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The following Preliminary Memoranda on Plague Prevention in Hongkong were laid before the Legislative Council on the 10th instant, and are published.

By Command.

J. H. STEWART LOCKHART,
Colonial Secretary.

Colonial Secretary's Office, Hongkong, 11th April, 1902

PRELIMINARY MEMORANDA ON PLAGUE PREVENTION
IN HONGKONG.

FIRST MEMORANDUM.

SANITARY BOARD OFFICE,
20th January, 1902.

SIR,

As requested by His Excellency I have the honour to furnish him with a brief memorandum on the measures which it is advisable to take in order to combat the annual and seasonal recurrence of plague. Two deaths have been already reported from this disease within the past fortnight, and it is important from a preventive point of view that vigorous action be promptly taken.

2. No success is likely to accrue from the adoption of any measures limited to dealing with plague in human beings and which does not take cognizance of the fact, that plague in rats and mice also disseminate the infection. It does not serve any very useful purpose to remove the sick and cleanse everything in the infected houses and above ground if the infection is being also carried by plague stricken rats from house to house or district to district by the subterranean movements of rats, whether this be effected by rat burrows or by sewers and drains. Both rat and human plague possess infective powers and each can spread the disease not only to its own species but also to the other.

3. Plague is, in fact, primarily a disease among rats, the infection of which can be conveyed to human beings, but once established in human beings the infection is communicable to others by means of the expectoration, by the discharges from the bowels, and by the urine and by discharges from the buboes or glandular swellings which form in this disease. The clothes, the food and surroundings of a plague patient are likely to be infective and spread the disease to others, while the rats in the house which were previously healthy, by eating the food or coming in contact with the clothes or discharges catch the infection and also spread the disease. Accordingly no measures are complete which do not include the prevention of the disease in rats as well as in man. It is because of this intimate connection between rat plague and human plague that the following measures are advised.

4. To begin with the preventive measures against rat infection, it is absolutely essential to know in what houses, areas and quarters of the town the rats are infected with plague. To obtain this intelligence I would advise the appointment of two or three trained medical officers to bacteriologically examine daily the rats which are found dead by the rat-catchers and any that are alive which may appear to be ill. Large numbers of rats do not become infected all at once, but the infection, as in human beings, gradually spreads from one to another until plague among them becomes epidemic. Once the disease acquires a firm hold on the rats the danger to a locality is very great. I think it might be possible to obtain the loan from the Indian Government of some Assistant Surgeons specially trained in plague bacteriological work. The rat-catchers also should be at least doubled in number. The disease among rats could then be localised and the information obtained would cor-

respond in usefulness with the notification and early discovery of plague cases among human beings. It would then be possible to concentrate, with precision, attention on the infected localities and bring special measures to bear on them, with the view of destroying the rats and their infection before these localities became dangerous in any high degree to man. In connection with the habits of rats it may be mentioned here that whenever rats begin to die in numbers, whether from disease or poison, there is a disposition for the others to emigrate from that locality in a more or less distinctly defined direction. This phenomenon of migration should be borne in mind and watched so that on its first appearance the rats coming into a healthy locality may be destroyed.

5. These measures would not interfere with, but should go on side by side with the more general destruction of rats throughout the town and district carried out by the public, the object of which is to destroy the underground agents which are susceptible to the disease and thus prevent the infection from being disseminated further than the already infected areas. If the rats and mice are destroyed in a locality before plague is imported, plague becomes comparatively a manageable disease.

6. The methods of destruction at the disposal of the public are of a limited nature, consisting mainly of the laying down of poison such as arsenic and phosphorous, the employment of rat traps, the pouring of crude carbolic acid down the runs of rats and the killing of them when they endeavour to escape, and, in the case of large firms with godowns and warehouses, the employment of rat-catchers. The methods at the disposal of the sanitary authority are also somewhat limited but can be carried out in a more systematic manner. They consist in the pumping of carbonic acid gas or sulphureous acid gas into small sections of drains and sewers previously blocked up for that purpose, and into the holds of ships and boats infested with rats, the employment of rat-catchers on special areas, the taking up ground floors in infected houses, demolition of the rat runs and the setting up of another slightly infectious disease among rats which is not communicable, like plague, to other animals or to human beings. This disease can be produced by feeding rats with cultures of a coccobacillus discovered by DANYSZ.

7. No single method is altogether satisfactory in getting rid of all the rats, healthy and unhealthy, but each method when employed systematically materially assists in obtaining that object, and the continuous regular and systematic employment of all these methods in a district ultimately produces excellent results.

8. For the preparation of DANYSZ virus to be employed to set up disease among rats and mice, I would advise that the services of Dr. HUNTER, the newly appointed bacteriologist to the Colony, be made use of and be placed at the disposal of the Sanitary Board for the time being. I would further advise that thousands of doses of this virus be systematically distributed in different parts of the town not only during every day of the plague season but throughout the whole year in order that an impression may be made on the enormous number of rats which exist in Hongkong.

9. This desirable result will not be effected in Hongkong unless special measures are at the same time taken at the wharves and landing stages to prevent healthy or sick rats from being imported. Every newly arrived ship moored at the landing stages, without being subjected to precautionary measures, adds its quota of fresh rats to the warehouses and godowns. This is a matter for careful consideration, and precautions similar to those taken in other ports should be introduced at the landing stages and wharves of Hongkong and Kowloon.

10. Once the requisite measures are taken against rat plague, which, some times, in addition to the foregoing, necessitate the evacuation of a badly infected area in order to save the inhabitants from being extensively attacked with plague,

then, the measures against human plague resolve themselves into those that are ordinarily employed against an epidemic disease such as small-pox. These consist in arrangements for an early discovery of cases, the tracing out of their connection with previous cases, removal of the sick from the healthy, cleansing and disinfection of the infected house, and inoculation, if possible, of those persons who reside in localities in which the disease prevails. These measures, it will be observed, are distinct from the everyday routine sanitary duties of an ordinary nuisance and conservancy inspectorial staff whose time in Hongkong is occupied in the morning in supervising the removal by contractors of the nightsoil and refuse, and in the afternoon in making house to house inspections with reference to house nuisances. The inspectors usefully combine with their duties in the afternoon that of ascertaining whether there is any sickness in the house, but as they cannot possibly, in the few hours at their disposal, get over more than a few houses the number of sick persons they discover is necessarily very small. As a matter of fact a large number of the cases discovered are dead or dying. There is one trained disinfecting Inspector. For ordinary times when the Colony is free of epidemic diseases an establishment of this kind, with the Medical Officer of Health and Assistant Medical Officer of Health, may, possibly, be sufficient, but at times of emergency and particularly when an epidemic disease becomes endemic, recurring year after year, special officers and special establishments are required to contend with the special conditions that have arisen.

11. The town and district should be divided into conveniently sized districts with a medical man and sanitary inspector in each, their work to consist in the discovery of cases, house to house visitation, and supervision of preventive measures. If they could be assisted by some of the more influential Chinese residing in the district it would be a great advantage. Whenever a case of plague occurs in a house not only should the necessary measures be taken for that house but a zone of houses and buildings surrounding and adjacent to the infected house should be inspected daily by the medical man of the district to ascertain that the inhabitants are healthy and not suffering from any suspicious symptoms. The history also of every case should, as far as possible, be always traced out and recorded as it often gives the clue to the discovery of other cases and other unsuspected infected localities. Particularly the whereabouts of relations and friends who have had communication with the sick or to whom clothes or other articles have been sent from the infected houses should be ascertained. A daily inspection should also be made of the houses within the zone in order to ascertain that all rats have been destroyed and that fresh rats have not taken their place. I understand that there is great difficulty in obtaining trained medical men for this work. The same difficulty has arisen in other places and has been overcome by securing the temporary services of medical men from elsewhere.

12. Inoculation with Haffkine's prophylactic should be encouraged. If the protective effect of the prophylactic were carefully explained to the inhabitants in the immediate neighbourhood of a plague house, or to those who have come in contact with a person sick of plague, many, probably, could be persuaded to be inoculated, especially if some of the more enlightened residents in the district showed an example by being inoculated themselves. This prophylactic is very efficacious. In Poona, Bombay, and Capetown I found it gave a very great protection to those inoculated, the difference of attacks between those inoculated and not inoculated being nearly 80 per cent. The Plague Commission sent to India from England reported very favourably on the protective effect of Haffkine's prophylactic especially when two inoculations were carried out at intervals of one week from another. The prophylactic is not an absolute protection, but it diminishes the chances of attack immensely, and, at the same time, if an inoculated person should be attacked it reduces the chances of death. The inoculation is a very simple process more quickly

done and less painful in its doing than that of ordinary vaccination. The inoculation causes in a few hours fever, headache, malaise, and discomfort for about thirty-six to forty-eight hours and a painful swelling at the site of the inoculation which necessitates rest for a day or two. The discomfort and pain experienced in the inoculated arm are, however, seldom greater than those following vaccination against small-pox and only last a few days instead of a fortnight as in the case of vaccination. The inoculation against plague with properly prepared material is perfectly harmless. If the inhabitants residing in a zone surrounding an infected house are inoculated, they are rendered in a high degree immune to the plague and the risk of the spread of the disease among the inhabitants in that particular area, which is a dangerous area, is much reduced.

13. In Hongkong with its proximity and daily intercommunications with Canton and Macao which appear not to be free of plague, it is necessary to prevent, as far as possible, the importation of plague because every such importation is likely to add to the number of infected centres. This requires arrangements and medical officers for the inspection of incoming passengers from these places. Possibly in the Port as in the districts, Assistant Surgeons from India trained in plague work could be employed under supervision.

14. Connected with the removal of the sick from the healthy, I understand there are special difficulties owing to the Chinese having a dread of being taken to an European hospital.

It is believed, however, that these difficulties could be overcome to a large extent by allowing the large firms to establish private hospitals with Chinese doctors and nurses to attend the sick. If such hospitals are erected on suitable sites approved by the Medical Officer of Health, are equipped with the proper sanitary appliances requisite in an infectious hospital, and the necessary precautionary measures of disinfection carefully carried out in order to prevent them from becoming centres of infection for the locality in which they are situated, I see no objection. For all sanitary purposes the hospitals would require to be under the supervision of the medical staff of the Sanitary Board. It would be an immense advantage to secure in this way the assistance and co-operation of the different firms in the early discovery and isolation of the sick.

I have the honour to be,

Sir,

Your most obedient Servant,

W. J. SIMPSON, M.D., F.R.C.P.

The Honourable

J. H. STEWART LOCKHART, C.M.G.,

Colonial Secretary.

SECOND MEMORANDUM.

HONGKONG, 20th March, 1902.

SIR,

I have the honour to submit to His Excellency a resumé of the conclusions which I have arrived at during a somewhat short stay in the Colony investigating plague.

2. The material for the study of this disease is mainly taken from the past, owing to the fact that, during my stay in the Colony, only a few cases of plague have occurred. The conditions and circumstances which favour the annual recurrence and epidemicity of the disease have, however, been more or less present as in preceding years.

3. The population of Hongkong is mainly Cantonese, and there is a stream of people passing continually from the towns and villages of the Province of Kwantung and adjoining territory to Hongkong and *vice versa*. This continuous circulation by steamers and by junks goes on throughout the year, but is more particularly great in volume at and after the New Year and again at the tombs festival in April. It is between the New Year and the date of the last return from the festival that Hongkong incurs a serious risk of infected persons, infected clothes, and infected rats being brought into the Colony, varying in different years apparently with the amount of plague in these Chinese villages and towns. Later the risk is reversed by infected persons, things and rats, being carried in boats from Hongkong to the mainland. This was the case in 1894, and it repeats itself in other years. In a little over a fortnight, the Chinese will be going home to celebrate the tombs festival.

4. One of the circumstances that tend to keep up the recurrence of plague, is this intimate intercourse with infected areas; another is that Hongkong is a great emporium, with hongs and godowns filled with stores and infested with rats susceptible to the disease; a third is the poor class of people of which the greater part of Hongkong consists; and a fourth is the conditions under which a large proportion of this class live. It is essentially a labouring class, floating in its character and non-residential, mostly consisting of males, with their wives and families in the villages of China and, like all people of this class in Eastern towns, living under very insanitary conditions. Hongkong is peculiar in possessing a greater proportion of these insanitary classes and of housing them on a smaller space than other towns. In the early days, owing to the limitation of available land for building purposes and the rapid increase of population, a system came into vogue, when sanitation was considered of no particular account in the East, whereby the inhabitants were crowded into houses built close to one another and heightened as necessity arose without reference to the admission of fresh air and sunlight into the rooms, and each room was subdivided by partitions into cubicles or cabins, generally without windows, which were used separately as a house for several inmates. This system of housing once introduced has continued to the present day, and is permitted everywhere except on the ground floors and in houses in lanes less than 15 feet wide, where cubicles are only allowed on the top floor. It has been permitted to continue even in Kowloon, on the opposite side of the harbour. The result is that, in the older part of the town, there is a greater population per acre than in any town in the East I am acquainted with. In No. 5 District, for instance, there is over 840 persons per acre, which is more than three times the worst and most crowded area of Calcutta. Apart from too many houses being erected on too small a space, the evils attendant on the overcrowding of a dirty class of people are accentuated by the kind of buildings erected. It is possible to erect high buildings

which are sanitary, but in Hongkong the buildings are insanitary in structure and design, and also high. The proximity of the older houses to one another obstructs sunlight, and the internal structure of the houses, apart from cubicles, further darkens the rooms so that it is often not until one reaches the second or the top storey that there is a sufficiency of air and light to secure a healthy habitation. It is in these dark rooms and shops that rats and human beings have a common habitation.

5. The endemicity of plague in Hongkong as distinguished from re-infection, is kept up mainly by infected rats in the godowns and stores and in these dark and insanitary places. The insanitary conditions of the older streets and buildings is a legacy of the past. They were referred to by Mr. CHADWICK in his report of 1882, in which he remarks that "both the design and construction of existing buildings is defective. The Building Ordinance requires complete revision. The amended laws must be enforced with more rigour and intelligence than at present, particularly as to alleys, lanes and open spaces." Mr. CHADWICK's report led to the Public Health Ordinance of 1887, which originally contained clauses intended for the improvement of buildings by providing open spaces at the rear, but which, unfortunately, were deleted in deference to the strong opposition that was raised by one of the Chinese members of the Sanitary Board and by others. It was represented that "landed property in the Colony to the extent of millions of dollars will be sacrificed, vested interests greatly interfered with, and public confidence shaken to the ground."

Since this Ordinance the anxiety of the Government to improve the sanitation of the Colony is shown from the many enactments passed with that object in view. They are as follows:—

Ordinance 1 of 1890,	An Ordinance to appoint an additional member on the Sanitary Board.
" 4 of 1890,	Amendment of Public Health Ordinance.
" 26 of 1890,	Amendment of Public Health Ordinance.
" 11 of 1891,	The Latrine Ordinance.
" 12 of 1891,	Amendment of Public Health Ordinance.
" 5 of 1894,	An Ordinance to remove doubts as to the validity of certain Bye-laws made by the Sanitary Board, and for other purposes.
" 15 of 1894,	The closed houses and insanitary dwellings Ordinance.
" 4 of 1895,	Amendment of Public Health Ordinance.
" 9 of 1895,	Medical Officer of Health Ordinance.
" 11 of 1895,	The Sanitary Committees Ordinance.
" 8 of 1897,	The Government Latrine Ordinance.
" 16 of 1899,	Amendment of Public Health Ordinance.
" 34 of 1899,	Insanitary Properties Ordinance.
" 6 of 1900,	Amendment of Public Health Ordinance.
" 13 of 1901,	An Ordinance to consolidate and amend the laws relating to Public Health in the Colony of Hongkong.

6. It is apparent that there has been a steady endeavour, under considerable difficulties, to obtain powers to improve the ventilation of houses. Scarcely more than six years have elapsed since the appointment of a Medical Officer of Health, and during this period, especially since the passing of the Insanitary Properties Ordinance of 1899, much has been done to open up and endeavour to make habitable a very large number of the worst houses. Dr. CLARK's work and that of the Sanitary Board in this respect are worthy of the highest commendation, and it is a matter of surprise to me, the large number of improvements that have been effected in so short a time. But notwithstanding the activity of the Medical Officer of

Health, who is untiring in his devotion, his labours are not so productive of benefit as the conditions require, because even with the existing Ordinances there is neither the power nor the organization to remedy the past or prevent insanitary dwellings and insanitary areas being constructed in the future. The existing Ordinances, as will be explained later on, do not even secure sanitary dwellings. Moreover to prevent further overcrowding it is essential to raise the existing minimum of superficial area and cubic space permitted for each person and to spread out the population. In Kowloon there has been since 1861 land which could have been utilised, and since 1899 there is abundance of land on that peninsula. Land will also be available in Hongkong itself when the several reclamation schemes which are in hand and which are proposed, are carried out, and the projected tramway is begun and completed. But there will be little use of this land from a sanitary point of view if buildings and streets are permitted to be constructed which are insanitary and the rooms of the buildings are permitted to be subdivided into cubicles without windows, each cubicle accommodating as it often does an entire family.

7. With reference to the water-supply and sewerage, they are stupendous works which the Government may well be proud of. The gathering-grounds of the water-supply were, however, not calculated to cover a succession of years of comparatively small rainfall or the enormous waste that always occurs when water is freely supplied in the houses of a large Eastern population. Hence the difficulties that have arisen with regard to scarcity of water for potable and for cleansing purposes. In my opinion, the sewers and small covered storm-water channels should not be dependent on the ordinary water-supply for flushing. It may, however, be said at once that neither the scarcity of water nor the system of the drainage has anything to do with the plague epidemics. I have only one suggestion to make with regard to the water-works and that is, that after filtration of the water at the Albany filter-beds it should be received into covered reservoirs. This has already been recommended by Mr. CHADWICK. The exposure of water in an uncovered tank after it has been filtered is wrong in principle as it is liable to contamination which, with typhoid and cholera occasionally visiting the island, is dangerous.

8. Having mentioned the circumstances which render Hongkong susceptible to re-infection from the mainland, more specially in epidemic years, and the conditions which favour plague endemicity in Hongkong itself, I shall turn to a consideration of the measures which are feasible and which should be taken to prevent the inhabitants suffering annually from plague. It is impossible to pull down the whole of that portion of the town inhabited by the Chinese and reconstruct it or any considerable part of it, though there are districts, which I shall mention later, that must be treated in this way, while even with the most radical improvements rapidly effected, many years must necessarily elapse before any very great change can be effected. Under these circumstances it is important to concentrate every effort as regards plague prevention on the chief modes by which it spreads, and on organization for its prevention. This concentration of effort is not to take the place of sanitary reform, but it will allow of the inhabitants living in comparative safety while the greatly needed sanitary changes in the town are being gradually effected.

9. The proximity of Hongkong to the Chinese Coast and the very intimate intercourse between the districts of Canton, the West River and Hongkong, together with the fact that the prevalence of the disease in the towns and villages of Southern China are not notified, renders the problem of preventing the importation of the disease specially difficult. I would suggest, if it can be arranged with the Foreign Office, that the Medical Officers of the Consulates in different parts, or the Consul himself, might submit a *weekly bulletin* as to the infected towns or villages in his district in Southern China. Arrangements might also be made with some of the leading medical missionaries for a similar bulletin, and it might be possible, with the concurrence of Sir ROBERT HART and the Chinese Authorities, for a *weekly*

bulletin on this subject to be sent by the Medical Officers of the Customs or by the Commissioners of Customs of the different districts. These would at least assist in giving the Government timely information of infected villages and towns. It is important for this Government to know, at all times, the exact location and state of plague in Southern China for, without this intelligence, no precautions of a precise nature can be taken against the importation of the disease from the infected district, and general precautions are likely, as a rule, to be ineffective. There is no necessity of declaring any place infected, but whenever plague exists in any village or town, suitable arrangements should be made for boarding the vessels coming from the district to ascertain if there is any sickness on board. There are at least four months in the year, from the middle of January to the middle of April, which are dangerous, and for these four months, or even longer, special precautions might readily be adopted, particularly if it is known what villages in Southern China are infected.

10. Medical inspection of the steamers loses much of its value, because the voyage by steamer is so short in its duration. In the case of junks which take longer to sail from port to port, medical inspection is likely to prove more efficacious. Still the examination of passengers can only be a slight screen while the further medical surveillance for 10 days, which forms part of the system of medical inspection, is, by reason of the peculiar circumstances of the Colony, quite impracticable. It is the custom in Europe for the purposes of surveillance to take the name and address of all passengers landing and keep them under medical surveillance by visiting their homes or making them report themselves daily at a central office or offices for 10 days. In the Colony of Hongkong surveillance would be useless because of the very large numbers entering, because of the Chinaman having more than one name, of the probability of the wrong address being given and the impossibility of maintaining an effective watch over the accumulating numbers. The main advantage of the system adopted in Europe is accordingly lost, and it is under these circumstances a question open to argument, although it is certain that plague cases are imported into the Colony, whether medical inspection as understood in Europe is of sufficient value to justify its adoption, and if adopted whether it would not be soon found to be impracticable. A modified system of inspection should, I think, however be introduced during the first months of the year. Ships and junks coming from the Chinese coast, more particularly those coming from districts in which plague is known to exist even in the slightest degree, should be boarded by boarding officers previous to their admission to the harbour to ascertain if there is sickness of any kind on board, and if there is the slightest suspicion of sickness whether supposed to be infectious or not and there is no medical man on board, the ship or junk should be visited by one of the Medical Officers assigned to the port for that purpose. Such Medical Officers and in fact all the Port Health Officers should be part of the Sanitary Department and should report direct to the Medical Officer of Health. Hongkong has no Custom House officers who could have performed this duty. I am, however, informed by the Harbour Master that three or four Boarding Officers would be sufficient for the purpose. Personally, I am further of opinion that the Canton steamers—Native and European—should, during the first six months of the year, carry at their companies' own expense a medical man who might be a Chinese graduate, educated at the Hongkong College of Medicine for Chinese, to examine the Chinese passengers *en route* and report to the Boarding Officers.

12. These arrangements are quite different from placing passengers and ships from infected districts under observation at a quarantine station, and they do not attempt medical surveillance once a passenger has landed. They are simply a rough screen against actual or suspected cases. The system is neither surveillance nor quarantine, and it would not be followed by either of these. The sick or suspicious only would be dealt with and taken to hospital or to the quarantine station for

observation, all others would be freely passed, and, without delay, greater care being taken with those boats coming from districts in which it is known by the bulletins suggested, that plague exists.

13. Special measures should also be taken for the systematic destruction of rats on in-coming steamers and junks from the Chinese coast, from infected ports, and which go to the wharves or into the docks. The junks and steamers anchoring in mid-stream need not be dealt with, nor need ships in transit, provided the precautions referred to in my previous memorandum for the prevention of rats coming on shore from the ships and boats which are moored to the shore are rigorously and properly enforced.

14. The defence against the importation of plague being so weak, it is all the more important that the defence against its spread in the town shall be particularly strong in order that full control over the disease may be obtained. This cannot be said to have been the case hitherto, for there exists no special and separate organization for that purpose.

15. In addition to the ordinary intercourse between China and Hongkong already mentioned, there are thousands of emigrants brought into the town from the districts of Pakhoi, Hoihow, Canton, Amoy, Swatow and the Chinese coast generally to be despatched to Singapore and elsewhere. The busy season is from the New Year to May and, so far as I have been able to ascertain, there is absolutely no control over their housing or movements during their temporary stay in the Colony. Immediately on their arrival they go to the common lodging-houses, boarding-houses, and tenement houses in the town, and are collected from these by the Chinese agents and contractors who have brought or have had them brought from China. No emigrant is allowed to leave the Colony without his or her history having been enquired into and a permit being given, and without a cursory medical inspection before leaving; for this purpose the emigrants meet at the Harbour Master's Office on one day and are inspected on boardship by the Medical Officer of the Port and the Assistant Harbour Master on the next. If rejected by the Medical Officer, the emigrant, unless obviously suffering from plague, goes back into the town, no one knowing where he goes. In the case of American, Philippine and Canadian ports, the medical examination, as distinct from mere medical inspection, is very complete and each emigrant is bathed and his or her clothes and baggage are thoroughly disinfected.

16. The protection of this Colony does not appear to have come into the arrangements. I would advise that emigration be regulated as it is elsewhere, and with this in view, arrangements should be made that the emigrant-houses are known, registered and kept under special control; that they are inspected daily, that their sanitary condition as regards cleanliness, superficial area, cubic space, sunlight and ventilation, is thoroughly looked after, that a proper register of the names of the inmates is kept by the emigrant-house keeper and that the state of health of every emigrant in this Colony is also known, and this can only be obtained by regular medical inspection of the emigrants in the emigrant-houses and immediate compulsory notification of all sickness, whether infectious or not, by the emigrant-house keeper.

17. The early discovery of plague cases is one of the requisites necessary for dealing with the disease. Plague, with its millions of minute and invisible microbes capable of self-multiplication, is more formidable than an army even with smokeless powder and it is as essential, when dealing with plague, to have the earliest possible intelligence of its several movements, as it is for a General in the field to know the exact and if possible the intended movements of the enemy he has to meet.

18. The usual method adopted in plague and other infectious diseases to obtain early intelligence of the disease is compulsory notification by the medical men attending the case and by the householder in whose house the case occurs, which is

then followed up by a very careful inquiry by a medical man with the object of tracing out the causes of the disease, *i.e.*, whether it is due to infection from another case, to infected clothing, to an infected house, to infected rats, or to other causes, aggravated by the conditions under which the patient was living. As pointed out in my last memorandum there is no organization for acquiring the second portion of this intelligence, and for that purpose I recommended the appointment of medical men in districts.

19. As regards the first portion I find that the system for acquiring early information of all cases, which is adopted in England, has been bodily transferred to this Colony without relation to the differing conditions. What is admirably adapted for the conditions of England does not apply to the conditions of Hongkong. Any one reading the Ordinances of Hongkong in regard to infectious diseases without being cognizant of its inner life would consider the bye-laws most excellent. They impose notification on medical men, lodging-house keepers and on householders. But, with the exception of the few European medical men who may be called in occasionally by the Chinese or other Asiatic to attend on them, the bye-laws so far as they relate to the Chinese population are a dead letter. It is the Chinese and Asiatics that are chiefly attacked with plague, and as the Chinese and Asiatics practically comprise over 90 per cent. of the Hongkong community, the value of such bye-laws can be estimated accordingly. The method fails, as has been repeatedly pointed out by the Medical Officer of Health in his plague reports.

20. More serious even than the non-reporting of cases, is that a large proportion of the cases are found dead in the street or floating in the harbour. The dead bodies are conveyed at night from the houses and are thrown into the street or harbour. In 1898, no less than 36 per cent. were thus found, in 1899, 40 per cent., and in 1900, 37 per cent., and this occurred notwithstanding the employment of special constables—soldiers, police and others—for the express purpose of preventing it. Until this is put a stop to, there is no chance of plague being effectually dealt with. The throwing of dead bodies into the street is much worse than leaving the dead body in the house, and all the inmates abandoning the house. In the latter case, it is known at least where the infection is, but in the former case when the dead body is thrown into the street, all trace of the infected house and clothes is lost and an unknown centre of disease remains with probabilities of infecting others, either then or in the next year's season for plague.

21. My professional duty lies in pointing out the fact that, while this continues, plague will not be got rid of in Hongkong. It is for the Government to devise an efficient method to prevent it, or to check it to a minimum extent and which shall not have any more serious drawback than the plague itself. I may, however, be permitted to suggest a method for consideration which seems to me more likely to be attended with success than those hitherto tried. I have very carefully considered the question and have consulted others on the subject, and I have come to the conclusion that the Chinese in Hongkong must be treated in this respect more in accordance with Chinese customs. The responsibility should be thrown on themselves. I would recommend that the City of Victoria and Kowloon be divided into districts and sub-districts, and each sub-district into streets, and if there is a long street sub-divide this again. Then, that each householder be served with a notice pointing out the importance to his own welfare of the plague being prevented and the necessity of his complying with the law and notifying to the Central Sanitary Office, or office of the medical officer in the district, or the police office, any case of sickness or death in his house, and also warning him that, in the event of a dead body being found in his street, that not only he but all the householders in that street, will be subjected to a fine which will be placed in a common fund to defray the expenses of providing watchmen, blocking up the street and of taking other measures to prevent the spread of plague. There is, I understand, a register of Chinese householders kept by the Registrar General.

It has been suggested to me that cremation of the bodies thrown into the street would stop the practice, but I am loath to recommend a measure which would probably hurt the religious feelings of the Chinese.

The method which I suggest does not hurt the religious susceptibilities of any one, but it brings home to all through their pocket that each Chinese resident has certain responsibilities and duties to perform with reference to the prevention of plague, and, doubtless, when this is thoroughly understood, the Chinese of Hongkong will soon organize among themselves a system of reporting instead of as hitherto giving no assistance.

22. It is essential and only fair at the same time that every household in the Colony should be informed by means of hand-bills what are the causes and symptoms of plague and what should be done in the event of plague breaking out in the household. The vast majority of the population is ignorant of the wishes of the Government and of its benign intentions in the matter of plague prevention. Instead of viewing any regulations which they may hear of as intended for their benefit, as well as of the community at large, and in the carrying out of which everyone is interested, they treat them with the greatest suspicion and alarm and as just objects for evasion.

Certain hand-bills have been printed in English and Chinese giving information about plague and its prevention. I would recommend that, with some modifications, at least 100,000 copies be printed on coloured and attractive looking paper and that they should not only be distributed so that every householder, shopkeeper, caretaker and godown holder should be given one or more copies but that a copy should be posted on every door of a household, in a conspicuous place in every junk, sampan, native vessel, steamer, craft, workshop, restaurant and factory. In this hand-bill special prominence should be given to the destruction of rats and equal prominence to the addresses of the places where sickness can be notified. Enormous sized posters should also be placed in prominent places in the streets and also in the more public resorts of the Chinese. A conference of Chinese doctors should also be held and the necessity of notification and early reporting should be explained to them; similarly the Chinese contractors of labour and, if possible, the heads of the guilds, should be made fully acquainted with the wishes of the Government.

23. Another and additional method of improving the intelligence branch of the plague department and locating the disease is the bacteriological examination of all rats daily secured by the rat catchers. It was with this object that I recommended three doctors trained in this kind of bacteriological work. As the number of rats secured are gradually mounting up and, I hope to see over 1,000 disposed of in a day, probably more doctors will be required for this bacteriological examination. It may be taken as a fact that an infected rat in a house or in a locality means plague in that house or locality sooner or later unless prompt measures are taken to eradicate the infection. Even the Chinese in their villages recognise the fact that when rats are dying in a house, it is dangerous. For the purpose of locating plague, the daily examination of the rats bacteriologically gives most valuable information and it is all important that this information should be promptly acted upon. By this means the infection can be localised and the measures of prevention concentrated on the infected area.

24. Having organized the machinery for the early discovery of human and rat plague together with the machinery for tracing out its ramifications and conditions of extension, the plague department is in a position to deal with the disease. In January a case of plague in Jardine's Bazaar was reported to the Medical Officer of Health by a European medical practitioner. The plague patient was the Chinese wife of an Indian who always employed a European doctor. It was merely accidental then that this case came to the knowledge of the authorities. On careful enquiry,

which occupied much time, it was discovered that other suspected cases had occurred in adjoining houses and had gone home and died in their villages in China. It was a locality also in which an infected rat had been found some time before. The block of buildings to the extent of some 20 houses were closed and the inmates were temporarily housed by the Government in a new set of buildings. On examination of the block after its abandonment, 23 dead rats were discovered and the houses themselves were found to be rat-ridden in floors, ceilings and walls; a rat could pass from one end of the block to the other through these rat runs.

25. It is important to thoroughly grasp the fact that plague spreads slowly at first whether among rats or human beings. It is no doubt influenced by the weather, so are armies, which seldom mobilise or carry on active operations in the depth of winter, and it is during a mobilisation of plague, which is a slow process at first but very rapid afterwards, that effective work can be done to destroy it. When an epidemic once gets beyond a certain stage none of the measures which were useful at the beginning will influence the duration of its destructiveness. Measures such as the vacating of a whole block, on account of rat or human plague will prove successful if applied promptly and at an early stage, but cannot be recommended later on because of their impracticability.

26. The abandonment of the block is a mere temporary measure and of little permanent value unless the rats in the block are destroyed and the houses made rat-proof. In many of the old houses I have examined, I find the footings of the walls consisting of loose rubble stones so that rats are able to pass easily under the floors from house to house, and in old houses with hollow walls to pass up to the ceiling and often by this means into the rooms of the upper storeys. The filling up of the rat runs in the footings with glass and cement and a three or four-inch layer of cement on and at the sides of the footings and on the floor are necessary to render the ground floors safe.

27. As in the vacating of large blocks, which is quite feasible and useful at the commencement but which is impracticable later on, so it is with the isolation of contacts. After a certain stage, it is impracticable to provide for contacts and keep them under observation. The vacating of the house is the chief measure. When this is done promptly it has been ascertained that the number of contacts falling ill afterwards forms but a small percentage. If arrangements are made for the disinfection of the clothing and effects of the contacts and they are thoroughly examined by a medical man, they can be allowed to go to certain districts, provided it was not a case of pneumonic plague which, at the highest computation, forms a very small percentage of the plague cases. In such a case the contacts from the floor should be provided for.

The system until lately practised of vacating a floor for six hours only during the fumigation should, therefore, be replaced by a complete vacation of the building in all cases.

28. If a case of plague occurs in a house a medical inspector with an interpreter should immediately visit the house and make as careful an enquiry as possible into its history and the manner in which it was probably caused. If it is a case of pneumonic plague the inmates of the floor should be treated as contacts and isolated for 10 days. If not a case of pneumonic plague the clothes and effects of the inmates of the floor should be disinfected by steam and they should be permitted to leave. If it is possible to get them to report themselves for ten days at the Sanitary Office of the district in which they reside, it is useful; if not possible then the risk run is after all small. The house itself should then be vacated; and by the house I do not mean the one room which may contain half a dozen families, but the whole building; and a bye-law should be passed without delay to

give effect to this. The building having been vacated the floors, ceilings and walls should be thoroughly examined for rat runs; rat poison and rat-traps should be laid down for one night and then the building should be cleansed and disinfected. Usually it will be found necessary that the owner should make the house rat-proof and put it in a sanitary condition before it is re-occupied. If a sufficiency of light and air cannot by structural alterations be admitted, it should be declared on that account unfit for human habitation and should not be re-occupied. The rats in the adjoining houses should be destroyed and examined bacteriologically and, if found necessary, these houses should also be rendered rat-proof and altered so as to admit a sufficiency of air and light.

A similar procedure of vacating the house should be carried out when rats infected with plague are discovered therein, or when several infected rats are found in the adjoining street.

29. The plague work should be independent of the ordinary sanitary routine work of the day, and therefore requires a special establishment which can work in conjunction with the Sanitary Department and get the benefit of its assistance. But the two should not be amalgamated to that degree that one set of duties are lost in the other. The Director and executive Head of both should be the Medical Officer of Health for the Colony. His time must not, however, be occupied with clerical work, which should be relegated to a capable head clerk or if necessary several clerks working in his office. I would recommend that the *weekly bulletins* received by the Government and all official documents relating to the Health of the Colony, or to outbreaks of disease in other countries should be sent direct to the Medical Officer of Health; while official documents relating purely to administrative work should be addressed to the administrative President of the Sanitary Board.

30. The duties of the special Plague Department summarised, are:—

- (1) The discovery, location and microscopical examination of plague cases whether—
 - (a) rat plague;
 - (b) human plague.
- (2) The tracing out of the history of the human plague and the connection with others, if any, of each case and the following out the course of rat plague.
- (3) The removal of patient and disinfection of clothes, &c.
- (4) The examination of contacts and disinfection of the contacts' effects.
- (5) The vacating of buildings.
- (6) The destruction of rats and the cleansing of infected buildings.
- (7) The seeing that infected buildings and adjoining buildings are made rat-proof and that air and light is admitted into these buildings.
- (8) The careful supervision as regards cleanliness and freedom from rats of the houses provided by the Government for people removed from any block of buildings.
- (9) The boarding of vessels when required and inspection of sick persons.
- (10) The establishment of a quarantine station for the observation of any sick persons coming by boat from an infected district.
- (11) The inspection of the quays and reporting to the Harbour Master any relaxation or infringement of the regulations relating to the precautions in the harbour to prevent rats from coming on shore.
- (12) The general destruction of rats in godowns and elsewhere. For this purpose several of Clayton's machines for pumping gas would be useful. The distribution of rat poison in the storm-water

channels, houses, quays, stores, &c.; the superintendence of the work of the rat catchers; the preparation of cultures of *Danysz bacillus* and its distribution.

- (13) The special destruction of rats in infected areas.
- (14) Preventive inoculation with Haffkine's prophylactic.
- (15) The keeping of the necessary registers and notices, also bulletins received from Southern China and the issuing of the weekly reports.

These duties, it will be seen, are distinct from the ordinary routine of the Sanitary Department, which is occupied chiefly in matters relating to the scavenging and conservancy of the City of Victoria, the villages and Kowloon; to the abatement of nuisances, etc.; to the drainage of houses; and to the dealing with cases of small-pox, cholera, diphtheria and other infectious diseases.

31. Neither do the duties in any way touch the larger sanitary questions of the Colony such as the distribution of the water-supply and its purity as apart from the constructive work, the maintenance of the sewerage and its flushing arrangements, the laying out of streets, public and private, projecting new streets and scavenging lanes, improving the line of old streets, the reservation of open spaces, the construction of healthy houses, the space to be left between and about buildings to secure free circulation of air, the provision of public and private latrines and urinals. Nor do they include the abolition of cubicles without windows nor the larger questions relating to insanitary property. There are areas such as No. 5 district in which nothing short of acquiring the property, compensating the owners, and demolishing and reconstructing, can improve the sanitary conditions, and there are others in which the conditions can gradually be improved. There is also the very important duty of preventing what is actually even now taking place of insanitary areas springing up in the town; and of blocks of buildings being erected to contain hundreds of inmates without the owner of the buildings being obliged to provide for each house a latrine in the backyard, and for every block a public latrine with a proportional number of seats to the number of inmates the block is likely to contain.

32. It is only necessary to enumerate these sanitary duties which are now more or less carried out by different and independent officers, but are not co-ordinated under the head of a department, to make it obvious that a Sanitary Board, meeting infrequently and having a President who is particularly well fitted for the position, but who is not expected to devote his whole time to the duties or even the greater portion of his time, who has no administrative or executive powers other than carrying out the decisions of the Board in meeting and who is not on the Executive Council of the Government, cannot give that continuous and detailed attention to the sanitary requirements which the rapidly growing City of Victoria on one side of the harbour and the town of Kowloon on the other, demand.

33. In order, however, that the President and Sanitary Board shall be able to effectively deal with these questions, it is necessary that the Public Health and Building Ordinances shall give them the necessary powers. I have already mentioned that the internal design of a Chinese house as constructed in this Colony is insanitary. The rooms, as a rule, are far too deep, the object of this depth being to sub-divide each room into a number of cubicles for the accommodation of families or lodgers. Though there may be windows at each end of the room, the great depth materially obstructs the light. For instance, to take an example from the better class of buildings, many of the houses that are being erected on the Praya are eighty feet deep without lateral windows and contain long narrow rooms of fifty-five feet in depth, by twelve or thirteen feet in width, lighted in front by a window and also in the rear by another window which looks into a backyard of twelve feet in depth. The houses are sixty feet high and behind the backyard of twelve feet, approached by a

bridge, are the kitchens, on each floor. The kitchens form a building as high as the house, and practically cut off the greater part of the light from the back. These long tunnel-like rooms are dark of themselves and are still further darkened by insufficient open space behind. As if this were not enough, a masonry verandah ten feet wide is added in front on each storey and projected not on the site belonging to the house but over the public street. This verandah still further obstructs the light. When occupied as a tenement dwelling each room is still further darkened by being sub-divided into cubicles each separately occupied by a cubicle holder who may have his wife and family or his friends living in it. The air in these cubicles is stagnant and the light in them, from a sanitary point of view, is most inadequate. The projection of these several-storied masonry verandahs over public streets is a curious privilege or custom that has arisen in all streets over fifty feet in width. It is tantamount to the Government making a present of a certain amount of land for habitable purposes—for most of these verandahs are practically rooms—to every builder of a house. On the Praya, it is a gift of ten feet for eighty, but in some parts of the town the proportion of land given is greater. In Queen's Road the street is fifty feet wide and the houses on each side of the street have three-storied verandahs. Each verandah encroaches on the public street ten feet to eleven feet, so that practically the street originally fifty feet has been narrowed to less than thirty feet. In determining the height to which a building shall be erected the full width of the street from house to house and not the actual width of the street from verandah to verandah is taken as the measure. It seems as if the builder gave nothing and received a good deal.

34. In any future Ordinance and in any future sales of land the Government should have powers to prescribe the type of house to be built in different parts of the Colony. The long deep rooms without any lateral windows to them are very objectionable. It is obvious also that rules and regulations suitable for European houses at the Peak are not suitable for Chinese houses or for houses of the warehouse and office class. Excellent plans of improved Chinese houses have been prepared by the present Director of Public Works, and by one or two of the local architects. Powers should also be obtained to regulate the maximum proportion of the roofed over area of any domestic building hereafter erected in such a manner that every such building shall have an adequate open space attached to it. This open space should in future be at least one-third of the total area, and the streets and scavenging lanes should not be included in calculating this total area. Back yards should bear a minimum proportion to the height of the houses and not as now to the depth. The depth of a house should be regulated by its lateral windows, the objection to deep rooms is removed with lateral windows. No cubicles should be allowed in new houses unless each cubicle is provided by a window. In old houses the cubicles should be gradually eliminated except perhaps in top storeys, where skylights and special arrangements for ventilation can be introduced. To prevent overcrowding, the superficial area or floor area should be raised from thirty to fifty feet per head.

35. There are other matters which call for attention, but probably the foregoing will suffice to indicate that many important measures require to be enforced and that the details of them can only be properly considered and efficiently carried out by having an administrative President of the Sanitary Board whose whole time is devoted to this work and whose title might be "Sanitary Commissioner" for the Colony.

I have the honour to be,

Sir,

Your obedient Servant,

W. J. SIMPSON, M.D., F.R.C.P.

The Honourable

J. H. STEWART LOCKHART, C.M.G.,
Colonial Secretary.