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The Third Plague Pandemic and British India: A Transformation of Science, Policy, and Indian Society

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Doctor tending to a patient in Karachi, 1897

THE THIRD PLAGUE PANDEMIC AND BRITISH INDIA: A TRANSFORMATION OF SCIENCE, POLICY, AND INDIAN SOCIETY

By Rebecca L. Burrows

Cholera, malaria, influenza, and now COVID-19 all have cast fear and panic into the hearts of mankind. These unexplained, hidden killers spared few, regardless of age, gender or ethnicity. Disease has haunted mankind throughout history. After the Black Death's decimation of 13th century Eurasia, the bubonic plague took residence in the hearts of mankind as a frightening reminder of human mortality. While other pestilences tormented the world, plague lurked in the background, reappearing in smaller epidemics to remind the world that it had not truly disappeared. Scientific advancements of the 19th century set about conquering diseases that afflicted mankind as new technology and understanding allowed for vaccines and cures. However, an outbreak of plague in China in 1850 tested both the great powers of imperialism and the greatest scientists of the time as the outbreak rapidly spread to become the Third Plague Pandemic. The Third, and most recent, Plague Pandemic, while spreading throughout the world, struck hardest in colonial India where it brought tremendous loss, but also advancements in scientific understanding, unheard of proactive prevention measures, and increased separation between the colonial powers of Great Britain and the common people of India.

Plague remained quite a mystery up to the late 19th- early 20th century. The First Plague Pandemic, also called the Plague of Justinian, occurred in ancient times, and the Second Plague Pandemic, also called the Black Plague or the Black Death, lasted several hundred years across Europe, Asia and the Mediterranean. By the Third Pandemic, medical professionals and scientists still speculated much about the cause, spread,

and prevention of plague. These speculations informed policy and prevention measures, especially in India, and many of the popular plague theories evolved as both public opinion and scientific understanding changed.

Currently, it is known that plague is derived from the bacterium *Bacillus pestis*. Originally identified as *Bacterium pestis*, the name was changed to *Bacillus pestis* in 1900. In 1970 the name was once again changed to its final form of *Yersinia pestis* to honor the bacteria's discoverer, Alexandre Yersin.¹ *Bacillus pestis* consisted of three plasmids, a type of DNA molecule that can replicate independently such as pFra, pCD, and Pla, which allow for the bacteria's survival, spread, and role in phagocytosis disruption.² The pathogen's outer proteins worked to obstruct and damage the cell once in contact with host cells, therefore compromising the immunity of the host.³ While the most commonly thought of strand of plague remains the bubonic type, plague consists of several different variations.⁴ One such variation is the pneumonic form, the only person-to-person infectious strand of plague. Another variant called the septicemic strand uses blood to transport the bacterium. Both of these strands result in a higher mortality rate than the commonly experienced bubonic plague but appear in far fewer cases globally.

The plague bacteria is now known to be spread through rats or rodent species, and a carrier. Notably, in most cases of successful infection the rat flea (*Pulex cheopis* or *X. cheopis*) acts as the carrier. As L. Fabian Hirst, author of *The Conquest of Plague*, wrote, "no rats, no

¹ T. Butler, "Plague History: Yersin's Discovery of the Causative Bacterium in 1894 Enabled, in the Subsequent Century, Scientific Progress in Understanding the Disease and the Development of Treatments and Vaccines," *Clinical Microbiology and Infection* 20 no. 3 (January 2014): 203.

² Butler, "Plague History," 207.

³ Ruifu Yang, "Plague: Recognition, Treatment, and Prevention," *Journal of Clinical Microbiology* 56, no. 1 (December 2017): e01519

⁴ Butler, "Plague History," 203.

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plague.”⁵ *Rattus rattus*, or the common black rat, has been found to be the predominant cause of plague among humans as it nests closer to people than other rat types. Its fleas, *X. cheopis*, are also more likely to attack humans when hungry and lacking a proper host.⁶ In fact, the most common rat type in Bombay until the mid-1900s was *R. rattus*.⁷ Coupled with the high numbers of *Rattus norvegicus*, a sister rat species, the plague survived and continued even during the off-season.⁸ The pattern of “(1) plague among rats with many deaths, (2) a lull, (3) then plague among men,” that W.B. Bannerman wrote of in 1906 showcased the role of the flea in plague transmission. As the flea became increasingly hungry when its natural hosts died, it would eventually attack man, spreading plague as it bit.⁹

After the infection made its way into the human body, patients initially presented with flu-like symptoms: fever, chills, and a headache.¹⁰ This was easy to mistake for another of India’s prevalent diseases if the physician or medical practitioner was not looking for plague symptoms. Usually, around the flea-bitten area, an inflamed, dry region would develop stimulating severe pain.¹¹ Rapidly increasing fever, fatigue, extreme pain, and swollen lymph nodes, or buboes, occurred over the next few days as the bubonic plague infection progressed throughout the body. During this excruciating process, the

⁵ L. Fabian Hirst, *The Conquest of Plague: A Study of the Evolution of Epidemiology* (Oxford: Clarendon Press, 1953), 121.

⁶ Hirst, *The Conquest of Plague*, 124.

⁷ Places throughout the essay will be referred to in their British Indian form to maintain consistency with the sources of the time. S.C. Seal, “Epidemiological Studies of Plague in India: 2. The Changing Patterns of Rodents and Fleas in Calcutta and Other Cities,” *Bulletin of the World Health Organization* 23, no. 2-3 (1960): 293.

⁸ Hirst, *The Conquest of Plague*, 139.

⁹ W. B. Bannerman, “The Spread of Plague in India.” *The Journal of Hygiene* 6, no. 2 (April, 1906): 208.

¹⁰ Yang, “Plague: Recognition, Treatment, and Prevention,” 2-3.

¹¹ Yang, “Plague: Recognition, Treatment, and Prevention,” 3.

patient's immune system rapidly deteriorated and their buboes increased in size. Typically by a week after infection, the patient recovered slowly from the excruciating ordeal or passed away due to major organ failure.¹²

Although most medical professionals and scientists neither knew nor suspected fleas or rats originally, by 1897 theories and experiments shifted the scientific mindset. As early as 1896, scientists identified that rats played a role in plague. By January 1897, scientists identified that plague first affected rats, serving as a warning sign for an approaching human epidemic.¹³ The scientific contributions made by gifted individuals worked to change the entire perception of plague and anti-plague measures. However, these changes came late, after considerable damage was already done to British-Indian relations and to the native people enduring the aggressive British anti-plague campaign.

Plague was not new to India when the Third Plague Pandemic occurred. Instead, it had reared its head throughout the land several times over the 1800s and centuries before. K. Marion Hunter, a British plague officer writing for the *Nineteenth Century* journal in 1898, addressed this when he remarked that "In India, plague has probably existed since 1815, from time to time in a sporadic form and under many names in various parts of the country, with no reliable information as to mode of origin."¹⁴ Cutch, a princely state in the north-west coastal region of India, suffered famine then plague in 1812.¹⁵ By 1815, nearby regions, such as Gujarat, experienced outbreaks. Some of these were perhaps attributed to an influx of Egyptian cotton while Egypt underwent an outbreak of plague, including the Pali plague of 1836-37 which displayed classical bubonic

¹² Myron J. Echenberg, *Plague Ports: The Global Urban Impact of Bubonic Plague, 1894-1901* (New York: New York University Press, 2010), 9.

¹³ James Cantlie, "Abstract Of An Address On The Spread Of Plague," *The British Medical Journal* 1, no. 1880 (1897): 73.

¹⁴ K. Marion Hunter, "Fighting the Bubonic Plague in India," *The Nineteenth Century* 43, no. 256 (June 1, 1898): 1008.

¹⁵ Ira Klein, "Plague, Policy and Popular Unrest in British India," *Modern Asian Studies* 22, no. 4 (1988): 735.

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plague markers.¹⁶ Despite the earlier presence of plague, Ira Klein, a historian who has written extensively on India, argued that the lack of countrywide devastation was due to the Himalayan villages' sparseness, combined with the villagers' tendency to run away from any impending disease.¹⁷

Anil Kumar, in *Medicine and the Raj*, explained that while plague occurred in India before 1896, its mild quality was confirmed through the absence of a plague deity found in Indian Muslim or Hindu communities.¹⁸ The local death-tolls, despite never reaching the damage of the First and Second Pandemics, should have warranted some attention from the East India Company rulers in India. Yet, the intervention of the company, who ruled parts of India until 1858, was unremarkable compared to the measures taken by the British government in 1896. The lack of reaction partly stemmed from a bigger concern within the land: cholera. Throughout the early to mid-1800s, cholera epidemics exploded across the world, driving the locally bound plague to the corners of the mind.

The Third Plague Pandemic began in China in the 1850s and quickly spread to Hong Kong, leading to a violent outbreak there in 1894.¹⁹ France, Japan, and several other countries around the world sent scientists to study the epidemic in China in order to discern more about plague. One of these scientists, Alexandre Yersin from France, discovered the bacterial cause of plague in 1894 during extensive experiments in Hong Kong.²⁰ Yersin's discovery of what was termed

¹⁶ I. J. Catanach, "The "Globalization" of Disease?: India and the Plague," *Journal of World History* 12, no. 1 (2001): 10.

¹⁷ Klein, "Plague, Policy, and Popular Unrest," 736.

¹⁸ Anil Kumar, *Medicine and the Raj: British Medical Policy in India, 1835-1911* (London: Sage Publications Inc., 1998), 193.

¹⁹ Robert Nathan, *The Plague in India, 1896, 1897*, vol. 1 (Simla, India: Printed at the Government Central Printing Office, 1898), 110; Butler, "Plague History," 207.

²⁰ Butler, "Plague History," 202.

Bacterium pestis prompted a rapid race to understand more about the bacteria, specifically concerning how it was transmitted to people. Among the scientific community at the time, a popular theory concerning the spread of the disease centered on the idea that the bacteria hid in the soil. Therefore, many scientists believed the theory explained that people who went barefoot, like many in Indian cities and towns, contracted the plague quicker. Another theory considered the contamination of the food supply as the reason behind the rapid spreading of plague across China and into other nations.²¹ These theories did not usually consider the role of rats except as beasts living closer to the soil, explaining their high death rate but neglecting their part in facilitating the spread of plague. Oftentimes, scientists studying the plague wondered if rats acted as a precursor to outbreaks of the disease, but they were unable to find concrete evidence indicating rats as the cause of the plague. Experiments and observations put these theories to the test as plague spread to its next, and most deadly, location: India.

Plague arrived in India through sea transportation, presumably from Hong Kong.²² During the initial outbreak in Hong Kong, India imposed a quarantine against sea trade from the city. However, India lifted the quarantine as the epidemic slowed down, allowing for the plague to spread and arrive at several key Indian ports.²³ Calcutta, on the eastern coast of British India; Karachi, in modern day Pakistan; Poona, on the western coast of British India; and Bombay, to the west as well, all reported sightings of some plague-like fever in 1896. Although cases of glandular swellings, a classic plague sign, were found as early as May 1896, no official diagnosis was made until late 1896. This was most likely due to the lack of knowledge on identifying the plague amongst

²¹ W.B. Bannerman, *Plague in India, Past and Present: A Contrast* (Bungay: Richard Clay and Sons, 1910), 6; Charles Creighton and the Royal College of Surgeons of England, *Plague in India* (Washington: Government Printing Office, 1907), 313.

²² Klein, "Plague, Policy, and Popular Unrest," 737.

²³ Nathan, *The Plague in India*, vol. 1, 110.

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the medical community. September 1896 saw an increased average mortality rate through the city in classifications of fevers and all other disease, for which plague was often mistaken.²⁴ Newspapers and journals reported a large number of rat deaths within the city to the extent that “children used to amuse themselves by throwing dead rats into the gullies and frightening and chasing each other in the streets with the carcasses of the rats they found.”²⁵ Speculation of the rats’ connection to plague continued, but it focused on the rats’ greater susceptibility to plague rather than the rat’s role in spreading plague. Within the year, Bombay’s epidemic exploded throughout the city whereas the other ports’ plague encounters practically disappeared.²⁶ The official plague diagnosis came on September 23, 1896, when Dr. A.G. Viegas, an Indian physician of Bombay City, reported that he found “a genuine case” of bubonic plague, beginning a mass epidemic that would change the future of India.²⁷

Reports of the plague’s presence in India spread like a wildfire. Within a day of Dr. Viegas’ report, newspapers across the United Kingdom announced that “a serious outbreak of bubonic plague has occurred” in Bombay and almost 300 people already had died.²⁸ In Bombay, the *Bombay Gazette* argued that the disease identified as plague was not truly plague but a mild fever.²⁹ Medical and governmental officials in Bombay predominantly met the presence of the plague with

²⁴ Nathan, *The Plague in India*, vol. 1, 108-9.

²⁵ “The Plague in India,” *The British Medical Journal* 2, no. 1869 (1896): 1254.

²⁶ Muhammad Umair Mushtaq, “Public Health in British India: A Brief Account of the History of Medical Services and Disease Prevention in Colonial India,” *Indian Journal of Community Medicine* 34, no. 1 (January 2009): 9.

²⁷ Echenberg, *Plague Ports*, 47.

²⁸ “Bubonic Plague at Bombay,” *St. James’s Gazette*, September 24, 1896, 9.

²⁹ Echenberg, *Plague Ports*, 47.

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great resistance.³⁰ Partly, this resistance came from disagreements over Dr. Viegas' ability to diagnosis plague since many of the British saw local Indian practitioners as barely proficient in medicine. Local Indian physicians were the *vaidyas* and the *hakims* who practiced within the individual religious communities and held the respect of the people. These practitioners either performed Ayurveda medicine, traditionally a Hindu practice from Sanskrit works, or Greco-Arabic medicine common in Muslim communities.³¹ Originally, British efforts attempted to westernize the native physicians while seeing some use for their system. With the wave of western rationalization and superiority dominating European perspectives, many British medical professionals started to see the Indian medical system as irrational and the native physicians as inexperienced and inferior to their British counterparts.³² Therefore, the British often discredited diagnoses by the native community of physicians, as was the case initially with the Third Plague Pandemic.

Internationally, the British originally attempted to minimize the outbreak within India, instead referring to it as a case of “bubonic fever” to reassure the public and foreign trading partners.³³ The ruse convinced few. France desired the closure of Bombay's ports to help stop the spread of plague into Europe and imposed their own extreme restrictions on incoming Indian ships.³⁴ Other nations implemented similar restrictions against Indian ships and goods as proactive measures. Russian ports treated Indian ships, goods, and people as if already contaminated, while several other cities, such as Baghdad, required Indians to undergo quarantine upon arrival. Italy went as far as to refuse Indian ships entry

³⁰ David Arnold, *Colonizing the Body: State Medicine and Epidemic Disease in Nineteenth-Century India* (Berkeley: University of California Press, 1993), 203.

³¹ Anu Saini, “Physicians of Colonial India (1757-1900),” *Journal of Family Medicine and Primary Care* 5 no.3 (Jul-Sep 2016): 5.

³² Saini, “Physicians of Colonial India,” 16, 20.

³³ Echenberg, *Plague Ports*, 55.

³⁴ Echenberg, *Plague Ports*, 55-6.

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to their ports.³⁵ Panic and fear spread in Europe over the thought of the dreaded black plague's return. This fear heavily influenced the unprecedented, ruthless anti-plague measures of the British in India.³⁶

The first cases of plague came from the district of Mandvi, one of Bombay's seven city wards. Known for being an extremely insanitary part of the city, medical officials concluded that the present conditions within the ward were already ripe for disease.³⁷ Plague first struck workers in the grain warehouses, but soon spread to the merchants as well.³⁸ While Mandvi held a large number of cases as the beginning point of plague infiltration, plague appeared all over the city quite rapidly. Consequently, this lent validity to the theory that cases had existed prior to Dr. Viegas's announcement in September.³⁹

To confirm Dr. Viegas's claim of plague in Bombay, the British Imperial government of India asked Dr. Waldemar Haffkine, a remarkable bacteriologist, to come to the city and provide verification on the possible outbreak of bubonic plague. Dr. Haffkine's previous work with the creation of the cholera vaccine made him an ideal candidate to research the plague.⁴⁰ Dr. Haffkine arrived on October 7, 1896, set up a laboratory, and began working.⁴¹ The British government in India also appointed a committee of five scientists, Haffkine included, to

³⁵ Natasha Sarkar, "Plague in Bombay: Response of Britain's Indian Subjects to Colonial Intervention," *Proceedings of the Indian History Congress* 62 (2001): 445.

³⁶ Kumar, *Medicine and the Raj*, 194.

³⁷ Prashant Kidambi, "'An Infection of Locality': Plague, Pythogenesis and the Poor in Bombay, C. 1896-1905," *Urban History* 31, no. 2 (2004): 255.

³⁸ Echenberg, *Plague Ports*, 48.

³⁹ Nathan, *The Plague in India*, vol. 1, 110.

⁴⁰ "Dr. Haffkine Dies; Cholera Conquered," *New York Times*, October 28, 1930, 21.

⁴¹ Selman Abraham Waksman, *The Brilliant and Tragic Life of W.M.W. Haffkine, Bacteriologist* (New Brunswick, NJ: Rutgers University Press, 1964), 30. ; Bannerman, *Plague in India, Past and Present*, 2.

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investigate the bubonic plague, specifically considering means of spreading, treatment options and prevention methods.⁴² British imperialists confidently believed that western medicine was superior to anything found in India and that the disease would quickly be taken care of.

In preparation for Haffkine's results and as an effort to stay ahead of the outbreak, the British government in India on October 6, 1896, extended the already substantial authority of Bombay's municipal commissioner, P.C.H. Snow at the time of the epidemic. The official announcement endowed the commissioner the ability to grant the right of entry to his officers'. In effect, this authorized their entry into any building suspected to house plague. It also allowed Snow to enforce the segregation and hospitalization of plague cases.⁴³ Less than a week later, by October 14, Dr. Haffkine confirmed that the outbreak in Bombay was indeed bubonic plague.⁴⁴ He immediately began working on a vaccine geared at preventing infection rather than attempting to discover a cure.⁴⁵ Ironically, as Haffkine made his announcement, I.J. Catanach, author of a substantial number of works on India and the plague, wrote that "the *Bombay Gazette* was 'glad to report that the sickness is rapidly being stamped out'."⁴⁶

With the commissioner's newfound powers and Haffkine's positive results, the city of Bombay's municipal officers went to work to stop the spread of the infection. By mid-October, commissioner Snow

⁴² Creighton, *Plague in India*, 309; "Bubonic Plague," *The British Medical Journal* 2, no. 1871 (1896): 1402.

⁴³ M.E. Couchman, *Account of Plague Administration in the Bombay Presidency from September 1896 till May 1897* (Bombay: Government Central Press, 1897), 11.

⁴⁴ "Bubonic Plague in India," *The British Medical Journal* 2, no. 1868 (1896): 1161.

⁴⁵ Waksman, *The Brilliant and Tragic Life of W.M.W. Haffkine*, 32.

⁴⁶ I.J. Catanach, *Imperial Medicine and Indigenous Societies*, ed. David Arnold (Manchester: Manchester University Press, 1988), 149.

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ordered the hospitalization of all plague cases within the city. Officers searched the city to find any suspected cases, but many remained untrained in distinguishing plague from other Indian fevers. In order to purify the city and stop the epidemic, a massive project of urban cleansing was undertaken.⁴⁷ Thousands of gallons of sea water and carbolic acid washed out sewers and drains throughout the night. During the day, a great number of shops, houses, and warehouses were disinfected with limewashing and powder. Regretfully, the plague officers destroyed many slum housings in their effort to cleanse the city.⁴⁸ Earthen floors were dug up and entire buildings torn down based on the belief that plague remained in the soil and spread through contact.⁴⁹ The municipal health officers conducted their urban cleansing throughout Bombay, paying special attention to the most insanitary districts, often the poorest parts of the city, in compliance with 19th century sanitation theory.

The measures undertaken by governmental officials relied on common 19th century perceptions and understandings of the cause and transmission of plague. Classical miasmatic theory clashed and blended with new germ theory and bacterial science, leading to a disconnect between knowledge and action that played out throughout India. Epidemiologists from Germany, Austria, Russia, Italy, and Britain arrived in India after 1896 to study the disease.⁵⁰ Initial theories of what caused the dissemination of the plague bacteria split depending on which theory one ascribed to. Miasmatic theorists argued that “plague was not a filth fever but a ‘want-of-fresh-air disease’” whereas bacteriologists focused on filth and squalor as the precipitating causes of the plague.⁵¹

⁴⁷ Arnold, *Colonizing the Body*, 204.

⁴⁸ Arnold, *Colonizing the Body*, 203-4; Nathan, *The Plague in India*, vol. 1, 135.

⁴⁹ Echenberg, *Plague Ports*, 57.

⁵⁰ Hirst, *The Conquest of Plague*, 105-6.

⁵¹ Hirst, *The Conquest of Plague*, 120.

Debates over the plague as a contagion, the bacteriologist view of a pathogen that is able to pass from person to person through contact, or a miasmatic disease persisted even in light of new pathological evidence. Suspicions over the part of rats in the plague arose in both scientific camps, but neither determined whether the rat or the human was first affected.⁵² As such, rats played a small role in both theories. Prashant Kidambi, author of "An Infection of Locality," remarked that medical and sanitary personnel in Bombay held onto the localist miasmatic ideologies of plague even though most believed in germ theory.⁵³ This disparity affected policy and anti-plague measures within the city as two separate beliefs competed to impact decisions.

Despite differences in fundamental scientific philosophies, both of these theories focused their recommended prevention efforts on the poorest districts of Bombay: the slums. Bombay was considered one of the most densely inhabited metropolises of the time with what Klein described as "appalling crowding and insanitation."⁵⁴ Later called "the city of the Plague," Bombay housed a variety of diseases such as typhus, malaria, cholera, and several fevers that contributed to the unhealthiness of the city.⁵⁵ Two to three families lived in one room in increasingly dark, water-logged and filth-ridden conditions. Miasmatic theory viewed these conditions as the perfect breeding ground for the plague. Not only were the living conditions considered subpar, there was a lack of fresh air which common perception thought to increase the power of the plague bacillus and its attack on humans.⁵⁶ The root cause of plague,

⁵² "Bubonic Plague in India," *The British Medical Journal* 2, no. 1868 (1896): 1161.

⁵³ Kidambi, "An Infection of Locality," 254.

⁵⁴ Klein, "Plague, Policy and Popular Unrest," 740.

⁵⁵ Sidney Low, *A Vision of India: As Seen During the Tour of the Prince and Princess of Wales* (London: Smith, Elder & Co., 1906), 10.

⁵⁶ Klein, "Plague, Policy and Popular Unrest," 740.

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many sanitation and medical officials believed, was the combination of pollution and poor sanitary conditions abundant in the city's slums.⁵⁷

As the municipal government embarked on a fierce sanitation campaign, they met heavy resistance from the Indian people. Forced hospitalization and segregation of plague victims encountered strong opposition, especially concerning the examination and removal of women from the home.⁵⁸ The Indian poor made up the largest percentage of hospitalization cases, something of which they were acutely aware.⁵⁹ The poor's overrepresentation contributed to their increased protests of the commissioner's actions. On October 29, 1896, health officers hospitalized a female millhand; violence erupted at Bombay's Arthur Road Infectious Diseases Hospital as around a thousand millhands attacked and destroyed the hospital.⁶⁰ Only the arrival of the police managed to drive off the enraged crowd. Almost immediately afterwards, Snow dictated that home segregation satisfied the requirements and hospitalization would only be enforced upon medical recommendation. While this reversal of policy appeased the rioting Indians, plague fatalities continued to appear throughout the rest of 1896.

Although September saw large initial numbers of plague cases, neither October nor November of 1896 saw a total increase of cases.⁶¹ Reports across India and the United Kingdom, such as the British Medical Journal, declared that "the plague in Bombay is abating."⁶² This proved to be a faulty hope as the latter half of November and December saw a substantial rise in the number of cases. December especially saw a dramatic upsurge in plague mortality, from 130 deaths on December 1 to

⁵⁷ Kidambi, "An Infection of Locality," 252.

⁵⁸ Kumar, *Medicine and the Raj*, 197.

⁵⁹ Kidambi, "An Infection of Locality," 263.

⁶⁰ Couchman, *Account of Plague Administration*, 11-2.

⁶¹ Nathan, *The Plague in India*, vol. 1, 112.

⁶² "Bubonic Plague," *The British Medical Journal* 2, no. 1871 (1896):

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almost 300 deaths per day at the end of the month.⁶³ This increase in cases, combined with the commissioner's policies, led to a mass exodus of all those who had the means to leave the city. Thousands of people packed into railway stations to escape both the plague and the government actions to control it.⁶⁴ Within the first months of plague, the city of Bombay saw large numbers of the population flee out into the countryside, almost 380,000 out of a population of 850,000 by February 1897.⁶⁵ Their flight ensured the spread of plague across India. The increase in cases progressively continued until a peak in February before rapidly declining throughout March and into the next few months. This pattern of rise and fall would remain typical for the plague in India over the next few years, with a peak in the later and early months of the year, and a decline from May to July.⁶⁶ As later scientific committees would find, the ebb and flow of the plague epidemic largely depended on the number of fleas compared to the susceptibility of the host. In the summer and fall months, temperature remained a main factor in the lifespan of the flea, which explained the decline in plague cases during the warmer months compared to the increase during cooler months, when the activity and lifespan of the flea spiked.⁶⁷

As the sanitation methods proved useless and more people continued to flee the city, the government of India pressured Dr. Haffkine to provide a vaccine as quickly as possible. Haffkine hoped to develop a vaccine that ideally prevented infection and, hopefully, granted

⁶³ W.F. Gatacre, *Report on the Bubonic Plague in Bombay* (Bombay: Times of India, 1897), 14.

⁶⁴ Bannerman, *Plague in India, Past and Present*, 1; Klein, "Plague, Policy, and Popular Unrest," 735.

⁶⁵ Nathan, *The Plague in India*, vol. 1, 112-3; Arnold, *Colonizing the Body*, 207.

⁶⁶ Joseph A. Lewnard and Jeffrey P. Townsend, "Climatic and Evolutionary Drivers of Phase Shifts in the Plague Epidemics of Colonial India," *PNAS* 113, no. 51 (December 2016): 14604-5. ; Klein, "Plague, Policy, and Popular Unrest," 733.

⁶⁷ Lewnard, "Climatic and Evolutionary Drivers," 14605-6.

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immunity from the plague. The first round of prophylactic inoculations were ready in December of 1896, only a little over three months from the outbreak's start in Bombay.⁶⁸ The vaccine was quite unpolished and resulted in severe reactions and complications. Haffkine went on to develop his vaccine until the effects were much milder. He tested the new and improved vaccine on himself to ascertain its effectiveness and reduced consequences. In late January, an outbreak of plague struck one of the Bombay jails. Haffkine offered to test his vaccine on any volunteering prisoners. He inoculated 134 in the prison, while 177 refused the vaccine. Among those who refused inoculation, thirteen succumbed to the plague and seven died. Haffkine's vaccine demonstrated its effectiveness as only one person became sick and recovered after receiving the vaccine (two others received the injection but died hours later from already being infected with plague).⁶⁹ Haffkine's vaccine proved to offer a greater protection from death than those who refused inoculation.⁷⁰ Within the next several months, Haffkine and his assistants inoculated individual volunteers in Bombay and the surrounding communities.

British control over the epidemic and the superiority of western medicine were tested during 1897. An overwhelming desire to eradicate plague spiked as cities outside of Bombay reported cases appearing within their jurisdiction. By late-January, as Haffkine tested his vaccination, Karachi and Poona experienced plague epidemics.⁷¹ In Bombay, the grain warehouses became the center of increased suspicion as the source of the infection because the first plague cases appeared there.⁷² Though the public were right to connect the plague to the

⁶⁸ Waksman, *The Brilliant and Tragic Life of W.M.W. Haffkine*, 32-3.

⁶⁹ Waksman, *The Brilliant and Tragic Life of W.M.W. Haffkine*, 35.

⁷⁰ Bannerman, *Plague in India, Past and Present*, 19.

⁷¹ Great Britain, House of Commons, *Parliamentary Debates* vol. 45 (London, January 22 1897).

⁷² Bannerman, "The Spread of Plague in India," 202.

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warehouses, the grain inside did not contain the plague bacillus. Instead, the transported grain came into contact with rats and the rat-flea, *X. cheopis*, which “bred best in the debris of cereal gains.”⁷³ The whole continent of India experienced a wide famine in the 1890s and the spread of relief grain, especially from ports such as Bombay, provided an avenue of dissemination for plague. Rats followed the grain and helped transport plague to the outlying villages.

The grain trade likely single-handedly increased the number of plague cases within India. The flight of thousands aided in this dissemination as clothing and bedding transported plague-carrying fleas across India. Once in a location with their proper hosts, the fleas attacked and infected the local rat population, starting a plague epizootic among the rats.⁷⁴ Both Karachi and Poona experienced a large number of rat deaths before human cases emerged. By this time, scientists and medical professionals highly suspected the rat played an important role in the spread of plague. The Austrian plague commission, one of the foreign groups sent to study Bombay’s plague in 1896, studied mosquitos as possible plague transmitters, but found no evidence of infection caused by them.⁷⁵

The inquiry into different methods of plague transmission demonstrated an important shift in the scientific community. Long held miasmatic and contagion beliefs were being challenged through experimentation. While these beliefs were not necessarily built on faulty observations, new tools allowed for deeper investigations into the specifics of the plague bacillus. Dr. Ernest Hankin, an English bacteriologist who studied cholera in India, conducted a series of experiments on ants and found that although they could contain the

⁷³ Klein, “Plague, Policy and Popular Unrest,” 737.

⁷⁴ George Lamb and India, *The Etiology and Epidemiology of Plague: A Summary of the Work of the Plague Commission* (Calcutta: Superintendent of Government Printing, 1908), 53.

⁷⁵ Creighton, *Plague in India*, 313-4.

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plague bacillus, they could not be the perpetrator of the disease.⁷⁶ Dr. M. Otaga, a Japanese scientist found in 1897 that fleas discovered on plague-stricken rats contained plague bacilli. The German plague commission in the same year discovered that fleas could spread plague to guinea pigs.⁷⁷ Their experiments and findings implicated a new enemy in the battle against plague. Yet these discoveries faced serious criticism as common knowledge contended that rat-fleas did not bite humans.

As the scientific community argued over whether fleas transmitted plague to humans, the British government faced a potential international crisis. European nations, especially France, requested a meeting of the International Sanitary Conference to discuss the implications of plague in India.⁷⁸ Under this pressure and the threat of trade embargos, the British House of Commons met January 22, 1897, with Lord George Hamilton, the secretary of state for India, to discuss the measures being taken to stop the plague's spread. Lord Hamilton informed the Commons that he suspected the epidemic would get worse as the winter continued. To combat the possibility that the thousands fleeing the city carried plague, the governments in Bombay, Karachi and Poona mandated that inspections and examinations were to be conducted at all train stations and sea ports by medical officers.⁷⁹

Hamilton's news brought more worry than relief to the House of Commons. The news of so many fleeing concerned the British, especially as another port city, Karachi, experienced plague most likely transported from Bombay. Port cities acted as colonial jewels for the British Empire. They showcased British power, commerce, and colonialism to the rest of the world. The fear that Bombay's plague

⁷⁶ Bannerman, "The Spread of Plague in India," 205.

⁷⁷ George F. Shrady, ed. "Rats and the Plague," *Medical Record: A Weekly Journal of Medicine and Surgery* 59 (1901): 818.

⁷⁸ Catanach, *Imperial Medicine*, 152.

⁷⁹ Great Britain, House of Commons, *Parliamentary Debates* vol. 45 (London, January 22 1897).

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would spread to infect India's other key ports, such as Calcutta, and the threat of an international embargo heavily influenced the passage of the Epidemic Diseases Act on February 4, 1897.⁸⁰

The short act, only four sections long, gave the government unprecedented powers to stop the plague. Essentially, the government could empower with formal authority any official or public announcement in its pursuit to halt the plague.⁸¹ This included segregation, hospitalization, and inspections across India. Six days later, the Governor General of India used the powers of the act to give greater control over building inspections and disinfections to the sanitation and municipal officers. These officers condemned buildings, evicted residents of overcrowded buildings, and used their powers to threaten landlords for cooperation.⁸² Medical officers examined people across the city and hospitalized those found with plague symptoms.⁸³ House inspections removed any suspected of being infected to hospitals or segregation camps. In Poona, a city known for its opposition to colonial rule, British troops conducted a majority of the house searches while crudely manhandling those who got in their way. Kumar noted that "reports of sexual harassment, insult and abuse by British troops soon began to circulate in the city" and these seemed to the people as evidence of British punishment towards a rebellious city.⁸⁴ In retaliation, Indians began to hide their infected or dead family members to avoid their removal by these house inspections.⁸⁵ Fears that the plague officers

⁸⁰ Arnold, *Colonizing the Body*, 204, 206.

⁸¹ Rakesh PS, "The Epidemic Diseases Act of 1897: Public Health Relevance in the Current Scenario," *Indian Journal of Medical Ethics* 1 no. 3 (November 2016): 156-7.

⁸² Kidambi, "An Infection in Locality," 257.

⁸³ Mushtaq, "Public Health in British India," 10.

⁸⁴ Kumar, *Medicine and the Raj*, 197.

⁸⁵ Nathan, *The Plague in India*, vol. 1, 141; Hunter, "Fighting the Bubonic Plague in India," 1011.

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hospitalized people “to make a speedy end to them” spread rapidly.⁸⁶ Riots also broke out across India over the execution of colonial power, but the government suppressed these through continued military intervention.⁸⁷

As tensions increased and plague spread farther into western India, the International Sanitary Conference met in May in Venice, Italy to discuss the British response to the plague and the likelihood of it reaching European shores. Representatives from all over Europe deliberated over the findings of the many foreign plague commission reports. When the discussion came to what measures the conference felt were necessary, the British delegation declared that in response to the spreading plague, the Muslim pilgrimage from India to Mecca would be prohibited for the year.⁸⁸ They also agreed to comply with sanitation measures on ships carrying cargo to Europe. France pushed to impose harsher restrictions against Indian ships to prevent the spread into Europe. However, the fear of harming international commerce swayed the Sanitation Conference to limit its actions against India.⁸⁹ Instead, the agreed upon sanitation regulations became the only precautions recommended by the conference as they believed that “there seems to be but little danger of the pest reaching Europe this year.”⁹⁰ Despite France’s hopes, British Indian ports remained opened and functioning with very little intervention.⁹¹

As Britain triumphed on the international level, problems in India continued to intensify. The British efforts to prevent and contain the plague were largely feared and hated by Indians. Hospitalization posed a major problem, as the British realized caste and gender would

⁸⁶ Klein, “Plague, Policy, and Popular Unrest,” 742.

⁸⁷ Mushtaq, “Public Health in British India,” 10.

⁸⁸ Wallace S. Jones, “Italy. International Sanitary Conference,” *Public Health Reports (1896-1970)* 12, no. 19 (1897): 454.

⁸⁹ Kumar, *Medicine and the Raj*, 195.

⁹⁰ Jones, “Italy. International Sanitary Conference,” 459.

⁹¹ Catanach, *Imperial Medicine*, 152.

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not simply be brushed away by western medicine. Rumors of caste mixing and uncleanness increased Indian wariness, and many refused to go to the hospital when sick.⁹² Indians saw hospitals and doctors as agents of the plague, desiring to either kill or infect them by the Queen's orders.⁹³ While these concerns remained troublesome to British plague policy, the examination of women caused the most violence and anger among the people. Traditionally, Indian women were not touched by men outside of the household, yet male doctors primarily examined these women in public, an extreme dishonor and mistreatment in Indian culture.⁹⁴ Riots, protests, and violence ensued based on suspected detainment or abuse of Indian women. This violence culminated in the assassination of Plague Committee chairman W.C. Rand and Lieutenant Ayerst in Poona late at night on June 22, 1897.⁹⁵ As the people of India rejoiced in their declaration of noncooperation, Rand and Ayerst's murders shocked the British government as many feared that continued measures would bring even worse results and wondered if this was the start of a rebellion.⁹⁶

By the end of 1897, plague had exploded outside of Bombay and spread to over fifteen cities scattered across the north and west, but remained nearly nonexistent in central and southern India. The plague also finally appeared in Jullandar, Punjab where it ravaged the population, supplying a majority of India's 12 million plus plague deaths.⁹⁷ Prevention measures to stop the spread failed as key northern

⁹² Arnold, *Colonizing the Body*, 213.

⁹³ Hunter, "Fighting the Bubonic Plague in India," 1013.

⁹⁴ Echenberg, *Plague Ports*, 56.

⁹⁵ "The Attacks on Indian Officers," *Edinburgh Evening News*, June 25, 1897, 4; Arnold, *Colonizing the Body*, 215.

⁹⁶ Catanach, *Imperial Medicine*, 153.

⁹⁷ Sanitary Commissioner, *Annual Report of the Sanitary Commissioner with the Government of India* (Calcutta: Office of the Superintendent of Government Printing, India, 1898), 173; C.H. James, *Report on the Outbreak of Plague in the Jullundur & Hoshiarpur Districts of the Punjab, 1897-98* (Lahore: Punjab Government Press, 1899), 1,7.

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areas like the Punjab and North-West Provinces acknowledged plague outbreaks appearing within their lands. Increased dissatisfaction, violence and concealment by Indians worried British officials that segregation methods would be unreasonably hard to implement.⁹⁸ In order to keep appearances of control for the international community, and to exert colonial force, the Government of India announced stricter and more comprehensive adherence to anti-plague measures.⁹⁹

Admittance to segregation camps grew as medical officers sent family and friends of plague victims to the camps while their houses underwent the disinfection process.¹⁰⁰ As British troops were called in to help local medical officers, Indian resistance grew more creative. They hid infected family members within chests, under clothing, and wherever they might not be found; they also memorized the inspection troops' routes to avoid being caught unaware.¹⁰¹ Indians rarely called on physicians for fear of possible poisoning or hospitalization. As British precaution measures continued to fail due to an assortment of reasons, specifically concerning lack of information on how the disease spread, Indian compliance with western medicine declined and resistance increased.

In 1898, the French scientist Paul-Louis Simond connected what Dr. Otaga discovered in 1897, that fleas could contain the plague bacillus, to the plague epidemic occurring in India. In his experiment, Simond found that rat-fleas transmitted plague among rats and, when hungry, to humans.¹⁰² Skepticism surrounded Simond's findings as the medical community largely ignored and dismissed his publication. If accepted, his work would have negated much of the anti-plague

⁹⁸ Catanach, *Imperial Medicine*, 156.

⁹⁹ Arnold, *Colonizing the Body*, 230.

¹⁰⁰ Hunter, "Fighting the Bubonic Plague in India," 1010.

¹⁰¹ Klein, "Plague, Policy, and Popular Unrest," 745.

¹⁰² Marc Simond, Margaret L. Godley, and Pierre D.E. Mouriquand, "Paul-Louis Simond and His Discovery of Plague Transmission by Rat Fleas: A Centenary," *Journal of the Royal Society of Medicine* 91, no. 2 (February 1998): 102.

measures advocated by the medical community and enforced by the British army. It would be another eight years before Simond's work gained acceptance and influenced proactive measures in India.

Meanwhile, enormous death tolls caused some coastal villages to lose over a fourth of their population within two to three months.¹⁰³ The high death rates simply amplified the volatile situation between governmental measures and Indian resistance. Numerous Indians believed that physicians spread the disease to ensure their wages or that the gods used medical officials as a part of their divine punishment. Instead, they trusted local practitioners and enchantments over government mandates and medical officers.¹⁰⁴ This aversion continued to impact British-Indian relationships, as many Britons did not understand Indian resistance to western medical practice. Their refusals of cooperation and use of violence frustrated British efforts in the country.

Violence continued to escalate in Bombay and other regions of India. In March 1898, riots erupted in Bombay over the segregation of a young girl. Muslim weavers harmed a magistrate in their effort to burn down the hospitals and surrounding buildings to prevent the girl's isolation. The suggestion of anti-plague vaccinations in Calcutta resulted in riots against suspected inoculators and the flight of 150,000 people from the city.¹⁰⁵ Cawnpore, a city in northern India, saw severe riots in 1900 over segregation camp detainments and a misinterpretation over regulation requirements.¹⁰⁶ In 1901, major riots in the Sialkot and Gurdaspur districts of the Punjab saw over 300 Sikhs, a prominent religious group in the area, destroy plague camps and kill three

¹⁰³ Creighton, *Plague in India*, 318.

¹⁰⁴ Klein, "Plague, Policy, and Popular Unrest," 749-50.

¹⁰⁵ Echenberg, *Plague Ports*, 64-5; "Plague Riot at Calcutta," *Bristol Times and Mirror*, May 23, 1898, 8; "Calcutta Plague Riot," *Morning Post*, May 23, 1898, 3.

¹⁰⁶ Catanach, *Imperial Medicine*, 157; Arnold, *Colonizing the Body*, 214.

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individuals.¹⁰⁷ Other forms of resistance continued as Indians voiced their hatred of British anti-plague methods. Rumors that the plague signaled the downfall of British rule in India spread as more Indians defied colonial mandates.¹⁰⁸

In response to the violence and rumors, British government officials in India decided that political concerns needed to take precedence over medical recommendations.¹⁰⁹ Sanitation methods had done little to curb the epidemic and compulsory measures resulted in violence akin to the Indian Mutiny of 1857. The resulting tensions in light of few European plague casualties convinced British administrators that the risk of continued anti-plague measures would result in more trouble than good.¹¹⁰ In their minds, if the Indians wanted to discard western medicine and British help to face plague on their own, then they would have to suffer the consequences of their decision.

By 1900, modification to the anti-plague measures resulted in the elimination of those policies Myron Echenberg, author of *Plague Ports*, deemed as “unduly repressive.”¹¹¹ The Indian Plague Commission reported that compulsory measures, including house inspections and segregation, were counter-productive and requested their end. The British government in India agreed and announced that compulsory hospitalization and segregation were no longer encouraged without the approval of the local community leaders. The sanitary commissioner made large efforts to “enlist the help of the respectable and intelligent members of the native community” to change public opinion.¹¹² Public hospitals adhering to caste restrictions opened to ease Indian resistance to hospitalization. The total number of hospitals jumped from 1200 in 1880

¹⁰⁷ Klein, “Plague, Policy, and Political Unrest,” 747.

¹⁰⁸ Echenberg, *Plague Ports*, 64.

¹⁰⁹ Catanatch, *Imperial Medicine*, 156.

¹¹⁰ Echenberg, *Plague Ports*, 73.

¹¹¹ Echenberg, *Plague Ports*, 72.

¹¹² Sanitary Commissioner, *Annual Report of the Sanitary Commissioner*, 173; Kidambi, “An Infection of Locality,” 264.

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to 2500 in 1902 to service the specific needs of the people.¹¹³ In order to appease the Indian traditions concerning women and the violence surrounding their inspections, the British allowed for Muslim and Hindu women observing strict traditional views to be administered to by female physicians only.¹¹⁴

As compulsory measures were abandoned, physicians and plague officials promoted inoculation to hinder the plague's further spread. Dr. Haffkine's vaccine produced useful results in his earlier tests and its use in Bombay. Medical officials looked to use his vaccines across the Punjab and northern India in a widescale, voluntary inoculation campaign. Beforehand, Haffkine had been revered as the "Savior of India," but as colonial health officials began to recommend the use of his vaccine, the public opposed its introduction.¹¹⁵ The change in manufactured doses from 1896-1901 to 1902 showcased the sudden switch from acceptance to rejection. By May 1901 over 2.3 million vaccines were created and circulated in India within the four and a half year period. However, in 1902, the number decreased to less than 500,000 doses.¹¹⁶

Hoping to still gather ample volunteers, despite wide rejections, the Government of India opted to distribute the relatively cheap and easy inoculation across the rest of India, but concentrating particularly in the Punjab. In a massive medical and administrative undertaking, almost 500,000 people in the Punjab received Haffkine's vaccine in 1902-3.¹¹⁷ Medical officials expected a much greater acceptance of the vaccine than

¹¹³ Kumar, *Medicine and the Raj*, 199; Mushtaq, "Public Health in British India," 8.

¹¹⁴ Sanitary Commissioner, *Annual Report of the Sanitary Commissioner*, 174.

¹¹⁵ Echenberg, *Plague Ports*, 61-2.

¹¹⁶ Waksman, *The Brilliant and Tragic Life of W.M.W. Haffkine*, 45.

¹¹⁷ Edmund Wilkinson, *Report on Plague and Inoculation in the Punjab from October 1st, 1901, to September 30th, 1902* (Lahore: Punjab Government Press, 1904), 48.

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they received. Plague statistics had continued to rise throughout India, with Bombay suffering as many as four hundred deaths per day in 1901.¹¹⁸ Regardless, the increase in cases did not prompt acceptance of British medical advice. Several villages asked to inoculate reacted so negatively that they were bypassed entirely.¹¹⁹ This partly came from the popular belief that physicians introduced plague through the inoculations.¹²⁰ The intense distrust for government physicians cannot be disregarded, as it shaped Indian response to many colonial regulations and recommendations.

Vaccination also prompted an extensive chain of rumors and fears that made many adamantly opposed to it. These rumors hurt the chances of inoculation as locals believed that, as Edmund Wilkinson, an officer reporting on the progress of inoculations in the Punjab, described, “needles a yard long which were pushed in at one side of the body and emerged at the other.”¹²¹ Rumors of death, bad eyesight, “unusual sensations of the heart” and “destroying sexual powers” kept the general public from accepting the proposed vaccinations. In November 1902, public perceptions of inoculation further decreased after the Malkowal village incident.¹²² An English doctor inoculated a group of Malkowal villagers in November 1902 with contaminated serum and nineteen fell seriously ill and died.¹²³ The incident removed what slight trust physicians had amongst the people and doused the medical official’s enthusiasm for their task as well.¹²⁴

¹¹⁸ *Report Of The Bombay Chamber Of Commerce Year -1901* (Bombay: Bombay Gazette Steam Printing Works, 1902), 108.

¹¹⁹ Creighton, *Plague in India*, 332.

¹²⁰ Bannerman, *Plague in India, Past and Present*, 22.

¹²¹ Wilkinson, *Report on Plague and Inoculation*, 59.

¹²² Waksman, *The Brilliant and Tragic Life of W.M.W. Haffkine*, 53.

¹²³ “The Plague: Inoculations in the Punjab: Deaths From Contaminated Serum,” *The Homeward Mail from India, China and the East*, December 15, 1902, 1724.

¹²⁴ Wilkinson, *Report on Plague and Inoculation*, 60.

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Haffkine's vaccination provided better survival rates than any proactive measure the British introduced. Selman A. Waksman, author of *The Brilliant and Tragic Life of W.M.W. Haffkine*, wrote that the inoculations reduced the mortality rate by 85-90 per cent.¹²⁵ Although the vaccines worked to save many lives, they were consistently unable to fully grant protection from plague, instead offering a better chance at protecting oneself from death if plague was contracted. The only foolproof method found by the Indians involved completely evacuating a place once the rats began to die.¹²⁶ As John Spencer Carmen, a missionary physician living in Hyderabad in central India during the plague, wrote:

Most of the people in India still don't know about the relation of these things (some of them so little, microscopic) to the mysterious disease that comes so quickly and kills so ruthlessly. What did the people in London do? The best they knew; but mostly they fled, if they could, and often carried the infection with them. So it is with many in India. And when death comes close, in their own house, they run quickly and offer a sacrifice to their gods that the plague may be stayed; or else fatalistically accept it as the inexorable will of God.¹²⁷

The rats' connection to the plague marked them as "the Devil's agents" among the people of India.¹²⁸ Escaping the presence of the rat proved impossible, as they infested houses, granaries, and burrows throughout the city. Rats followed the source of food and travelled across

¹²⁵ Waksman, *The Brilliant and Tragic Life of W.M.W. Haffkine*, 34, 37

¹²⁶ Creighton, *Plague in India*, 331.

¹²⁷ John Spencer Carmen, *Rats, Plague, and Religion: Stories of Medical Mission Work in India* (Philadelphia, PN: The Judson Press, 1936), 62-3.

¹²⁸ Kumar, *Medicine and the Raj*, 203.

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the city in search of it. As they travelled, fleas followed their food source and spread to different areas of a city or village. People soon practiced the art of fleeing whenever villages or towns reported plague infections. In the Himalayan villages of India, W.B. Bannerman of the Indian Medical Service described that the people voluntarily left their villages to seek shelter in the nearby jungle. They built a temporary village of huts and stayed away for several months before returning to their village free of plague. Bannerman noted that this method of evacuation became the preferred recommendation of plague authorities as prevention measures proved unhelpful.¹²⁹ This method gained acceptance in the Punjab, as several hundreds of villages suffered major outbreaks. Later the 1906 Plague Commission found that the unparalleled suffering of the Punjab in part stemmed from the fact that the rat common to the Punjab “harbors considerably more fleas than it does in Bombay.”¹³⁰

As Simond’s work gained greater respect due to the research conducted by the 1906 Plague Commission confirming the role of rats and fleas in plague transmission, the people found another avenue to deal with the rise in infections. Rat killing became a favored approach in areas resistant to inoculation, with the government even offering prizes in return for rat-tails.¹³¹ Religious groups like Hindus, who worshipped rats, and Jains, who practiced strict non-violence, remained vehemently against these measures.¹³² While public perception held that killing the rats would stop the spread of plague, in reality, it most likely heightened the numbers of immediate cases as fleas then had no natural host and jumped to humans more readily.

The turn to rat-killing and endorsed fleeing marked the withdrawal of strenuous British efforts in halting the plague in India. By the withdrawal, plague had become in the minds of the British simply

¹²⁹ Bannerman, “The Spread of Plague in India,” 197-8.

¹³⁰ Lamb, *The Etiology and Epidemiology of Plague*, 14.

¹³¹ Catanach, *Imperial Medicine*, 161-2.

¹³² Kumar, *Medicine and the Raj*, 203.

another Indian disease. Spreading rapidly from China and India in 1896, plague appeared in Japan, Egypt, Argentina, Brazil, Australia, the United States, and England by 1900.¹³³ Barbara Bramanti, Katharine Dean, Lars Walloe, and Nils Stenseth, in their article “The Third Plague Pandemic in Europe,” calculated the number of European plague cases and deaths through public records and newspapers. They found that from 1899 to 1947, Europe experienced “1,692 cases and 457 deaths from plague”.¹³⁴ Comparatively, Charles Creighton, a plague physician working in India, recorded that in 1906 alone India saw over a million deaths, with almost half occurring in the Punjab region.¹³⁵ The few British deaths and the strength of Indian resistance resulted in British turnover of anti-plague measures to local officials and native practitioners who never embarked on prevention campaigns as fierce as the British.

According to the World Health Organization, The Third Plague Pandemic ranged from the first cases in China in 1855 to 1959, when the number of cases dropped below 200 worldwide.¹³⁶ Within those years, twelve to twenty-five million deaths are estimated to have occurred, with a mass majority of these from India. Common scholarship unanimously agreed that India suffered over 75 percent of recorded fatalities. Due to the nature of British anti-plague measures, these numbers are most likely quite higher, as many Indians sought to hide their plague stricken family members and friends from British plague officers. By the end of the Third Plague Pandemic, the world equated India with plague.

The Third Plague Pandemic challenged the relationship between the colonial powers of Great Britain and the common people of India.

¹³³ Barbara Bramanti, Katharine Dean, Lars Walloe, and Nils Chr. Stenseth, “The Third Plague Pandemic in Europe,” *Proceedings of the Royal Society: Biological Sciences* 286, no. 1901 (April 24, 2019): 1.

¹³⁴ Bramanti, “The Third Plague Pandemic,” 2.

¹³⁵ Creighton, *Plague in India*, 312.

¹³⁶ John Frith, “The History of Plague –Part 1. The Three Great Pandemics,” *Journal of Military and Veterans’ Health* 20, no. 2 (April 2012): 15.

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Resistance throughout the nation spoke to the people's disdain for British interference and the unprecedented anti-plague measures. Concealment and riots became commonplace as Indians voiced their hatred to not only what they saw as an overstep of British power, but the forceful integration of western medicine. Scientific understanding advanced rapidly during the plague years to bridge the disconnect between theory and experience. However, these advancements came too late to save British-Indian relationships as the damage from preventive plague measures already took its toll. The Third Plague Pandemic reminded the world of the fright of bubonic plague, but more importantly, it forever changed the lives of so many in India as they saw what their resistance could accomplish.