to a set of work-in-progress maps that were hand-drawn by Alexandre Yersin between July 1898 and April 1899. These maps were never meant for publication and no version of them has been published before their appearance in the present article.

Methodologically, this article wants to stress that epidemic maps should be taken seriously as historical-ethnographic objects of epidemiological reasoning. The only way to do this is through the in-depth examination of the events that give rise to them, and in the context of which their meaning is accrued or challenged. I will thus examine Yersin's maps of the Nha Trang

¹¹ An exception to this is the discussion by Hanson (2017) of a hand-drawn map by Jean-Jacques Matignon. For further discussion of this map see: Christos Lynteris, *Ethnographic Plague: Configuring Diseases in the Chinese-Russian Frontier* (London: Palgrave Macmillan 2016). Also see: Lukas Engelmann, *Mapping AIDS. Visual Histories of an Enduring Epidemic* (Cambridge: Cambridge University Press, 2018).

plague outbreak with a close reading of the events unfolding on the ground, as allowed by the examination of his correspondence with his mother, leading Pasteurians, and the General Governor of Indochina (GGI), as well as through newspapers, official reports, and notebooks composed in the course of the outbreak.¹² What this close reading will allow us to see is, first, the fundamental malleability of epidemic maps in their epistemic-graphic entanglement, and second, that what drove the development of these particular cases was not so much an argument about the source of the outbreak or its transmission pathway, but an increasingly anxious desire to distance the outbreak from the person drawing the maps, Alexandre Yersin, and his laboratory.

The June-July 1898 Outbreak

The first Institut Pasteur in French Indochina was founded in 1890, under Louis Pasteur's instructions, by Albert Calmette in Saigon.¹³ The Institute in Nha Trang was established five years later, in September 1895, by Alexandre Yersin, in the aftermath of his discovery of the plague bacillus in Hong Kong, with the expressed purpose of establishing a laboratory for the preparation of anti-plague

¹² A limitation of this study needs to be acknowledged here: with the exception of reprints of Indochinese press items in the French metropolitan press, it has not been possible to acquire access to the former as these sources were either not available or could not be consulted for conservations reasons.

¹³ Jean-Pierre Dedet, *Les Instituts Pasteurs d'Outre-Mer. Cent vight ans de microbiologie française dans le monde* (Paris: Éditions L'Harmattan, 2000).

serum and immunisation experiments with horses. The site of Nha Trang had been chosen due to its distance from great urban centres and the availability of land for purchase and use.¹⁴ In practice, the main research focus of the Nha Trang Institute was animal diseases, and the development of a serum against rinderpest in particular, a disease that in 1897 broke out amongst cattle in Tonkin.¹⁵

According to Yersin's account to his Pasteurian colleague Émile Roux (7 July 1898), the first case of plague in Nha Trang appeared to be an Annamite girl, who died on June 20 after two days of illness, bearing a single axillary bubo.¹⁶ This was followed by the mother of the girl, who died the following day after being ill for five days. The third case was that of the son of Yersin's river skipper (*cai*

¹⁴ Bertrand, *Les Instituts Pasteur d'Indochine*.

¹⁵ Ibid.

¹⁶ Archives Institut Pasteur, Fonds: IP d'Indochine, Cote: IND.A2 - Lieu: A4/151-153, A/ Missions de l'Institut Pasteur sur la peste 2_ Missions en Inde, d) Correspondance adressée à Émile Roux, Yersin (henceforth IND.A2 A4/151-153). All information on outbreak in this paragraph is derived from: Yersin to Roux, 7 July 1898, IND.A2 A4/151-153. Yersin and Roux (1853-1933) had been close collaborators, co-authoring in 1888 a now classical work on the aetiology of diphtheria. Roux would be one of Pasteur's most influential 'lieutenants' and would take over the directorship of the Institut Pasteur in 1904; Annick Perrot and Maxime Schwartz, *Pasteur et ses lieutenants: Roux, Yersin et les autres* (Paris: Odile Jacob, 2013).

matelot; Cái being the name of the river defining the north shore of Nha Trang) who died on June 24. None of these cases were, however, reported to the Institute. The following day, an oblivious Yersin left for Saigon on his way to Hong Kong where he was supposed to continue his plague research, as he had done in the last three years during the spring-summer epidemic season in the British colony. That very day, however, one of Yersin's 'boys' died. His death was followed by that of the wife of Yersin's cook, on June 27. It would take two more deaths, that of an Annamite woman on June 29 and then, on July 2, of the wife of Yersin's skipper for his colleagues to take action. Attending to the last case, Carré and Fraimbault, the military vets employed at the Institute, isolated the plague bacillus from the blood and bubo of the victim. This was the first case actually observed by staff of the Institute, thus allowing a diagnosis. According to Yersin's own account, it was on that day that he received a telegram informing him of the outbreak in Nha Trang, just as he was about to embark on a boat to return to the town, having already aborted his Hong Kong trip on account of the outbreak in the British colony being already nearly resolved. Yersin arrived in his lab the following morning, on July 3, where his assistants had already preventatively delivered anti-plague serum injections to all lab staff. After a lull of seven days, on July 9 a new case appeared, this time at the far North corner of the fishing village, followed by six more cases in the same, second foyer until July 12. Then on July 14, one new case appeared in the village proper of Nha Trang, without however more cases following in this third foyer. By contrast, on

July 15, three more cases appeared in the second foyer, and one in the lazaretto where, by then, contacts were being held.¹⁷

With a sudden start, the illness was characterised by a chill and followed by high temperature. Yersin later described it as causing such dizziness to its victims that they 'look[ed] drunk'.¹⁸ A bubo, usually single, 'appeared in the first hours and developed very rapidly'.¹⁹ In the second day, high temperature continued while respiration became 'more anxious; and the pulse faster, with the patient often becoming delirious; 'the bubo grows and often assumes the dimensions of a pigeon egg'.²⁰ By the third day, and with the patient's pulse reaching more than 140 beats per minute, 'the bubo acquires the dimensions of a chicken egg. Death arrives suddenly, by an arrest of respiration'.²¹ Readers of medieval and early modern treatises on plague will have no difficulty recognising

¹⁷ Yersin to General Governor of Indochina, 16 July 1898, Second Letter.

Archives nationales d'outre-mer INDO GGI 6676, Épidémie de peste à Nha Trang (Annam) (henceforth ANOM INDO GGI 6676).

¹⁸ Archives nationales d'outre-mer INDO GGI 6789, Rapport sur la peste bubonique de Nha-Trang (Annam) (henceforth ANOM INDO GGI 6789); this report would later be published verbatim as: Alexandre Yersin, 'L'épidémie de peste à Nha-Trang de juin à octobre 1898', *Annales d'hygiène et de médecine coloniales*, 1899, 373-385.

¹⁹ ANOM INDO GGI 6789.

²⁰ Ibid.

²¹ Ibid.

this narrative; so much so, that one wonders what the effects of such a long-established nosology may have had on Yersin's experience and description of the disease.²² Yet Yersin seemed to be aware that all this sounded rather too neat. He thus added that this 'typical case of plague' was in fact exceptional: 'In reality we observe a great variety of symptoms, so much so that in most cases diagnosis is not possible but after death, on the basis of microscopic research on the characteristic bacillus of the plague'.²³

The measures taken to contain the epidemic were consistent with the usual repertoire of epidemic control at the time, and, according to Yersin, were agreed upon between him, the colonial resident in Nha Trang, Rousseau, and Tong Doc, the leading mandarin of the province, and were implemented starting from 3 July 1898.²⁴ Village chiefs were required to give information on all cases of illness, which, when identified, were immediately removed to an isolation camp together with all other resident in the house of the infected.²⁵ The camp, which

²² Lars Walløe, '3 Medieval and Modern Bubonic Plague: Some Clinical Continuities', *Medical History*, 2008, 52, 59-73.

²³ ANOM INDO GGI 6789. However see Au (2013) for an alternative reading on Yersin's diagnostic practice, suggesting that, in reality, diagnosis was often based on clinical examination rather than bacteriological evidence.

²⁴ Yersin to Roux, 7 July 1898, IND.A2 A4/151-153.

²⁵ Yersin to the General Governor of Indochina, 16 July 1898, Second Letter. ANOM INDO GGI 6676. In his January 1899 report to the GGI, Yersin claimed isolation lasted 15 days (ANOM INDO GGI 6789). It should be noted that the

was referred to as a 'lazaretto', was installed on Xóm Bống Island at the mouth of the Cáy. There, the sick would be placed in small bamboo huts and kept separate from contacts who were also quarantined on the island.²⁶ In the meantime, the houses of the infected were burned to the ground, with all possessions, as were neighbouring houses.²⁷ Both the residents of each 'infected house' and its neighbours were inoculated with the anti-plague serum produced by the Institute.²⁸

measures taken were far more intrusive than the ones that a few months earlier Yersin had enumerated as necessary were plague to break out in Indochina; Archives nationales d'outre-mer INDO GGI 6788, Rapport du docteur Yersin sur la peste aux Indes [August 1897] (henceforth ANOM INDO GGI 6788).

²⁶ ANOM INDO GGI 6789.

²⁷ Yersin to the General Governor of Indochina, 16 July 1898, Second Letter. ANOM INDO GGI 6676. A few photographs taken by Yersin of the Nha Trang outbreak focus on these huts and their incineration; Institut Pasteur Nha Trang/Alexandre Yersin Museum, uncatalogued photographs of Alexandre Yersin; I would like to thank Jacques-Henri Penseyres for bringing these to my attention.

²⁸ Yersin to the General Governor of Indochina, 16 July 1898, Second Letter. ANOM INDO GGI 6676. As discussed at length by Au (2013), the anti-plague serum was Yersin's next big thing after the discovery of the bacillus in Hong Kong. First clinically tested in Canton in 1896, Yersin claimed that his serum was a success and that it led to a significant decrease in human mortality rates from the then, roughly established 80% to 10%. See also: Matheus Alves Duarte da

Such intrusive and indeed drastic counter-epidemic measures had the usual outcome: 'As the Annamites know that the infected houses are burnt', lamented Yersin, 'their first concern, from the moment when an individual becomes ill or dies in a hut, is to remove all the furniture and possessions. Themselves seek refuge in the neighbouring houses to avoid the small discomfort of vaccination; it is thus that ~~numerous~~ new foyers can be formed'.²⁹

Ants, Monkeys and Leaky Labs

Rather than simply constituting a small, isolated outbreak, the plague cases in Nha Trang were immediately understood as part of the third plague pandemic, which had already spread in 1896 from Hong Kong to India, engulfing the British colony in a protracted epidemic and a frenzy of anti-epidemic measures and plague research in which the Institut Pasteur and Alexandre Yersin himself were involved.³⁰ This rendered the small outbreak in Nha Trang

Silva, 'Compétition, controverses et cultures de microbes: le développement du sérum antipesteux entre Paris et l'Inde (1894-1899)', *Revue d'histoire de sciences*, 2018, 71, 49-77.

²⁹ Yersin to the General Governor of Indochina, 16 July 1898, Second Letter. ANOM INDO GGI 6676, word crossed out in the original.

³⁰ David Arnold, *Colonizing the Body. State Medicine and Epidemic Disease in Nineteenth-Century India* (Berkeley CA: University of California Press, 1993); Ian Catanach, 'Plague and the Tensions of Empire, British India 1896–1914', in David Arnold, ed., *Imperial Medicine and Indigenous Societies* (Manchester:

an event of international importance, as it was the first French territory to be affected by the pandemic.³¹ On 7 July 1898, Yersin sent a letter to his friend and colleague at the Institut Pasteur in France, Émile Roux, with whom he maintained regular correspondence, describing for the first time the unfolding outbreak: ‘We are going to have a tough time in Nha Trang: cases of plague have been declared amongst the Annamites whose houses are those closest to the laboratory!!’, wrote Yersin in distress.³² ‘Here is the complete story and the probable causes of this accident’:

‘We know that amongst monkeys ill with plague, the excrements are virulent. Our experimental monkeys are in cages placed in the inoculation room (see the plan below). Every day we wash (or we should have washed) with cresyl the interior of the cages; in spite of this, ants always come in great numbers to eat the debris of bananas and rice that the monkeys have

Manchester University Press, 1988), 149–71; Pratik Chakrabarti, *Bacteriology in British India: Laboratory Medicine and the Tropics* (Rochester, NY: University of Rochester Press, 2012).

³¹ Yersin’s published report on the outbreak would be summarised and translated across the globe; see for example the thirteenth volume of *O Brazil-Medico* (1899), where the report was published in Portuguese.

³² Yersin to Roux, 7 July 1898. IND.A2 A4/151-153. There he also urgently asked Roux for more flasks of serum, as his stock had been depleted as a result of sending large quantities to Portuguese doctors in Macau.

let escape from their cages. It is equally certain that ants sneak into the cases and eat food debris soiled with excrement'.³³

To further stress that there is 'no doubt that it is these ants that transported the virus into the village', Yersin recounted to Roux how, a few months earlier, he

³³ Ibid. Cresyl is a cresol-based disinfectant. Current scientific evidence does not support the idea of ants being vectors of *Yersinia pestis*. Yersin, who had included ants amongst many other possible carriers of plague already in his 1894 article announcing the discovery of the bacillus, was not clear regarding how ants might transmit plague to humans. He probably relied on the observations by the British bacteriologist E. A. Hankin regarding ants eating plague-infected rat corpses in India in 1897. Hankin only briefly mentioned this in his extensive 1898 *Annales de l'Institut Pasteur* article on the propagation of plague (p. 761), which was published in November 1898, and thus after Yersin's report (E. A. Hankin 'La propagation de la peste,' *Annales de l'Institut Pasteur*, 1898, 12(11), 705-762). However, Yersin could have been exposed to this idea either by word of mouth during his stay in India, or via Nuttall, who claimed Hankin had inoculated rats with "excreta of ants" that had earlier fed on infected rat corpses, and that this had led to the infection of the former (Geo H. F. Nuttall, 'Elucidation of the Part Played by Insects in the Spread of Plague – On the Receptivity of Different Animals to Plague Infection,' *Public Health Reports*, 1897, 12(35), 906-909). Hankin's experiments were also discussed in the minutes of the Indian Plague Commission (1898-1899) but there is no indication that these were available to Yersin before their publication in 1900.

had brought back with him from India four mongooses which he had placed at the far corner of his laboratory in a cage 'elevated over one meter above ground'.³⁴ 'The mongooses, Yersin explained, 'eat chickens and the detritus of these chickens always fall underneath the cage, where ants abound'.³⁵ In spite of one of his mongooses dying in early June, Yersin admitted to have paid no attention to the incident. Moreover, he reflected that after returning from India, he had made an expedition to the Moï's, a group of people he had famously 'discovered' through two long and celebrated expeditions between 1892 and 1894. In the course of one of the expeditions, he had been faced with another similar incident: 'During my last excursion to the Moï's, 2 more mongooses died with large cervical buboes. Carré performed the autopsy, and remarked that the liver was granulated like in the case of plague, and he isolated a small bacillus very similar to that of the plague'.³⁶ Yersin recounted that, having developed cultures from these bacilli, he tested them on mice which all died within 48 hours with plague lesions. 'Hence', he reasoned, 'my mongooses died of plague, and given the isolation of their cages and the impossibility of any other mode of penetration, it is but ants that could have infected them (*les contagionner*) by

³⁴ Yersin to Roux, 7 July 1898. IND.A2 A4/151-153. In India, Yersin had investigated plague alongside Paul-Louis Simond and had tried out his anti-plague serum.

³⁵ Ibid.

³⁶ Ibid. For Yersin's published accounts of his expeditions to the Moï's see: Alexandre Yersin, *Voyages chez les Moï's d'Indochine* (Paris: Olizane, 2016).

transporting the virus from the monkeys' room to the mongooses' cage'.³⁷ The narrative here is confusing, for it begins by describing mongooses dying during Yersin's expedition to the Moïis, in the Annam highlands, but then claims these died from plague bacilli carried over by ants from the monkeys' cages in his lab in Nha Trang. This, however, did not stop Yersin from reaching the conclusion that, 'It is more than probable that these same ants have transferred the infection into the village', adding nonetheless that that his 'boy', who died of plague on June 25, had been handling the caged mongooses.³⁸

In his July 7 letter to Roux, Yersin enclosed a hand-drawn map (Figure 1). This focused on a narrow geographical area: the base of the sand-dune peninsula, where Yersin's lab was located. The map only depicted cases in the first foyer of the outbreak, reflecting the actual number of cases appearing up to July 7, when Yersin wrote his letter to Roux.

Insert Figure 1 Here: Fig.1 Map showing plague cases surrounding Alexandre Yersin's lab in Nha Trang; Yersin to Roux, 7 July 1898, IND.A2 A4/151-153; Courtesy of Institut Pasteur/Archives Alexandre Yersin.

The map may be best described as what Marie de Rugy, in her recent examination of colonial maps in Indochina, has described as "ephemeral maps", insofar as by contrast to expeditionary maps at the time, including Yersin's own

³⁷ Yersin to Roux, 7 July 1898. IND.A2 A4/151-153.

³⁸ Ibid.

maps of his expeditions to the Annam highlands, it provides very little topographical detail, acting instead as a cartographic shorthand embedded in an epistolary exchange.³⁹ Nonetheless, this is a well-crafted map, using a ruler for the contours of buildings. It bears no cardinal points, and is positioned so that the top of the page points to the East. Yersin took particular care to identify the different buildings contained in his lab complex. From left to right we see the following: horse stables, the veterinarians' house, a building labelled 'factory and shops' with a tower to its West. Then parallel to the factory are stables housing horses used for serum production, followed by Yersin's house, and finally the laboratory. The map depicts Yersin's laboratory as composed of two buildings.

³⁹ Marie de Rugy, *Aux confins des empires. Cartes et constructions territoriales dans le nord de la péninsule indochinoise (1885-1914)* (Paris: Éditions de la Sorbonne, 2018); De Rugy reserves this term for maps produced by native subalterns in the course of exploratory and border-making expeditions. Yersin's large-format maps from his expeditions (1892-1894) are exhibited at the Alexandre Yersin Museum in Nha Trang. Nine other maps from his expedition notebooks and journals are available online via the Institut Pasteur Phototheque, Reference Numbers 38341; 38340; 48419; 48420; 48421; D589; D590; D591; D592. On the connection between Yersin's bacteriological research and geographical exploration see: Robert Peckham, 'Matshed Laboratory: Colonies, Cultures, and Bacteriology,' in Robert Peckham and David M. Pomfert, eds, *Imperial Contagions. Medicine, Hygiene and Cultures of Planning in Asia* (Hong Kong: Hong Kong University Press, 2013), 123-147.

From East to West, the first, long building is separated in two sections. The first contained Yersin's monkeys, with three smaller boxes on the map possibly representing their cages. Then follows the second, longer section of the same building, marked simply as 'laboratory', Finally a second smaller building to the West is marked 'mongooses'. To the West of the lab complex, past a road leading to the fishing village, Yersin has drawn four houses; the two to the North are marked as 'Annamite houses', and the two to the South marked as 'matshed houses of laboratory personnel'. Turning to the village itself, Yersin's map contains only eight houses proximate to the laboratory complex. Both houses to the West of the complex and houses in the village itself are marked P1-P6 with an additional house marked as 'P?'. In his letter to Roux, Yersin gives a key to the map, which we can systematise as Table 1, following Yersin's narrative order.

Insert Table 1 Here: Table 1. The first six plague cases in Nha Trang, shown on Yersin's map to Roux, reconstructed from: Yersin to Roux, 7 July 1898, IND.A2 A4/151-153.

The map contained in Yersin's first letter about the outbreak to Roux thus deployed proximity and distance in a way that created a coherent epidemiological spatial relation between his laboratory and the plague cases. Both the narrow focus of the map and the way in which lab buildings are individualised contribute to the diagrammatic economy of this map. As Lukas Engelmann argues, the diagrammatic character of much of epidemic cartography both preserves and

presents 'a tension between observed event and conceptual framework' that is proper to infectious disease outbreaks.⁴⁰ In this case, and in spite of important precedents in the drawing the spread of plague, which were certainly known to Yersin, the map does not attempt to show the directionality of the transmission of the disease by means of linking different clusters with lines or arrows.⁴¹ And yet the way in which the affected houses appear to be almost auxiliary to the

⁴⁰ Lukas Engelmann, 'The Configuration of Plague: Spatial Diagrams in Early Epidemiology', *Social Analysis*, forthcoming.

⁴¹ As Koch (2011) has shown, the first disease map in human history is Filippo Arietta's map of plague quarantine in the province of Bari (Italy, 1694), with the cartography of the disease dating back to the seventeenth century. In the context of the third plague pandemic, mapping the disease coincided with the first observations of its outbreak, in 1870s' Yunnan, where the French explorer Emile Rocher plotted the spread of the disease using arrows to indicate its dissemination in the Chinese province. Between 1894 and 1898 numerous maps of plague on both a local and a global scale were produced. For a discussion of late-nineteenth-century plague cartography see: Engelmann, 'The Configuration of Plague'; Nicholas H. A. Evans, 'The Disease Map and the City: Desire and Imitation in the Bombay Plague, 1896-1914', in Lukas Engelmann, John Henderson and Christos Lynteris, eds, *Plague and the City*, (London and New York: Routledge, 2018), 116-138; Hanson, 'Visualizing the Geography of the Diseases of China'. For Rocher's plague map see: Emile Rocher, *La province chinoise du Yun-nan*, 2 vols. (Paris: Leroux, 1879).

laboratory complex unmistakably ties together the space of the outbreak and the space of Yersin's plague experiments in an epidemiological image that is replete with causality.

It is important to remember that up until the declaration of the plague epidemic in Nha Trang in June 1898, French Indochina had witnessed no outbreak of the disease, or at least none had been officially observed. Yersin's first communication to the GGI in Saigon about the outbreak in Nha Trang is thus also the first official declaration on part of the Institut Pasteur of a plague epidemic in French Indochina. Yersin wrote two letters to the GGI on 16 July 1898. In the first, shorter letter, he announced the outbreak giving no details as to the cases or causes of the epidemic, but stressing that the latter posed no threat to Europeans, as 'the cases of plague are rare and localised in areas where no European will go for a walk'.⁴² More detailed, the second letter comprised a proper report, which opened with a defence of the Pasteur laboratory in Nha Trang: 'A remarkable fact is that none of the natives employed in the Institute have contracted the disease. We have taken in the laboratory the most detailed precautionary measures for avoiding, from the start, the diffusion of the plague bacillus'.⁴³ Nonetheless, Yersin offered two scenarios under which the laboratory

⁴² Yersin to the General Governor of Indochina, 16 July 1898, First Letter. ANOM INDO GGI 6676.

⁴³ Yersin to the General Governor of Indochina, 16 July 1898, Second Letter. ANOM INDO GGI 6676. This information was of course misleading, as Yersin's 'boy' was directly involved with the lab's experimental animals.

may indeed have been the source of the outbreak. The first involved the monkey experiments already mentioned to Roux, and the possibility that these animals 'have left fall, outside their cage, some food debris', which, mixed with their infectious excrement were then carried to the village by ants that appear to infest the area in spite of diligent employment of 'antiseptic washing'.⁴⁴ In support of his ant theory, Yersin once again mentioned the mongoose incident, here however claiming that, in the first half of June, not one, but 'three of the mongooses died of a disease which we afterwards recognised to be plague': 'As these mongooses were isolated from all possibility of infection, it is only the ants that could have penetrated their cages and introduced the plague virus'.⁴⁵

The second scenario involved not monkeys or ants, but, less controversially to our understanding of plague today, mice. In one of the infected houses, Yersin admitted, a stolen cage was discovered, which the laboratory has been using for keeping mice for experiments. It seems that the cage had been used by its appropriators for the conservation of betel. Not explaining how that would work, Yersin laconically stated that it might have been a way for the disease to spread, but that he 'believed more in the first cause of infection [i.e. the ants scenario] than the second'.⁴⁶

⁴⁴ Ibid.

⁴⁵ Yersin to the General Governor of Indochina, 16 July 1898, Second Letter. ANOM INDO GGI 6676.

⁴⁶ Ibid.

The folder containing the Yersin's first report to the GGI also holds a loose hand-drawn map that illustrates the position of the three plague foyers that date in Nha Trang (Figure 2).⁴⁷ Also oriented so that the top of the sheet points to the East, the map is drawn using three colours: blue for geographical contours, black for buildings, and red for plague foyers. The initial foyer of the outbreak is clearly drawn as being adjacent to the laboratory, with the indication '7 cases'. At the time, Yersin's laboratory stood at the base of the elongated sand-dune peninsula marked on the map as occupied by the 'point village'. The lab was located next to Yersin's house, where a hotel for retired police officers stands today.⁴⁸ The second foyer ('10 cases') is marked as located in the midst of fishing village spanning the same peninsula. The third foyer of the disease is marked '1 case' and is placed inside Nha Trang proper (*grande village*). The island 'lazaretto', located in the area defined by the mouth of the river directly opposite the Champa temples of Po Nagar, where one case occurred, is also marked with a

⁴⁷ The map is undated. As is often the case in archives, the original position of the map in the folder is not noted, as papers contained therein are not numbered, but the likelihood of it being contained in the letter to the GGI is high as the number of cases in the map is also that (18) of a table giving the order, date and location of cases to that date (titled 'Statistic of plague cases from June 20 to [July 16]').

⁴⁸ A statue of Yersin stands in the area north of the hotel, with the peninsula leading to the motorised Tran Phu Bridge.

broken red line, though the case there is not numbered.⁴⁹ It is interesting to note that in this map Yersin did not attempt to show the detailed distribution of cases. Instead he highlighted three foyers of plague in temporal sequence (first, second and third) and located these in terms of their proximity to four key colonial buildings (Yersin's lab, Yersin's house, the house of the colonial inspector, and the house of the colonial resident). In this way the cases were not simply distributed in space and time but were also tied together as an epidemic meta-cluster in relation to the colonial buildings from where the causative agent may have spread via ants.

Insert Figure 2 Here: Fig.2 Map showing foyers and cases of plague in Nha Trang, possibly included with Yersin to the General Governor of Indochina, 16 July 1898, Second Letter. ANOM INDO GGI 6676; courtesy of Archives Nationales d'Outre-Mer.

Read in chronological order, Figure 1 (7 July) and Figure 2 (16 July) then portray a persistence in cartographically underlining the relation between colonial buildings and plague cases. And yet already in Figure 2, drawn 9 days after Figure 1, we see Yersin the cartographer assuming a less determined outbreak narrative. As the epidemic map zooms out as it were from the immediate are of his laboratory, so as to show all plague foyers in existence by July 16, the aetiological link between Yersin's lab and the outbreak becomes less firm. This is

⁴⁹ Though differently shaped, this may have been Xóm Bón Island.

in itself interesting, for in terms of the textual outbreak narrative no significant shift is observable between Yersin's letter to Roux on July 7 and his report to the GGI on July 16. Does the shift from Figure 1 to Figure 2, simply reflect no more than a scalar practicality, given the larger area covered by Figure 2? Or does it afford a glimpse of a shift in epidemiological reasoning already in place? The events that followed point to the latter hypothesis.

The August Outbreak

With no more cases declared after July 25 (the last case to be infected was a 31 year old woman who died on July 30 in spite of receiving the serum), the outbreak was prematurely, as things turned out, believed to be over.⁵⁰ More than 400 serum inoculations had been delivered by that date, and 20 people had been infected with 15 of them succumbing to the disease.⁵¹ No statistics about how many houses were burned, the value of the properties destroyed, or how many people had been displaced was made available. On July 30, Yersin wrote to the GGI to reassure him that the epidemic was over, stressing that, as plague is a disease that 'moves slowly, from house to house', the Institute should be able to easily contain any further outbreak in the colony as long as access of

⁵⁰ See Au's analysis on the problems raised by this last case in relation to the use of the serum (2013).

⁵¹ Archives Institut Pasteur Fonds: Yersin (Alexandre) Cote: YER.6 - Lieu: A1/13 L/ Fonds complémentaires, Liste des 15 personnes mortes de la peste pendant l'épidémie de Nha Trang.

natives to boats was forbidden for the following month.⁵² More enthusiastically, Yersin would write to Roux, on August 4: 'So here you have it, 10 days without new cases. Another 5 or 6 days and we will be able to consider the epidemic as definitively contained. What luck! For we know that in theory it is very simple to stop an epidemic, but in practice...!!!'.⁵³

On August 9, confident the outbreak was well over, Yersin cabled Roux: 'epidemic contained'.⁵⁴ If we are to go by Yersin's own dramatisation of the

⁵² Yersin to General Governor of Indochina, 30 August 1898. ANOM INDO GGI 6676. The interdiction extended only to natives, reflecting prevalent racial prejudices over understandings of disease transmission at the time.

⁵³ Yersin to Roux, 4 August 1898. IND.A2 A4/151-153.

⁵⁴ Yersin to Roux, 9 August 1898, IND.A2 A4/151-153. In his letter to Roux, August 12, Yersin notes that together with the usual correspondence he sends him stereoscopic images of the outbreak. Whether these are the ones now collected at the Alexandre Yersin Museum of the Institut Pasteur in Nha Trang is not clear, but a pamphlet of *Lectures pour tous* from March 1900 titled 'La fin d'un cauchemar' also bore two photos of the Nha Trang outbreak: one of natives next to their huts and the other of a burning hut, with both photos attributed to Roux (Archives Institut Pasteur Fonds: Brumpt (Emile) Cote: BPT.Doc.81 - Lieu: A7/244-267 N/ Dossiers de travail et de documentation sur la parasitologie 44_ "Peste" d) Iconographie 1- Publications illustrées). In a sheet dated 13 June 1898 (but whose correct date must be July 13), marked 'Photographies verascope serie 2ème' (IND.A2 A4/151-153), Yersin lists 11 photographs relating to the

events, immediately after the cable was sent news arrived that a fisherman had died in a small junk after an extraordinarily short illness of merely five hours.⁵⁵ Yersin attended the corpse and noticed no sign of buboes, but only a small inguinal hernia. And yet he isolated bacilli 'in the pulp of the ganglions'.⁵⁶ These he declared to be able to develop in 'numerous colonies of a small bacillus that seemed to me notably bigger than that of plague', but upon inoculating mice with it he concluded it was indeed the dreaded disease.⁵⁷

Yersin quickly concluded plague was back: 'So we were left 15 days without a single case and now here is the epidemic returned!'.⁵⁸ Indeed in the next few days more cases were diagnosed with plague, though these too bore no buboes. In this new phase of the epidemic, a new phenomenon became pronounced, which appeared to trouble Yersin: people, usually of advanced age and showing no sign of illness 'die suddenly, sometimes in the midst of their

outbreak. As these are numbered 12 to 22, it is clear that he had sent a total of 22 images to Roux.

⁵⁵ Yersin to Roux, 12 August 1898. IND.A2 A4/151-153. It must be noted that this letter though dated 'August 12' also contains notes on events taking place on August 13, so it is not clear when Yersin posted it to Roux. Junk is a type of Chinese boat used at least since the Song Dynasty.

⁵⁶ Ibid.

⁵⁷ Ibid.

⁵⁸ Ibid.

work'.⁵⁹ Yersin claimed that this was a form of 'lightning plague (*peste foudroyant*) where the disease develops insidiously without external symptoms'.⁶⁰ Ever the apt ethnographer, in his January 1899 report to the GGI Yersin would provide a couple of examples, with the following being the first case of the new phase of the epidemic: 'On August 9, an old fisherman of 60 years sailed out on his junk to go fishing in the sea. At around 9 in the morning, he said he was feeling unwell and went to bed. An hour later, his comrades called him up to eat; he was dead. In the autopsy I concluded plague'.⁶¹ What made the situation even more complicated, was that, at the same time, a cholera epidemic was raging. Yersin admitted to Roux that these cases were hard to diagnose and complained that the natives 'try all the time to trick us and to make us take for cholera what are cases of plague', as, by contrast to those of plague victims, houses of cholera victims were not put to the torch.⁶²

Apparently accompanying the letter to Roux, a third map produced by Yersin within less than a month from the official beginning of the outbreak,

⁵⁹ ANOM INDO GGI 6789.

⁶⁰ Ibid. Yersin also used the notion of *peste foudroyant* in his description of serum treatments in Nha Trang; Archives Institut Pasteur Fonds: Yersin (Alexandre) Cote: YER.6 - Lieu : A1/13 L/ Fonds complémentaires, Epidémie de peste à Nha-Trang.

⁶¹ ANOM INDO GGI 6789

⁶² Yersin to Roux, 12 August 1898. IND.A2 A4/151-153.

covered the epidemic up to August 11 (Figure 3).⁶³ The map adopts a colour system that is a permutation of the one used in Yersin's July map to the GGI (Figure 2). Here blue is used for landscape contours, black for buildings, red for plague cases, and yellow for larger areas that are identified as foyers of the disease. The map is oriented in the same way and covers more or less the same area as Figure 2, but its topography is strikingly different. First, the very contours of the area are different. The peninsula is no longer needle-like, but resembling more a lop-sided mushroom. Its now rounded tip is moreover pictured as being much closer to the opposite shore, which is no longer void but populated by houses forming Culao village. Then the urban plan is radically changed. The laboratory is no longer depicted as having a wall to the sea, but as being open to it. The colonial residence has grown enormously in size, to the effect that its Western wall now stands next to the main town, with the rather large area separating the two in Yersin's map to the GGI having disappeared. Overall affording a much more detailed plan than the map to the GGI, this map shares some characteristics with Yersin's first map to Roux (Figure 1). Though the laboratory's buildings are not drawn or named in equal detail, here too the monkeys' experimental room, and the room with the mongooses are clearly named and marked with red ink. Also houses are individually drawn, with red filling indicating plague cases within. Besides the colour link between the monkey

⁶³ Undated, untitled map, IND.A2 A4/151-153. Yersin's letter to Roux (August 12) makes no mention of the map, yet the latter bears the old archival number 24,227, thus immediately following Yersin to Roux, which is numbered 24,226.

and mongoose lab facilities and the infected households, we should also notice that here the cartographic tropes of case plotting and foyer clusters are combined so that yellow shading, indicating a plague foyer, encompasses individual infected houses. Moreover new foyers and cases are added to correspond to the August outbreak: the case on the boat outside Culao, and a foyer marked 'foyer of 11 August' in the main town.

Insert Figure 3 Here: Fig.3 Map showing plague cases Nha Trang to 11 August 1898; IND.A2 A4/151-153; Courtesy of Institut Pasteur/Archives Alexandre Yersin.

However this map does not simply add epidemiological data, it actually revises them. Comparing Figure 3 and Figure 1 we see that in the former Case 2 (P2 in Fig. 1) is no longer in the Northern periphery of the laboratory, where it stood in the same house with P1 (Case 1 in Figure 3 still in the same location), but has been moved to a house on the Western periphery of the laboratory that in Figure 2 appeared to be non-infected. P3 has remained in its original position but P5 and P6 which occurred in the same house in Figure 1 now appear in other houses to the North of the same row of houses (out of view in Figure 1). In turn, P4 has been moved from the Western to the Northern periphery of the laboratory, to what appears to be the same house as the doubtful case 'P?' of Figure 1. What does this reshuffling of cases around the laboratory signify? If we go back to Table 1, it becomes obvious that these changes do not simply revise the order

of the outbreak but radically rupture any epidemiological cohesion of the case data in place. Given that nowhere does Yersin introduce in writing a change in the sequence of cases, we must proceed by assuming that cases 1 to 6 in Figure 3 correspond to cases P1 to P6 in Figure 1. If this is the case, we are faced with a perplexing image: P1 and P2 were reported by Yersin as being mother and child, and the move of P2 to a different household lacks any explanation. Similarly, P3 and P6, which in Figure 1 occupy the same house, were also reported to be mother and child. Given the lack of a key to the map in the archives it is nearly impossible to decipher what this all means. Rather than however despairing about this cartographic blind-spot, we should look at what this map does make visible as a work-in-progress cartographic object drawn in the duration of an outbreak. Although the colour identity between the suspect laboratory sources (monkey and mongoose cages) and the infected households does maintain an aetiological link, the way in which the latter are arranged in relation to the lab tends to de-emphasise this. By comparison to the more diagrammatic arrangement provided by Figure 1, here proximity is not foregrounded. The fact that the cases around the lab are also no longer marked in relation to it, as in Figure 1, and the occupational relatedness of the infected residing in these houses to Yersin is erased (the row of houses to the West of the lab is no longer marked as residences of lab workers), moreover dilutes the aetiological connection. If anything the dispersal of the cases in a new, mysterious arrangement reinforces this effect: no longer clustered in single households with a direct link to Yersin as in Figure 1, these now appear as

anonymous serial cases with nothing left to point back from them to the laboratory. If this map already shows signs of Yersin's effort to dissociate the outbreak from his laboratory, new information would soon trigger his more concerted effort to spatially distance the source of the epidemic from Nha Trang and eventually Indochina.

Distancing Plague

On 15 August 1898, an official telegram from Hue's Resident-Superior, Léon Jules Paul Boulloche, informed the GGI of the return of the epidemic, which had now spread from the fishing village on the peninsula to Nha Trang proper.⁶⁴ In the telegram, particular emphasis was placed on the fact that a fisherman from Bình Định Province (was this the case described by Yersin to Roux?) had been found dead in his junk: 'as a result, it would be very interesting to know exactly what was the epidemic that had struck Binh-dinh and which the doctor [of] Quinhon believed to be typhus and that could well have been none but plague. As junks from Binh-dinh sail very frequently into the Nhatrang river, the origin of the epidemic is easily explained'.⁶⁵ Three days later, Yersin would write to his mother for the first time about the plague outbreak, explaining how his initial fears of an involvement of his lab in the epidemic were now allayed by the revelation of

⁶⁴ Boulloche to the General Governor of Indochina, 15 August 1898, ANOM INDO GGI 6676.

⁶⁵ Ibid. Qui Nhơn (the proper Vietnamese spelling of Quinhon) is a coastal city in Bình Định Province, some 230km north of Nha Trang.

the Qui Nhơn connection, and the possible role of China as the origin of importation.⁶⁶ The same day, in yet another letter to Roux, Yersin explained this new theory at length: 'I have started to see that it was not us that introduced plague to Nha Trang'.⁶⁷ Since 1896, he argued, an epidemic had been raging in Bình Định, 'a bizarre illness that has killed 3,000 persons in 5 villages over the last year'.⁶⁸ The key symptom listed by Yersin was a pimple on the leg. The doctor of Qui Nhơn, whom Yersin dismissively described as 'young', had diagnosed the epidemic as typhus. Yet Yersin maintained it could have in fact been plague and that the outbreak in Nha Trang must have started as a result of heavy junk traffic between it and Bình Định, notably at a time of plague in Hong Kong and Hainan with which the latter communicated directly. In fact this was not the first time that Yersin had become aware of the epidemic in Bình Định. In his first, short letter announcing the beginning of the Nha Trang outbreak to the GGI (16 July 1898), Yersin briefly mentioned that he had received hearsay that, 'in recent years there have been epidemics in Bình Định which are not cholera and which kill the natives in great numbers and after a very short illness. A doctor said it is typhus. Could it not have been plague?'.⁶⁹ If in mid-July Yersin showed no further interest in this theory, by mid-August he would return to it so as to

⁶⁶ Alexandre Yersin to Fanny Yersin, 18 August 1898. YER.COR.1.

⁶⁷ Yersin to Roux, 18 August 1898. IND.A2 A4/151-153.

⁶⁸ Ibid.

⁶⁹ Yersin to the General Governor of Indochina, 16 July 1898, First Letter. ANOM INDO GGI 6676.

seize the opportunity to distance the source of plague from his laboratory and reverse his previous verdict on monkeys, ants and mongooses:

‘And then it is telling that nobody in the lab took sick, not even the boy of the monkeys who all too often used his feet as a broom to clean the floor of the room! The first cases were in houses that nobody from the lab ever set a foot. If the mongooses died of plague, it was an intestinal plague provoked by the chickens which we bought in no other place than the village’.⁷⁰

Here we have no less than a brazen diversion of attention from one of the few hard facts of the outbreak: that while the ‘boy’ handling the monkeys was not infected, the one handling the mongooses, which had themselves died of the disease, was one of the first victims of the epidemic. Thrilled with the possibility of absolving his laboratory of guilt, Yersin was clearly disappointed when the Resident of Qui Nhon replied that an expedition to Bình Định was not necessary: ‘A shame as it will be easy in 2 or 3 months for the doctor and Resident of Quinhon to discover plague there and say it was imported from Nha Trang!’.⁷¹

If in his letter to his mother on 1 September 1898 he appeared confident that plague was under control, two weeks later (15 September 1898) Yersin was much more concerned.⁷² The reason for this may have been that, after weeks of speculation, his Bình Định theory was going to be examined by medical officers

⁷⁰ Yersin to Roux, 18 August 1898. IND.A2 A4/151-153.

⁷¹ Ibid.

⁷² Alexandre Yersin to Fanny Yersin, 15 September 1898. YER.COR.1.

from Hanoi who after spending eight days in Nha Trang were about to set off for Qui Nhon.⁷³ The trouble was that Yersin was in fact already convinced that the Binh Dinh theory was not valid. In a letter to Roux on September 1, he mentioned that, although he was still awaiting the return of Carré from Qui Nhon, he had already got word from him that, 'this illness is probably not plague'.⁷⁴ Yersin sounded desperate: 'In the case that plague did not come from Binh-Dinh it came from the laboratory. How?'.⁷⁵ In a rare moment of negating responsibility, Yersin explained that during the first cases he was out of town, under the GGI's instructions, and so he could not be implicated.⁷⁶ Responsibility laid with Carré, who, Yersin, claimed was unusually diligent in issues of laboratory precautions. By September 15, when the Tonkin medical authorities were already in Nha Trang, Yersin had even more reason to worry. On that day, he had discovered that two mice kept in his lab, and which had been injected with 'toxin' for some time, suddenly died of plague. Yersin wrote to Roux: 'Is it because their cages

⁷³ Already by the end of July, Yersin appeared alarmed at the possibility of a Hanoi intervention in the epidemic, something he expressed to the GGI; Yersin to General Governor of Indochina, 30 July 1898. ANOM INDO GGI 6676.

⁷⁴ Yersin to Roux, 1 September 1898. IND.A2 A4/151-153.

⁷⁵ Ibid.

⁷⁶ On Yersin's Lang Bian expedition and the founding of Dalat see: Eric T. Jennings, *Imperial Heights: Dalat and the Making and Undoing of French Indochina* (Berkeley CA: The University of California Press, 2011).

were close to a cage where there is a mouse inoculated with the bacilli?'.⁷⁷

Yersin protested that they kept cages in small platforms filled with phenic water. Making a hasty retreat to a theory he had already discarded, Yersin returned to his suspicion of ants as the true culprits of the outbreak, spreading plague from house to house: 'The critters will indeed forage everywhere without however greatly distancing themselves. They are very capable of defiling the food of the natives, which would explain to us the large number of cases of plague without buboes that we have observed'.⁷⁸ Yersin expressed this conviction to both Roux and to his mother, and on the basis of the supposed ant connection proceeded to torch down 200 houses.⁷⁹ Not even the discovery of two dead rats in the infected neighbourhood could change his mind. For Yersin these had nothing to do with the outbreak: 'In the process of incinerating the village, we placed a hundred armed militia with batons around the region to be burned, so as to kill all the rats looking for a way to escape; they was none, but by contrast millions of ants escaped the houses'.⁸⁰

⁷⁷ Yersin to Roux, 15 September 1898. IND.A2 A4/151-153.

⁷⁸ Ibid.

⁷⁹ Alexandre Yersin to Fanny Yersin, 29 September 1898. YER.COR.1. The same letter contains a very small map drawn between paragraphs that shows which areas were infected and which evacuated.

⁸⁰ Yersin to Roux, 15 September 1898. IND.A2 A4/151-153. Yersin was well aware of observations linking rats to plague. In his report from India, he wrote: 'In India like in China, plague is always accompanied by a great mortality of small

By the end of September news about the plague outbreak in Nha Trang had reached Paris. In the midst of the Dreyfus Affair, these never made big headlines, and Yersin continued to be adored by the French press as before. And yet for those in the know – most worryingly, Yersin’s colleagues at the Institut Pasteur – what did get through in these news clips was not flattering. At first, the news talked of a limited outbreak that had been successfully controlled.⁸¹ Soon, however, a news item copied from the Hanoi newspaper *Independance Tonkinoise* appeared in several Parisian newspapers. Without directly naming Yersin, it nonetheless pointed unambiguously to his lab and his incredible ant-transmission theory: ‘We have been able to obtain precise information on the plague in Nha-Trang. It had been tried to make us believe at first that the scourge had been propagated by white ants; it is not so. It is

rodents, rats and mice’; ANOM INDO GGI 6788. The rat-and-flea plague transmission hypothesis was only slowly accepted by scientists, with no historical study of the global development of this disease aetiology to-date. For a study of the scientific uncertainty over the role of the rat in the transmission of plague in India see: Nicholas H. A. Evans, ‘Blaming the Rat? Accounting for Plague in Colonial Indian Medicine,’ *Medicine Anthropology Theory*, 2018, 5(3), 15-42.

⁸¹ Identical pieces claiming these appeared for example in: Anon., ‘Au Tonkin, La peste à Nha Trang – Une bagarre au Bac Ninh’, *Le Radical* 18: 254 (11 September 1898), 2; Anon. ‘Nouvelles du Tonkin’, *La Justice* 6816 (11 September 1898), 2.

inoculated mice and rats that have managed to escape, which have harmed the Annamites'.⁸²

Was it to these articles that Yersin would refer to in his January 1899 report to the GGI when he wrote, 'From the first instance, it was allowed to suppose, and some malevolent spirits did not lose the time to insinuate, that the plague derived from the laboratory'?⁸³ A glimpse of what appears to have been a nexus of interests and grievances going well beyond the specifics of the outbreak is afforded by a letter of Yersin to Roux, dated 5 October 1898: 'This epidemic will make us the greatest damage: the newspapers of Tonkin howl like they are possessed: the neighbouring colons, especially a bankrupt baron named Perignon who wants to make rice plantations in Phan Rang talks of nothing less than pressing charges for damage and interest!'.⁸⁴ Hurling abuse at the man, and accusing him of being a failed businessman who was venting his frustration on the world, Yersin protested he had taken every measure to protect outlying areas from the epidemic. But the particular letter lets another crucial bit of information slip through:

'The chief doctor, in his report (very benevolently) wrote to the General Governor that it [the plague] came on a Chinese junk as this year we had taken no quarantine measures in Nha Trang against arrivals from China where plague was very intense. All that, is of course for the broad

⁸² Anon., 'La peste a Nha-Trang', *Le Rappel* 10476 (5 November 1898), 2.

⁸³ ANOM INDO GGI 6789.

⁸⁴ Yersin to Roux, 5 October 1898. IND.A2 A4/151-153.

public as for us, men of the laboratory, the question remains very doubtful'.⁸⁵

September produced 25 plague cases out of which 16 died. October would finally see the demise of the epidemic, with only 4 cases out of which 3 succumbed.⁸⁶ The second phase of the outbreak was declared over on 1 November 1898 and, by comparison the first phase, which had produced 19 cases, this time the cases were 54. And yet, by contrast to the first phase, very little information survives about the second and most lethal one. No extensive serum inoculation case studies, no fever charts, such as exist in relation to the June-July phase are to be found in the archive. What we do know is that the measures adopted by Yersin matched, if not the true proportion of this limited epidemic, then certainly his own anxiety about putting an end to the outbreak and the accusations surrounding it. These radical measures, focused around house incineration, were in turn praised as responsible for ending the outbreak.⁸⁷ Yet newspapers in Indochina did not relent in their attacks on Yersin, who suspected that they were having an all too strong and negative effect on the Hue Resident-Superior, Boulloche, a colonial official with whom Yersin already had a difficult relation.⁸⁸ Boulloche's hostility to Yersin is evident in his telegrams to the GGI

⁸⁵ Ibid.

⁸⁶ Ibid.

⁸⁷ ANOM INDO GGI 6789.

⁸⁸ Yersin to Roux, 10 November 1898. IND.A2 A4/151-153.

from the start of the epidemic.⁸⁹ So far had relations between the two deteriorated, that in December of the same year Yersin did not hesitate to joke to Roux about killing Boullouche.⁹⁰ Using a trope that, unbeknownst to him, had been used four years earlier by his arch-enemy in Hong Kong (the British colonial doctor James Lawson) in a letter to Kitasato Shibasaburō, Yersin wrote: 'I am on my way to Hue where I will stroll and see M. Boullouche with whom it would be good if I could cause a little bit of human plague or bovine plague'.⁹¹ Referring to Boullouche's inability to understand scientific matters, Yersin explained that his aim is to 'make him understand that we are not a permanent danger to the colony and that it has not been absolutely proved that it was we that introduced plague in Nha trang [sic], as this disease was already present in Vinh in 1894'.⁹²

Hence by the end of the outbreak, Yersin had no definitive idea about the source of the outbreak, or whether his lab was responsible for it. With the temporary end of the epidemic Yersin was, however, able to compose a cohesive outbreak narrative, which took the form of his January report to the GGI. It was

⁸⁹ Boullouche to Governor General of Indochina, 18 July 1898. ANOM INDO GGI 6676.

⁹⁰ Yersin to Roux, 5 December 1898. IND.A2 A4/151-153.

⁹¹ Ibid.; on Lawson's letter to Kitasato see: Lynteris, 'A Suitable Soil: Plague's Breeding Grounds at the Dawn of the Third Pandemic', *Medical History* 2017, 61, 343-357.

⁹² Yersin to Roux, 5 December 1898. IND.A2 A4/151-153.

there that he conclusively traced the source of the outbreak to China, and rejected any connection to his lab:

‘Chinese junks, arriving from Canton and from Hainan and destined for Singapore sailed down at the start of the year and stopped at the island of Bai-Men where they bought pigs. The village of Culao, rather distant from the Institute, and with which no relation exists, as it is also separated by the river estuary, is in constant rapport with these junks, with which it trades pigs. Hence this village declared that the first dead amongst its inhabitants took place in March 1898. This date coincides with the passage of the junks and the strong recrudescence of plague that raged in China that period. It is thus no longer permissible to doubt that the people of Culao were infected on board the Chinese junks and that they were the vehicles of the bacillus’.⁹³

The idea that plague arrived from China seemed comforting to Yersin. When on 18 January 1899 he wrote to his mother to announce that plague had reappeared in the region, he sounded reassuring, saying that the new cases did not worry him as, ‘It is now well proved that the origin of the epidemic was a Chinese junk. The first village infected was a village far away from the laboratory, having no relationship with us, and this was last March, just at the time when Chinese junks come to buy pigs’.⁹⁴ Between January 10 and April 7, the outbreak

⁹³ ANOM INDO GGI 6789. The same narrative is repeated in: Alexandre Yersin to Fanny Yersin, 18 January 1899. YER.COR.1.

⁹⁴ Alexandre Yersin to Fanny Yersin, 18 January 1899. YER.COR.1.

would cause 54 cases, with 47 dying of the disease.⁹⁵ Yersin would go on to contain this new outbreak as was by now his habit: by torching down the two infected villages near Nha Trang.⁹⁶ In an undated letter from after April 7, he would write to his friend and colleague Paul-Louis Simond with a fully-revised chronology and aetiology of the outbreak. This version claimed that the first case of the epidemic was a 17-year-old girl in the village of Culao who fell ill on 11 March 1898, 'having, a few days earlier, traded with a Chinese junk in Bay Mieu'.⁹⁷ In an effort to link this never before mentioned case to the June outbreak in Nha Trang, Yersin proceeded to describe three more specific cases in Culao (case 2: March 20; case 3: March 21; case 4 - March 25) before making a characteristic narrative leap: 'In the course of April and May there were a dozen

⁹⁵ Alexandre Yersin to Paul-Louis Simond, undated. Archives Institut Pasteur, Fonds: Simond (Paul-Louis), Cote: SIM.4 - Lieu: A3/81-84, C/Correspondance régulière. 5_ Alexandre Yersin (henceforth SIM.4 A3/81-84).

⁹⁶ Alexandre Yersin to Fanny Yersin, 16 March 1899. YER.COR.1.

⁹⁷ Yersin to Simond, undated. SIM.4 A3/81-84. It should be noted that a sheet with two very rough maps marked 'the first epidemic June 98-August 98' and 'the second epidemic Nov 98-April 99' accompany some very rough undated notes on the Nha Trang plague epidemic. The two maps, not reproduced here, seem to be concerned with the isolation facilities during the outbreak; Archives Institut Pasteur, Fonds: Simond (Paul-Louis), Cote: SIM.6 - Lieu: A3/81-84, D/ Dossiers 04_ Mission de la peste aux Indes (1897-1898) c) Articles manuscrits de P.-L. Simond sur la peste, 1- Rapport sur les épidémies de peste en Extrême-Orient.

more cases in Culao and it was only in June that the plague crossed the lagoon in order to strike Nha Trang'.⁹⁸

It is in this context that we encounter the last map of the Nha Trang plague epidemic drawn by Yersin (Figure 4).⁹⁹ This is not contained in any of Yersin's correspondence files but, by the appearance of four pin holes on its corners, seems to have been a map that Yersin or Simond had put up on a wall. The map is much larger than the previous ones examined in this article, of roughly A4 dimensions, and made of rice paper which today appears browned, possibly due to the time elapsed. In portrait rather than landscape position like the other maps, its top is oriented to the North.

Insert Figure 4 Here: Fig.4 Foyers of plague in the Nha Trang epidemic; SIM.4; Courtesy of Institut Pasteur/Archives Alexandre Yersin.

Titled 'Foyers of plague in the Nha Trang epidemic', the map covers a much larger area than any of the previously discussed. To the North it stretches to unmarked territories north of Culao village all the way to what is today the town

⁹⁸ Ibid. It is not the aim of this paper to evaluate the veracity of this claim, yet the reader needs to be reminded that Culao was less than 15 minute's sailing away from Yersin's home and laboratory, and an outbreak of plague going unnoticed, as Yersin claims it was, at the time seems incredulous.

⁹⁹ Archives Institut Pasteur, Fonds: Yersin (Alexandre), SIM.4.

of Đường Đệ; to the South to what is today the Bãi Dài Beach Resort; and to the West to the Diên Khánh Citadel (marked as Citadelle Khanh Hoa). The map draws out the sequence of outbreaks in a way that cartographically establishes the innocence of Yersin's laboratory in the events of 1898-1899. Several areas are marked with numbers corresponding to legends given at the bottom-left corner of the map. The first site, marked 1 is the island of 'Bai Mieu' (known today as Hòn Miếu) with the legend reading: 'Mooring of Chinese junks from November to May'. The second site, marked 2, is the village of Culao, which is identified as 'The first plague foyer (February-March 1898) (to Jan. 1899)'. Following up, marked as 3, is Huong Huan, the fishing village next to Yersin's laboratory, with the latter also being clearly marked on the map but not numbered. Huong Huan is described as 'The second foyer of plague (June-July 1898)', and is followed by the 'third foyer of plague (July-September 1898)', marked 4, which is Nha Trang town proper. The last three marked sites are in sequence: the village of Logom (5) 'The fourth foyer of plague (Feb-March 1899)', Phuong (6) 'The fifth foyer of plague (Feb.-March 1899) and Cho Moï (7) 'The sixth foyer of plague (March-April 1899)'. In spite of its apparent simplicity, this map distances the source of plague from Yersin in a complex manner.

First, by zooming out as it were from the area framed in the previous maps it removes epidemiological gaze from what in Figure 1, and then in decreasing degrees in Figures 2 and 3, was the focus of cartographic attention: Yersin's laboratory. From being a complex of named buildings (Figure 1), with the suspected source of the outbreak (the monkey and mongoose cases) marked in

the same colour as the infected houses in the nearby village (Figure 3), in this final map, Yersin's lab is but a dot in a vast landscape of sea and land. Second, the fact that the laboratory is not numbered makes it equivalent to other not-numbered sites, which are only described by name in the map. It is thus simply rendered a point of general geographical reference, unrelated in itself to the outbreak. Third, the fact that, by contrast, 'Bai Mieu' is marked with a number, as only foyers in this map are, and that this is the number 1 clearly shifts the blame from the laboratory to that site, and by extension, via the explanation provided in the legend, to China. We need to notice here the cross drawn in the bay of 'Bai Mieu', which invites us to consider Chinese junks mooring there as the ground zero of the epidemic. Fourth, lest the connectivity of the island to the actual foyers of the disease be in doubt, Yersin has added not only the nearest mainland villages across the sea but also, in bold red strokes, roads connecting these to the infected regions. By means of an image similar to a blood circulation system, plague is thus depicted as emanating from the Chinese junk mooring station and spreading into the mainland in a web-like manner. A 'Chinese import' par excellence, plague was thus safely repatriated to what colonial medical experts considered to be its true, universal source.¹⁰⁰

¹⁰⁰ On China as the cradle of plague see: Christos Lynteris, 'Yellow Peril Epidemics: The Political Ontology of Degeneration and Emergence', In Frank Billé & Soren Urbansky, eds, *Yellow Perils: China Narratives in the Contemporary World* (Honolulu: Hawaii University Press, 2018). Concerns about plague importation from China into French Indochina date from before the

Conclusion

Making sense of the source of the 1898 plague outbreak in Nha Trang involved Yersin in complex and stressful processes of epidemiological reasoning over the duration of the outbreak. On the one hand, Yersin himself was not at all certain of his laboratory's innocence in this event. On the other hand, while an epidemic-inducing laboratory leak is never going to be seen favourably by the public or by one's superiors (especially in a colonial context), when the person in

discovery of the pathogen in 1894 and were linked to regular reports of plague in Yunnan since the 1870s (e.g. H. Rey, 'Contribution à la géographie médicale (Le Tonkin)' *Archives de médecine navale* 1887, 48, 29-69). With the Hong Kong outbreak the focus shifted to the British colony and to the maritime importation of plague. By 1896, when plague had become a seasonal phenomenon in the British colony, the colonial authorities in Saigon were anxious to regulate trade in a way that protected France's South-East Asian empire but did not impede trade. See: ANOM INDO GGI 23864, Tonkin dossiers divers, Épidémie à Hongkong et autres ports de Chine, État sanitaire dans les régions des frontières du Tonkin, année 1894; ANOM INDO GGI 55275, Consulat de France à HongKong, Situations de l'épidémie de peste bubonique à HongKong. A. s. de l'entrée en Indo-Chine des ruminants de cette colonie, Mesures prises contre cette épidémie.GGI 23916; Tonkin Dossiers Divers, Épidémie de peste à Hongkong et autres ports de China, Mesures quaranténaires prises en Indochine, année 1894.

charge of the lab in question is the one who has discovered the bacillus in the first place, and when the outbreak is the first to introduce the disease to an entire administrative region (in this case French Indochina) the stakes are particularly high. Hence, a demographically underwhelming outbreak in a remote region of the colony became the cause of asymmetrical medical and administrative anxiety. However, contrary to what we may have expected on the basis of the historiography of laboratory science and the Pasteurian laboratory in particular, Yersin's defence of his lab did not rely on providing evidence of its leak-proof nature, both infrastructurally and in terms of laboratory protocols. Instead, both the defence of his lab and the anxiety about it were played out in a decisively extra-laboratory field: the epistemic and graphic transformation of epidemic maps created by Yersin in the course of the outbreak.¹⁰¹ Nicholas Evans has argued that, in the context of colonial medicine, 'some disease maps should [...] be read not just as panoptic claims to know the colonial city, but also as spaces of desire in which colonial science chased after its own image of itself as able to know and control its subjects'.¹⁰² But, he goes on, when it comes to a disease like plague, this desire always unfolds in an epistemic context of persistent uncertainty. An uncertainty, we may add, about the disease's transmission pathway, its "breeding grounds", and mode of attenuation and recrudescence. Indeed these questions were catalytic in Yersin's plague research following the discovery of the bacillus

¹⁰¹ Thus supporting Robert Peckham's revision of the Pasteurian lab as being in a dynamic relationship with the field; Peckham, 'Matshed Laboratory'.

¹⁰² Evans, 'The Disease Map and the City'.

in Hong Kong, which, while ontologically stabilising the disease, threw open all questions about what we may call its topology.¹⁰³ Where did the disease come from? Where did it go when it disappeared? Where did it hide or incubate in inter-epidemic periods? What material carried it, or allowed it to assume an invisible, attenuated form? Could the disease be lurking in human bodies as well as in other organic or inorganic material?

What complicated matters in the case of Nha Trang, was that this topological uncertainty on the part of Yersin (which was plague's proper locus?) was combined with an aetiological suspicion on the part of third parties. While Yersin struggled to identify the source of the outbreak or its mode of transmission, a range of other agents (including members of the colonial elite) appeared convinced that the former was no other than Yersin's laboratory, and the latter its experimental mice. As Yersin took ever more intrusive and draconian measures so as to stamp out the outbreak and relieve himself of international embarrassment, getting rid of both accusations and his own suspicions about his lab's involvement in the outbreak proved much harder. In this case, then, the article has argued, epidemic mapping expressed not the desire to know a disease, nor a desire of self-portrayal on the part of colonial doctors as epistemic subjects. Rather, in their in-situ permutations, Yersin's hand-drawn and epistolary maps expressed his desire to repel the source of the outbreak away from the person producing the map both in the eyes of others and also in his own mind.. While always functioning as an experimental system in the context of

¹⁰³ Lynteris, 'A Suitable Soil'.

epidemiological uncertainty, more than simply being an apodictic tool, in this case, epidemic mapping was also a process of epidemiological distancing. Its aim was not simply to prove that the source of the outbreak was unrelated to Yersin's personal and professional sphere, despite considerable evidence of connections with the monkey building and people connected to Yersin's lab, but to symbolically banish it back to the mythic geographic cradle of plague: China.

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