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Book section

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The disease map and the city

Desire and imitation in the Bombay plague, 1896–1914[1]

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This chapter examines colonial attempts to map and visualise plague in British India, 1896–1914. It asks how mapping might have fascinated those seeking certainty in the interpretation of a disease, and it explores how colonial doctors tried to capture the power of maps in their own writing.

By the end of the nineteenth century, mapping was a well-established investigatory technique in epidemiology. Maps had been used extensively in the investigation of yellow fever in late eighteenth-century North America, and in the nineteenth century they were important tools in the struggle to comprehend the global spread of a number of diseases, in particular cholera.[2] For many medical historians, however, these epidemiological maps are more than just representations of disease. The historian Tom Koch, for example, has shown that from the late early modern period onwards, mapping has been a crucial technique through which diseases have been made visible out of isolated local phenomena. For Koch, maps are instruments through which theories and arguments about the nature of disease have been articulated.[3] Mapping connects lived experience with investigations carried out under theoretical assumptions so as to transform disparate phenomena into something that can be known as disease. Illustrating this, Koch shows how during the nineteenth century, mapping enabled up to four quite separate choleras to be debated and argued, and, in doing so, allowed overwhelming quantities of data to be synthesised as arguments.[4] He thus shows that by the late nineteenth century, maps were essential tools through which hypotheses about disease could be articulated. Maps were crucial to scientific processes through which disparate phenomena could be argued to belong to broader events such as epidemics and pandemics,

and they were central to the construction of arguments through which certainties about those disease-events could be formulated.

Beyond the study of disease, the ability of maps to produce incontestable knowledge about territories has been a continuous source of fascination for scholars of cartography. Since at least the nineteenth century, cartographers have often laid claim to neutral scientific objectivity: maps are seen as representations of the world as it really is. In the last few decades, however, a number of scholars have questioned such claims, in order to show how the power of the map to produce certainty can operate through a façade of neutral science. Brian Harley, for example, famously argued that maps might be as much images of social order as they are objective measurements of the world.[5] In this tradition of analysis, the most thorough work on cartography in colonial India is Matthew Edney's *Mapping an Empire*, which explores an ever-present tension between a cartographic ideal and actual mapping practices. While nineteenth-century surveys of British India were frequently chaotic, such anarchy could be hidden beneath a cartographic archive that sustained a myth of order, and in this way, 'the British created a geographical *myth* of an empire comprising known or knowable territory.'[6] This approach challenges any reading of cartography as a neutral science. Cartography's claims to objective representation are seen to cloak a sometimes imitative relation to reality, in which maps project themselves as objective technologies, but in so doing can mesmerise us with their mimetic power.[7] Unifying this literature is a concern to understand how maps produce a sense of their own certainty. Maps can erase complexities, and produce a fictive sense of seeing all and thus knowing all. Matthew Edney in particular shows that by the late nineteenth century, mapping was valued as a technique across scientific and political realms precisely because of its ability to create a certain and known image in the face of otherwise incomprehensible complexity.

This chapter asks what that sense of certainty might have meant for colonial doctors who utilised mapping as a technique to understand a plague epidemic in Bombay in the late nineteenth and early twentieth centuries. I ask how the capacity of disease maps to assert, to reason, to clarify, and to argue had, by the very end of the nineteenth century, become a part of their mythology. The plague outbreak in India created a situation of far-reaching uncertainty for the colonial administration: the mysterious aetiology of the disease pushed doctors to the limits of their own medical understanding, while also revealing the colonial state's inability to know its racial and social other.[8] In such a setting, the technology of

mapping, which was understood to make arguments in a cogent fashion, could offer a certainty that was much desired.

In probing the link between desire and certainty, this chapter thus aims to contribute to our understanding of the 'mimetic powers' of maps.[9] Previous analyses of this, building upon the work of Brian Harley, have tended to focus upon cartography's seductive promise to accurately mimic 'reality' through technical skill.[10] In this chapter, I explore a further layer of mimicry, namely, the way in which cartography's promises could be mirrored and reflected *within* practices of mapping. This, in turn, can help us to understand the place of mimetic thinking within European colonialism. The anthropologist Michael Taussig has described how European colonial thought associated mimesis (an attempt to capture the power of the other through imitation) with its 'savage' other.[11] Europeans saw themselves as uniquely creative and original, while the 'primitive' subjects of their colonial expansion were seen to be innately imitative. Across the colonial world, much imperial ideology thus rested upon a narrative that dignified European scientific modernity as a break from primitive forms of mimetic reasoning. The texts and maps that I will discuss in this chapter were contemporary with James Frazer's *Golden Bough*, the early anthropological treatise which – in a broader public sphere – most clearly articulated the separation of European thought from its past as an evolution of thought on causation: if Europeans had science, their savage other had sympathetic magic, based upon a mimetic and imitative logic.[12] The modern European, in other words, was understood to have evolved beyond imitation with the discovery of reason and science. Taussig nonetheless argued that Europeans were not immune to their own mimetic excesses, and they frequently mimicked the other, often acting out the savagery that they imputed to the other.[13]

The maps explored in this chapter can further help to deconstruct colonial claims to rationality, which were based upon a hierarchical logic in which the primitive was to the modern as mimesis was to science. I will ask what might be learnt by viewing colonial disease mapping as a genre that imitated itself in a search for certain knowledge. In so doing, I will argue that some disease maps should thus 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.

This chapter thus aims to speak to more than just the history of cartography. Colonialism is often seen as a project that sought to know its racial and environmental other through acts

of classification, codification, and definition, which ultimately produced the certainties through which imperial rule could be effected. This chapter follows a broader shift within the medical humanities to deprivilege the study of knowing, and instead begin to look at the ways in which ignorance and uncertainty might be seen to have their own histories.[14] I therefore ask how we might begin to think about maps – quintessential tools of certainty – as records and of doubt and indecision. The maps that I discuss in this chapter fretfully mimicked the purported ability of colonial science to *know* its racial and social other, and the trace that they leave is thus one of uncertainty.

The arrival of plague in India, 1896

The bubonic plague epidemic in India was part of a broader global event that is nowadays referred to as the Third Plague Pandemic. The disease most probably emerged in Southern China in the late nineteenth century, and the first outbreak to come to widespread international attention was in Hong Kong in 1894. There for the first time in history, the bubonic plague was investigated through the new science of bacteriology. This work was carried out with an urgency resulting from the disease's mythic status as the medieval Black Death. As Christos Lynteris has observed, 'plague was thus rendered an object of knowledge under the bane of its perceived ability to wipe out humanity'.[15] During the Hong Kong outbreak, several bacteriologists competed to discover the microbial cause of the disease, with the Pasteurian Alexandre Yersin eventually identifying the plague bacterium, hence its modern scientific name, *Yersinia pestis*. Yersin's discovery did not, however, do much to demystify the disease, for the bacteriologist's newfound ability to know plague in the laboratory created further new uncertainties about how the disease spread from person to person. Major plague outbreaks on every inhabited continent in the decade following the first case in Hong Kong therefore often confused and bewildered sanitarians, who turned to a variety of techniques and technologies to both control and understand the disease. Both insanitary built environments and racialised others came under suspicion of spreading this feared disease. In Honolulu, for example, quarantine, inspection, and disinfection were supplemented by the burning of many Chinese-owned properties, which in January 1900 led to the accidental incineration of almost the entirety of the city's Chinatown.[16]

Bubonic plague arrived in Bombay in late 1896. The British reaction to the disease was bifurcated: on the one hand, the authorities expressed confidence that immediate and far-reaching sanitary measures could promptly bring the disease under control. At the same time,

plague precipitated a panic among both the administration and the general population.[17] By January 1897, close to half the Indian population of Bombay had fled the city, causing major economic concerns for both the government and industrialists.[18] As one historian has recently argued, by 1897 the Bombay plague was, for legislators and officials, both a 'nightmare of death', and a fertile ground for the exercise of 'fantasies of social control.' Moreover, because neither the nature of the disease nor the appropriate control measures could be agreed upon in these early days of the epidemic, 'plague control had of necessity to be experimental'.[19] For all that was known about plague from the laboratory, its movement through the city confounded doctors, and it seemed to challenge cherished certainties that the British administration relied upon to control their Indian subjects. Plague spreads through human populations via a complicated pathway involving rodent hosts and insect vectors, none of which became known until the first decade of the twentieth century. In the final years of the nineteenth century, the unpredictable nature of the disease and the fact that it did not spread in an obvious fashion among what the British understood as insanitary subjects was thus a cause of much perplexity.[20] This was an uncertainty that continued to haunt plague science in India for at least the first decade of the epidemic.[21]

In this situation of uncertainty, the desire to control plague and the desire to know plague were wholly interlinked. This can be best understood from the enormous paper output produced by the government as a response to the plague. Between September 1896, when the first bubonic plague case was diagnosed in Bombay, and 1900, a series of reports, texts, and statements were published, which attempted to order plague through chronological accounts and to capture the nature of the epidemic through exhaustive detail.[22] In these lengthy and verbose narrative accounts, the unknown aetiology of the disease was discussed, while the efforts of the government to control it – which were only ever partially effective – were celebrated. In the appendices of these reports were maps that situated the disease in urban space. I investigate the way in which these reports related to these maps, and how the interaction between the two produced fantasies about how both the city and the plague might be known.

That these maps were produced in India was no coincidence. Around the world, the vast majority of plague outbreaks during the Third Pandemic were relatively contained events, and yet in India the disease became endemic, recrudescing in the colder months of each year such that by 1930 it had killed more than 12 million people in the country.[23] The initial

confidence felt by the British administration that they could control the plague soon disappeared, and what replaced it was an urgent desire to understand the confusing spread of this disease.

The creation of the Plague Committee

In the late nineteenth century, the Indian government was as a rule committed to a non-interventionist, hands-off approach to infectious disease outbreaks such as smallpox and cholera.[24] Plague, however, occupied a special case, as its feared and much mythologised history drove an unprecedented level of state intervention. As the historian David Arnold has shown, this intervention frequently preceded the arrival of the disease, and for the Indian population, was often 'far more distressing' than the actual epidemic.[25] Sanitary activity began in October 1896, with enforced segregation, hospitalisation, and urban cleansing.[26] It nonetheless quickly became clear that such measures were having little effect on the spread of plague, and consequently, the government hastily introduced new legislation – the Epidemic Diseases Act of February 1897 – which gave the authorities almost unlimited power to do whatever needed to halt the disease across the whole of India. In Bombay, the passing of this Act led to the creation of a Plague Committee with powers to supersede the Municipal Corporation of the city in all matters relating to plague. With no clear idea of how to rid the city of disease, this Committee continued and intensified the already existing sanitary programme of highly intrusive plague measures involving house-to-house inspections, compulsory disinfection, and forced patient removal. These measures were not guided by any uniform theory of the disease. Borrowing Michael Worboys' terms, these sanitary policies consisted of 'exclusive' interventions such as isolation and targeted disinfection, but implemented in a scattered and chaotic fashion that harked back to 'inclusive' sanitary policies that saw the city as space of danger and infection.[27] These sanitary policies were, in other words, directed by no single epistemological understanding of plague, but aimed to halt the disease in any way possible.

The exhaustive nature of the Plague Committee's sanitary measures were exceeded only by the comprehensive manner in which they were documented and recorded. In 1897, under the direction of its chairman, Brigadier-General W. F. Gatacre, the Committee narrated its activities during the first plague season in a painstakingly thorough report, the main volume of which stretched over 258 pages.[28] Much of this report was devoted to the minutiae of sanitary process: the organisation and management of personnel; the arrangement of camps

and hospitals; the routines of duty. It was also in large part a justification for measures that had frequently aroused intense opposition and resentment from local populations. The job of the Committee had never been to determine the bacteriological and clinical nature of plague – that task had been assigned to other functionaries, mainly within the Indian Medical Service.[29] Nonetheless, the Committee's report speculated extensively on the nature of plague. Among wide-ranging observations of plague's clinical signs (for example, descriptions of the 'earthy, clear-like odour' coming from patients' skin and breath),[30] extensive patient case studies, and descriptions of individual symptoms, the report also asked questions about, for example, why the disease was infectious in the city but not in hospitals.[31] The best answer that could be given was that plague became contagious in insanitary conditions, and thus within a sanitary hospital, remained non-infectious.

What is most remarkable about this report is that just as the Committee described how they had attempted to control the plague through recourse to multiple rationalities, theories and methods – in other words, *in any way possible* – so too did they appear to be willing to try and understand the disease *in any way possible*. Take, for example, a section of the report, by a Dr A. McCabe Dallas, which recounted the 'statistical and clinical record of work done' in Bombay's Grant Road Hospital. Before reaching the statistical and clinical evidence, Dallas gave an extensive account of his own understanding of plague's transmission. He argued that rats harboured the infection and caused it to multiply. He argued that drains too were implicated, due to being contaminated by matter coming from infected patients. Soil was also seen as a dangerous location of infection, particularly sewage soil, and Dallas was extremely complimentary about sanitary measures to flush sewers with disinfectant. He also, however, argued that the disease was airborne: micro-organisms escaping from decomposing rats would ascend with hot air currents and thus travel across a locality. Other forms of transmission that Dallas considered included the sharing of drinking vessels. Pneumonic plague, he concluded, was the only form of the disease directly transmitted by human intercourse.[32]

Many of Dallas' speculations aligned with areas of investigation that would give way to a much more comprehensive understanding of plague in the coming decades. What is striking about his reasoning, however, is that it embraced a multiplicity of factors and a multiplicity of possible ways in which plague could be understood to spread across the city. No single cause was given weight – instead, every possible avenue of transmission was considered as a

potential mode through which plague could propagate. The Plague Committee's 'inclusive' inclinations in sanitation were thus echoed in their multifactorial accounts of the disease; to borrow a phrase from Worboys, this was a report that was more concerned 'not to be wrong than to risk being right'.[33] This report, in other words, sought every possible avenue through which truth about plague might be spoken: in a situation of radical uncertainty about the sanitary future of the city, it cast as wide a net as possible in order to try and catch some truth about the disease.

It is in light of this encompassing search for certain knowledge that attempts to map the Bombay plague have to be understood. The Bombay plague outbreak occurred at a particular moment in colonial medicine, when medical geography, once the 'queen of the medical sciences' was slowly giving way to a new scientific medicine of laboratories and bacteriology.[34] Not only did the new science of bacteriology lead to a de-privileging of the map, but it also led to a slow transformation in which theories of disease moved away from environmental and spatial forms of reasoning. As Warwick Anderson has shown, bacteriology wrought a transformation in the tropics such that imaginaries of problematic environs eventually gave way to the idea of dangerous germ-carrying native bodies. This was, however, an extremely slow process, and as bacteriology first rose to prominence it served rather to 'adjust or extend' preceding theories of geographic pathology.[35] In other words – as has been shown so many times in relation to this epidemic – the bacteriological 'revolution' in plague was slow and uneven.[36]

This slow and uneven adjustment was particularly noticeable in the early years of the Bombay plague. A partial bacteriological understanding of the plague epidemic frequently obscured the disease for colonial observers, for its indirect mode of transmission did not seem to fit with accepted understandings of bacterial disease. As a result, theories of environmental propagation were frequently added to notions of bacterial transmission, to create what historians have described as a theory of 'contingent contagion,' that is, an understanding that plague was passed between bodies but also encouraged by environments.[37] Such notions fell comfortably within an Anglo-Indian medical tradition, which during the late nineteenth century was often famously resistant to contagionist thinking.[38] For many of India's late nineteenth-century doctors, germ theory could provide only a partial explanation for diseases that they viewed as primarily environmental.[39]

In such a situation, where laboratory discoveries only seemed to further mystify the disease, and where germ theory was not trusted to give a full account of an epidemic, medical cartography continued to be seen as a form of reasoning that could persuasively fashion arguments beyond the laboratory. In this regard, the maps contained within the Committee's report represented an important hope: they were spaces of exploration in which a *certain* plague science could be imagined and made possible.

The rest of this chapter asks how our analysis might be enhanced if we begin to think of maps of the Bombay plague not just as records of the disease, but as objects of attraction and desire. In doing this, I follow recent developments in the history of science that have embraced anthropological approaches to documents as material objects – 'paper technologies' – that can perform social and political functions.[40] These plague maps were, I argue, spaces of desire that stood in a particular physical relationship to an archive of reports that otherwise aspired to narrate the plague in its totality. As complicated images that were printed on large sheets of paper, the maps were often physically separate from or additional to the volumes they accompanied. There was a straightforward technical reason for this, for these maps were irregular and hard to print. This chapter, however, seeks to interrogate the question of the distance between text and map in order to ask how the supplementary nature of these maps as 'paperwork' contributed to their authority.[41] How is it that having a relationship to text that was never quite stable led to these maps having an imitative truthfulness? Within the archive of plague, the map was an interesting technology, for it was of necessity supplementary and separate from text, and yet it was also the place where colonial science promised and suggested forms of argument that could achieve a synthesis of data instead of an excess of information.

My goal is thus to contribute to the history of the medical geography of plague by showing how an investigation of the tensions between text and map can uncover fantasies and longings within colonial medicine's engagement with the city. As arguments, these maps might be thought of as deceptions. They posed as arguments and they carried the visual rhetoric of an argument, but they were simulacra of arguments; mimetic hints at the possibility of arguments. This chapter considers a moment in medical geography when the power of the map to argue was already an object of desire. The maps analysed here were thus statements, not so much of how things were, but of how things were desired to be. My analysis takes in three case studies. The first two maps were created early in the epidemic,

and represent attempts to grasp plague at both micro and macro levels. The final case study is from 1914, at a point when plague had been stabilised as an epistemic object.

Three case studies

1. Worli Koliwada

The city of Bombay presented a challenge to plague research, due to its population of nearly 850,000, its mobile residents, its rapid development, and its heterogeneous composition.[42] The Plague Committee therefore focused upon specific micro-examples in order to gain a better understanding of the efficacy of sanitary policy within Bombay. I here examine a case study contained in the Committee's report, one of a number of such studies of urban villages spread throughout the peninsula, each of which was accompanied by a map.

One of these villages, Worli *Koliwada* (fishing village), had a peripheral relationship to the city that surrounded it, being a self-contained settlement on the northern peninsula of one of the original seven islands of Bombay. The Committee chose to study plague in Worli partly because the disease was uncharacteristically virulent there, with over 90 per cent of those infected dying in a few hours.[43] Plague is manifested in three main forms: bubonic, pneumonic, and much more rarely, septicemic. If the Committee's statistics were accurate, they point towards pneumonic infection, which is an airborne disease, spread directly and rapidly from person to person. No mention, however, was made in the report as to the predominant type of plague present in Worli.

Worli village was also chosen for study because of its relative isolation from the rest of the district, and its seemingly stable population. For the Committee, it must have appeared as a manageable and controllable case. There was, additionally, a degree of autonomous organisation in the village that attracted the Committee. The report noted with approval that the villagers had from the outset been 'fully alive to the dangers' of the disease, and consequently, they had decided at the very beginning of the epidemic to place watchmen at the entrances to their village. These guards both prevented strangers from entering, and prevented villagers from leaving to visit stricken parts of the city. This spontaneous sanitary cordon was nonetheless ultimately unsuccessful, and a first case of plague appeared in the village on 1 December, 1896.[44]

At a basic level, the Committee's report on Worli was a narrative of disinfection operations within the village, embedded within a larger chapter detailing sanitary activities in

Bombay, such as house-to-house visitation and disinfection. The report's authors did not, however, limit themselves to simple narration. They also speculated upon the spread of plague. In doing so, they adopted a style of writing in which knowing plague, controlling it, and describing it were intimately related practices. In this way, the report was saturated by multiple possible explanations for the plague, each of which was nonetheless inconclusive. The report made reference to the dark and low huts of the residents, the lack of artificial drainage, and the narrow streets that nonetheless benefitted from sea-breezes on both sides.[45] It described how the ground of the village was receptive to plague due to the 'drainage of generations' soaking into the soil, and the villagers letting their water flow into that ground.[46] It described in detail the disinfecting operations, in which 270 coolies were employed in an operation that involved removing the roof from every single house in the village, in the belief that enabling sunlight and fresh air to enter the houses would purify them of plague. The supposed success of this measure again implied the possibility of an understanding of the disease as something that could adhere to the material structure of the city and then subsequently infect humans. Worli, as with many other localities in Bombay, was seen as so dangerous that a wholesale disinfection of the entire village was understood to be necessary.

Within the Committee's description of this fishing village, multiple possibilities of knowing plague were considered: none were wholly conclusive. Nonetheless, the report did promise its readers a certain understanding about plague, not in its own pages, but within a map that lay in a physically separate volume.

This map is shown in Figure 5.1. For the authors of the report, the map threw light 'on the way in which the disease spreads'.[47] The map was a detailed tracing of the outline of all 936 mud houses in Worli, which at the beginning of the epidemic were home to 5,493 people. These houses were individually numbered and then plague cases were drawn by hand in three groupings. The first grouping, in red, consisted of a single case. The second grouping (in yellow) contained four further cases, and the third grouping (in green) consisted of all other plague cases. These corresponded to the chart beneath showing plague cases against time. Additionally, this chart indicated the dates upon which sanitary operations were begun and completed. For the authors of the report, the grouping of these cases appeared to promise an understanding of plague. Precisely what this understanding could be, however, was deferred to the map, in other words, to a space beyond the text.

FIGURE 5.1

Figure 5.1

Map of Worli village, originally from the *Report on the Bubonic Plague in Bombay* by the Plague Committee. This image is of a reproduction of the original, in R. Nathan *The Plague in India*, 1898. The reproduction differs from the original on two points only: the orientation has been changed (north–south is now horizontal) and the bar chart has been placed below the map rather than on a different page.

The map was nonetheless riven by a tension, for it was being called upon to function as both a demonstration of disinfection operations in Worli, and as evidence of the epidemic's spread. It was, in other words, being made to simultaneously make an argument about aetiology and about the efficiency of colonial policy. Ultimately, in its peculiar visual composition, it provided a vision of the city as a place of almost endless disease potentiality that was uninterrogated, unspecific and in many ways unknown. As already explained, the report itself envisioned the ground of the city – clogged by human effluvia and wastewater – as a fertile space of plague possibilities. In the map of Worli, only houses and built structures were made to stand out in relief, making the map an unusual representation of urban space in that it showed units of habitation, but not roads or streets through which movement or flow could occur. The result was that the ground of the village was coterminous with the paper of the map, and was bisected only by a single line to indicate the Eastern shore of the peninsula. At the top of the map (to the west) the ground spread out, city became paper and vice versa: this was a fecund surface of undifferentiated disease possibility. Within this map, the ground of the city was thus equated with plague, in such a way as to create a bewilderment of possibilities. The map could not, however, reveal the details of transmission that the Committee so sorely sought to know.

The centrality of idioms of flow and movement to the construction of an ideal sanitary city in the early twentieth century is well documented in contemporary urban studies,[48] and in post-plague Bombay, visions of unrestricted flow came to dominate plans for urban renewal, even if they were not always realised.[49] Here, however, flow was understood as a property of the insanitary city: this map pictured disease flowing across the surface of the urban in an unimpeded fashion.

The Worli map was not alone. A similar relationship between text and map can be seen in multiple other case studies from the Committee's report. The report contained three further maps of other urban villages in Bombay: Sewri Koliwada, Parel Village, and Mahim

Koliwada. As with the map of Worli, these showed plague cases arranged by colour in groups and placed in numbered houses, corresponding to tables charting deaths by time. Taken together, these plans showed little evidence for the success of disinfection, for where disinfection correlated with a diminishing of plague (as in Worli and Sewri) there were also widespread exoduses from the villages, as terrified residents fled the epidemic. In each case, the text gave way to speculation about infection by suggesting that these maps be taken as evidence of the grouping of cases and as evidence of personal infection, while also continuing to point towards the expansive ground of these villages as sources of filth and disease. In each case, an attempt to understand was deferred to the promise that the map would provide understanding.

In these narrative accounts of plague in the urban villages of Bombay, the map was thus continually invoked as a synthesiser. The maps were presented as promises to speak with certainty about the grouping of cases and the relationships between them. In each of these short village studies, the report assured its readers that they would find an argument in the corresponding map, but this posed a problem. The report as a whole was simply too multifactorial to ever give a clear account of the disease: that is, it tended to see every factor as a potential cause of plague in such a way that no single factor could ever be a certain cause. Its assumptions about what plague could be and from whence plague could emerge were so all embracing that no clear relationship between place and body as mediated by disease could ever be suggested. This report could not say how plague related within and through the urban because it ultimately ended up equating the disease *with* the urban. Each of the village case studies nonetheless promised to answer specific questions about the relationships between plague cases by reference to maps. These maps can therefore be seen as fantasy-spaces in which desires for comprehension could be deposited. Here we can see what Harley described as the 'charisma' of the map: the idea that through its technical precision, the map might precisely mirror the world as it really is.[50]

In summarising nineteenth-century debates surrounding cholera, Tom Koch tells us how 'the wealth of data was too complex for a simple inductive argument, too vast for a simple statement'.[51] Mapping thus became an 'essential medium' through which such data could be 'transformed into arguments'.[52] The Plague Committee's maps must be understood against such a moment in medical history, when maps were seen as capable of transforming data into

reason. The maps in this report, however, did not do this. Instead, they mimicked this capability.

2. Situating plague on the map

As has been seen, the surface of the city appeared as a particularly problematic object for colonial science. The fact that this surface was seen as a fecund layer out of which plague could emerge was behind much of the colonial uncertainty about the disease. The surface of the city, in other words, appeared to be so ripe with the potential for disease that any simple explanation of this disease was precluded. The ground, the soil, surface water, the floors of houses, the coating of walls, and the roofs of dwellings were all implicated in the transmission of plague and were all objects of sanitary intervention – being either destroyed or disinfected by the Plague Committee's gangs of coolies and soldiers.[53] The Committee desired to both know and control the surface of the city. In this context, the map of Worli carried a promise of a clear understanding of plague, but it too ultimately produced an image of the city's surface as unknowable, uncontrollable, and subject to an unlimited flow of plague. The Worli map thus emerged as a space of desire; desire both for a way to argue plague and desire for a legible surface to the city.

A year after the publication of the Plague Committee's report, in 1898, the Worli map and case study were reprinted in another multi-volume report about the plague in the Bombay Presidency.[54] Compiled by the civil servant Robert Nathan, this report was an attempt to narrate plague as a totality that comprised both the story of the epidemic and the story of the government's response. Statements from various texts and other sources were collected and placed together to give a narrative of the disease that was both historical and geographic. It was an accumulation of all possible ways of describing plague, and thus, like the Committee's report, it was characterised by a structural glut of data that rendered impossible any conclusion. Included in this report were a number of maps, one of which can be seen in Figure 5.2. This map depicted the 'principal places where plague was endemic' in the Bombay Presidency. It did so through the combination of two elements: a standard survey-map of the territory overlain by a series of dots that had been added to indicate cities where plague was epidemic.

FIGURE 5.2

Figure 5.2

Bombay Presidency (exclusive of Sind) showing the principal places where plague was endemic. From R. Nathan, *The Plague in India 1898*.

The map in Figure 5.2 elucidated two important features of Nathan's report. Firstly, as with the Worli map, this map was physically separate from the text of the report, and promised a certainty that could not be found within his prose. This map was one of a series that, for Nathan, stood in the place of a description of the 'course' that plague took in the Bombay Presidency. Textual description was unnecessary, he explained, for the statements, maps, and charts in the appendices 'furnish as clear a picture of the epidemic as any verbal description could convey'.[55] The statements that he referred to consisted of twenty-five pages of statistics: reports on plague seizures (sudden attacks of illness) and deaths; comparisons of weakly mortalities; a statement that set seizures against temperature and humidity.[56] In this context, the disease maps were once again being asked to function so as to translate an excess of data into something readable.[57] The clarity that Nathan lauded was quite clearly not to be found in the charts and statements, but rather in the maps that synthesised them. Figure 5.2 was thus presented as an orphan argument parallel to Nathan's account that stood in lieu of text and made legible a set of otherwise impenetrable charts. Yet in spite of Nathan's seeming confidence in the explanatory possibility of his charts, the map itself was ineffectual as an argument, for it made no conjectures about relations in a way that could explain disease. Nathan's map spoke neither of temporal relations, nor of relations of intensity or contact. This is not, however, to say that relations were absent from the map, for it established in forceful terms a relationship between the plotting of plague and another potent form of colonial control: the cartographic depiction of space.

This brings us to the second important feature of Figure 5.2: it can be seen as an attempt to respond to that central problem of plague: the seeming illegibility of the surface of the city. This becomes clear when we look at how this map was constructed. It was based upon a plan of the Bombay Presidency from the office of the Surveyor-General, complete with lines of latitude and longitude, and details of railways up until 1894. This was a map produced out of a colonial survey of the country: a map that was designed to demonstrate a grasp of imperial territory, and which promised 'the potential perfection of the map's relationship with the territory mapped'.[58] It was a perfect example of the 'mimetic map', which could claim to '*be* the territory' it represented.[59] As such, it was part of a cartographic archive, which for the British was a 'perfect geographic panopticon'.[60] In Figure 5.2, plague had therefore been

superimposed upon an archetypal image of colonial control. In this map, the surface and ground of the territory had been transformed into an eminently knowable and legible representation, and plague had been placed atop of this. This map therefore offered up a possibility of both knowing and controlling disease in the same way that the British understood themselves to know and control the landscape of India. Contained in this map was a longing for the plague administrator's knowledge to be as sure and complete as the (already mythical) knowledge of the surveyor. What is once again obvious is the desire to incorporate the mythic explanatory power of the map into an uncertain plague science: Figure 5.2's power lay in its ability to ape and conjure a regime of visual authority.

As the anthropologist Matthew Hull has argued, there has long been a poverty to our understanding of maps 'as the most basic technology and most fundamental metaphor of modern state surveillance and control'.[61] For Hull, anti-positivist approaches to maps have often underplayed the map's referential function and thus obscured the fact that the map's ideological work is bound up 'in the practices that link maps to the realities they reference'.[62] How might we build upon such work to understand the way in which the ideological power of a map can be bound up in its referencing of a larger genre of mapping? This map of plague in the Bombay Presidency gained its power not so much through its claims to represent a spatial reality, but rather through its mimetic evocation of a genre that was seen to control space with exactitude. Understanding this helps us to appreciate that the weakness of some maps is not only, as Matthew Edney has argued, their disorder and partiality, but also the fact that they represent the repugnant other of colonialism: the 'bad copy'.[63]

3. Erasing the city's surface

The map in Figure 5.2 was not an isolated example: rather it was part of a broader fantasy within colonial science that plague might be known if only the problematic surface of the city could be erased. A good example of this can be found in the musings of the Bombay Health Officer, J. A. Turner, in 1903. Turner's quarterly sanitary reports make interesting reading, for he often treated them almost as a personal diary: a space to criticise the short sightedness of colleagues and to speculate on ways to improve the sanitary condition of the city. One wonders whether he thought anybody was reading them. His report for the first quarter of 1903 is particularly utopian in its speculations about the sanitary future of Bombay.[64]

Turner began this quarterly report with a reiteration of the idea that plague had become a disease of locality. Plague had recrudesced every winter since 1896, and it was now clearly

endemic in Bombay. What is more, he lamented that few scientific advances had been made in understanding this disease since 1897. The disease, Turner argued, was clearly communicable between persons, and between persons and rats. But, he claimed, it was almost certainty also to be found within the fabric of the city. Like so many of his contemporaries, Turner thus transposed a germ theory of plague onto an older view that saw the disease as imbricated in the material space of the city.[65] For Turner, this conclusion meant that sanitary improvement would be impossible without years of disruption and rebuilding. Turner's response to this – his utopian dream – was of a city without a surface; a space of figure but no ground; a space in which dirt could not linger.

Beginning his reverie with the words 'but supposing it were possible…', Turner proposed the creation of a floating city of 300,000 people in the Back Bay of Bombay. Constructed out of floating houses and piers, this temporary structure would, he conjectured, provide lodging for the city's day labourers, while giving them quick and easy access to their places of employment in the south of the city. It would expose them to ample fresh air and sunlight, and water for washing would be plentiful. More importantly, it would create a space for total surveillance; workers moving back and forth between the floating city and their work on land would be under constant observation, 'every case of sickness reported and every death verified.' To remove the people from the surface of the city was therefore also to make them and their diseases observable and controllable in a way that had never been possible before. Furthermore, Turner argued that the creation of this floating utopia would enable improvements on shore: filthy houses could be demolished, streets cleaned, and most importantly, soil in the infected parts of the city would be able to dry out. All of this could be achieved because a city with a porous and therefore dangerous ground would be replaced by a city with no ground at all.

Turner's idea ultimately had no afterlife; it was a thought experiment buried within his normal work reports. It nonetheless tells us what it meant to dream of controllable, *knowable*, plague in 1903. It meant imagining a city in which there was, quite literally, no ground and no surface. We have already seen from the Worli village map that the problem of *knowing* plague was tied to its excessive spread across the ground of the city. In Figure 5.2, this problematic ground was replaced by a surface of trigonometric certainty. Turner's musings represented a third response to this same dilemma, but one in which the problematic ground or surface of the city was discarded in favour of the purifying instability of water. Much has

been written of imperial desires for a colony without people, particularly in relation to colonial visual culture's habit of emptying lands of natives.[66] Here, by contrast, we see a desire for a colony of productive native labour, shorn of the territory in which they lived.

Turner's utopian musings came at the end of the period of plague science characterised by radical uncertainty. Specifically, new and very specific understandings of the disease began to percolate in the Indian medical establishment after 1906, when a new Plague Commission was instituted in India as a joint venture between the Government of India, the Royal Society, and the Lister Institute.[67] This Commission carried out both large-scale epidemiological work and laboratory studies, which primarily focused upon understanding the role of plague's hosts and vectors. This led to significant advances being made in the understanding of plague as a zoonotic disease, and plague ceased to be seen as a troubling disease of locality. Concern shifted from the environment to infected bodies, both human and animal, and plague mapping consequently decreased in frequency and importance. The use of maps as spaces of epidemiological theorisation and argumentation continued sporadically until the end of the decade, but they were slowly supplanted by other methods.[68] This was part of a more general trend: the maps discussed in this chapter stood at the very end of a long period when medical geography was felt to contribute significantly to the progress of medical science.[69] By the late 1910s, plague publications from India increasingly used maps only to orientate readers to place. These maps showed where things had happened, but had no overlay of disease: there was no longer any attempt to create a relationship between the disease and the space thus depicted.[70] More broadly, multi-causal explanations and expansive narratives that sought to assess the character of the disease were abandoned in favour of accounts that focused upon the mechanisms of plague's spread between human and animal bodies.[71]

Yet it was in this later stage of plague science that we can observe the emergence of a form of mapping – and I use the term in its loosest sense – that most clearly realised Turner's fantasy. The most striking example of this can be found in Figure 5.3, which has been taken from a paper about the bionomics of the common rat flea, published by the Indian Plague Commission in 1914.[72] At this point, the role of the flea as a vector of bubonic plague was well established. The Indian Plague Commission were thus conducting experiments to try and understand everything they possibly could about the flea's life history so as to better ascertain the insect's role in communicating the disease. Figure 5.3 is the end product of an experiment to try and establish the ability of newly hatched flea larvae to survive without food. To do

this, a number of rat and human flea larvae were placed in test tubes and left without food to see how they would survive in different temperature and humidity conditions. The 'crawling powers' of freshly emerged unfed larvae were then put to the test. The larvae were placed at the centre of white sheets of paper on which various other substances – blood-stained rags, flea faeces, plain cloth, and sand – had been arranged at equal distances from their starting point. The movement of each larva was then followed with a pencil for thirty minutes. This test failed to produce the results the experimenters had hoped for – that the larvae would show an inclination to seek out food. The tracings were nonetheless used to create the two maps-in-miniature that make up Figure 5.3. The lines, produced by the tracing of the pencil, were rearranged in relation to one another in order to fit upon the paper. When we think about the technicalities of this operation, we realise that the multiple invisible backgrounds (that is, the very pieces of paper) upon which the larvae crawled had to be quite literally cut up and stitched together in order to produce these miniature pathways. Multiple events were placed upon a single plane in a process that completely obliterated the surfaces upon which the crawling occurred. An exact, specific detail of the bionomics of a single plague vector thus came to be known, but in doing so the ground upon which it occurred was erased.

FIGURE 5.3

Figure 5.3

The map-in-miniature showing the effacement of the surface. From A. Bacot, 'LXIX. A study of the bionomics of the common rat fleas and other species associated with human habitations, with special reference to the influence of temperature and humidity at various periods of the life history of the insect', *The Journal of Hygiene* 13, (1914), 447–654.

In some ways, this map-in-miniature achieved what the other maps could not; a complete erasure of a surface, whose relationship to plague produced excesses that undermined colonial attempts to know and to control. This map's condition of existence was the literal destruction of the *ground* upon which it was built. It was, in miniature form, the achievement of Turner's fantasy.

In many ways this echoes histories of clinical photography in this period. For example, Ari Larissa Heinrich has shown how racial tensions played out in clinical photography at the turn of the twentieth century in China, where contextual and biographical data about Chinese subjects was over time edited out of clinical photographs, until finally the Chinese subject

entirely vanished 'from the image to which it has become essentially superfluous'.[73] The racialised body and, in this case, the tumour, were separated from one another, prompting Heinrich to ask a question that might be applied to these Indian plague maps: when plague was totally separated from the surface of the city, 'we know only that there was a pathology and that the pathology has been removed. The question is, which one?'[74] For British doctors, it was the Indian city, and not the disease, which posed the real diagnostic questions. The maps examined in this chapter promised an understanding of that city, but only when the city was expunged could they make comprehensible arguments about disease.

Rethinking the mimetic map

In this chapter, I have examined the medical cartography of the Bombay plague in order to explore an ambiguous relationship between actual certainty and the desire for certainty. In doing this, I have argued for an expanded reading of the mimetic map: these are maps that functioned by imitating the certainty that their makers attributed to cartography as a genre.

More broadly, it is perhaps time that we began to think seriously about the ways in which the desire for certainty is embedded within our understanding of disease maps. A good example of why this is necessary can be taken from Kari McLeod's analysis of the most famous of all disease maps: John Snow's 1854 dot-map of cholera.[75] Snow drew this map during a debilitating outbreak of cholera in London's Soho. The dot-map is much celebrated by modern medical geography, as it is seen as a crucial tool through which Snow was able to arrive at the conclusion that cholera was spreading from the contaminated water of a single pump. Based on this information, Snow removed the handle from the pump and thus ended the outbreak. Perhaps no medical map is more famous, and it is a factor in Snow's modern reputation as a hero of epidemiology. Recent reappraisals, however, have questioned the importance of the map to Snow's epidemiological reasoning. McLeod has shown that Snow's dot-map has been subject to much memorialisation within medical geography, even though there is little archival evidence to support the idea that Snow actually used the map to determine the source of the cholera outbreak. Indeed, Snow's textual references to the map are almost entirely descriptive. In spite of this, the dot-map has become a mythologised example of the power of medical cartography to reveal what cannot be seen by other methods. Examining the legacy of this map, McLeod asks whether disease maps always show causation or prove anything. 'Do medical cartographers actually state that causation and proof exist in their maps, or do the map interpreters project those expectations?'[76]

To respond to such a question requires that we understand the forms of legitimisation and authority that exist between and within genres of reasoning in a paper archive. This chapter has attempted to do just that: I have argued that to fully understand practices of disease mapping in late nineteenth-century India, we have to understand the attraction of mapping as a genre that seemed to promise certainty. When the authors of reports on plague referred to maps, they were not just engaging in forms of reasoning, but also attempting to capture a way of knowing that seemed elusive and impossible. I have, in other words, attempted to show how recourses to mapping in plague science were often attempts to mimic other, more certain forms of knowledge and control. In particular, I have shown how, in the Bombay plague, disease maps were an imitative attempt to capture the promised certainty of their own genre.

What are the advantages of thinking about mapping as a genre that could sometimes imitate its own power to make arguments? For a start, this approach can begin to challenge narratives of plague in India as a series of competing claims made by physicians and administrators with absolute certainty. Furthermore, it can help us to uncover the tensions and desires that suffused a situation of radical uncertainty and ignorance. It helps us to understand why histories of certainty are often more tempting to write than histories of unknowing, for these maps always presented themselves *as if they were* arguments springing from certitude. If we want to understand the ways in which plague and the city were thought to relate to one another in maps, then we must understand the relationship between maps as paper objects and the wider archive to which they belonged. As objects, these maps could be spaces of desirous thinking about plague in Bombay, but as instruments of colonial science they only imitated forms of power and control.

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Notes

[1] Research leading to this chapter was funded by the European Research Council Starting Grant under the European Union’s Seventh Framework

Programme/ERC grant agreement no. 336564; European Research Council [FP7/2007–2013] for the project Visual Representations of the Third Plague Pandemic (CRASSH, University of Cambridge).

[2] Koch, 'Knowing Its Place'.

[3] *Ibid.*, *Disease Maps*, 12.

[4] *Ibid.*, 116.

[5] Harley, 'Deconstructing the Map'.

[6] Edney, *Mapping an Empire*, 332.

[7] Harley, 'Historical Geography and the Cartographic Illusion', 83.

[8] Evans, 'Blaming the Rat? Accounting for Plague in Colonial Indian Medicine'.

[9] Harley, 'Historical Geography and the Cartographic Illusion', 83.

[10] *Ibid.*, 83.

[11] Taussig, *Mimesis and Alterity*.

[12] Published in multiple volumes between 1890 and 1915, this is often taken to be the foundational text in British Social Anthropology.

[13] Taussig, *Shamanism*.

[14] For example, Proctor and Schiebinger, *Agnotology*; Samimian-Darash and Rabinow, *Modes of Uncertainty*.

[15] Lynteris, *Ethnographic Plague*, 1.

[16] Echenberg, *Plague Ports*, 198–202; Mohr, *Plague and Fire*.

[17] Chandavarkar, 'Plague Panic and Epidemic Politics in India, 1896-1914'.

[18] Sarkar, 'The Tie That Snapped'.

[19] *Ibid.*, 184.

[20] Evans, 'Blaming the Rat? Accounting for Plague in Colonial Indian Medicine.'

[21] Hankin, 'On the Epidemiology of Plague'.

[22] Campbell and Mostyn, *Report of the Bombay Plague Committee*; Gatacre, *Report on the Bubonic Plague*; Nathan, *The Plague in India, 1896, 1897*.

[23] Arnold, *Colonizing the Body*, 202.

[24] *Ibid.*, 203.

[25] *Ibid.*, 202.

[26] *Ibid.*, 203–204.

[27] Worboys, *Spreading Germs*.

[28] Gatacre, *Report on the Bubonic Plague*.

[29] Report by Surgeon Major R. W. S. Lyons, I. M. S., President of the Plague Research Committee. National Archives of India. Home: Sanitary Plague: B: August 1898: Nos. 96–98.

[30] Gatacre, *Report on the Bubonic Plague*, 58.

[31] *Ibid.*, 50–51.

[32] *Ibid.*, 93–94.

[33] Worboys, *Spreading Germs*, 120.

[34] Numbers, 'Medical Science', 1.

[35] Anderson, *Colonial Pathologies*, 24.

[36] Peckham, 'Matshed Laboratory'; Sutphen, 'Not What, but Where'.

[37] Prashant Kidambi, '"An Infection of Locality"'.

[38] Harrison, 'A Question of Locality'.

[39] Arnold, *Colonizing the Body*, 36.

[40] Delbourgo and Müller-Wille, 'Introduction'; Müller-Wille and Charmantier, 'Lists as Research Technologies'.

[41] Delbourgo and Müller-Wille, 'Introduction', 712.

[42] On the population of the city, see Arnold, *Colonizing the Body*, 207.

[43] Gatacre, *Report on the Bubonic Plague*, 187.

[44] *Ibid.*, 188.

[45] *Ibid.*, 187.

[46] *Ibid.*, 188.

[47] *Ibid.*

[48] Sennett, *Flesh and Stone*.

[49] Kidambi, *The Making of an Indian Metropolis*.

[50] Harley, 'Historical Geography and the Cartographic Illusion', 82.

[51] Koch, *Disease Maps*, 117.

[52] *Ibid.*

[53] For an examination of soil as 'an unstable yet highly productive epistemic thing' during the Third Plague Pandemic, see Lynteris, '"Suitable Soil"', 343.

[54] Nathan, *The Plague in India, 1896, 1897*.

[55] *Ibid., Vol. I*, 95.

[56] Nathan, *The Plague in India, 1896, 1897, Vol. II*, 109–134.

[57] Koch, *Disease Maps*, 117.

[58] Edney, *Mapping an Empire*, 21.

[59] *Ibid.*, 21.

[60] *Ibid.*, 34.

[61] Hull, *Government of Paper*, 212.

[62] *Ibid.*, 230.

[63] Gable, 'Bad Copies.'

[64] British Library, IOR/V/25/840/23, Health Officer's Report for the 1st Quarter of 1903.

[65] Sutphen, 'Not What, but Where.'

[66] See, for example, Ryan, *Picturing Empire*.

[67] This is not to be confused with the 1900 Commission of Inquiry – the Fraser Commission – into plague in India.

[68] For example, Anon., 'XXXV. On the Spread of Epidemic Plague'; Tucker, *The Management of a Plague Epidemic*.

[69] Anderson, 'Geography, Race and Nation'; Numbers, 'Medical Science before Scientific Medicine'.

[70] E.g. Kunhardt and Taylor, 'LXXII. Epidemiological Observations'; Gloster and White, 'LXXXIII. Epidemiological Observations'.

[71] Evans, 'Blaming the Rat?'

[72] Bacot, 'LXIX. A Study of the Bionomics'.

[73] Heinrich, *The Afterlife of Images*, 111.

[74] *Ibid.*

[75] McLeod, 'Our Sense of Snow'.

[76] *Ibid.*, 926.