

BUBONIC PLAGUE IN NORTH AMERICA, 1898-1908

by

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The outbreaks of bubonic plague in North America between 1898-1908, including those in Honolulu, San Francisco, and Seattle were significant because they coincided with important bacteriological work and discoveries. This thesis explores the relationship between bacteriological discoveries and the management of bubonic plague in North America and argues that these discoveries had a clear and significant impact on the course of plague history.

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INTRODUCTION

Bubonic plague was pandemic at the end of the 19th century. The disease reached China, Japan, India, Africa, Germany, Mexico, Hawaii, and the United States. Such a worldwide problem garnered worldwide attention and bacteriologists found themselves with the burden of discovering how to stop the spread of bubonic plague. Between 1898-1903 vital progress was made toward this goal. The first reports identifying and describing the bubonic plague bacillus were published in 1898. Identification had a major impact on diagnosis, and eventually allowed health officials to react quickly and decisively to outbreaks of plague. The ongoing attempt to determine the mechanism, or mechanisms, by which plague was communicated also met with success in this period. In 1903 it was discovered that the plague was being transmitted to humans by fleas. Up until that point, bacteriologist had divided their efforts among a number of possible transmitters, and while some of those inquiries had produced minor success, none had produced a transmitter prevalent enough to be the main disseminator of plague. Consequently, measures aimed at those transmitters met with limited success.

The history of the bubonic plague outbreaks in North America can be understood as a reaction to, and a result of, these bacteriological discoveries. Through the records of the Marine Hospital Service and other sources, these discoveries and the progress toward them, are shown to have had a crucial effect on plague management. The work of identifying the origin of plague and its means of transmittal through the population

consumed officials during the Honolulu outbreaks. Officials and bacteriologists explored numerous possibilities and created measures to confront each of them. The imperfect success of their attempts attested to the fact that they had not yet found the primary transmitter. That discovery came later and was the windfall that bacteriologist, health officials and politicians had hoped for.

In the interim, the discoveries surrounding the identification and diagnosis of plague played a major role in the controversy which embroiled San Francisco in 1900. The controversy turned on whether or not plague actually existed on San Francisco. Discovering the truth depended on bacteriological diagnosis. The characteristics of plague and methods for accurate diagnosis, however, had not yet been agreed upon. In the absence of definite diagnosis, controversy flourished. What began as a bacteriological question spiraled out of control until it included arguments about the competency of the State Board of Health and even the well being of the Chinese in Chinatown. Eventually, the controversy also included the frequently troubled interactions between state and city Boards of Health, California and US politicians, the Marine Hospital Service, and the press – interactions that effected the course of plague events in that city. These struggles nearly eclipsed the original bacteriological question that had catalyzed the entire course of events. Did plague exist in San Francisco? Nevertheless, it was that question that had created the environment ripe for controversy.

Perhaps most importantly, the eventual defeat of plague in North America was due to bacteriological discovery. The 1903 discovery that fleas were the primary transmitters of plague from rats to humans had a major effect on the course of the 1907 – 1908 outbreaks. Armed with that knowledge, health and political officials were able to

re-engineer measures to target rats. The reworked measures were far more extensive and much more strictly enforced than any previous anti-rat measures. The result was the relatively quick eradication of plague – even in the face of more rampant outbreaks and environments that had become more conducive to plague in the wake of San Francisco’s great earthquake.

No other factor had a more significant effect on the history of plague in North America than the work done by bacteriologists. The attempt to identifying plague transmitters consumed Honolulu officials and influenced each of their anti-plague measures. The uncertainty of diagnosis spawned the controversy in San Francisco and the eventual discovery of the primary transmitter of plague effected the elimination of plague, not only in North America, but also around the world.

In order to observe these bacteriological discoveries and their effects, this paper relies heavily on a few sources. The records of the Marine Hospital Service provide a sober, direct, and statistical account of the outbreaks as they occurred. These pages contained the weekly and monthly reports of health officials, as well as many telegrams exchanged between them. Also included were the reports of the Pasteur Institute, a center of bacteriological study, and the transactions of a number of health conferences. The reports commissioned by the US government during the outbreaks provide similar information. Later reports, published 10 – 30 years after the outbreaks, continued detailing the government’s examination of plague. Finally, *The San Francisco Chronicle*, while biased and distinctly sensational, was invaluable to the narrative of the first San Francisco outbreak. These sources provided the information necessary to

construct a short history of the effect of bacteriological discovery on plague in North America between 1898 and 1908.

CHAPTER I: PASTEUR, POLICIES AND PRECEDENT

Studies at the Pasteur Institute through 1897

The work toward identifying the plague bacillus and the development of a vaccine both had repercussions on the history of plague. Much of this work was done at the Pasteur Institute of Paris, France. H. D. Geddings, a Passed Assistant Surgeon of the Marine Hospital Service was in residence at the Institute and involved in these processes. He reported on the progress and results obtained at the Pasteur Institute were on the cutting edge of bacteriological knowledge. The information from the Pasteur Institute was used by groups around the world concerned with plague and plague prevention. Geddings' reports focused on the studies that identified the bubonic plague bacillus and on the development of the vaccine that would become known as Yersin's serum. The identification of the bacilli made it possible to diagnose the disease in human victims. This made it possible to say for certain that a patient had, or had not, died of plague. The development of Yersin's serum had a major influence on the treatment of patients and on the suppression of plague. Reviewing these reports gives familiarity with the bacteriological work up to 1897 and makes the effects of these developments clear.

Identification and Diagnosis

The work of identifying the plague bacillus was done simultaneously by two scientists working at different laboratories. A scientist named Kitasato wrote the first report identifying and describing the bubonic plague that was published in the US.

Kitasato reported that it was "a small fine bacillus with rounded ends."¹ However, Geddings and others preferred the description written by Yersin, who also worked at the Pasteur Institute, and never fully accepted Kitasato's description. The disagreement between the descriptions concerned the size and shape of the bacillus. Yersin's report classified the organism as a "cocco-bacillus," not a "small bacillus with rounded ends."² However, there were characteristics on which both reports agreed and those characteristics were useful in diagnosis. They included staining at the poles, the tendency to form chains, quick growth in culture, and the lack of automobility.³ Additionally, "in bouillon . . . it forms flakes or flocculi, which rapidly sink to the bottom of the test tube." These characteristics, especially the staining, were used to suggest that bacilli present in animals and humans suspected to have died of the plague was the bubonic plague bacillus. However, these characteristics were not unique enough to eliminate the controversy surrounding accurate diagnosis.

Various groups and governments had accepted the description of the bacilli's shape given in one report and rejected the other. Any diagnosis that relied on either description was consequently uncertain and suspect. This was extraordinarily problematic for health officials. The impossibility of verifying diagnosis made it difficult to justify anti-plague measures that were often extreme and frequently expensive. Additionally, the problem of diagnosis frequently contributed to major disputes and

¹ Public Health Reports. Vol. XII, 1898, P 463.

² Public Health Reports. Vol. XII, 1898, P 463.

³ Public Health Reports. Vol. XII, 1898, P 463.

difficulties in a number of locations where plague was thought to exist, including San Francisco, California.

Yersin's Serum

Geddings also reported on the development of a plague vaccine. By 1897, that serum was being tested on plague victims in Bombay, India. Geddings reported that results were good as long as the serum was administered in sufficient quantities and as early as possible:

Given an ordinary case in the early states, the hypodermatic injection of 10-25 c.c. of the remedy will usually suffice to produce a rapid amelioration of the symptoms, disappearance of the fever, relief of the profound prostration, and rapid absorption or disappearance of the bubo.⁴

The serum, however, was less successful in the more advanced stages of the disease. Geddings was unable to offer statistics on the success in Bombay, and two months later, had to report that the trials in the Bombay epidemic were not nearly as successful as he had hoped. He faulted the strength and instability of the serum. The serum was sensitive to temperature, and was completely destroyed at temperatures above 60° C. Geddings assured the US Surgeon General that "every nerve is being strained to produce a stronger serum."⁵

The full potential of Yersin's, or any other serum, was unknown in 1898. Vaccination was a fairly young science and treatments for plague had, so far, proved elusive. Geddings' hopes were partially realized when the serum proved marginally effective as both a vaccine and an antidote. Yersin's serum was eventually used with success in some outbreaks, including Honolulu. The serum was even useful in diagnosis.

⁴ Public Health Reports. Vol. XII, 1898, P 465.

⁵ Public Health Reports. Vol. XII, 1898, P 634.

When the serum was added to two drops of blood from a mouse recently killed by plague agglutination, or clumping together, of plague bacilli occurred.⁶ Yersin's serum was the only treatment ever developed for bubonic plague. Unfortunately, it was never strengthened to the point where it was completely effective. Nevertheless, the serum had a small impact on the course of plague events – especially in outbreaks outside of North America. Certainly, it had a major effect on all the victims it cured.

Precedent and Policy

Discoveries at the Pasteur Institute also played a vital role in shaping the quarantine policies used to keep plague from being communicated between ports. By 1896, multiple countries had established plague quarantine measures and policies regarding the management of plague within their countries. Plague was raging in Bombay, had appeared in China and was threatening to work its way through the Suez Canal to Europe and the Atlantic seaboard. The quarantine policy of Egypt and the domestic policy of Bombay describe the precedent that existed before the outbreaks in the US and Hawaii. These precedents show the effects of bacteriological speculations and discoveries on policy and provide a typical policy against which North American policies can be compared.

Quarantine Regulations and Policies

Egypt's Sanitary, Marine and Quarantine Council of Egypt adopted a quarantine policy on April 3, 1896 that was typical of contemporary quarantine policies.⁷ Egypt's proximity to the outbreak in Bombay India and its location on the Suez Canal put it in

⁶ Public Health Reports. Vol. XII, 1898, P 493.

⁷ Public Health Reports. Vol. XII, 1898, P 57.

danger of contracting plague and made it a key port for plague observation and, ideally, arrest. The policy consisted of six articles: non-infected vessels, suspected vessels, infected vessels, passengers, disinfection, and arrivals by land. The policies from France, Germany and England that I have included expand on some points of the Egyptian policy.

A non-infected vessel was defined by the Egyptian policy as one that had departed from an infected port but that had not had a case of plague on board anytime during the journey. Such vessels were allowed free passage after medical inspection, the disinfection of “linen, soiled bedding, utensils in use, and any article or piece of baggage which the quarantine authorities shall consider contaminated,” the drinking water was renewed, and the water in the hold was emptied.⁸ In France and Germany the policies forbade the importation of the articles mentioned above as well as raw hides, green skins, human hair, wool, claws, hoofs, and carpets.⁹ The stress on disinfection was due to two circumstances. First, the notion that plague was a disease of filth: While this theory was contested as the sole cause of plague, filth was suspected to contribute to the propagation of the disease.¹⁰ Second, these policies were not originally drafted for plague but had been modified from policies dealing with cholera. Those policies had met with success and so the emphasis on disinfecting the above items was carried over to plague quarantine.

⁸ Public Health Reports. Vol. XII, 1898, P 57.

⁹ Public Health Reports. Vol. XII, 1898, P 238, 362.

¹⁰ Public Health Reports. Vol. XII, 1898, P 633.

France also restricted the importation of goods and the above mentioned articles from any plague-infected ports to Marseilles, Pauillac, St. Nazaire, Havre, Dunkerque, and Algiers. These ports were better equipped to manage plague.¹¹ Grain was one good that was suspected of carrying plague. This suspicion was tested and rejected in April 1897 by bacteriologists in the Northwest Provinces of India whose attempt to find the plague in grain and flour failed under a number of conditions, including the inspection of grain which had been mixed with the excrement of a rat infected with plague.¹² While this particular bacteriological inquiry was not able to reveal a transmitter of plague, it is a good example of the interaction between these suspicions and the articles which quarantine regulated. Thorough treatment of uninfected vessels and their cargoes suggests the interest of the British government in keeping plague from being transmitted through the Suez Canal or into its Egyptian protectorate, as well as the severity of the plague.

A suspected vessel was one that had had cases of plague on board, but none within the last nine days. Suspected vessels were further divided into two categories: those that had a physician as well as a disinfecting stove on board, and those that did not. Vessels that had a physician and a disinfecting stove on board could pass through the canal with their hatches sealed and received no additional attention. Vessels that did not have a physician and a disinfecting stove on board were detained at the sanitary station until the sanitary condition of the vehicle was determined by health officials, and the

¹¹ Public Health Reports. Vol. XII, 1898, P 238.

¹² Public Health Reports. Vol. XII, 1898, P 507.

disinfection the articles listed above was completed.¹³ The vessel could then pass through the canal with its hatches sealed.

Passengers disembarking in Egypt from suspected vessels were required to remain at the quarantine for forty-eight hours while suspect articles were disinfected.¹⁴ The amount of time stipulated in this section was not arbitrary. The nine-day consideration reflected the time bacteriologists had determined was the maximum amount of time which plague could remain latent, or incubate, in humans.¹⁵

Infected vessels were those that had cases of plague on board within the previous nine days. Cases of plague were identified by observation of symptoms. According to the Pasteur Institute the symptoms of plague were:

A chill, followed by a fever of greater or less intensity, sometimes reaching 41° to 42° C.; there is an overwhelming prostration; nausea and vomiting and the rapid formation of a glandular enlargement, surrounded by an extensive oedema (sic), forming the bubo which has given the most common name to the disease.¹⁶

The incubation period of plague and the description of plague symptoms provided by bacteriologists are two more examples of the way these studies had a direct effect on policy.

Upon arrival at port, vessels carrying passengers with these symptoms were detained for forty-eight hours. All passengers displaying these symptoms were to disembark and be completely isolated. The other passengers were also required to disembark but were isolated in small groups so that an outbreak of plague in any one

¹³ Public Health Reports. Vol. XII, 1898, P 58.

¹⁴ Public Health Reports. Vol. XII, 1898, P 58.

¹⁵ Public Health Reports. Vol. XII, 1898, P 59.

group would not infect the whole. Soiled linens and clothing, all susceptible pieces of merchandise and the ship were to be disinfected. Passengers and vessels were required to remain at the quarantine station for seven days from the last case of plague, again, this amount of time was dependent on incubation.

Passengers infected with plague were detained at the sanitary station until they either made a full recovery or succumbed to the disease. The bodies of the dead were buried at the sanitary station's cemetery or in an isolated spot. All rooms occupied by the convalescents were to be disinfected and the "linen, clothing, and articles of bed clothing" used by the patients were to be disinfected and all rags burned.¹⁷ The disinfection and burning of articles that had definitely come in contact with plague differs from those articles that were disinfected because of filth. Those articles were disinfected so that their filth would not transmit plague. Articles were burned only when they had come into contact with a plague victim and where, therefore, considered by bacteriologists to be definite conductors.¹⁸

The method of disinfection, according to the Egyptian policy, was identical to the disinfection used for articles suspected of cholera infection. Disinfection consisted of fumigating the ship with either sulfur dioxide or formaldehyde. The ships were first made as airtight as possible and then boiling sulfur dioxide or formaldehyde solutions were placed on board. This disinfecting method continued to be used throughout the North American outbreaks. Disinfection of suspect articles was by the same method, though in a smaller airtight space such as a room, or a cauldron.

¹⁶ Public Health Reports. Vol. XII, 1898, P 632.

¹⁷ Public Health Reports. Vol. XII, 1898, P 58.

The Egyptian policy required arrivals by land to remain at the quarantine station for seven full days and that their baggage be disinfected. A significant number of these travelers were presumably Islamic pilgrims making their way to Mecca. The government of France banned all of the Muslim subjects in its colonies -- which included Senegal, Algiers, and Tunis -- from making the pilgrimage to Mecca.¹⁹ In addition, the English government requested that the Sultan of Egypt prohibit all pilgrims travelling through Egypt to Mecca.²⁰

There seems to have been faith in these quarantine policies, at least among the consuls reporting to the Marine Hospital Service. The United States Consul at Bremen reported that there was very little chance, given such precautions, of the plague reaching the United States.²¹ However, not all health officials were convinced of the success of quarantine measures. At the Seventh International Congress of Hygiene and Demography the British Surgeon General J. M. Cunningham delivered a paper on "The Mode of Preventing the Spread of Epidemic Disease from One Country to Another" in which he severely criticized quarantine. He was chiefly concerned with cholera quarantine, but as the plague policies were frequently variations on the cholera policies and both were epidemic disease, the criticism is applicable to plague quarantine. Cunningham maintained that the absence of disease in a country was not necessarily due to quarantine. Epidemic disease was fickle and mysterious. He also argued that even if those absences were due to quarantine, quarantine mishaps were prevalent enough to

¹⁸ Public Health Reports. Vol. XII, 1898, P 464.

¹⁹ Public Health Reports. Vol. XII, 1898, P 239.

²⁰ Public Health Reports. Vol. XII, 1898, P 258.

²¹ Public Health Reports. Vol. XII, 1898, P 214.

require a re-evaluation of the entire quarantine system. His indictment, in fact, was quite scathing: "The history of cholera over the world . . . is a consistent history of the failure of the whole system, and the marvel is that after so many years of failure it should yet be upheld and continued in any part of the globe."²² Cunningham also criticized quarantine for the delays and expenses that it created for travelers and merchants. Most importantly, however, was his assertion that the attention paid to quarantine significantly distracted from sanitary improvement. All of these criticisms concerned quarantine's "evils" but, this was "greatest of them all . . . the utter neglect of these sanitary improvements."²³ Nevertheless, quarantine continued in the British Empire and elsewhere throughout the North American outbreaks and was an important part of the history of plague. The faith that bacteriological knowledge could produce effective quarantine measures must have outweighed Cunningham's arguments.

Domestic Policies

The policies discussed thus far were concerned with the matters of quarantine and plague communication between countries and the effects of bacteriological discoveries on those policies. The experience of plague within a country also showed the effects of bacteriological knowledge on policy and provides a precedent to which we can compare the actions of health officials in North America.

The policy from Bombay, India was significant because Bombay was the place most affected by plague at the end of the 19th century. The policy required officials to be

²² Transactions of the Seventh International Congress of Hygiene and Demography. Vol. I, sec. I. Eyre and Spottiswoode: London, 1892. P 39.

²³ Transactions of the Seventh International Congress of Hygiene and Demography. Vol. I, sec. I. 1892, P 42.

stationed at all railway stations and entrances to major cities in order to inspect people passing through those points. The officers were empowered to detain any person they suspected to be suffering from plague, and, if they were not medically trained, to send such people to a medical officer so that an examination could be made and the person declared plague infected, or not. If the official was a medical officer, he, of course, could make the examination himself.²⁴ Presumably, these examinations relied on the same symptoms published by the Pasteur Institute that were used to evaluate passengers moving through quarantine.

The policy also required any occupant of a house where a case of plague had occurred to report any sickness or death. Upon receiving this information, a health official was required to go to that house. If the occupants forbid him entry, he was authorized to forcibly enter and to examine all sick inhabitants. Those who suffered from plague were detained at some vacant lot or building. If any dwelling where plague was reported seemed to the officer to be unfit for human habitation he could evict all inhabitants and forbid the building to be used as a dwelling. The same was true of dwellings where no cases of plague were reported, but which seemed to the officer to be unsanitary. An officer could also forcibly remove inhabitants from an overcrowded dwelling. The tenants of any building that appeared to be in an unsanitary condition could be required to clean and disinfect the dwelling. If the tenants disobeyed, the officer could forcibly enter the building and remove and destroy any goods found there. Any huts or dwellings built in alleys or against buildings could be burned if found to be unsanitary. Compensation for burned dwellings and goods was to be determined by a

²⁴ Public Health Reports. Vol. XII, 1898, P 386.

panel whose decision was final. The burial of plague victims was required to be a certain depth and limited to specifically designated locations. No person who was suspected to have died of plague could be cremated. Disobedience of any orders issued by a plague officer was prosecutable under the Indian penal code.²⁵ The removal of people from unsanitary or overcrowded dwellings, cleaning and disinfecting those dwellings and destroying huts were all examples of the attempt to get rid of unsanitary conditions. Sanitation, as a part of bacteriology, focused on destroying the environment where bacteria flourished and, therefore, reducing the spread of disease. The Bombay policy can be divided into two parts. First, the identification of people infected with plague travelling between cities by symptoms. The second, larger part, focused on making it difficult for bacteria to thrive and depended on the knowledge, provided by bacteriologists, of what conditions were conducive to bacteria.

Finally, the officers carrying out these measures were instructed “to make it generally understood that these rules were absolutely necessary for the public safety, and to see that no needless inconvenience is caused to anyone.”²⁶ The only inconveniences necessary were those determined to be necessary by attention to bacteriological discovery. The same attention was present in quarantine policies. Bacteriological knowledge was frequently the driving force behind both specific and general parts of policy. Bacteriological inquiry and discoveries were responsible for the changing list of articles suspected to transmit plague, the time required for passengers to remain at the sanitary station in case they had contracted the plague, and the sanitary efforts mandated

²⁵ Public Health Reports. Vol. XII, 1898, P 386.

²⁶ Public Health Reports. Vol. XII, 1898, P 387.

by the Bombay policy, as well as the identification of the bacillus, and the development of a vaccine. The reaction to the bubonic plague was directly related to the bacteriological information available. The bacteriologists' work, however, was not finished. In 1898, Bacteriologists were still uncertain about the transmittal of human plague. The outbreak in Hawaii would give them, and health officials, a chance to explore a number of possibilities.

CHAPTER II: HONOLULU

The First Honolulu Outbreak

The first reported appearances of bubonic plague in the US territory of Hawaii during this period was in December 1899. Between the 11th and the 14th of that month, six suspicious deaths occurred in Honolulu's Chinatown. Tissue and fluid samples were taken for examination from two of the autopsied bodies. In both cases, guinea pigs, rats, and a rabbit inoculated with the tissue died within 5 days and the stained fluids revealed a "short bacillus rounded at both ends, which resembled that of bubonic plague."¹ The uncertainty in this statement reflects the difficulty of making a definite bacteriological diagnosis of plague at the turn of the century. Bacteriologists were challenged by the fact that the bubonic plague bacilli had not been definitively identified. In addition to the disagreement over the shape of the bacillus *The San Francisco Chronicle* reported that, according to experts, "there seems to be just enough variation in the symptoms and bacteriological showing from the typical form of plague to throw a slight doubt on whether it is plague or not."² While the doubts surrounding identification and diagnosis were key in San Francisco's experience, the Hawaiian officials accepted the cases as bubonic plague and officially notified the Hawaiian Board of Health. Upon receiving this report, the Board of Health imposed a quarantine on Chinatown, and launched a house-

¹ Link, Vernon B. Public Health Monograph No. 26: A History of Plague in the United States. Washington: Government Printing Office: 1955. P 69.

by-house inspection of the entire area. Contingency measures were drafted in case plague was found to be widespread in Chinatown, but no other suspect illnesses or deceased bodies were found and the quarantine was lifted on December 19. Honolulu was declared “free from infections, contagious, or dangerous disease.”³ Between the 22nd and the end of the month, however, eight additional suspicious deaths occurred and the contingency measures were put into effect.

The entire city of Honolulu was divided into 40 districts, which were each further divided until they were small enough that all inhabitants of each sub-district could be surveyed by one man in one hour. This was done twice a day until the city was declared free from plague. Contact with the other islands was placed under quarantine restrictions and any vessel bound for the United States could not accept steerage passengers. Some of the shipping companies operating out of, or through, the port of Honolulu refused to take aboard even cabin-class passengers. As result “no Asiatic passengers, baggage, or freight were shipped for several months, and some vessels would not even take mail.”⁴ All ships that docked at the port were required to moor away from the docks and to place rat guards on their mooring lines. The measures also included a strict quarantine around Chinatown, the depopulation of part of Chinatown, and the thorough cleansing of the whole. Over 7,000 people were moved to detention camps while the work in Chinatown was completed.

On January 9, 1900, an article about the situation in Chinatown and the treatment that the inhabitants received under these measures was published in *The San Francisco*

² The San Francisco Chronicle. March, 14 1900. P 5.

³ Link, 1955, P 70.

Chronicle. It reported that the entire military force of Hawaii was involved in these plague measures and that an entire row of buildings had been burned, with more expected to follow. The people who had inhabited those buildings were displaced and "several hundred in number . . . were marched off under military escort to a quarantine camp established at Kakaako." Further, the militia was reported to be "employed with full regimentals, with Springfield rifles, fixed bayonets and well-filled cartridge belts, in preventing ingress of egress to or from a portion of the city which the Board of Health has cordoned off."⁵ *The Chronicle* was critical of the extreme nature of these measures. The quarantine, in particular, was characterized as unnecessary. One article contended that the only result of the quarantine, "is that business is demoralized and many poor Chinese and Japanese who working in the American quarter are starving."⁶ The same article criticized the lack of sanitation measures including burning and disinfection.

According to the article, "The work of sanitation, of cleansing and disinfection, and putting the city in a condition inimical to infection, has practically ceased."⁷ In the opinion of this author, the Honolulu health officials were unnecessarily harming people while doing very little in the way of addressing the problem. While the quarantine and depopulation of Chinatown did have their roots in bacteriological knowledge, *The Chronicle* was appalled that other bacteriological methods – such as sanitation, cleansing and disinfection, had fallen by the wayside. Some cleansing and disinfecting of

⁴ Link, 1955, P 69.

⁵ The San Francisco Chronicle. January, 8 1900. P 3.

⁶ The San Francisco Chronicle. January, 8 1900. P 3.

⁷ The San Francisco Chronicle. January, 8 1900. P 3.

Chinatown did occur, but Honolulu officials continued to focus their efforts on the quarantine and moving people to camps outside the infected area.

The last case in the first Honolulu epidemic occurred on March 31, 1900. The end of the first Honolulu outbreak was largely due to the burning of infected dwellings. Fires set by the plague officials burned out of control and destroyed many of the conditions, such as dwellings, garbage piles, and rat habitats, that were conducive to the plague. This may have been what Vernon B. Link meant when he attributed the suppression of plague to “natural forces at work rather from any efforts of man to control the disease.”⁸ On April 30, 1900, Honolulu was declared free from plague. During this period 71 cases had been diagnosed as plague, of which 61 died.⁹

In addition to the problems of social ills and the choices made between various anti-plague measures addressed above, the reaction to the outbreaks in Hawaii was consistently troubled by the question of how the plague was being transmitted. In the records of the first outbreak, the disinfecting of baggage and the reluctance of shipping companies and officials to transport any freight or passengers to be transported suggested that the ability to transmit plague was suspected of each of these things. These, and other possibilities, were investigated during the second Honolulu outbreak. However, the effort to determine which cause or causes were responsible for the spread of plague remained mired in the inability of bacteriologists and health officials to eliminate conclusively, or verify, any one of the possibilities. Nonetheless, those attempts were significant and were often reflected in plague management measures.

⁸ Link, 1955, P 74.

⁹ Link, 1955, P 73.

The Second Honolulu Outbreak

The second outbreak of plague followed one year behind the first. On April 2, 1901, Surgeon D. A. Carmichael of the Marine Hospital Service, who was stationed at Honolulu, sent a report to the US Surgeon General. The report stated that on March 29, 1901 a Japanese woman had died and her autopsy had revealed “a short bipolar stained bacillus rounded at the ends apparently the same as that found during the epidemic here last year.”¹⁰ On April 8, a telegram was sent from another officer of the Marine Hospital Service confirming that the death was due to plague. In the reports of this, and the next four deaths, the attempt to determine the method of plague transmittal was recorded. Passed Assistant Surgeon L. E. Coffey, the chief quarantine officer of the Hawaiian Islands, considered this question crucial to stopping the spread of plague. In his June 8th report he listed the fact about the current cases:

First: 4 cases and 4 deaths from plague for the sixteen days ended to day. Second, 2 cases (first and third) from focus No. 1 (Honolulu stockyards). Third, 2 cases (second and fourth) from focus No. 2 (Beretania street near Nuuanu street). Fourth, 1 case last year in same house with the third case (June 6) charged to focus No. 1. Fifth, 3 cases last year within 250 feet of focus No. 2. Sixth, across the street from focus No. 2, 6 dead rats were found within the past fifteen days . . . Seventh, of the subjects held under observation from both foci, none have developed the disease to date. Eighth, all of the cases occurred in persons who have resided here continually and whether the appearance is a recrudescence or due to some new importation of infection is not known.¹¹

Unfortunately, no conclusions could be drawn from this information. The reoccurrence of plague within particular locations – especially those locations where plague occurred the year before – suggested that plague could attach itself to a location, but the

¹⁰ Public Health Reports. Vol. XVI, 1901, P 980-1.

¹¹ Public Health Reports. Vol. XVI, 1901, P 1546.

mechanism by which plague might attach itself to a location remained unknown. If, instead, the plague was transmitted from person to person, then the fact that none of the other inhabitants of those locations had become sick was problematic. If plague was associated with the dead rats, then how was it being transmitted from rat to human – or from dead rat to human? Each fact suggested another possible transmitter, but in light of additional facts, none of those transmitters seemed likely. Also, Coffey's observation that these cases might be either a new appearance of a reappearance of the last epidemic complicated the issue. The inability to discern the method of plague communication was not merely frustrating; it kept the health officials from creating widely effective anti-plague measures. The effort, however, continued.

A number of hypotheses concerning this question were considered over the next year as the second Honolulu epidemic ran its course. The locations where plague occurred continued to be suspect. Locations were evaluated for proximity to other locations, to industry and shipping, and for cleanliness. Chinese food was suspected and evaluated, as were personal habits, linens, clothing and personal articles, and rats. Consideration of each of these possible carriers was frequently included in the reports of the Marine Hospital Service. In one case, all of these suspicions were considered.

The Case of the Well Dressed Man

Another fatal case of plague occurred July 17, 1901. The report described the deceased, a Hawaiian man as being “of family and of the better class.” His home was described as a “neat little cottage.”¹² These descriptions are noteworthy because this man was not a typical plague victim. He was physically and socially distant from the

¹² Public Health Reports. Vol. XVI, 1901, P 1894.

people usually effected. This was probably the reason that the origin of his disease received so much speculation.

The accepted notion at the time was that the plague was a disease chiefly associated with unsanitary conditions or locations. Surgeon-General Wyman had stated that “plague is essentially a filth disease” and that, as such, the Marine Hospital service was able to “stamp out the disease at any state” – presumably through removing the filth.¹³ All locations were also suspect if they were in close proximity to other locations where plague had occurred. In this case, however, consideration of the locations frequented by this man offered no insight as to the origin of the man's disease;

There have been no cases or deaths of a suspicious nature occurring in the neighborhood of this man's home, either during the last or the present year . . . The man's occupation was that of freight clerk in Davies & Co.'s warehouse, which is not only a well-kept and well-conducted place, but one never containing oriental freight.¹⁴

These locations had none of the expected attributes. There were no suspicious illnesses in the proximity of his house, and his place of work was apparently scrupulous, in both its cleanliness and its cargo. The role that the filth had been assumed to play on the propagation of plague appeared irrelevant in this case. The evaluation of the location shows the attempt to attribute plague to specific verifiable causes that could then be bacteriologically verified and treated with measures specific that cause.

The connection of plague to filthy locations was further challenged when in November of 1902, two cases of plague occurred eight miles outside the city at the Aiea plantation and one case occurred twenty-nine miles out of the city at the Waialua

¹³ The San Francisco Chronicle. January 4, 1900. P 2.

¹⁴ Public Health Reports. Vol. XVI, 1901, P 1895.

Plantation. The reporting Assistant Surgeon, W. C. Hobdy, maintained that none of the infected persons had been to Honolulu and Hobdy was unable to give any theories as to the method of infection.¹⁵ Failing to find anything about the location that conducted the disease in these cases, the officials turned to other considerations.

Attention was also focused on the Hawaiian man's personal habits. The report stated that, "This man was always well dressed and had never eaten oriental food."¹⁶ The two things being considered here were personal cleanliness and diet. The first, the matter of personal cleanliness, was very similar to the question of cleanliness concerning locations. Filthy locations and filthy people were both suspected to harbor plague. The second possible origin, whether a diet contained oriental food, did not give the health officials any leads in this particular case. However, the same possibility was considered in at least two other deaths where the victims' diet did include oriental food. In March of 1902, the plague deaths of two children were attributed to food imported from China. It was reported that one child sickened after eating "Chinese candies or sweetmeats" and in the other the source of infection was simply stated as "believed to be from Chinese food."¹⁷ The discussion of food produced in China as a possible transmitter of the plague was not given much more attention. It remained one among the list of possibilities which could not be ruled out, but which was also uncertain enough that specific measures against it would not have been justified.

¹⁵ Public Health Reports. Vol. XVII, 1902, P 2767-8.

¹⁶ Public Health Reports. Vol. XVI, 1901, P 1895.

¹⁷ Public Health Reports. Vol. XVII, 1902, P 772.

The most popular suspicion in the outbreaks that proceeded those in Hawaii was that baggage, including, rags, linen, and clothing were the chief means by which plague was spread. This suspicion was reflected in quarantine policy and was also the reason the “oriental freight” absent from the warehouse where the “well dressed” plague victim worked was noteworthy. Unlike Chinese food, the suspicion of baggage and linens was prevalent enough that it was subjected to bacteriological examination. A report issued and distributed in August of 1902 entitled “The Bacteriology of Soiled Garments” by Passed Assistant Surgeon J. M. Eager reported on the results of that examination:

Clothing, linen, and other garments are capable of holding a relatively large number of microorganisms, varying from minimum of 915 to a maximum of 571,962 for each square centimeter of goods . . . In clothing actually being worn pathogenic bacteria live a shorter time than in the same garments hanging in a wardrobe . . . pathogenic germs can retain their virulence in human raiment for a considerable but not indefinite period.¹⁸

Besides confirming the general suspicion that linens and such could transmit plague, the finding that pathogenic bacteria lived longer while in a wardrobe, or a wardrobe-like container – like a trunk being shipped overseas – was significant. Packaged linens and clothes were evidentially an excellent environment for plague. Disinfection, consequently, became a higher priority. Unfortunately, this report shed no light on how plague was being disseminated throughout a city, or how humans contracted plague from infected linens. Finally, it offered no answer in the specific case of the ‘well-dressed’ man.

Rats were another possible transmitter considered in his case. The coincidence of dead rats in the vicinity of plague victims was frequently reported during the Honolulu

¹⁸ Public Health Reports. Vol. XVII, 1902, P 1908.

outbreaks. However, no dead rats had been reported nor could be recollected by neighbors in this case.¹⁹ The report also included the interesting statement that “the body was carefully inspected and there was neither scar nor scratch to be seen.”²⁰ This suggested the consideration of the possibility that plague was being transmitted through contact with the blood stream, as in a scratch, and not merely proximity or superficial contacts. This man, then, had not gotten the disease by being bitten by rats, or by being around dead rats, or by going barefoot. The ability to rule out the possibility of an infection transmitted by rats in this case, however, did not do so for other cases. Determining the specific cause of this man's disease would not have definitively answered the question of how the plague was being spread. Nor would it have ruled out the possibility that any of the other possibilities were also transmitting the disease. The attempt to bacteriologically identify any transmitter, however, was a major part of the second Honolulu outbreak. Had a transmitter been verified, more specific measures could have been drafted and enforced. Unfortunately, very little progress was made toward that goal. The lack of progress was not for lack of effort, however, as officials continued to divide their attention between these possibilities.

The Rat Connection Begins to Develop

Early in the Honolulu outbreaks attention at the wharves was focused on baggage rather than rats. In the city, attention was focused on sanitation. As the outbreak continued, however, rats received more attention. A definite connection between rats and human plague was not accepted for another couple of years, but the progress toward that

¹⁹ Public Health Reports. Vol. XVI, 1901, P 1895.

²⁰ Public Health Reports. Vol. XVI, 1901, P 1895.

connection is important. The attention rats did receive early in the second Honolulu outbreak was largely as perpetrators of the unsanitary conditions that had been shown to be favorable to plague. In the Honolulu outbreaks the mention of dead rats in the vicinity of plague cases was frequently made, but usually went unexamined, as did the rats themselves. On March 6, 1900, however, dead rats found near the warehouses of the Hawaiian Commercial and Sugar Company were autopsied. The rats were infected with the bubonic plague bacillus.²¹ The coincidence, however, received no further investigation. Similarly, on June 22, 1901, Passed Assistant Surgeon L. E. Coffey reported that rats were gathered from two empty lots adjacent to dwellings where plague had occurred. Thirty-five to forty rats were autopsied and "specimens from both places showed the bacilli of plague."²² Coffey, unfortunately, was unable to offer conclusions from these observations and the questions of whether and how plague was being transmitted from rat to human remained unanswered. However, the connection between rats and human plague did receive more attention after these autopsies.

The examination of rats for plague bacilli on a grand scale began in November 1901 when the first "rat-killing crusade" was launched in Honolulu. The reasons for examining and killing rats were not cut and dry. The crusade organizers disagreed on the purpose of the crusade. Dr. Pratt, in a letter encouraging the crusade, stated that "plague is spread principally through the agency of rats."²³ A decrease in the island's rat population would, consequently, decrease the spread of plague. This statement, though

²¹ The San Francisco Chronicle. March, 14 1900. P 5.

²² Public Health Reports. Vol. XVI, 1901, P 1602.

²³ Public Health Reports. Vol. XVI, 1901, P 2815.

supported by contemporary research, was not accepted by the Health Board Officials. In fact, this notion was wholly absent from the instructions given to the agents participating in the rat crusade. The instructions provided by the Board of Health were concerned with sanitary methods of trapping, the clearing of rubbish and the requirement that all trapped rats must remain "separated according to the district from which they come, and are to be examined for the purpose of determining whether or not a certain district is probably infected and was in need of special attention."²⁴ According to these instructions, the rats were being collected and examined for plague bacilli in order to determine which sections of the city required the most extreme sanitation and quarantine measures. The idea that rats were the agent spreading the plague was ignored in favor of viewing plague infected rats as indicators of where plague might exist.

The reluctance of officials to acknowledge rats as the principal agent of plague spread was probably due to two things. First, there were a large number of suspected transmitters and the urgency of the situation did not allow the health officials to devote all of their time to any one possibility - in Honolulu or elsewhere. Second, as Vernon B. Link notes in his history, the theory that rats might be agents of plague spread was advanced only the year before the second Honolulu outbreak. The theory had not been conclusively proved and was not generally accepted. In fact, the theory was especially difficult to support in situations outside the laboratory. A report from the medical department of the British government, dated November 11, 1902, sums up this difficulty:

Ashore, the affection (sic) has sometimes been simultaneous in rats and man, but sometimes rodents have been first affected and then man and sometimes the opposite. It would also appear that rats may be extensively affected and man remain free and that the reverse may also occur. It is

²⁴ Public Health Reports. Vol. XVI, 1901, P 2815.

pointed out that at sea the disease is not readily conveyed from rat to man and from man to rat. Ships have brought plague patients into port and yet the rats aboard have been exempt.²⁵

Additionally, the theory was problematic because of the absence of rat bites on infected humans. Rats were still suspected to be directly transmitting the plague to humans, and the bacteriological attempt to verify rats as the main proponent of plague spread foundered on that point. Otherwise, the bacteriological information collected during this outbreak, including the examination of rats for plague bacillus was crucial to plague management. Infected rats were very reliable indicators of unsanitary and plague-infected locations.

The attention that would later be focused on rats was spent on “isolation, quarantine, disinfection, and destruction of infected premises by fire.”²⁶ These were the measures used most pervasively throughout the second Honolulu outbreak. Although these measures did rely on bacteriological knowledge, that knowledge still lacked the few crucial pieces that created extraordinarily effective anti-plague measures.

The city of San Francisco had the benefit of observing the beginning of the Honolulu outbreaks while still free from plague. Some San Franciscans not only observed, but commented, too. The attitude of *The San Francisco Chronicle* was very critical of the Hawaiian health officials, the treatment of the Chinese, and the lack of attention given to sanitation and disinfection. By June 1900, however, San Francisco had become mired in its own experience of plague and was in no position to pass judgement.

²⁵ Public Health Reports. Vol. XVII, 1902, P 2769.

²⁶ Link, 1955, P 71.

CHAPTER III: THE FIRST SAN FRANCISCO OUTBREAK, 1900-1902

At a glance, the first San Francisco outbreak was less than one hundred deaths and more than enough controversy. The contention between politicians, health official, and economics interests grew to such an extent that even the families of plague victims were sometimes conscripted to take sides. This all began with a bacteriological uncertainty. The exact characteristics of plague had not been agreed upon by bacteriologists. The dispute over the shape of the bacillus was still fresh and bacteriologists had found significant variations of other characteristics of plague bacilli. These uncertainties made it extremely difficult to bacteriologically diagnosis plague. Consequently, both those who believed plague existed in San Francisco's Chinatown and those who did not had bacteriological evidence to support their assertions. The controversy had begun. Soon, each side added other supporters to their ranks and the controversy began to grow. The California State Board of Health, who had declared plague, was less successful in filling its ranks. Technically, it had the backing of the US Government, but the city and state politicians who refused to admit plague existed had more significant support from economic interests. One of those supporters was the Chinese Six Companies, a coalition of businessmen with significant economic interest in keeping commerce in Chinatown alive.

Each side claimed to be working in the public interest. The Board of Health argued that declaring plague and instituting anti-plague measures was in the interest of

public health. The Chinese Six Companies claimed to act in the interest of the rights and liberties of the citizens of Chinatown, and all citizens by procuring injunctions against the Board of Health's measures. The course of events progressed as a display of one-upsmanship as the Board of Health implemented more and more strict measures and the Chinese Six Companies retaliated with petitions to higher and higher authorities – eventually bringing the President of the United States into its ranks.

Fortunately, the bacteriological impetus of the controversy did not disappear in the wake of the growing argument. The question of plague's existence remained at the forefront. Consequently, bacteriologists played leading roles in the controversy. Bacteriology also had an effect on many of the measures, such as sanitation and quarantine, which had been somewhat effective in stopping the bacteria. Finally, both sides attacked each other with accusations of sloppy bacteriological processes, and bacteriologists played important roles on either side of the controversy.

1900 - *The San Francisco Chronicle* and the First San Francisco Outbreak

The San Francisco Chronicle played three roles during the first outbreak. First, it reported the facts about where plague was supposed to have occurred and the names of those involved in the controversy. Second, it detailed the events of the controversy. Third, it firmly endorsed the opinion that plague did not exist in San Francisco's Chinatown.

On March 13th, 1900, *The San Francisco Chronicle* reported that the State Board of Health had claimed that a case of plague occurred in Chinatown on the 6th of that month. A Chinese man named Chick Gin died under questionable circumstances and bacilli taken from his body was injected into a monkey at the quarantine station at Angel

Island to determine if the cause of the man's death was plague. While waiting for the results of the inoculation, the State Board of Health launched a house-to-house inspection of Chinatown searching for sick persons and to ascertain the sanitary condition of Chinatown.¹ *The Chronicle* derided the declaration of plague and the actions of the State Board of Health, referring to the inspection as premature and claiming it accomplished nothing but disrupted business. The antagonism between the Board of Health and *The Chronicle* continued regarding the question of Chinatown's sanitary condition. *The Chronicle* quoted Dr. William M. Lawlor, a former member of the Board of Health, as having said that, "Chinatown is, or should be, one of the best portions of the city, relatively speaking, from a sanitary standpoint to resist any attack of the plague . . . Chinatown was put into a splendid sanitary condition last year."² His claim was based upon plumbing improvements that were undertaken by the previous Board of Health. The findings of the current Board of Health during its inspection, however, was contrary to this statement. Those reports characterized Chinatown as being "in an unclean condition."³ *The Chronicle* endorsed Dr. Lawlor's statements and argued that the disagreement was evidence that the current Board of Health was incompetent and unable to maintain the state of cleanliness that the previous Board of Health had created in Chinatown. Additionally, the inspection did not find any cases of plague. *The Chronicle* argued that this was further proof that no plague existed in California and that the original case of plague was contrived. The Board of Health, it charged, had launched the

¹ The San Francisco Chronicle. March 13, 1900. P 12.

² The San Francisco Chronicle. March 13, 1900. P 12.

³ The San Francisco Chronicle. March 13, 1900. P 12.

inspection solely to withdraw money from the treasury.⁴ The attention paid to these two questions, sanitation and bacteriological diagnosis, implies the seriousness with which the groups involved viewed the information provided by scientists. Also, the way in which *The Chronicle* was able to construe the Board of Health's failures depended upon bacteriological knowledge.

The same article reported that the monkey that had been inoculated with bacilli from the body of the supposed plague case, had died. This did not mean that Chick Gin had definitely died of plague. Nor did it mean he had not. This experiment became one of the pieces of medical evidence used by both sides. The Board of Health claimed the monkey's death did mean that Chick Gin had died of plague. The paper refused to ascribe its death to plague. Instead, it joked that the death was due to "the emaciation that follows close confinement and too persistent attention from eager bacteriologists."⁵ *The Chronicle* also quoted another former member of the Board of Health as saying that, "if an emulsion made from the tissue of a dead body, which has probably been decomposing for several days, be injected into the blood of a living creature, septicaemia will result."⁶ The paper and the former member of the Board of Health easily found other potential causes of the monkey's death. Since bacteriologists were unable to verify whether the monkey had, or had not, died of plague, each side was left standing only on its arguments and no resolution occurred.

⁴ The San Francisco Chronicle. March 14, 1900. P 7.

⁵ The San Francisco Chronicle. March 14, 1900. P 7.

⁶ The San Francisco Chronicle. June 1, 1900. P12.

House-to-house inspections continued through May. During this time the Board of Health declared six additional cases of plague. At the end of May, Dr. J. J. Kinyoun, the Federal quarantine officer for California, and the City Board of Health agreed that these deaths indicated a serious situation. An inoculation order was passed that forbade any inhabitant of Chinatown to leave without first being inoculated with an experimental prophylactic known as Haffkine serum. The Chinese population refused because of their distrust of Western medicine and the unproven nature of Haffkine serum. This meant that the majority of the residents of Chinatown were confined to that district. For those residents who were day laborers in other parts of the city, this meant no wages, and consequently, no food.

Wong Wai, a prominent Chinese businessman, and a member of the Chinese Six Companies contended that the inoculation order violated the rights and liberties of the inhabitants of Chinatown. He filed a petition on May 25th on behalf of the inhabitants of Chinatown to have an injunction issued against the Board of Health's inoculation order. The petition came before Judge Morrow who ordered Kinyoun and the Board of Health to justify their order by producing bacteriological evidence that plague existed in Chinatown.⁷ The Board of Health renewed its inspections but was unable to produce any additional cases or evidence of the disease. On May 29th the injunction was ordered and the decision written by Judge Morrow of the Federal Circuit Court declared the "regulations of the Health Board . . . to be without authority."⁸ This was a huge blow to the Board of Health. *The Chronicle* joined in the criticism of the Board of Health by

⁷ The San Francisco Chronicle. May 25, 1900. P 12.

⁸ The San Francisco Chronicle. May 29, 1900. P 7.

attributing its failure to find evidence to that fact that doctors employed by the Chinese Six Companies had closely monitored the Board of Health's inspectors. *The Chronicle* speculated that the inspectors' search might have yielded very different results if had it been unsupervised.⁹ Whether or not observation was the reason the Board of Health was unable to find any evidence, the fact that they could not produce bacteriological proof of plague determined the course of plague events.

The Board of Health, which still maintained that plague existed, determined it necessary to counter the revocation by attempting to quarantine Chinatown. The Board of Health had support for this attempt from the Citizens Relief Committee, another group of merchants. This group met with the Board of Health who told them that either Chinatown or all of San Francisco was going to be quarantined. These businessmen would have incurred substantial losses from a citywide quarantine. Quarantining Chinatown, while also disruptive to commerce, posed much less of a threat. The merchants supported the Board of Health's efforts. The quarantine measure was then submitted to the Board of Health's superior, the Board of Supervisors, who promptly rejected it. The Board of Supervisors issued a resolution stating that there had never been plague in San Francisco and that the actions of the Board of Health had caused them to lose faith in that Board. The resolution called for the resignation of all the members of the Board of Health.¹⁰

By the next day, however, the Board of Supervisors had mysteriously changed its mind. Another meeting between the two Boards produced a resolution that overrode the

⁹ The San Francisco Chronicle. May 26, 1900. P 9.

¹⁰ The San Francisco Chronicle. May 29, 1900. P 7.

injunction against the inoculation order and granted authority to the city Board of Health to carry out anything it judged necessary to stop the spread of infectious disease.¹¹

Plague was not specifically mentioned and no specific reason for the complete turnaround was given. However, the Board of Supervisors did publicize its opinion that any possibility of plague warranted quarantine. It is possible that the Board of Supervisors was concerned with the loss of authority the Board of Health had suffered. Allowing the quarantine may have been an attempt at restoring the legitimacy of the Board of Health.

The quarantine went into effect on May 29. By the next day, the Board of Health's inspectors had located two suspicious and one "demonstrated" case of plague in Chinatown.¹² The demonstrated case was that of a deceased man named Wong Dang.

Because the body had a swollen gland – one of the symptoms of plague reported by the Pasteur Institute – the body was placed under guard and an autopsy performed at the undertaker's facility. Sections of the glands were moved to the Board of Health's laboratory where they were examined and the case declared to be plague. The examination was promptly challenged. Wong Dang's physician and friends told *The San Francisco Chronicle* that he had been sick for months, and, therefore, had not died of plague. *The Chronicle* investigated further and reported that the bacteriologist who had made the autopsy and declaration, Dr. Kellogg, had based his findings on the swollen gland and the observation of a quantity of "blood stained serum" found within the body. No bacteriological examination had been made. The undertaker who had received Wong Dang's body maintained that the "serum" in question was the embalming fluid with

which he had prepared Wong Dang's body for shipment back to China.¹³ It had nothing to do with plague. Additionally, a representative of the Chinese Six Companies had been present at the autopsy and succeeded in procuring a small amount of viscera. He gave it to a bacteriologist allied with the Chinese Six Companies for examination. Tests performed on this tissue were reported to have produced no plague bacilli.¹⁴ At this point in the case, there were two bacteriologists, one affiliated with each side of the controversy, with very different findings.

A similar course of events occurred in the two other cases found during the first days of the Chinatown quarantine. The Board of Health responded to the repeated challenges by closing their autopsies to anyone who was not a representative or member of the Board. This, along with the quarantine, outraged the Chinese Six Companies and drove them back to the courts in pursuit of another injunction.

The Chinese Six Companies again petitioned Judge Morrow for an injunction. Without hearing arguments from the defense, Morrow declared that he would issue an injunction against the quarantine of Chinatown if the Board of Health could not produce conclusive evidence of plague.¹⁵ The Board maintained that it had conclusively proved the existence of plague through the autopsies it had carried out.

Dr. Kinyoun predicted that Judge Morrow would not be satisfied with that argument and would issue the injunction anyway. Kinyoun began preparations to quarantine the entire city in order to keep plague from spreading. On June 16, Kinyoun

¹³ The San Francisco Chronicle. June 1, 1900. P 12.

¹⁴ The San Francisco Chronicle. June 1, 1900. P 12.

¹⁵ The San Francisco Chronicle. June 6, 1900. P 8.

sent a telegram to US Surgeon General Wyman regarding his intent, stating that since measures in Chinatown had been prohibited the only way to maintain public health was to quarantine the entire city.¹⁶ Morrow did order the injunction and Kinyoun put the citywide quarantine into effect. All people wanting to leave San Francisco were required to visit the Board of Health to procure a certificate saying that they were in good health. No one without a certificate would be allowed to leave the city. The city was outraged. Kinyoun was cited for contempt of court, and numerous transportation companies operating out of San Francisco refused to check for certificates.

The Chinese Six Companies, frustrated with results at the state level, appointed a committee of six men to go to Washington to meet with Secretary of State Hay and President McKinley. The delegation was successful. President McKinley was convinced that plague did exist in San Francisco. He ordered Dr. Kinyoun demoted to an advisory capacity and lifted the citywide quarantine.¹⁷ Back in California, Kinyoun was called before Judge Morrow to plead his case. According to *The Chronicle*, he admitted that his measures had been too extreme and asked the court for pardon, essentially taking the fall for the entire Board of Health. The Chinese Six Companies had apparently won the battle because the Board of Health had not produced sufficient bacteriological evidence.

This controversy encompassed and catalyzed the events of the first San Francisco outbreak. The conflict between the two sides, one represented by the Chinese Six Companies and the other by the Board of Health hinged on the ability to produce verifiable bacteriological information. Unfortunately, the lack of this evidence was not

¹⁶ The San Francisco Chronicle. June 17, 1900. P 11.

¹⁷ The San Francisco Chronicle. June 19, 1900. P 9.

an accurate indicator of the absence of plague. Plague did exist in San Francisco. *The Chronicle* also subjected the ways in which the Board of Health attempted to examine and manage plague to heavy scrutiny. The paper characterized the practices and measures used by the Board of Health as being bacteriological unsound. It was even argued that in the event of a true outbreak, those measures would have been worthless.

The Board of Health's Unhealthy Procedures

The Chronicle often speculated that if the bubonic plague had existed in San Francisco the measures instituted by Dr. Kinyoun and the Board of Health would have done nothing to stop the plague from becoming epidemic. When the Board of Health first issued the inoculation order an editorial responding to the order stated, "If the bubonic plague really existed in Chinatown the members of the bubonic Board would deserve to be taken to the nearest lamp-posts and rewarded for their criminal recklessness."¹⁸ The author complained that the inoculation of only the inhabitants of Chinatown and not those passing in and out of that district was absurd. If the plague could be spread among the inhabitants of Chinatown then it might also be spread to anyone visiting Chinatown, who might take the plague with them when they left.¹⁹ The editorial also pointed out that the buildings where the supposed cases of plague had occurred were not quarantined or destroyed but left standing and open to the public.²⁰ In the event of a real epidemic such lapses would have had dire consequences. The fact that they did not was seen as further evidence that the plague did not exist in San Francisco.

¹⁸ The San Francisco Chronicle. May 26, 1900. P 6.

¹⁹ The San Francisco Chronicle. May 26, 1900. P 9.

²⁰ The San Francisco Chronicle. May 3, 1900. P 10.

Another measure that received similar criticism was the quarantine of the city of San Francisco. Requiring all persons leaving the city to obtain a certificate of health seemed both ridiculous and impossible. A reporter from *The Chronicle* investigated the health certificate process. The reporter went to the offices of the Board of Health and applied for a certificate. He was asked his name, height, nativity, and age, but not whether he had recently been in Chinatown. He gave the required information and was issued a certificate. The reporter argued that such a perfunctory examination could in now way encourage the half of plague. His report made the quarantine appear farcical. He also reported that all Chinese and Japanese people who applied for a certificate were refused without any attempt to determine their proximity to locations where plague had occurred.²¹ They were not refused because they had been in proximity to the plague, but because of their race. Not only was this discriminatory, but ridiculous because plague could affect people of any race. Because of these faults the reporter regarded the certificate process to be both ineffective and discriminatory. He included a statement from Dr. Kinyoun regarding the quarantine to drive the charge of discrimination home. A telegram sent by Kinyoun to the Surgeon General said, "The order was originally directed against Asiatics, but since it has been found that no discrimination can be allowed, all persons are subject to the regulations."²² The inoculation and quarantine policies appeared to ignore important bacteriological considerations. Both were only concerned with a small segment of the population that had been identified by race, not

²¹ The San Francisco Chronicle. June 17, 1900. 11.

²² The San Francisco Chronicle. June 17, 1900. 11.

any bacteriological qualifications. *The Chronicle* was staunch and ruthless in making these valid criticisms of anti-plague measures.

The precautions taken during the autopsy of supposedly plague-ridden bodies also came under attack. Dr. Kellogg, the Board of Health bacteriologist was lambasted for his lack of attention to infecting himself and those around him with the plague. It was reported that:

He in no wise protects either his clothing or his person from saturation with the very germs he is seeking. He works barehanded . . . Having dissected his subject he puts a collection of tissue samples into a graniteware bucket with a loose fitting lid . . . His bucket loaded to the lid with alleged plague bacilli he takes it through the quarantine line and with him to City Hall . . . mingling with the passengers with his death-laden pail.²³

A bacteriologist who acted with so little regard for the ways bacteria could be spread was judged to be incompetent and a threat to the entire city. Further, the conclusions of any such bacteriologist were suspect in light of his demonstrated ignorance. *The Chronicle* took up the slack left by inept bacteriologists like Dr. Kellogg by becoming, and consulting, experts on bacteriology. The paper subsequently produced a staggering criticism of the diagnosis procedures used by the Board of Health to declare plague.

The Difficulty of Diagnosis

The difficulty of bacteriologically identifying the bubonic plague bacilli evident in the disagreement between Yersin and Kitasatao had, so far, played a major part in the controversy surrounding the first San Francisco outbreak. The question continued to re-appear. The difficulty of recognizing the bubonic plague bacillus was repeatedly used by

²³ The San Francisco Chronicle. June 5, 1900. P7.

The Chronicle to cast doubts on the Board of Health's declaration of plague. One article details the accepted method of plague diagnosis:

The micro-organism must be isolated in pure culture from a person dead of the disease. This pure culture must kill an animal infected with it, and from it must be isolated the germ answering in every particular that causing the death of the original case.²⁴

This process agreed with the process published by the Marine Hospital Service.²⁵ *The Chronicle* reported that Dr. Kellogg and the Board of Health repeatedly ignored the necessity for isolating the bacillus in pure culture and testing the culture on an animal subject. It is true that the monkey at the Angel Island quarantine station was the only animal subject to such a test by the Board of Health in 1900. The rest of the cases autopsied by the Board of Health were diagnoses as plague by means of a microscopic inspection.

Another article published on June 6, entitled "What Science Says," which appears to have been written by an experienced bacteriologist, takes up this issue at length. The article declares that post-mortem examination and microscopic inspection were not sufficient to diagnosis plague. The author claimed that knowledge of the case history was necessary and that one must have an opportunity to "observe the various changes that a body undergoes during an attack of the plague."²⁶ Since no living plague victims had yet been found in San Francisco, this statement invalidated every single diagnosis of plague made by the Board of Health in one swoop. The author also pointed out that the origin of the specimen of plague used by the Board of Health for comparison was

²⁴ The San Francisco Chronicle. June 2, 1900. P 9.

²⁵ Public Health Reports. Vol. XII, 1902, P 2373.

uncertain. A story about Kinyoun was circulated wherein the Board sent Kinyoun an unidentified bacillus. Kinyoun identified it as pneumonia. The Board then informed Kinyoun that the sample was a pure culture of plague obtained from studies in China, and Kinyoun changed his mind.²⁷ This raised the suspicion that the sample might, in fact, have been pneumonia and that all declared cases of plague were actually pneumonia. Overall, these were solid criticism of the Board of Health's bacteriological procedures. In light of this information it is no surprise that the Board of Health's authority and reputation had been maligned.

“Feed the Chinese!”

The affront to the civil liberties of the Chinese also contributed to the Board of Health's diminishing status. Both injunctions had been justified because the rights of the inhabitants of Chinatown were being violated. A letter sent to the Board of Health by the Chinese Six Companies before the Chinatown quarantine demanded that if quarantine were enacted some provision would have to be made for the feeding of the 10,000 restricted people.²⁸ This letter was not answered. When the quarantine was enacted, these same advocates sent a letter to the Board of Supervisors that stated that most of the people confined to Chinatown were day laborers and depended on each day's work for food. The letter included the assertion that “at least half of them are already reduced to a condition of distress bordering on famine for lack of necessary food” and demanded that the Board of Supervisors find a way to feed the people.²⁹ This letter also went

²⁶ The San Francisco Chronicle. June 6, 1900. P 8.

²⁷ The San Francisco Chronicle. June 3, 1900. P 11.

²⁸ The San Francisco Chronicle. May 3, 1900. P10.

²⁹ The San Francisco Chronicle. June 2, 1900. P 9.

unanswered. On June 8th, the Chinese Six Companies began shipping food into the quarantined section of the city. Quarantine officers did nothing to stop them.³⁰ This sequence of events made it easy to cast dispersions on the Board of Health.

The Board, however, was making an effort to manage plague. Unfortunately, citizen's rights were still in danger of falling by the wayside. For example, the Board also tried to move people out of Chinatown to detention camps. The same type of detention camps used in the Honolulu outbreaks had already been criticized by *The Chronicle* as a violation of liberties. The preparation by the Board of Health for moving numerous Chinese to detention camps was underway as early as May 1900. During a meeting held immediately after the order for the quarantine of Chinatown had been put through Dr. Kinyoun reported that he had already inspected and chosen a site with an existing structure for a detention camp.³¹ It was, perhaps appropriately, called Mission Rock. Mission Rock was owned by the California Dry Dock Company which had agreed that it could be used as a detention camp for one hundred dollars per month.³² The preparation of Mission Rock got underway and by June 5th it was reported that Mission Rock was prepared to receive 1,000 residents that evening. The 1,000 who were selected were characterized as "indigents."³³ It is possible that the removal of these particular 1,000 people was not only an anti-plague measure, but had something to do with removing the homeless and poor from the streets of Chinatown. The request for the first injunction against the Board of Heath, however, was already at court and the Board of

³⁰ The San Francisco Chronicle. June 8, 1900. P 12.

³¹ The San Francisco Chronicle. May 30, 1900. P 9.

³² The San Francisco Chronicle. June 5, 1900. P 7.

Health had to focus its efforts on producing evidence of plague. In order to collect that evidence the Board of Health had requested a continuance. The continuance was granted on the assurance that in the mean time no Chinese would be moved to Mission Rock.³⁴ None was. In fact, the controversy demanded so much attention that no Chinese were ever moved to this or any other camp during the San Francisco outbreaks.

The Cost of Plague Precautions

Unsurprisingly, the potential damages to the economy were also discussed by *The Chronicle*. Both sides of the controversy had economic backers, but the Chinese Six Companies had more. An editorial published in *The Chronicle* stated that during the time wasted as the Board of Health flaunted their authority and enforced the inoculation order, “the neighboring states are quarantining against us, and we are on the eve of experiencing all the evil effects of interrupted commercial intercourse.”³⁵ The frequency with which economic consequences were considered testified to the expected severity of those consequences.

The reaction to the quarantine of Chinatown was predictably more extreme. A telegram sent by the Chamber of Commerce to the Board of Health asked them to recant the reports of plague that they had sent to various localities, such as British Columbia. The telegram also asked the Board of Health to convince the authorities of British Columbia to allow coal shipments to San Francisco to continue.

We greatly fear that the authorities of Victoria will immediately order a quarantine against our city which would seriously affect our coal supply, nearly twice as much coal coming here from British Columbia as from any

³³ The San Francisco Chronicle. June 5, 1900. 7.

³⁴ The San Francisco Chronicle. June 8, 1900. P 12.

³⁵ The San Francisco Chronicle. May 26, 1900. P 6.

other point . . . This action on your part . . . will, we think, be of great value to the commercial interests of our city.³⁶

If the reaction concerning economics and the quarantine of Chinatown was stern, though expected, the reaction to the quarantine of the entire city was explosive. The authors of these critiques feared that the existence of quarantine was perceived as outright evidence that plague existed in San Francisco and that the city would suffer drastic economic consequences. The outcry against Kinyoun reached its loudest after he sent another series of telegrams to neighboring states informing them that plague was in existence and that people coming from the city were required to have a certificate of health.³⁷ While these telegrams did not deal directly with the export and import of goods any communication with the city of San Francisco had come under suspicion in light of the quarantine. These economic fears could have been assuaged by bacteriological evidence that plague did not exist. Or, if it did exist, evidence could have convinced these economic interests that the measures were necessary. Unfortunately, neither side could produce such evidence and the controversy had economic repercussions.

Problems with this Version of the First San Francisco Outbreak

Such was the story as told by *The San Francisco Chronicle*. Dr. Kinyoun was depicted as a racist villain working with the corrupt Board of Health in order to do harm to the morale and economy of San Francisco and the state of California. The Board of Health was characterized as a greedy, incompetent organization and both figures were repeatedly discredited. According to the reports of the Marine Hospital Service and Vernon B. Link's history of plague, there was a case of plague in San Francisco on

³⁶ The San Francisco Chronicle. June 6, 1900. P 8.

March 6, 1900 and by the time Kinyoun was called before Judge Morrow, there had been 11 more deaths from plague.

The Board of Health was correct in the diagnosis of plague but its reaction left much to be desired. Measures too extreme for the situation were enacted without justification, sanitary and bacteriological problems and procedures were ignored and the rights and liberties of the Chinatown were arguably violated. Unsurprisingly, significant opposition arose. The controversy that developed can be traced back to a bacteriological uncertainty.

Comparison to Bombay's Domestic Policy

The domestic policy of Bombay briefly discussed earlier in this paper makes an interesting comparison to the policies of the California Board of Health during 1900. The quarantine of the city, which required travelers to procure a certificate of health, was similar to the stationing of inspectors at major points of entry and exit from Bombay. However, the policies of the Board of Health varied from the Bombay policy in more ways than they paralleled it. The Bombay policy clearly outlined the procedure for dealing with a location where plague had occurred: That location was to be thoroughly cleaned, or destroyed if it was found to be unsanitary or unfit for habitation.³⁸ This policy relied on the principles of sanitation that sought to eradicate environments conducive to bacteria. The Board of Health, on the other hand, seems to have ignored the houses wherein plague occurred in favor of inoculation and quarantine – measures that diverted attention away from sanitary measures and relied on bacteriological developments

³⁷ The San Francisco Chronicle. June 19, 1900. P 9.

1901 - 1902 The Outbreak Continues

After the debacle of 1900, the US Surgeon General and the Marine Hospital Service sent a commission of three independent doctors to ascertain the truth of the situation in San Francisco. The report of this commission, dated February 26, 1901, recounted the bacteriological examination of thirteen cases between February 5th and 16th and declared that plague did exist in San Francisco.³⁹ The report was fastidious about supporting its diagnosis with a detailed account of the methods used. The commission also met with the Governor, members of the Board of Health, and members of the Chinese Six Companies and other economic associations to assure their support of the investigation.⁴⁰ The Commission was interested not only in determining if plague existed but protecting that study against controversy.

Based on this report, the Marine Hospital Service, the authorities of the state of California, and authorities of the city of San Francisco agreed in April to cooperate in “the work of inspection, isolation, and disinfection in Chinatown.”⁴¹ This work was nowhere near as extreme as Kinyoun’s policies. The report described the plague situation as minor and the precautions suggested by the committee were made with both prevention and eradication in mind. Surgeon General Wyman, in a telegram, expressed this sentiment when he wrote, “Measures should be taken as necessity arises. Nor need they be in such manner as to excite alarm . . . Assured of this, publication would be

³⁸ Public Health Reports. Vol. XII, 1902, P 387.

³⁹ US Marine-Hospital Service. Report of the Commission appointed by the Secretary of the Treasury for the Investigation of Plague in San Francisco, under instructions from the Surgeon-General, Marine-Hospital Service. Washington: Government Printing Office, 1901. P 22.

⁴⁰ Report of the Commission . . . for the Investigation of Plague in San Francisco, 1901, P 7-9.

unnecessary.”⁴² A similar telegram was sent from John P. Young, a representative chosen by the Governor of California, Mayor of San Francisco, and business interests of California, expressing appreciation for the alliance and the certainty that the desired results, “will be speedily achieved and by methods that may be effective without causing undue alarm.”⁴³

The desire to keep the sanitation work out of the public eye seems suspicious in light of the secrecy of the Board of Health’s autopsies. However, the plague in San Francisco was relatively mild, and the question of publication turned on that fact and the desire to disassociate the new plague work from the methods of the Board of Health rather than on dishonesty. The work of the Marine Hospital Service remained relatively low-key throughout the remainder of the first outbreak. The total number of plague cases in 1901 was 33 of which 3 recovered.⁴⁴

The work of cleaning Chinatown was completed on June 22. The number of houses that had been disinfected was 1,180 and the number of rooms was 14,117.⁴⁵ Between June and the end of 1901 the only plague prevention work which continued in Chinatown was the fumigation of localities where plague occurred and the bacteriological verification of the bacilli in each of those victims.⁴⁶ For the first time in San Francisco, a

⁴¹ Public Health Reports. Vol. XVI, 1901, P 933.

⁴² Public Health Reports. Vol. XVI, 1901, P 934.

⁴³ Public Health Reports. Vol. XVI, 1901, P 934.

⁴⁴ Link, 1955, P 91-2.

⁴⁵ Public Health Reports. Vol. XVI, 1901, P 2837.

⁴⁶ Public Health Reports. Vol. XVI, 1901, P 2837.

bacteriological diagnosis had been accepted and the work of plague prevention was carried out without impediment.

Yersin's Serum and San Francisco's First Convalescent

The Marine Hospital Service reported the first recovered case of plague on July 20, 1901. The report was included with the case histories of a number of deaths. Four of these cases, including the one that recovered, occurred among the women of a Japanese brothel. The brothel was quarantined, but not before one woman moved. She was found sick and returned to the brothel where she, and two of the others, died. These cases were the first where plague was identified while the patient lived. Consequently, these reports were more detailed than the majority of the case histories in 1901. This was the first opportunity for San Francisco officials to observe and treat plague in a living victim. This report was full of those observations, but the question of treatment is curiously lacking. Bacteriologists took blood samples and were able to identify the plague bacillus in the blood. Pure cultures were grown and examined and specimens of the bacillus were injected into laboratory animals for further observation. Additionally, the women's physical states were described in detail. The treatment these women received, if there was any, was not reported. The report focused on the opportunity to diagnose and observe plague in a live patient.⁴⁷ The absence of treatment is unusual because a treatment did exist. Yersin's serum had been used around the world as an inoculation and treatment for plague.

⁴⁷ Public Health Reports. Vol. XVI, 1901, P 1735.

A report from Beirut stated that, “the most striking fact shown by the observation of the patients is the real value of Yersin’s serum.”⁴⁸ Three patients treated with the serum were completely cured by injections of only 40 c.c. each on the fourth, sixth, and eleventh days of the disease. From Berlin came the report that the serum had cured 9 out of 15 cases. Of the 6 cases that did die, 4 were in advanced stages of the disease. The reporting consul could not explain the other two deaths. He reported that in all of the deaths the number of plague bacillus in the body was significantly lower than the average in bodies that had not been treated. This observation, he argued, substantiated Yersin’s effectiveness even in the advanced cases the serum had failed to cure.⁴⁹ The use of Yersin’s serum in advanced cases in Honolulu had also failed. For example, a case that was given 50 c.c. doses had died, and another that was regularly treated with the serum showed some improvement, but eventually succumbed.⁵⁰ Yersin’s serum was also widely used in India. The reports of the cases in the brothel did not say how far the disease had progressed. If the disease had been relatively mild Yersin’s serum may have been as effective as it was in Beirut and Berlin. However, the serum was not used in these or any other living cases in San Francisco, and San Francisco consequently stands as an anomaly in the history of plague treatment. Officials focused their attention in these cases on observing live patients. The decision to regard the cases in this manner may have been a result of the debatable success of the serum. In fact, the unproven success of the serum caused it to be used less and less over the years. The development of a

⁴⁸ Public Health Reports. Vol. XVI, 1901, P 539.

⁴⁹ Public Health Reports. Vol. XVI, 1901, P 1957.

⁵⁰ Public Health Reports. Vol. XVI, 1901, P 1545-6, 1711.

stronger serum, however, received significant attention until the bacteriological discoveries of 1903 focused health official's attention on other means of managing plague.

International Conference and Commerce

Two international conferences in 1901 brought together doctors and politicians to discuss plague. In the report of the International Conference of American States held in Mexico in early October of 1901, US Surgeon General Wyman stated that the conference turned on the understanding that, "The time has come when common action should be taken. Trade and a higher civilization both demand that we should attend to this matter now."⁵¹ Wyman also stated that "The elimination of this disease from one city becomes but a palliative and temporary measure of relief to commerce if no efforts are made to eliminate it from other communicating cities at the same time."⁵² The emphasis on commerce depended on the fact that the majority of the associations these countries had with one another concerned commerce. The resolutions adopted at this conference established a board that would determine minimum sanitary requirements that ships calling at a port had to meet in order to be allowed to dock and unload cargo.⁵³ Determining which sanitation measures were necessary and effective depended on bacteriological knowledge.

The reports of ships arriving in the US from plague infected ports offer a narration of the US quarantine policy and how it functioned. One ship, the *Carlisle City* departed

⁵¹ Public Health Reports. Vol. XVI, 1901, P 2351.

⁵² Public Health Reports. Vol. XVI, 1901, P 2350.

⁵³ Public Health Reports. Vol. XVI, 1901, P 2352.

from Hong Kong and passed through Honolulu on its way to San Diego. Three days before her arrival at Honolulu, a death occurred. The deceased had not experienced a fever or swollen glands and so the case was not considered to be plague and the ship was granted free pratique with three conditions. Only Europeans were allowed to go ashore, all cargo was unloaded under guard, and the ship was required to moor away from the dock.⁵⁴ These conditions were wise in light of the five deaths from plague that occurred aboard the *Carlisle City* by the time she reached San Diego. The remaining passengers and crew were bathed, all of their personal effects were disinfected and all baggage was destroyed.⁵⁵ Passengers who departed at San Diego were all given an immunizing dose of Yersin's serum. The *Carlisle City* was then sent on to Angel Island where the cargo was unloaded and the entire ship disinfected.⁵⁶ In this case, the policy proved successful. No cases developed among the passengers or could be attributed to anything carried on board.

Regardless of adherence to policy, however, bubonic plague found its way into California and Washington in this period and Louisiana and Texas within the following fifteen years. Like the Egyptian policy, the US policies were unable to stop the communication of plague.

⁵⁴ Public Health Reports. Vol. XVI, 1901, P 1547.

⁵⁵ Public Health Reports. Vol. XVI, 1901, P 1447.

⁵⁶ Public Health Reports. Vol. XVI, 1901, P 1734.

Additional Bacteriological Advances

During 1901 and 1902, there were two discussions concerning rats and the theory of plague communication. Professor Robert Koch gave a speech to the British Tuberculosis Congress in which he reported:

It has been discovered that only those plague patients that suffer from plague-pneumonia – a condition that is fortunately infrequent – are centers of infection, and that the real transmitters of the plague are the rats . . . By far the majority of cases in which the plague has been transmitted by ocean traffic, the transmission took place by means of plague among the ship rats. It has also been found that wherever the rats were intentionally or unintentionally exterminated the plague rapidly disappeared.⁵⁷

Additionally, Professor Kohl, who was identified as a respected bacteriologist by the sanitary inspector who recounted Kohl's studies for the records of the Marine Hospital Service, declared that the bacteriological studies currently being done on rats were delinquent in not recognizing that a chronic form of plague existed in rats.⁵⁸ These discoveries provided a critique of previous and current policies that were focused on disinfection rather than rats.

The work of the Marine Hospital Service during these two years was a continuance of the agreement reached in 1901. Locations where plague occurred were quarantined and disinfected, or destroyed and cases of plague were each diagnosed bacteriologically. During these two years 73 cases occurred bringing the total of plague cases in San Francisco to 96.⁵⁹ The relatively calm events of 1901 and 1902, however, did not last through 1903.

⁵⁷ Public Health Reports. Vol. XVI, 1901, P 1773.

⁵⁸ Public Health Reports. Vol. XVII, 1902, P 1864.

⁵⁹ Link, 1955, P 91-92.

CHAPTER IV: THE FIRST SAN FRANCISCO OUTBREAK, 1903 - 1906

1903: The Plague Conference and the Flea Connection

There was no significant change in the number of cases of plague in 1903, but the predicted consequences of declaring plague began to emerge. A dispute with Mexico broke out over who had infected who with plague and various countries passed anti-US quarantines. The comparative calm of 1902 was further disrupted by election politics in November of that year. A new Governor, as well as the State Board of Health he appointed, took office and declared that plague no longer existed in San Francisco. In January of 1903, a special conference was held by the Surgeon General to determine the truth and discuss bringing the newly elected Governor and State Board of Health in line. The controversy surrounding plague was back.

The Controversy and the Conference

Two years of cooperative efforts between the Marine Hospital Service and the San Francisco Board of Health passed before the election of Dr. Geo C. Pardee to Governor brought to power men who did not want to admit that the plague existed in San Francisco. Pardee had a history of disbelieving the existence of plague. He had been one of the six doctors chosen to go to Washington D.C. to protest the quarantine of San Francisco in 1900. The meeting Pardee and the others had with President McKinley convinced McKinley to demote Dr. Kinyoun and lift the quarantine around San Francisco. Upon Pardee's election, he refused to admit that plague still existed in San

Francisco. The officers of the Marine Hospital Service regarded this stance as ridiculous, and continued their anti-plague work. However, the Governor had enough backing, presumably most of it commercial, to revive the controversy among those who were outside the Marine Hospital Service and the city Board of Health. The Surgeon General was forced to take up the issue in a special conference that he convened on January 19, 1903 in Washington D.C.

For the most part, the delegates to the conference made it clear that they believed plague had been proved to exist in San Francisco by the Marine Hospital Service. The conference passed a resolution to that effect and turned its attention to the effort to get the State Board of Health to admit the same.

The first proposition came from Dr. Lewis of the State Board of Health of North Carolina and Dr. Holton of the State Board of Health of Vermont. They suggested that the only way to convince the commercial interests backing Governor Pardee to drop the ruse was to threaten the commerce of California. They asked whether Surgeon-General Wyman had the authority to quarantine the entire state of California. Wyman replied that he did, but would not unless the situation demanded it.¹ Remembering the events of 1900, the conference considered this motion too extreme and the motion did not carry.

Next, Dr. Lewis of the New York State Board of Health argued that if the conference issued a statement to the press that it believed plague existed in San Francisco, the reaction of the public would be significant enough to force the officials to

¹ United States. Supplement to the Public Health Reports. Plague Conference Continued. Washington: Government Printing Press: 1903, P 21.

recant. "If the public . . . are satisfied that it is plague, they will do the rest."² A statement was issued by the conference, but they doubted that this would be sufficient.

Dr. Fulton of the Maryland State Board of Health suggested the third and most popular solution. He maintained that the strength of the conference was sufficient to convince Pardee and the Board to recant. Additionally, force would be brought to bear by the media attention garnered by the statement mentioned above. He proposed that telegrams should be sent to the reluctant officials demanding that they admit plague and threatening the quarantine of the San Francisco if they did not.³ The responses could be considered by the conference at their afternoon session and a course of action could then be chosen. A member of the California State Board of Health, Dr. Mathew Garner, was present at the conference and made excuses as to why the telegrams could not be answered. He said that the Governor could not vouch for the State Board of Health and would be unable to convene them immediately, or meet with Mayor Schmitz and the City Board of Health.⁴ The motion was tabled until the afternoon session where Dr. Garner maintained his stance and no communication between the conference and Pardee's camp occurred.

In the absence of negotiation with Pardee's camp and because of the inability to agree on any of these suggestions, the conference adopted a number of resolutions designed to encourage California's officials to recant:

It is possible that these resolutions may create some little animosity in California, provided they are strong enough to display any animosity, but

² Supplement to the Public Health Reports, 1903, P 23.

³ Supplement to the Public Health Reports, 1903, P 22.

⁴ Supplement to the Public Health Reports, 1903, P 25.

from the inception, certainly from the fourth week after the outbreak of plague in 1900, this contest has been a bare-knuckle contest.⁵

The conference intended these resolutions to be strict enough to convince Pardee and his Board to recant. The resolutions, however, did no more than declare plague and denounce the actions of Governor Pardee and the officials cooperating with him.⁶ It is difficult to discern whether the resolutions of the conference of January 1903 had any significant influence. The work of the Marine Hospital Service had not been impeded by Governor Pardee and was unchanged by the resolutions. Pardee apparently wanted the best of both worlds and allowed the plague work to continue while declaring that San Francisco had a clean bill of health.

Meanwhile, Back in San Francisco

The plague was slowing down. The last reported death was December 11, 1902 and “active measures for the eradication of plague are being enforced daily.”⁷ As well as the disinfecting and inspection mentioned earlier, these included a cubic air ordinance that allowed for the arrest of people refusing to move out of overcrowded Chinatown tenements.⁸ By March, authorities of the Marine Hospital Service were as eager as California officials had been to verify the end of the outbreak. However, hopes fell on March 16, when a Japanese girl was diagnosed and died from the plague. Eighteen more deaths occurred by the end of 1903.⁹ The most radical measures used by the Marine

⁵ Supplement to the Public Health Reports, 1903, P 32.

⁶ Supplement to the Public Health Reports, 1903, P 28-29.

⁷ Public Health Reports. Vol. XIII, 1903, P 388.

⁸ Public Health Reports. Vol. XIII, 1903, P 389.

⁹ Link, 1955, P 93.

Hospital Service during this outbreak were instituted in late 1903. One measure provided for the clearing of courtyard and alleys that had been filled with unsanitary wooden lean-to structures that were being used as dwellings.

A number of anti-rat measures were implemented at the same time. The sewers were repeatedly flushed and poisoned. The use of poison depended on the bacteriological knowledge of the virus used as poison and included the danger of poisoning other animals and humans. This danger was avoided by the use of Danysz's virus which had an 88.7% mortality rate in rats but did not affect humans or other animals.¹⁰ Anti-rat measures at the docks were also strictly enforced with much success.¹¹ The anti-rat measures, of course, also stemmed from a bacteriological premise. All of these measures seem to have been effective and efficiently carried out.¹² This efficacy was probably due to the practice health officials had obtained during the past couple of years. In this respect, 1903 was a great improvement over the previous two years. However, these policies still lacked the important piece of information that would encourage officials to draft and enforce extensive anti-rat measures.

The Flea Connection is Made

At the Eleventh International Congress of Hygiene and Demography held at Brussels, Belgium on September 2-8, 1903, Dr. Leon Albert Callmette delivered a paper that reported discoveries concerning the mechanisms that spread plague.

It is well known that, though plague can propagate itself from man to man . . . by nasal, bronchial, and throat secretions in which the bacillus of pest

¹⁰ Public Health Reports. Vol. XIII, 1903, P 546.

¹¹ Public Health Reports. Vol. XIII, 1903, P 1457.

¹² Public Health Reports. Vol. XIII, 1903, P 274.

abounds . . . the principal agents of contamination are rats by intermediation of the fleas that infest them.¹³

The discovery came too late to have any effect on the first San Francisco outbreak. But officials dealing with the second San Francisco outbreak and the outbreak in Seattle benefited enormously. In the long view this discovery would have a profound effect on plague history because the final piece of the bacteriological puzzle was now in place. Unfortunately, the information would not be incorporated into anti-plague measures until 1907. In the mean time, US officials had their hands full with the impact plague had on international relations.

Anti-US Policies

In 1903, foreign authorities began to declare their ports closed to ships departing from San Francisco. On January 23, the vice-consul-general of Ecuador declared that Ecuador's ports would be closed to all arrivals from San Francisco.¹⁴ Mexico also quarantined against the US, and Mexican officials announced that the US was to blame for plague in Mexico. Plague was declared in Mazatlan on December 22, 1902 and by January 16, 1903 there had been 13 deaths from plague at Ensenada. Mexican authorities claimed the disease had reached Mexico via US steamships transporting Chinese travelers who landed at Mazatlan, before making their way to Ensenada to "smuggle themselves across the border" into the US.¹⁵ The US countered that Mexican immigrants had brought the disease to southern California. Both countries promptly quarantined

¹³ Public Health Reports. Vol. XIII, 1903, P 1971.

¹⁴ Public Health Reports. Vol. XIII, 1903, P 255.

¹⁵ Public Health Reports. Vol. XIII, 1903, P 73.

each other, creating a rift in relations and economics. It was a good thing that events elsewhere had quieted down.

1904 & 1905 – The End of the First Outbreak

There was a total of 7 cases of plague in San Francisco in 1904 and not a single case in 1905.¹⁶ The measures of the past 5 years had not always been successful, but had eventually suppressed the plague. A unanimous resolution was adopted by the Board of Health and ratified by the Marine Hospital Service on February 16, 1905 which declared the end of plague in San Francisco. The resolution said Chinatown had been put into a “comparatively sanitary state” and that the since no plague cases had occurred there for one year, anti-plague measures could be discontinued. The resolution also gave thanks to the Marine Hospital Service for its assistance in the “welfare of San Francisco’s high sanitary state and commercial prosperity.”¹⁷ All laboratory and inspection work, with the exception of the poisoning and examination of rats killed by Danysz’s virus, was stopped as of April 25.¹⁸ The future of San Francisco looked bright and plague free.

1906 – Plague Follows an Earthquake and Fire back to San Francisco

In the early hours of April 18, a massive earthquake rocked San Francisco.¹⁹ The earthquake sparked a citywide fire and the destruction wreaked on the city was a major blow to all of the sanitary improvements that had been made during the past 5 years. Additionally, parts of the city that had never been touched by plague were instantly

¹⁶ Link, 1955, P 93.

¹⁷ Public Health Reports. Vol. XX, 1905, P 345.

¹⁸ Public Health Reports. Vol. XX, 1905, P 801.

¹⁹ Mayer, Robert ed. San Francisco: A Chronological and Documentary History, 1542 - 1970. Oceana Publications, Inc.: New York, 1974, P 31.

transformed into ideal locations for the disease to flourish. This time, the disease was not limited to the ethnic quarters, but raged indiscriminately. In fact, there were more Caucasian victims than of any other race. *The Evening Daily News* predicted that “The progress of San Francisco has received a check form which it will probably taken (sic) many years to recover.”²⁰ The author did not refer to anything specific, but it is possible he meant not only commercial and social progress, but also plague. He was right. The task of feeding and sheltering the people of San Francisco was enormous and sanitation became a second priority. Large numbers of people were forced to live in makeshift huts with no plumbing. It was practically unavoidable that the plague would reemerge. It did, with a vengeance. In 1907 alone, there were 184 cases of plague, compared to only 152 cases of plague in San Francisco between 1900 –1905.²¹ The reaction to the second outbreak, however, was superlative compared to the first. Ironically, the earthquake had allowed San Francisco officials a chance to redeem themselves by incorporating the newfound bacteriological information into their anti-plague policies.

²⁰ San Francisco: A Chronological and Documentary History, 1974, P 114.

²¹ Link, 1955, P 102.

CHAPTER V: THE SECOND SAN FRANCISCO OUTBREAK AND THE OUTBREAK IN SEATTLE

1907 & 1908 – San Francisco and Seattle Get a Chance to Get it Right

During the 1907 outbreaks in San Francisco and Seattle officials reacted quickly and efficiently to plague by incorporating the discovery that the fleas that lived on rats were the primary transmitters of plague to humans into their anti-plague measures. This knowledge allowed them to create and enforce measures that specifically and extensively targeted rats. Consequently, the reports of that period relate the most successful encounters with plague in North America. It is true that extensive anti-rat measures could have been implemented without this knowledge. But they were not. The discovery was the driving force behind these measures. Seattle was the first city to take this course.

Seattle's outbreak consisted of seven cases, all of which were fatal. The first case of plague died on October 13, 1907.¹ Two ordinances were quickly issued. Ordinance No. 15957 prohibited the dumping of garbage and other things on public or private property. "It shall be unlawful for any person to have or permit . . . any nuisance detrimental to health, or any accumulation of filth, garbage, decaying animal or vegetable matter, or any animal or human excrement."² This destroyed the rat's habitat. Ordinance

¹ Link, 1955, P 95.

² Fricks, L.D. Public Health Bulletin No. 232. "Review of Plague in Seattle (1907) and Subsequent Rat and Flea Surveys," 1936, P 8.

No. 17391 provided for the rat-proofing of buildings. Section 1 of the ordinance dealt with the storage of food. Section 2 dealt with improvements that had to be made to buildings to make them rat proof. It required “the use of screens, netting, cement . . . as to prevent rats from gaining entrance.” Also, each building was to have two or more traps that were to be freshly baited twice a week and inspected daily. Section 3 detailed the protection of docks with wire screens and netting, and Section 4 made similar requirements of slaughterhouses. Finally, Section 5 provided for a \$100 fine, or 30 days in jail, or both, for noncompliance.³ These provisions kept rats, and consequently their fleas, as far as possible from humans. The relative mildness of plague in Seattle, and its short duration, was credited to these two ordinances.⁴ It is important to note that these ordinances might not have been passed, or strictly enforced without the discovery of the flea’s role in transmission. Seattle’s outbreak lasted only 3 months because those measures were enforced.

In September 1907, the Marine Hospital Service under the direction of Passed Assistant Rupert Blue was called back into the city of San Francisco and surrounding areas including Berkeley, Oakland, and Alameda, to oversee the eradication of plague.⁵ The most significant differences in the management of the San Francisco outbreaks were the use of extensive anti-rat measures and that, this time around, the people of San Francisco were informed and encouraged to be involved in the eradication of plague.

A telegram sent by the Board of Health to the owners of business called on them to assist the plague officials “in ridding of their premises of these pests which are so

³ “Review of Plague in Seattle,” 1936, P 9.

⁴ “Review of Plague in Seattle,” 1936, P 28.

dangerous to the health and commerce of the city.”⁶ Owners of large establishments were to employ professional rat catchers and employees of all businesses were to be involved in trapping and poisoning. All refuse was to be placed in metal cans with tight fitting lids and the wooden basement and ground floors of buildings were to be cemented. The extent to which these requests were complied with is unknown. However, the inclusion of the public in plague measures was probably a big part of the outcome of the second San Francisco outbreak. Rather than covertly carrying out measures, or promoting controversy, the officials sought to educate the public. Post-quake San Francisco was a city unified in reconstruction and progress.

In January of 1908, San Francisco Board of Supervisors launched a major education campaign. Officers of the State Board of Health filled requests for lecturers and visits to clubs and improvement associations. A meeting scheduled for mid-January invited over 600 prominent citizens to come and aid in “the further dissemination of knowledge concerning plague and its transmission.”⁷ By March the city was alive with anti-plague fervor:

Meetings of every line of business and trade have been held, the aid of the church federation invoked, the school teacher and their pupils interested . . . the women’s clubs have . . . placed voluntary inspectors in the field . . . and the entire public taught the danger of plague and the means of avoiding it and rendering the city permanently plague proof.⁸

The image of a committed, knowledgeable, and cooperative San Francisco stands as a sharp contrast to the dark days of 1900. The new anti-plague measures, coupled with this

⁵ Public Health Reports. Vol. XXII, 1907, P 1273, 1385.

⁶ Public Health Reports. Vol. XXII, 1907, P 1505.

⁷ Public Health Reports. Vol. XXIII, 1908, P 119.

effort at a united movement, was the reason for the successful suppression of the last San Francisco outbreak. Other possible means of suppressing plague were ignored in favor of giving extreme anti-rat measures widespread attention.

The use of Yersin's serum and the efforts to develop a more potent form of the serum is one example of an anti-plague measure that was abandoned in the wake of extensive anti-rat measures. Yersin's serum had been used with debatable success through 1902. During that year the Marine Hospital Service reported that the "great expectations hope for from Yersin's serum have not been realized," and that efforts to develop a more effective form of the serum would become the focus of extensive laboratory work.⁹ That work, however, was never reported on. The discovery that fleas and rats were the primary disseminators of the plague came just over a year after this endeavor was announced and diverted attention away from the use and development of anti-plague serums to extensive anti-rat measures.

The monthly reports of the number of people vaccinated in Hawaii, which had reached as high as 252 in November of 1902, disappeared altogether after the connection between rats, fleas, and human plague was discovered. Simultaneously, the numbers of rats caught or killed and examined skyrocketed in Hawaii, San Francisco, and Seattle.¹⁰ Before the 1903 discovery the largest number of rats that had been examined during one week had been 125.¹¹ After that discovery the number of rats examined during any one

⁸ Public Health Reports. Vol. XXIII, 1908, P 267.

⁹ Public Health Reports. Vol. XVII, 1902, P 1865.

¹⁰ Public Health Reports. Vol. XVII, 1907, P 2582.

¹¹ Public Health Reports. Vol. XVIII, 1903, P 592.

week ranged between 1,138 and 2,481.¹² The total number of rats collected during this time ranged from 4,360 to 8,235 per week before dropping off to around 2,000 after the last cases of human plague had been verified.¹³ The extraordinary increases in the number of rats collected and considered by plague officials showed the enormous amount of effort diverted toward creating and enforcing anti-rat measures. The effect of the 1903 discovery is not only visible in the anti-rat measures it produced, but also in the attention that it focused away from other anti-plague measures. Fortunately, these measures succeeded and the lack of further research into serums was not a hindrance in eradicating the plague. The anti-rat measures spawned by the 1903 discovery did the job.

The End of Second San Francisco Outbreak and . . . The End

Only two cases of plague occurred in San Francisco in 1908. Both recovered. On March 30, 1909, a banquet was held where every officer of the Marine Hospital Service who had been active in San Francisco received a medal. Dr. Blue was also presented with a gold watch.¹⁴ These officials were honored for eradicating the plague – a process that mandated assimilating bacteriological discoveries into plague management.

It might seem that harsh criticism of some officials responsible for public welfare is justified at a number of points in this history, and in the case of 1900 San Francisco, that might be true. But the difficulty of isolating and identifying plague bacilli cannot be dismissed. Officials were doing the best they could with the information they had. They deserve no harsher criticism than officials in Honolulu who saw rats as indicators of areas that needed sanitation attention, rather than as culprits in the spread of disease. The

¹² Public Health Reports. Vol. XXII, 1907, P 1675. Vol. XXIII, 1908, P 1059.

¹³ Public Health Reports. Vol. XXIII, 1908, P 239, 1059, 1721, 1864.

bacteriological knowledge that would change the direction of plague events had not yet been unearthed.

As plague developed in North America it consumed the efforts of an increasing number of individuals and organizations. Local and federal health officials, the media, the President of the United States, and parts of the populace were among the actors eventually involved in the struggle to eradicate plague. The most pivotal characters in this drama, however, had been involved since the beginning. They were the bacteriologists. Bacteriologists were the source upon which each of the other players based their actions. Each new bacteriological advancement had an impact on some part of plague history. The controversy in San Francisco was partly quelled by the reliance on the Marine Hospital Service's diagnosis. International relations fluctuated around the implementation and revocation of quarantines, and anti-plague measures were continuously altered to reflect the latest bacteriological discovery. They developed the knowledge that the health officials used to suppress plague, extensively altering the course of plague. The extensive anti-rat measures used in Seattle and San Francisco were the most successful because they were a direct result of the bacteriological discovery that the fleas which fed on infected rats also fed on humans and were thereby the principal agent of disease spread. Killing large numbers of rats and requiring that buildings be rat proof kept the rats and their fleas, and consequently, the plague, away from people.

None of the outbreaks in Honolulu, San Francisco, or Seattle approached the extent of epidemics experience elsewhere. The history of the North American outbreaks was not significant because of a high mortality rate or a decimating experience, but

¹⁴ Link, 1955, P 22.

because it was so unmistakably effected by bacteriological discoveries. Other countries likely experienced similar reactions to these discoveries, but the North American sources clearly show the impact bacteriological discoveries had on plague history.

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