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REPORT
OF THE
BOARD OF HEALTH
ON A
THIRD OUTBREAK OF PLAGUE
AT SYDNEY,
1903.

BY
J. ASHBURTON THOMPSON, M.D., D.P.H., President,
Chief Medical Officer of the Government.

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ATTACK occurred in the last case of the preceding outbreak on 12th June, 1902; the last plague-rat was taken on 14th July, 1902. The outbreak now to be described began in an epizootic of plague of which the first evidence was got on 12th May, 1903, and the last on 15th August, 1903. It consisted in occurrence of a case of plague in man, in which the date of attack was 17th June, and of one other in which the date of attack was 2nd July; both of these persons recovered. But it is necessary to review the plague-free period which preceded this third outbreak, as well as a part of the plague-free period which followed it; and therefore the account relates to the year and a half which lay between 15th July, 1902, and 31st December, 1903.

2. For descriptive purposes the term just defined may be divided conveniently into three periods, namely (*a*) from 15th July, 1902, to 30th April, 1903, being the preliminary plague-free period; (*b*) from 1st May, 1903, to 15th August, 1903, being the epizootic period;* and (*c*) from 16th August to 31st December, 1903, comprising a large part of the ensuing plague-free period.

3. During the first period the agencies through which watch was kept on the state of the rat-tribe were a staff of rat-catchers attached to this Department, and a similar staff employed by the Local Authority under the Public Health Act for the City of Sydney; the former was under direction of the headquarters staff, the latter under that of Dr. W. G. Armstrong, M.B., D.P.H., Senior Medical Officer of Health for the metropolitan district and titular City Health Officer (*see* Sydney Corporation Consolidation Act of 1902, sec. 59). These rat-staffs continued to work as they had done for long before; that is to say, the Departmental rat-staff attended to that part of the wharf-line which extends from Pyrmont to the eastern head of Woolloomooloo Bay and to the buildings on, or immediately adjacent to, it (*see* Diagram); it also did some occasional work in suburbs outside the City proper. The City rat-staff attended to the whole of the City proper, except the wharf-line, &c. Both used the same methods. They employed traps exclusively, and that kind of open trap in which the animal's neck is broken as soon as it takes the bait, this having been considered to have proved the best form for continued use. Each man set about three dozen traps at night. Members of the Departmental rat-staff attached the addresses at which animals had been taken to each lot, and delivered the carcasses at the Micro-biological Laboratory between 9 and 10 o'clock a.m.; there they were examined by a staff of experienced laboratory assistants under supervision of the Principal Assistant Medical Officer of the Government and Micro-biologist (Dr. Frank Tidswell, M.B., D.P.H.), who was responsible for all bacteriological determinations of

* Thus extended by eleven days for simplification of the analysis, in view of the probability that the epizootic had begun some unascertainable number of days before the date of its discovery.

of plague in carcases, as well as in all specimens from the human body (for methods employed *see* Report, 1900, Appendices A and L, and Report, 1902, pars. 158 to 163). From the beginning of 1903 the Departmental staff was directed to confine its operations entirely to the wharf-line and adjacent buildings; and as it became important to know not merely where rodents had been taken, but also that all the wharves had been regularly visited, they were then instructed to make daily return of all the wharves at which they had set traps, whether animals had been caught or not.

4. Under these conditions 25,664 rats were taken by the two rat-staffs between 15th July and 31st December, 1902; 12,051, or an average of about 70 a day, being all which had been taken by the Departmental staff, were examined in the laboratory (*see* Report, 1902, par. 235). From 1st January to 30th April, 1903, 5,411 rodents were collected by the Departmental staff, of which 5,109 (or an average of about 44 a day) were examined in the laboratory. So that during the whole of the first term from the 15th July, 1902, to 30th April, 1903, 31,075 rodents were taken, of which 17,160 were examined in the laboratory: and they had been taken in neighbourhoods selected in accordance with the experience which had taught that recurrent plague would probably first betray itself in them. None of the 17,160 were infected with plague. Additionally, a few had been handed in occasionally by the City staff, all of which were also healthy; the Senior Medical Officer of Health had reported that nothing to arouse suspicion had been observed in the inland parts of the City which were more immediately under his notice; and on the whole it appeared on 30th April, 1903, to be probable that Sydney had for eight months and a half been really free from plague in its rats, as it certainly had been free from plague in man.

5. Before passing on to speak of the rats collected during the second of the three periods, other work which had been done, and which was still being steadily continued, must be mentioned. In accordance with the general teaching of the two earlier outbreaks (*see* Reports, 1900 and 1902, *passim*) attempts had been made from a very early date to cause Local Authorities under the Public Health Act to render warehouses and food-stores of all sorts, but especially produce stores (in which chaff, hay, maize, lucerne, potatoes, and the like are kept) less accessible to rats, and less likely to harbour them, by obliging owners to make good casual openings in walls and doors, to defend permanent openings with wire-netting, and to substitute solid concrete for wooden flooring in basements. Within the City the Local Authority had most earnestly and most persistently taken up this line of preventive work, and had prosecuted it with much success; and it had done so especially on the eastern side of Darling Harbour, where not only is the produce trade chiefly carried on, but where also the two preceding outbreaks had beyond reasonable doubt taken their local origin. This neighbourhood fell under two authorities. The premises on the western (or water) side of Sussex-street, were vested in the Harbour Trust; those on the eastern side of that street were occupied by various owners in the usual way: But both of these parties were equally subject to the provisions of the Public Health Act under administration within the City of the City Corporation. On the water-side of this street, then, the work now referred to had been steadily prosecuted by the Harbour Trust during the preceding two years, and many (but far from all) premises had been put into satisfactory condition. As regards the eastern side of the street and the rest of the City behind it, the Senior Medical Officer of Health had, in 1901, formed the opinion that progress in this direction would be facilitated by special by-laws, and had presented a code to the Local Authority for the City, which was adopted by it, and which had come into force on 20th February in that year. Then, in view of the dissemination of plague *per saltum* which had so often been observed—a mode of diffusion in which the infection is conveyed with produce from the focus to some distant store, where it is communicated to the local rats and may form the starting-point of an independent sub-epidemic (*see*, for instance, Report 1902, Paddington, Alexandria, &c., &c.), a Model Code of By-laws was framed by the Board to empower Local Authorities to effect similar improvements in municipalities outside the City. All Local Authorities in the Metropolitan District were invited to adopt this Code, which is printed in Appendix B. There also is shown the proportion of them which voluntarily adopted it, and the number in respect of which the Board ultimately had to exercise the powers of compulsion conferred upon it by the Public Health Act of 1902, section 25. Within the City, then, and more especially in that part of it which experience had shown to be most fraught with danger

danger in relation to plague, much preventive work of great importance had been effected, and still was being effected when this third outbreak began, first by the Local Authority for the City under advice of the Senior Medical Officer of Health, and secondly by the Harbour Trust voluntarily working towards the same end with advantage of the same advice. That end was the keeping of rats outside premises, in accordance with the most important of the practical conclusions drawn from the teaching of the first outbreak (Reports, 1900, p. 47. and 1902, par. 9).

6. Description of the second period, or that during which epizootic plague was again observed may now be entered upon; it is dated 1st May to 15th August. On 8th May a firm of produce merchants trading at 153 Sussex-street (on the western, or water, side), made a communication to this Department in consequence of which rat-catchers were told off to watch the premises. They succeeded in catching one rat on the night of the 8th, and another on the 10th; both were healthy. On 12th May a further message was received, in response to which Departmental Sanitary Inspector Lloyd was sent down; he collected three carcasses, of which one was putrid, one was healthy, and one (of a rat which had been killed by a dog in his presence) was infected with plague, as revealed by the positive results of the morphological and cultural tests applied to it by the Microbiologist. Exit of stock from the premises was at once prevented, and a large gang of men was put in to turn it over. On 13th May, this gang delivered two more carcasses at the laboratory, both of which were infected. The stock consisted of maize and chaff. The bags in which the maize was contained were in good order, and were not further interfered with; but many of the chaff bags were broken, and it was thought prudent to cause 650 of them to be sent to a garbage destructor, in which they and their contents were destroyed by fire. In the course of doing this two rats happened to be seen to issue from one of the bags. The premises were part of a row of five houses all similarly constructed, and all in free communication with each other for rats. Sussex-street, at the part now referred to, ran along a low cliff, so that these and some other buildings had but one storey visible from the street, but other two storeys below it which could be entered at the wharf-level behind. Of the three floors of which the building thus consisted, the lowest had been concreted by the Harbour Trust; the other two were of timber, not ceiled. The premises were clean and well-kept, although very old, and presented little harbourage for rats except among the stock.

7. As soon as recurrence of infection among the rats had been thus discovered, the strength of the Departmental and of the City rat-staffs was increased; and the latter was then directed to attach addresses to its takes, and to deliver all carcasses at the Microbiological Laboratory. The Board also determined that it was expedient again to offer a capitation-payment of 6d. for each rat brought in by the general public, and to this was added, for the first time, a capitation payment of 1d. for each mouse. No other limit could be set to the area over which rats might be gathered by the public than that of the metropolitan district; and it was considered that, as a rule, no trustworthy statement as to the premises on which particular rats had been taken could be got from them. A furnace was re-established at a convenient point where the officers in charge were chiefly employed in counting, paying for, and burning the rats tendered to them; but they also had instructions to make such inquiry as was possible, and to note any information of importance which came to their ears. In this way a few enterprising people who thought it worth their while to import parcels of rats from a distance were checked, and occasionally an item of information of more or less value was picked up; but, on the whole, payment of capitation money must be regarded only as a means of securing the destruction of rats. This result must be sharply distinguished from that attained by agency of the organised and carefully supervised rat-staffs, which latter are rather a means of getting intelligence than of destruction.

8. The general plan of action in relation to search, and to treatment of premises on which infected rodents were discovered, was the following:—While 153 Sussex-street and some adjacent buildings were being examined by Departmental officers (operations which resulted within a few days in detection of infected rodents at Nos. 151, 139, and 129*, see Appendix A) a special gang of men, which included a plasterer, was put at disposal of the Senior Medical Officer of Health by the Harbour Trust, which, under his direction and that of the Trust's Engineer, went systematically through the Trust's property on the water-side of that street. A similar gang was reorganised

* All odd numbers in this street lie on its water side.

reorganised by the Local Authority for the City, which went through other properties in that immediate neighbourhood on the eastern side of the street, as well as elsewhere within the City. The plasterer's business was to stop the rat-holes which were very numerous in the old, thick, rubble-built walls of some premises. In this way a great deal of work was rapidly done of a kind which experience had shown to be of the greatest importance in checking epizootic plague. It consisted primarily in moving and re-stacking stocks of fodder and produce, examining them for live or dead rats, cleansing where necessary, and stopping rat-holes permanently; secondarily, in serving notices on the Harbour Trust and on other owners requiring them to defend permanent openings with wire-netting, to repair casual openings, to remove wood-flooring in basements, and to substitute concrete for it. When either of the intelligence-staffs delivered a plague-rat at the laboratory the information, if it concerned premises within the City, was communicated to the Senior Medical Officer of Health, who at once entered the premises on which the animal had been taken, and the premises on each side of them as well; he also concentrated his intelligence-staff in the neighbourhood. If it concerned premises outside the City, similar steps were taken by the Departmental staff, other Local Authorities having been rarely in a position to take effective action with the necessary promptitude. I have no doubt that by these thorough measures—aided by the autumn and winter seasons which, however, I do not suppose to have acted in any of those obscure ways usually classed as “meteorological”—spread of the epizootic was interrupted, delayed, and ultimately checked, and that development of an epidemic was prevented; for at Sydney epidemic plague has always been directly dependent on epizootic plague. There the rat has been the sole source of infection for man (Cf. Reports 1900 and 1902 *passim*).

9. Now, as regards rodents taken during this second period, 1st May to 15th August, the two intelligence-staffs delivered at the laboratory 8,695 rats and 5,976 mice, all of which were there examined. Of the total 14,671 rodents (which were examined at the rate, therefore, of just under 1,000 a week, or about 166 a day), 111 rats and 50 mice were ascertained to be infected with plague. The last plague-rodent was brought in on 15th August. The Departmental staff had still confined its attention to the wharf-line as defined in paragraph 3.

10. Then, as regards the third period, namely, from 16th August to 31st December, 1903, the number of rodents collected by the two intelligence staffs was 8,485 rats and 4,904 mice, total 13,389. The deliveries were at the average rate of about 111 a day; all were examined in the laboratory, and none were infected. The Departmental staff had continued to attend to the wharf-line. Thus, at the end of 1903 it once more appeared that Sydney was free from epizootic plague, and that it had been so for four months and a half.

11. The results achieved through the offer of capitation-money may be briefly reviewed; but as these consisted merely in destruction there is no object in dividing the period, and the whole term from 30th June, 1903, when capitation-money began to be paid to the end of the year may be dealt with at once. During that term of six months 46,472 rats and 22,814 mice were paid for. The record showed that the numbers delivered at the furnace varied very widely between a maximum of 666 and a minimum of 118 a day for rats, and between 322 and 28 a day for mice; but if the gross returns for successive weekly periods were considered, it appeared that these were nearly uniform. Thus the account yielded no evidence that this slaughter (to which should be added the number collected by the intelligence-staffs during the same six months, the whole furnishing a grand total of 88,829 rodents destroyed) produced such an impression on the general horde as rendered collection progressively more difficult; and there was no ground for inferring that any material impression had been thus made on the total rat-tribe. This result was in accordance with the opinion I expressed at first (Report, 1900, p. 47, for instance) namely, that extermination of rats on any large area was practically impossible;* and perhaps no more could be expected from such operations conducted in a district which carried residences housing about 500,000 persons, as well as other buildings. It is fortunate, therefore, that repeated experiences have shown that very strenuous efforts to destroy rats need be made only on those premises, and in their immediate neighbourhood, to which the discovery of one or more plague-rats by intelligence-staffs has directed

* By the methods described above. Further attempts to employ Dr. Danysz' *coccobacillus* usefully are being made.

directed attention; and, further, that during plague-free intervals the work of intelligence-staffs may be concentrated on and confined to that neighbourhood which local experience has shown to be the focus of danger for the city to be defended, or at least to be the locality in which a fresh outbreak is most likely first to take place.

12. One other note may be made, which concerns the difficulties which rat-catching appears to present even to experienced men. The figures now to be mentioned in illustration of this point, are to be regarded apart from those given above, under which they have already been included. During the eight months between 1st May and the end of the year the Departmental intelligence-staff paid 17,656 visits to wharves, piers, foreshores, &c., and to the open or bonded stores and sheds immediately connected with them; but only 4,095 of those visits were successful (or, resulted in captures), and the number of rodents taken was only 10,579 (Cf. Report 1902, par. 114). The premises thus examined were freely open to the appointed rat-catchers, yet their efforts were successful only in about 25 per cent. of their attempts. It will not fail to be noticed that when the object is to investigate a residential area, on which such efforts are impeded by the not unnatural reluctance of householders to admit men who are not personally known to them to their premises at night, the thoroughness of the search actually made, and consequently the value of any negative statement in which it may result, remains doubtful. Nevertheless, experience has shown that such searches have a greater practical value than the facts strictly reviewed would seem to warrant.

13. Before bringing this statement to a conclusion attention may be directed to the extremely small proportion borne by the number of rodents in which plague was identified to the total rodents taken. Such a rate must be struck, of course, with carcasses in which plague was identified, on the rodents taken and submitted to examination during that term (the second) which was defined by the first and last findings of plague-infected rodents; and the total can comprise only the rodents taken by the intelligence-staffs, because there is no evidence that the epizootic extended at any time beyond the neighbourhoods in which they worked. Under these limitations the gross percentage of plague-rodents identified was no more than 1.27 per cent. for rats, and 0.83 per cent. for mice; and the smallness of these percentages is accentuated by the fact that of the total 161 plague-infected rodents, no less than 78 were collected from one premises (a secondary focus; Gray's stables, Waterloo, *see* par. 25 below). If this number be subtracted from the total, then it appears that only 83 plague-rodents were identified in the whole of the infected district which included the original focus and all areas (except Waterloo) infected from it; so that the percentage of identified plague-rodents to the total taken by the intelligence-staffs falls to .55 per cent. for rats, for mice to .58 per cent., the gross percentage having been .56 per cent. But there are several considerations which show that such comparisons, if they are made with a view to gauging the severity of an epizootic, are illusory. The most important of them has been mentioned already (Report, 1902, par. 115); it is that the only methods practically available to rat-catchers tend to ensure capture of healthy rats for the most part. Those alone are taken in traps (as a rule) which are in good health, and which enter them in course of their active search for food, or, if infected, have not reached a stage of illness at which pathological signs have appeared. Hence the percentage of identified plague-rats thus calculated must always be extremely small. An additional reason can be assigned for the low percentage which our accounts show; this attaches to the manner in which I think it best to state the facts. A considerable number of carcasses have been delivered at the laboratory in a state too putrid for useful bacteriological examination, but in which there was every reason to think plague had been the cause of death; and were these counted as plague-rats the percentage would be increased. But I do not think the term "plague-rat" should be applied to any carcase in which the disease has not been identified; and I do not think that the term "identified" should be employed unless the presence of *B. pestis* has been bacteriologically demonstrated.

14. From all this it follows that percentages so struck are useful only in as far as they show the practical difficulties there are in the way of capturing plague-rats, and of identifying the disease which has destroyed them (Cf. Report 1902, par. 5, and elsewhere); a difficulty which, so far, has been generally overlooked, and which, I think, has not been fully appreciated by all even of those who have attempted

attempted to investigate rat-plague in a practical way, but by methods insufficiently systematised. Until it shall have been clearly recognised, and the full weight allowed to it with which it is invested by ascertained facts, the rôle of the rat in relation to epidemic plague will continue to be generally considered obscure.

15. It also follows that if it be desired to measure the extent to which an epizootic of plague has been fatal, the rate must be struck with plague-rats identified at particular premises on the total rats infesting them. But here, again, difficulties will be met with which are quite insuperable. In the first place, the number of the horde which infested the building never could be ascertained; in the second, certainty that the plague-rats identified comprised all which had died of plague never could be reached. For, while in several instances which have been already recounted (Report, 1902, pars. 78, 84, 106, 111, 145, 201, and par. 25 below) very considerable numbers of carcases have been found, the rule has been to find but few, even on premises where it seemed certain the disease had had every opportunity of spreading. This I have ascribed to death of many of the infected animals in burrows, and to the eating of some carcases by other rats.* If it should be suggested that the former might be dug out, it can be replied that apart from all considerations of time, &c., this often could not be done with safety to the building, and even that cases have occurred in which all dead rats could not have been uncovered except by destruction of the lower part of its walls. The practical conclusion, therefore, is that which has already been stated (Report 1902, par. 118); intelligence-staffs can indicate the area over which an epizootic has extended, but not its severity. Consequently, the identification of plague in a single carcase is a sufficient and an urgent call for presence of the cleansing-staff on the premises which yielded it, and for concentration of the intelligence-staff in their neighbourhood. The present account shows clearly that action thus guided, and promptly taken, may be successful in limiting and checking an epizootic, and in avoiding occurrence of a general epidemic.

16. From the foregoing statement we may proceed to investigate the localities in which plague-rodents were detected. The total 161 were taken on 25 separate premises (including the barque "Alsterschwan"), between the 12th May and 15th August. The position of each place is shown on the accompanying Diagram by spots; these are consecutively numbered in order of the earliest date on which a plague-rodent was observed at each place. In a Table printed on the Diagram are shown the addresses of the places, and these are consecutively numbered to agree with the numbers affixed to the spots; to each address is appended the earliest and the latest date on which plague-rodents were found at it. The course of discovery can be easily followed with this assistance, but this must not be taken without reserve as indicating the progress in place of the epizootic itself; for although it appears that freshly-infected spots were discovered as a rule soon after the infection had reached them (because very little evidence of local spread from such spots was acquired in spite of close search for it), yet some delay must generally have occurred, so that it is not likely they were discovered precisely in the order in which they became infected.

17. If, now, these 25 infected places are considered in detail after examination of the local conditions in the light of previous experience, it appears that they may be divided into four clearly-distinguishable groups. Thus, in consideration of the negative evidence furnished by the long-continued watch kept on the rats, and especially on the rats of the wharf-line, which has already been described (pars. 3, 9, 10) it seems probable that the Diagram numbers 1, 2, 3, and 4 indicate the neighbourhood of original infection or primary focus, and that the numbers 6, 9, 7, 10, 12, 13, 14, 17, 18, 19, 20, 21, and 23, most probably indicate gradual spread from it by contiguity, although there is a possibility that some of them indicate places to which the infection was conveyed *per saltum*. The numbers 5 and 8, situated far away from the primary focus on the shores of Woolloomooloo Bay, indicate points to which the two infected carcases to which they refer must have been conveyed either
overland

* About 8 per cent. of carcases delivered at the laboratories are found to have been gnawed or partly eaten. But, although this figure results from test-enumerations, circumstances connected with administrative exigencies reduce it to the status of an estimate. Each rat-catcher must, in the course of each week, hand in a certain minimum number of rats which is accepted as evidence of his attention to duty; and only those carcases can be credited to him which are approximately entire, for if a head or hind-quarters were counted one rat might be made to swell the credit of two men. Now, a considerable number of rats (the proportion is not known) are so eaten that heads separated from the remains of hind-quarters are all that is left of them; and as these pieces are not counted, so they are not often brought in.

overland with goods or by water; and perhaps these two specimens comprised all which were present there, for long-continued search among the wharves and among the houses in their vicinity failed to furnish any evidence of spread of the infection to the local rats. After two months of this search a further single plague-rat was brought in from land attached to an unoccupied private residence standing at the eastern head of this bay (Diagram, No. 22); but in this case again watch was continued afterwards and failed entirely to reveal any infection of the rats in that neighbourhood. It must be supposed, therefore, that this animal also had in some way been carried to the place where it was found. With these instances of transported plague must be included those indicated by the numbers 12 and 13, for these wharves were not only rather distant from the primary focus, but were effectually separated from it on the wharf-line by a large gas-works, as well as in other structural ways; and it may be noted that they were in the neighbourhood of a China wharf to which much fodder, consigned to China, was from time to time conveyed from Sussex-street stores. Lastly, the number 25 must be added to this group; the solitary carcase to which it refers having most probably been transported to the place where it was found, in which no other infected animals could be discovered. The numbers 11, 15, and 16 remain; they are grouped together at a point 2 miles to the south of the primary focus. Doubtless the infection was transported with produce to 11, which was a large stable. The premises afterwards formed a secondary focus from which infected rats spread by contiguity to 15, a soap-works near by, and to 16, a street at some little distance in a different direction; but general infection of the rats in the neighbourhood, although they were numerous, did not occur. Lastly, 24, indicates a ship alongside to which, as well as to the stables just mentioned, further reference will be made below.

18. Thus it is possible to distinguish an original focus, spread from it in its immediate neighbourhood by contiguity, and infection *per saltum*, of at least three distant points; namely, Woolloomooloo Bay, Miller's Point, and the stables at Waterloo. The latter premises afford a further instance of the manner in which secondary foci may become established which is on all-fours with several previously described (Report 1902, Paddington, Alexandria, &c., &c.) although it was not followed by any epidemic.

19. The course of the epizootic just described was marked by occurrence of two cases of plague in man. Time-relations are shown in the Table printed on the Diagram, on which, also, the places at which the patients were employed are indicated by the capital letters A, and B, while the situation of the dwellings they occupied is indicated by the corresponding lower-case letters within a circle. The particulars of the first case were as follows:—

CASE A.

Summary.—W.W., m., aged 15, 9/12; apprentice at a printer's. No former attack; not inoculated. Residence, View-street, Annandale, a suburb about 2 miles westerly from his place of employment, which was at 44, Pitt-street, City. Notified by a friend 20th June; visited 20th June by the Assistant Medical Officer of the Government (Dr. R. J. Millard, M.B., D.P.H.), at Annandale, 12:30 p.m.; admitted to hospital, 20th June; discharged, 20th August; duration of illness, 65 days. Left femoral bubo; morphological and cultural tests positive.

Movements prior to Attack.—Had gone to work regularly for several weeks before attack; went and returned by ferry-boat; left work at 5:30, and had travelled by the 5:50 boat for a long time past; took his lunch with him from home, ate it at the shop, or sometimes on Circular Quay near by; in the evening often went to see a friend at Balmain; Sunday, 14th June, on which date the seventy-two hours preceding attack commenced, was spent as follows:—Stayed at home till 2:45 p.m., went to Sunday-school till 4 p.m., from then till 5 p.m. sat in Wentworth Park, returned home and stayed there. Said that about 10th June he and another apprentice (who was ill at the date of inquiry, was visited, and was found to be free from suspicion of plague), had killed a rat in the composing room; the premises swarmed with fleas.

History of Illness.—June 17th, was well on rising; went to work as usual; at midday began to feel pain in the left groin and in back of head and neck; vomited several times; ate some lunch, but vomited immediately afterwards; got worse, and went home at 3:30; medical advice was not sought. Subsequent symptoms were pyrexia, vomiting, headache, and delirium, especially at night; the bubo increased and became more painful. At examination, 20th June, mid-day, the gland was as large as a pigeon's egg, some periadenitic effusion, tender. No breach of the epithelium of left lower extremity (nor elsewhere).

Residence.—A brick cottage of two rooms; semi-detached; state of repair and cleanliness, fair; pail-closet. It stood next to a large box-factory. Disinfected 20th June.

Employment.

Employment.—A brick building of five storeys, occupied by a printing firm (job; paper from England, America, Holland, and Belgium, after passing through Sydney warehouses); good repair; fairly clean; construction good, but ceilings of wood or iron in some rooms; lighting, ventilation, draining, and inside fittings excellent, and in good order. Cleansed and searched by large staff of employees under direction of Departmental officers, Sunday, 21st June.

Rats.—At residence, no signs; said none had been seen, but mice some weeks before, driven away by cats procured for that purpose. At the box-factory it was admitted a few rats were present; there was plenty of harbourage for them; but on examination it appeared that great care was really taken to avoid attracting them, and there was no sign of infestation; notices forbidding scattering of broken food were found posted, and proper boxes for it provided. At employment all agreed that no rats had been seen since 1902 (but see patient's statement, corroborated by fellow-apprentice); no signs of infestation; one rat-skeleton found, only; ceiling-spaces free; openings in basement walls afforded entry for outside rats.

Contacts and further Cases.—At residence, 4; at employment, 43. No further case at either place.

20. It will be noticed on the one hand that no direct connection with plague-rats was established in this case; but, on the other, that the circumstances appeared to exclude every other source of infection as well. In other words, it is manifest that some circumstance has remained undiscovered which was of determinative character in relation to attack.

21. The second case occurred a fortnight later.

CASE B.

Summary.—R.H., m., æt. 20, unmarried, master-tinsmith. No former attack; not inoculated; had had no communication with the previous case. Residence, Summer Hill, a suburb distant about 4 miles westerly from his place of employment, which was at 125, Sussex-street, Darling Harbour. Notified by Dr. Lawes, 4th July, afternoon; visited by the Assistant Medical Officer of the Government (Dr. R. J. Millard, M.B., D.P.H.), at Summer Hill, 2 p.m.; admitted to hospital 5th July, morning, discharged 5th August; duration of illness, 35 days. Right femoral bubo; morphological and cultural tests positive.

Movements prior to Attack.—Had regularly attended at his workshop for long before his attack; his business caused him to visit many shops and warehouses which stood in Sussex-street, and elsewhere in that neighbourhood; lunched daily at a place in Erskine-street, two doors from Sussex-street; 27th June attended a football match; and on the 28th visited the Coast Hospital to see a workman suffering from typhoid fever, who lay in a ward half-a-mile from the Infectious Diseases Division, in which Case A then was.

History of Illness.—2nd July, felt out of sorts on rising; went to the workshop as usual, and remained till evening, but felt very ill, shivered, and vomited several times; 3rd July, evening, first felt a pain in right groin; 4th July, afternoon, was found in bed, looked ill, headache, photophobia, T. 102·4, P. 84, dicrotic; right femoral bubo not larger than a hazel nut, some periadenitic effusion, very tender. No wounds of leg or foot, but many faint marks which may be flea-bites.

Residence.—Brick-built, two storeys, detached, clean, comfortable, connected with sewers; in all respects in good order. Two rooms occupied by patient were disinfected 5th July.

Employment.—Nos. 123-5-7 Sussex-street are contained within the same external rubble wall, and are very old. Two storeys show above street-level, two storeys below it open at rear to wharf-level. Basement, concrete floor, is a bonded store; next above is a produce store; Sussex-street, or ground-floor, occupied by offices and patient's large workshop; upper floor, a printer's. There were ceilings, and some double matched-board partitions. Premises fairly clean. A gang of twenty men was put in by the Local Authority for the City under the Senior Medical Officer of Health, Metropolitan District, 6th July.

Rats.—Residence was free from any sign of infestation. At patient's place of employment carcasses of rats and mice were discovered as follows:—Basement, 9 rats, 1 mouse; upper basement, 1 rat, 5 mice; ground-floor (in part occupied by patient), 3 rats; in a wing at rear, 4 rats; 18 live mice were also caught. The carcasses were putrid: the live mice were healthy; but on July 8th a mouse and a rat infected with plague were taken at No. 123, which building was one with No. 125; and on 9th July, 3 rats and 7 mice infected with plague were taken at No. 129, next door to the building which contained Nos. 123 to 127. There is no reason, therefore, for doubting that the unusual mortality discovered at No. 125 had been caused by plague.

Contacts and further Cases.—At residence, 4; at workshop, 4. No further case at either place.

22. In this instance direct connection with rats affected by disease was clear, although plague was not identified in any of the carcasses because they were delivered in too putrid a state; two of them were found on the roof of a little glass-enclosed office which was erected in one corner of the large workshop. But on 8th July plague was identified in a rat and in a mouse taken at No. 125, which, as explained above, was structurally the same building as No. 123.

23. A third case of plague came to notice, which occurred on a coasting steamer; the place of infection could not be certainly indicated, but as the balance of evidence pointed strongly to Brisbane, it has not been debited to Sydney. However, the following are the facts:—

CASE

CASE ON THE S.S. "INNAMINCKA."

On 5th September, the Commissioner of Public Health, Queensland (Dr. B. Burnett Ham, M.D., D.P.H.), notified detection of a case of plague in a seaman on board the Adelaide Steamship Company's "Innamincka," at Townsville. He further said that the diagnosis had been established by the Government Bacteriologist (Mr. C. J. Pound), who had reported that the morphological, cultural, and inoculation tests applied to liquid extracted from the swollen right inguinal gland which the patient exhibited had all yielded positive results.

The "Innamincka" was a coasting steamer of 2,500 tons, trading between Sydney and Melbourne to the south, and between Sydney and North Queensland ports to the north; the round trip usually extended from Melbourne to Cairns, Queensland, the port of Sydney being entered on both northern and southern voyages. It occupied about 28 days.

A.H.D., æt. 26, A.B., had sailed in the "Innamincka" for eighteen months before his death. The ship's master and chief mate considered him the most trustworthy member of the crew. He was perfectly steady, and neither smoked nor drank. He was married; his wife and child lived at Drummoyne, a suburb of Sydney. His wife was questioned; she said he always went straight home after his work while the vessel was in port, and as far as she knew he had not visited any other house than his own during the ship's last stay; she last saw him when he left home on the morning of 29th August; he was then perfectly well; he had no wounds about the body. She showed a letter from him which was posted at Brisbane on 31st August, in which he said he was "in the best health." On return of the vessel to Sydney it was learned that A.H.D. had gone ashore at Brisbane on the evening of the 31st August; he was met, returning to the ship, by the carpenter, who asked him where he had been, and was told "to post a letter, and to buy a newspaper and some prawns," which latter he was eating at the time. The vessel left Brisbane on 1st September at 3 p.m. On 3rd September he was at the wheel at 3 a.m., when he complained of feeling ill, was relieved, and went below. The "Innamincka" went alongside at Townsville, Queensland, early on 4th September; the patient was removed to hospital at 9.30 a.m., where he died at some time on 6th September.

The "Innamincka," after her previous voyage, had arrived at Sydney from Queensland ports on 20th August, at 6 a.m.; had berthed at Grafton Wharf, Darling Harbour; had visited the Colonial Sugar Company's Wharf, at Pyrmont, and had sailed for Melbourne on 21st August, at 6 p.m. She returned from Melbourne, and arrived at Sydney 27th August; berthed at Grafton Wharf; left Grafton Wharf for Queensland ports on 29th August, at 1 p.m. She again reached Sydney on her return voyage from Queensland, on 17th September, at 2 p.m. On arrival the vessel was arrested for inspection, but was allowed to go alongside immediately afterwards, no further illness having occurred on board. Rat-catchers were sent on board, and, notwithstanding reported fumigations for destruction of rats at Townsville and Cairns, Queensland, they delivered fourteen at the laboratory, all of which were healthy.

At Sydney the first plague-rat detected in 1903 was identified on 12th May; the last on 15th August. The "Innamincka" always lay at Grafton Wharf, which is one of 15 situated between the Gas-works and Erskine-street, on the eastern side of Darling Harbour. The records of work done by the Departmental rat-staff showed that these 15 wharves had been visited 149 times during August, 1903; 63 rodents had been caught at them and subsequently examined in the laboratory, all of which were healthy except a rat taken at Huddart Parker's goods wharf on 6th August, and a mouse taken at the same place on 11th August; these had plague. This wharf lay rather less than 300 yards south of Grafton Wharf. Special attention was directed to Grafton Wharf and the bonds connected therewith for a time after notification of A.H.D.'s case; visits were paid to it on 6th, 8th, 9th, 10th, 11th, and 13th September, when 22 rats and 31 mice were taken and examined in the laboratory, all of which were healthy. No plague-infected rodents were discovered later than 15th August (at a place remote from this wharf) either in this neighbourhood or anywhere else in Sydney, although the regular search along the wharf-lines continued.

As regards Brisbane, the Commissioner for Public Health has been good enough to inform me that the last case of the 1903 outbreak had been notified on 23rd May, and the last plague-rat had been identified on 8th June; between the latter date and 11th September (95 days) 3,424 rats and two mice had been examined by the Government Bacteriologist, and none had been found infected. But on 11th September 2 cases of plague were notified, and on 26th September 2 plague-rats were identified, all in central parts of Brisbane. From these facts it may be inferred that Brisbane was probably infected in its rats at the time at which A.H.D. landed there, namely, 31st August, on his last voyage.

Three sources of infection lay open to the patient, therefore; these were Sydney wharves, the vessel itself, and Brisbane. Melbourne wharves were under no sort of suspicion then or later, and may be safely excluded. Nothing at any time appeared pointing to infectiveness of the vessel, so that choice lay between Sydney and Brisbane. At what time was the patient infected? From his having been obliged by his illness to leave his post at the end of the third hour of the middle watch on 3rd September, it may, perhaps, be inferred that he was then attacked, or, at all events, that his attack probably began during that watch—say at midnight. He had left Sydney at 1 p.m., 29th August; that was the latest moment at which he could have been infected there. The interval between his arrival at Sydney on this voyage and the time of his attack was about 156 hours, and from the time he left Sydney it was 108 hours. From the time of his arrival at Brisbane to the hour of his attack was 59 hours, and from the time he left Brisbane it was 35 hours. In a case of bubonic plague the period of incubation is very unlikely to exceed 72 hours, and most often it is considerably shorter; yet, as it sometimes extends to 96 hours, and perhaps even somewhat longer, although it has been thought to have done so only in very rare cases which, as a matter of observation, are of doubtful validity, the possibility of his having been infected at Sydney cannot be positively excluded on that ground.

While the general search, and the abovementioned special searches, failed to detect any plague-infected rodent after 11th August at the line of wharves of which Grafton Wharf was one, or at any other part of Sydney after 15th August, subsequent events showed that the infection may well have been present in Brisbane many days before the two cases in man were notified on 11th September. A decision as to the place at which A.H.D. was infected is, of course, not possible; but, in my opinion, the balance of reasonable probability inclines to Brisbane.

24. During the epizootic term, plague-rats were discovered on a vessel alongside, which had arrived from Buenos Ayres; and, as this was the second vessel (only) on which plague-rats have been observed during the four years 1900-3, the following account is placed on record:—

THE BARQUE "ALSTERSCHWAN."

On 18th September, the barque "Alsterschwan" 2,500 tons, left Tacoma, Washington, with a full cargo of wheat, and arrived at Callao, December 14th, 1902. She discharged, took in ballast, and sailed for Buenos Ayres, 4th March, 1903. She arrived at Buenos Ayres 15th April, and anchored in the stream; the Master alone went ashore. Sailed for Rosario, 17th April, arrived 20th; lay in the stream, discharged ballast into punts, and took in a full cargo of maize by means of chutes resting on a cliff about 60 feet high, below which the vessel lay, and left Rosario 17th May. 1st June, she came to an anchor 20 miles off Buenos Ayres, and the same day sailed for Sydney. Arrived Sydney, 29th July, and was reported by the Port Health Officer (Dr. C. W. Reid) as follows:—Crew 26, no passengers; clean bill, good health, good sanitary state; full cargo of maize in bags.

On 29th July, the "Alsterschwan" anchored in the stream for two or three days, awaiting a berth, and then went alongside at Darling Island. On 3rd August, one of the crew offered 112 rats at the public dépôt; this occurrence was at once reported to the Department. On inquiry into the circumstances, the Master said that the rats had been found dead near the ventilators as soon as the hatches began to be removed; and he added that, with some idea of saving the cargo, the holds had been closed much more carefully than usual, and so as to prevent entrance of air as much as possible. To this he ascribed the mortality.

The rat-catchers were directed to secure further specimens, and on 4th, 5th, 6th, and 7th August delivered 1, 9, 25, and 16 rats, all of which were examined in the laboratory; 2, of the 16, were found to be infected with plague. Further numbers were delivered on 8th and 11th August (the latter after fumigation), among which were 6 and 3 infected carcasses.

Immediately after receipt of report from the laboratory, the Master was directed to hoist the yellow flag, and to haul off into the stream, while landed cargo was arrested. Instructions were given for fumigating the vessel with the Clayton Apparatus on two successive days, with an interval between the two fumigations of not less than twelve hours. This was done on August 8th and 9th, the engine having been reported by the Chief Sanitary Inspector to have worked on the first day from 9.30 a.m. to noon, when tests showed 20 per cent. gas in the holds; all was then securely closed down, and not reopened till 6 a.m. on the second day. The second fumigation began at 10.30, 9th August, and afterwards the hatches were again left closed till 10th August. After aeration the vessel was allowed to go alongside again, and to resume discharging under supervision. No live rats were seen.

The vessel was under orders to proceed to Newcastle after discharging at Sydney, there to take in a cargo of coal. She carried no ballast, and relied for stiffening on about 650 tons of maize which were consigned to Newcastle. To have caused her to discharge this also at Sydney (as was desired in order to search for and remove all carcasses of rats) would have obliged her to take in 500 tons of coal instead by way of ballast. The course usually taken under similar circumstances with produce-stores, warehouses, &c., ashore was directed: this portion of the cargo was turned over under supervision of Departmental inspectors; faulty bags were emptied and their contents replaced in new bags. This, and a general cleansing and search, occupied about five days, during which the vessel was hauled off from the quay. 117 carcasses were discovered in various parts of the vessel, and no live animal was observed. Thereupon the ship was released, and sailed for Newcastle.

Part of the cargo, landed before detection of plague, had passed to consignees and was not interfered with. Part still on the quay was turned over, and new bags were substituted for faulty bags. No aeration or disinfection of bags or grain was done, and distribution of the cargo was not interfered with further. As appears elsewhere, the last plague-rat of this outbreak was taken 15th August, in a far removed lane of the city, to which it could not have reached from the quay at which the "Alsterschwan" lay.

Darling Island (so-called, *see* Diagram), where this vessel lay, is faced with concrete blocks, and comprises an area of several acres which carries many large sheds; it is traversed by many railway lines. Owing to the general construction of these yards, and to the persistent attention of the Railway Commissioners, rats have always been few here. No plague-rat has at any time ever been taken on the Island, and the nearest point at which any have been collected was in Pyrmont, in a street at a considerable distance from it, and on 13th July, 1902. No plague-rats have been observed either at the Island or in Pyrmont during the two years which at this present date have since elapsed.

The only information at command concerning plague at ports of South America touched by the "Alsterschwan" on this voyage is contained in the reports issued by the Public Health and Marine Hospital Service of the United States, from which it appears that eight cases were noted on 14th April at Buenos Ayres, while the s.s. "Duca di Galliera" was reported under date 23rd June to have arrived at Genoa with two cases of plague, and at Barcelona with one case, on board, and in July the s.s. "Espagne" was found on arrival at Marseilles to have plague on board, both vessels having taken their departure from Buenos Ayres.*

The "Alsterschwan" is the second vessel on which plague-rats have been detected in Sydney.

25. The large number of rats and mice caught at Gray's stables, and the length of time during which they continued to be found, have already been referred to above as requiring explanation. The circumstances were as follows:—

GRAY'S STABLES, WATERLOO.

The stables were situated on the margin of a populous neighbourhood, 2 miles from the focus in a direct line, and on a part of an area of blown sand rather sparsely occupied by factories. A varying number of horses were housed there, but usually about 100. The buildings, which comprised stables, sheds

* As regards an earlier date than this see "Sur les épidémies de peste bubonique à l'Assumption (Paraguay) et à Rosario (République Argentine)," par M. Leopoldo Uriarte.—Annales de l'Institut Pasteur, 1901, p. 857.

sheds, feed-stores, and offices, were numerous, and the area occupied by them measured more than 13,000 square feet; they were ill-constructed of wood and iron. They were in a discreditable and filthy state, and greatly infested with rats and mice, to which linings, flooring-planks laid on the sand, and layers of unremoved horse-dung of great thickness afforded harbourage. They were leased to an omnibus proprietor, and were in part sublet to a firm of carriers.

In 1902 a plague-rat was taken on 26th April; and on 11th May one of the average number of forty men employed was attacked with plague. From that date onwards efforts were steadily made to cause the Local Authority to compel the tenants to reconstruct these stables, and to place them in reasonably good sanitary state; but the lease was to expire in a few months, and the granting of a new lease was then delayed by death of the owner. Hence, as the general epizootic had ceased almost concurrently with cleansing of the premises from infection, a delay was allowed which, as it turned out, became protracted until the further occurrence of plague now being described.

In 1903 the first plague-rat was taken here on 15th June. The premises continued to yield plague-rodents for the next 36 days, a total of 64 infected rats and of 14 infected mice having been gradually collected during that term, notwithstanding that the general cleansing of the place had been completed in about a fortnight. The reason lay in the local conditions. Some of the rodents nested in the cover which was afforded by linings and so-called "floors," or in the sand underneath the latter; these were easily turned out. But the whole area presented burrows at many different points, and especially over a rather large tract of it which, it was found, had at some earlier date been the site of a garbage tip. Hence the search was at once difficult to complete and very laborious; and although the last plague-rodent was discovered on 20th June, the rats infesting the place were by no means then exhausted, but continued to be captured from time to time during several weeks thereafter in which watch was kept upon them.

The manner in which infected carcasses made appearance is shown in the following Table:—

Date.	No. examined.		No. infected.		Date.	No. examined.		No. infected.	
	Rats.	Mice.	Rats.	Mice.		Rats.	Mice.	Rats.	Mice.
15 June, 1903	12	...	11	...	9 July, 1903	...	2	...	...
16 " "	6	...	3	...	10 " "	...	1	...	...
16 " "	9	1	3	...	13 " "	...	1	...	...
16 " "	15	1	12	...	14 " "	...	1	...	...
17 " "	1	3	...	...	15 " "	...	3	...	...
17 " "	16	6	10	...	16 " "	...	2	...	1
18 " "	3	5	1	...	18 " "	...	2	...	...
18 " "	17	1	10	1	20 " "	...	2	...	1
19 " "	5	...	3	...	21 " "	...	2	...	...
19 " "	25	3	10	...	22 " "	...	1	...	...
20 " "	3	2	...	...	24 " "	...	2	...	...
20 " "	13	4	...	...	30 " "	2	...	...	...
20 " "	2	1	...	...	7 August, "	1	1	...	...
22 " "	7	...	1	...	10 " "	...	2	...	...
23 " "	2	...	...	...	11 " "	1	2	...	...
23 " "	4	8	...	2	12 " "	1	1	...	...
24 " "	2	4	...	3	13 " "	...	2	...	...
24 " "	2	1	...	...	14 " "	...	2	...	...
25 " "	1	3	...	1	15 " "	1	1	...	...
26 " "	...	3	...	1	17 " "	1	...	...	...
27 " "	2	1	...	1	18 " "	1	...	...	...
29 " "	1	6	...	...	22 " "	...	1	...	...
30 " "	2	1	...	1	24 " "	1	...	...	...
1 July, "	...	6	...	1	26 " "	2	1	...	...
3 " "	...	2	...	...	27 " "	2	...	...	...
4 " "	...	2	...	...	28 " "	1	1	...	...
6 " "	...	2	...	...	31 " "	2	...	...	...
7 " "	...	1	...	...					
8 " "	...	1	...	1	Grand total	166	101	64	14

Plague-rats continued to be found during 14 days only; and of 134 carcasses submitted during this term only 64, or a minority, were infected. Plague-mice were found during 25 days; but of the 66 submitted only 14 were infected. During forty days subsequent to observation of the last plague-rat, 32 healthy rats were brought in; and during nineteen days after discovery of the last plague-mouse 19 healthy mice were submitted. Rats eat mice as well as each other.

No person took the infection at these stables in 1903. General information furnished by the intelligence staff before 15th June, and concentration of that staff in the neighbourhood subsequent thereto, showed that the latter was free from infection; and there is no room for reasonable doubt that it was conveyed *per saltum* to the stables from the focus at Darling Harbour, although the proprietors could not say more as to origin of their supplies of feed than that they purchased in lots as favourable opportunities offered, and of any dealer in Sussex-street whose terms suited them. However, some slight evidence of its spread to the contiguous land and the buildings on it was gained by discovery of a single plague-rat at a soap-works near the stables on 23rd June, and on inhabited premises in a street at a rather greater distance away (and in another direction) on 24th June; but further search rendered it probable that these animals were but strays, fortunately detected before they had had time to become a source of the disease to any horde which they may have joined. The omnibus service was transferred to other premises; the omnibuses were not interfered with.

After this second outbreak the premises were given up, and new stables were erected elsewhere.

26. Analysis of the records relating to discovery of infected rodents on the 23 remaining premises shows that 15 of them yielded plague-rats on a single day, namely, the day of discovery and of report; 14 of them also yielded but a single specimen. The other, which was a large factory where spices, rice, maize, mustard, &c., were manufactured or packed, yielded 4 on the one day, and no more were found during the several subsequent days over which the search extended. Of these 15 places 6 were wharves or piers, 2 were pieces of vacant land, 2 were streets or lanes. Of the other five, one was another factory for oatmeal, maize, &c., one was a soap-works (Waterloo, see above), and 3 were produce stores on the water side of Sussex-street.

27. The eight places from which plague-rodents were collected on more than one day yielded them during terms which extended to 2, 4, 12, 16, and 52 days. Seven of them were produce stores, situated on the water side of Sussex-street; the eighth was a wharf abutting on that street. The tables which are printed in Appendix A show the dates on which plague rodents made appearance among the healthy carcasses. They are not complete as regards the after term, but no more infected carcasses were taken. In the lastmentioned case (52 days) a long interval of 47 days, during which 11 plague-free rats and 36 plague-free mice were taken on 14 days, pointed to reinfection of the premises.

28. The two patients were lodged in one half of a small ward in the Infectious Diseases Division of the Coast Hospital, of which the other half continued to be occupied by persons suffering from other forms of disease. The rooms in which they had lain ill at home were disinfected in usual ways as a measure of precaution, although our uniform experience has been that such patients never communicate infection to their surroundings. Contacts were examined and recorded, but were not afterwards interfered with in any way.

29. It will have been perceived that the details mentioned in this account are fuller and still more nearly complete than those which were given in the corresponding histories of the outbreaks of 1900 and 1902, while the former exactness has been maintained. This is to be ascribed in part to the results of teaching and experience on the numerous members of the inferior staff, and, indeed, in some measure on the general public; but little advance in knowledge of many of the phenomena of plague in this city could be made without their intelligent co-operation. But all concerned in practical management have greatly benefited by further reflection and wider experience. Consequently, plans were laid on this last occasion with more assured confidence, directions were given with greater precision, and both were more completely carried out than ever before; while superfluous effort, the cause of unnecessary expenditure, was completely restrained.

J. ASHBURTON THOMPSON.

APPENDIX A.

TABLES showing the way in which Plague rodents appeared among rodents captured on infected premises from which plague-infected rodents were taken on more than one day.

153, Sussex-street.					151, Sussex-street.					139, Sussex-street.					129, Sussex-street.				
Date.	No. examined.		No. infected.		Date.	No. examined.		No. infected.		Date.	No. examined.		No. infected.		Date.	No. examined.		No. infected.	
	Rats.	Mice.	Rats.	Mice.		Rats.	Mice.	Rats.	Mice.		Rats.	Mice.	Rats.	Mice.		Rats.	Mice.	Rats.	Mice.
1903.					1903.					1903.					1903.				
9 May	1	...	...	...	14 May	1	...	...	...	15 May	1	...	...	...	18 May	8	4	...	...
11 "	1	...	...	...	15 "	2	...	2	...	15 "	1	...	1	...	19 "	2	1	1	...
12 "	3	...	1	...	16 "	4	1	2	...	18 "	2	1	...	1	18 June	...	7	...	...
13 "	4	11	2	...	18 "	1	...	...	...	18 "	5	1	...	1	19 "	...	4	...	...
14 "	1	...	...	...	21 "	1	1	...	...	19 "	3	...	...	...	20 "	...	1	4	...
16 "	2	...	...	...	.....	...	...	...	...	.....	...	...	...	...	22 "	...	2	2	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	23 "	...	3	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	24 "	...	5	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	25 "	...	3	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	26 "	...	2	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	27 "	...	1	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	29 "	...	1	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	30 "	...	1	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	1 July	...	2	1	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	2 "	...	1	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	4 "	...	3	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	6 "	...	1	...	1
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	7 "	...	1	...	1
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	9 "	...	3	10	1
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	10 "	...	4	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	13 "	...	1	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	17 August	...	2	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	18 "	...	1	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	19 "	...	1	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	21 "	...	1	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	22 "	...	2	1	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	24 "	...	1	...	...
.....	...	...	...	...	.....	...	...	...	...	.....	...	...	...	...	25 "	...	1	...	...
Total	12	11	3	...	.....	9	2	4	...	.....	12	2	1	2	.....	26	66	2	7

101, Sussex-street.					137, Sussex-street.					123, Sussex-street.					Huddart Parker's Wharf, Margaret-street.				
Date.	No. examined.		No. infected.		Date.	No. examined.		No. infected.		Date.	No. examined.		No. infected.		Date.	No. examined.		No. infected.	
	Rats.	Mice.	Rats.	Mice.		Rats.	Mice.	Rats.	Mice.		Rats.	Mice.	Rats.	Mice.		Rats.	Mice.	Rats.	Mice.
1903.					1903.					1903.					1903.				
21 May	1	2	...	...	15 May	10	5	...	...	16 May	2	...	...	...	6 Aug.	4	5	1	...
21 "	...	1	...	1	18 "	1	17	...	...	19 "	2	1	...	...	11 "	...	2	...	1
22 "	Cat.	...	...	...	18 "	23	4	...	...	22 "	2	...	...	...	.....	...	...	...	...
22 "	Rats.	1	1	1	18 "	8	20	...	...	23 "	1	5	...	...	.....	...	...	...	...
22 "	...	...	...	...	18 "	15	6	...	...	12 June	...	3	...	...	.....	...	...	...	...
23 "	1	...	...	...	19 "	1	1	...	...	6 July	1	1	...	1	.....	...	...	...	...
23 "	1	4	...	1	20 "	9	...	...	...	7 "	1	2	...	2	.....	...	...	...	...
25 "	3	3	2	2	25 "	...	1	...	...	8 "	1	18	...	...	.....	...	...	...	...
26 "	1	4	...	1	26 "	1	...	...	...	9 "	...	2	...	...	.....	...	...	...	...
26 "	...	4	...	1	27 "	1	...	...	...	.....	...	...	...	...	.....	...	...	...	...
27 "	...	3	...	2	5 June	3	1	...	...	.....	...	...	...	...	.....	...	...	...	...
27 "	...	8	...	...	6 "	3	1	...	...	.....	...	...	...	...	.....	...	...	...	...
28 "	...	4	...	1	9 "	2	...	...	...	.....	...	...	...	...	.....	...	...	...	...
29 "	...	7	...	2	10 "	1	1	1	...	.....	...	...	...	...	.....	...	...	...	...
30 "	...	16	...	...	11 "	1	...	...	...	.....	...	...	...	...	.....	...	...	...	...
1 June	...	8	...	...	15 "	1	...	1	...	.....	...	...	...	...	.....	...	...	...	...
1 "	...	4	...	1	15 "	15	7	2	...	.....	...	...	...	...	.....	...	...	...	...
22 "	...	2	...	...	16 "	1	1	1	...	.....	...	...	...	...	.....	...	...	...	...
.....	...	...	...	...	16 "	7	4	6	...	.....	...	...	...	...	.....	...	...	...	...
.....	...	...	...	...	17 "	9	2	2	...	.....	...	...	...	...	.....	...	...	...	...
.....	...	...	...	...	17 "	3	3	...	...	.....	...	...	...	...	.....	...	...	...	...
.....	...	...	...	...	18 "	5	3	2	...	.....	...	...	...	...	.....	...	...	...	...
.....	...	...	...	...	25 "	...	2	...	1	.....	...	...	...	...	.....	...	...	...	...
.....	...	...	...	...	29 "	1	...	...	...	.....	...	...	...	...	.....	...	...	...	...
.....	...	...	...	...	1 July	1	...	...	...	.....	...	...	...	...	.....	...	...	...	...
.....	...	...	...	...	25 "	...	7	...	...	.....	...	...	...	...	.....	...	...	...	...
Total	5	71	...	13	.....	122	86	15	1	.....	10	32	...	3	.....	4	7	1	1

APPENDIX B.

APPENDIX B.

[Form No. 312.]

DEPARTMENT OF PUBLIC HEALTH, NEW SOUTH WALES.

"MUNICIPALITIES ACT, 1897."

MODEL By-laws under section 130 (xxii) for better prevention of the spread of Plague by Rats; for regulating the construction and maintenance of Stables, Produce Stores, &c., &c.; and for storage and collection of House Refuse and Garbage.

(As passed by the Attorney General, 2nd July, 1903.)

1. The owner of any produce store in the Municipality, the floors of which are of such material, or so constructed, or in such a state as to permit the harbouring of rats in or about such store, shall, within one month after service upon him of a notice purporting to be signed by the Inspector of Nuisances requiring him so to do, cause such floors to be so reconstructed of concrete, stone, or other material impervious to rats, and shall so repair, alter, reconstruct or protect skirting-boards, partitions, doors, ventilation or other openings in the walls or elsewhere of such produce store, as to prevent, as far as practicable, access of rats to and harbourage of rats in or about it.

2. The owner of any premises within the Municipality who, after the passing of these by-laws, shall construct or let any building therein for the purposes of a produce store, or who shall convert any building therein to the purposes of a produce store, shall upon such construction, letting, or conversion, as the case may be, cause the floors thereof to be constructed of concrete, stone, or of other material impervious to rats, and he shall so construct, alter, repair, reconstruct or protect skirting-boards, partitions, doors, ventilation or other openings in the walls or elsewhere, as to prevent, as far as practicable, access of rats to and harbourage of rats in or about such premises.

3. The owner of any building, other than a produce store in the Municipality, which is in such a condition as to permit the access of rats to, or the harbourage of rats in it, and whether such condition be in the structure, or in openings in it, or in doors or ways of entrance to it, or in its floors, skirting-boards, ceilings, partitions, or the like internal fittings within it, shall, within one month after service upon him of a notice purporting to be signed by the Inspector of Nuisances requiring him so to do, cause such building to be so repaired, or as regards its doors or ways of entrance and its floors, skirting-boards, ceilings, partitions, and the like internal fittings within it, to be so altered or repaired, as to prevent, as far as practicable, access of rats to it and harbourage of rats within it.

4. The owner of any premises within the Municipality with which is connected any area grating, or in the external walls of which is any other opening of such a nature as to permit the entry of rats thereto, shall, within fourteen days of service upon him of a notice purporting to be signed by the Inspector of Nuisances requiring him so to do, cause such area grating and such other openings to be covered with wire netting of such a mesh and in such a manner as to prevent the entry of rats through them.

5. The owner of any stable, cow-yard, or cattle-shed, within the Municipality now constructed, shall cause the same to be paved, flagged or floored with concrete, stone, or other material impervious to rats, and to be completely and well drained, and to have proper sewer connections where available, within one month after service upon him of a notice purporting to be signed by the Inspector of Nuisances requiring him so to do.

6. The occupier of such premises shall, upon production of the notice served upon the owner as aforesaid, allow the owner and his workmen free access thereto for the purpose of enabling him and them to comply with the terms of the preceding by-laws.

7. The owner of any premises within the Municipality who shall, after the passing of these by-laws, construct a stable, cow-yard, cattle-shed, or pig-sty therein, or convert any building therein into a stable, cow-yard, cattle-shed, or pig-sty, shall cause the same to be paved, flagged, or floored with concrete or stone, or other approved material impervious to rats, to be completely and well drained, and to have proper sewer connections where available.

8. The owner or occupier of any stable, cow-yard, cattle-shed, or pig-sty within the Municipality shall, within one month of service upon him of a notice purporting to be signed by the Inspector of Nuisances requiring him so to do, cause any feed-store connected with such stable, cow-yard, cattle-shed, or pig-sty to be floored with concrete, stone, or other material impervious to rats, and shall so reconstruct, repair, or alter any floor, wall, and any ceiling or partition within it as may be directed so as to prevent the harbourage of rats therein, and shall protect all openings in the external walls thereof as may be directed so as to prevent the access of rats thereto.

9. The occupier of any premises in the Municipality which contain any stable, cow-yard, cattle-shed or pig-sty shall provide a bin for the reception of all dung or refuse arising in such stable, cow-yard, cattle-shed, or pig-sty, and shall cause such stable, cow-yard, cattle-shed, or pig-sty to be cleansed daily; and all manure, dung or other refuse arising in or in connection therewith if not removed from the premises immediately to be placed in such bin, and shall cause the said bin to be kept covered, and to be emptied and cleansed and its contents to be removed from the premises at least once in every week, and shall not at any time allow such bin to be or to remain a nuisance.

10. No person shall place or throw or suffer to remain any refuse on any premises in the Municipality in such a manner or for such a time as to encourage rats or other vermin to visit or frequent such premises.

11. Every occupier of premises in the Municipality shall, within seven days of service upon him of a notice purporting to be signed by the Inspector of Nuisances for the Municipality requiring him so to do, provide a sufficient number of receptacles of rigid metal, cylindrical in shape, and each of a capacity not exceeding 2 cubic feet for the reception of the garbage and refuse arising upon such premises.

12. Every such occupier shall provide all refuse and garbage receptacles in use on such premises with a cover, fitting as closely as practicable, and shall cause such receptacles to be continuously covered, save when garbage or refuse is being deposited in or discharged from them.

13.

13. Every such occupier shall cause all refuse or garbage receptacles in use on his premises and the covers thereof to be kept as clean as practicable, and maintained in good order and condition, and shall cause all garbage and refuse from time to time arising upon such premises to be forthwith deposited in such receptacles.

14. Every such occupier between such hours and on such days as may be prescribed by notice served upon him, and purporting to be signed by the Inspector of Nuisances, shall cause such receptacles to be placed in such a position on such premises as to be within 6 feet of the gateway or entrance from the street abutting on such premises, which is traversed by any vehicle employed by the Council in the collection of garbage and refuse, and so as to be conveniently accessible to the persons employed by the Council in the removal of garbage and refuse. Provided that if, by reason of conformation of the premises, it shall not be practicable to comply with the requirements of this by-law, and such occupier shall cause such receptacles to be placed on the outer edge of the footway in such street between the hours and days as aforesaid, he shall not be guilty of an offence against this by-law.

15. No person other than a workman employed by the Council in the collection of garbage and in street-cleansing shall interfere with, disturb, or remove any garbage receptacle for the time being in any street, nor the contents of any such receptacle.

16. The owner of any premises within the Municipality shall, within one month of service of a written notice purporting to be signed by the Inspector of Nuisances, cause the floor of any water-closet and of any pail-closet situated wholly or in part outside the walls of the dwelling portion of the premises, to be constructed of good cement concrete not less than four inches in thickness, and to be so laid that it shall be in every part thereof at a height of not less than six inches above the level of the ground adjoining such closet, and so that the said floor may have a fall or inclination from the rear of the closet towards the door of entrance of not less than one-half inch to the foot, and the riser enclosing the space beneath the seat (if any) to be removed in the case of a water-closet, and in the case of a pail-closet to be well fitted to the seat and to extend downwards not more than four inches from the under side of the seat.

17. In construction of these by-laws the words "produce store" shall mean any building or portion of a building wherein wheat, oats, barley, maize, pollard, bran, hay, lucerne, or chaff is deposited or exposed for sale, and with regard to other words, a similar construction shall be applied as the Interpretation Act, No. 4, 1897, provides for the interpretation of Acts of Parliament.

18. Any person offending against any of the above by-laws shall for each offence, upon conviction, forfeit and pay a sum not exceeding £10.

By order,
G. H. KING,
Secretary.

Sydney, 22nd July, 1903.

In the Metropolitan District the following Municipal Councils voluntarily adopted these by-laws:—

Alexandria.	Enfield.	Parramatta.
Annandale.	Granville.	Petersham.
Ashfield.	Hurstville.	Randwick.
Balmain.	Leichhardt.	Rockdale.
Burwood.	Manly.	Vaucluse.
Canterbury.	Mosman.	Waterloo.
Concord.	North Sydney.	Willoughby.

The by-laws were ultimately imposed (see Public Health Act, section 25) on the following:—

Bankstown.	Hunter's Hill.	Redfern.
Botany.	Kogarah.	Rookwood.
Camperdown.	Lane Cove.	Ryde.
Darlington.	Marrickville.	St. Peters.
Drummoyne.	Marsfield.	Strathfield.
Ermington and Rydalmere.	Newtown.	Waverley.
Erskineville.	North Botany.	Woollahra.
Glebe.	Paddington.	

[Diagram.]

N ^o	Place	Plague Rodents taken				First date	Last date
		M. Dec.	M. Rat.	M. Mus.	Total		
1	153 Sussex Street	3			3	12 5 03	13 5 03
2	151 Sussex Street	4			4	15 5 03	16 5 03
3	139 Sussex Street	1		2	3	15 5 03	18 5 03
4	129 Sussex Street	1	1	7	9	19 5 03	9 7 03
5	Dangar Gedyes Wharf, N ^o 1, W'loo	1			1	20 5 03	20 5 03
6	101 Sussex Street			14	14	21 5 03	1 6 03
7	150 Sussex Street			1	1	22 5 03	22 5 03
8	Long Pier, Woolloomooloo	1			1	28 5 03	28 5 03
9	137 Sussex Street	2	13	1	16	10 6 03	26 6 03
10	A. U. S. N. Wharf, N ^o 1	1			1	13 6 03	15 6 03
11	Grays Stables, Elizabeth Street, Waterloo	64		14	78	15 6 03	20 7 03
12	Town's Wharf	1			1	15 6 03	15 6 03
13	Dalgey's Wharf, New, N ^o 1	1			1	15 6 03	15 6 03

Case A, attacked 17.6.03									
14	268 Kent Street				/	/	22. 6. 03	22. 6. 03	
15	Hunters' Soap Works, Bourke Street, Waterloo	/					23. 6. 03	23. 6. 03	
16	81 Kellick Street, Waterloo	/				/	24. 6. 03	24. 6. 03	

Case B. attacked 2.7.03

Places at which plague-rats were taken, consecutively numbered in accordance with the date on which the first was taken at each place shewn thus ● 22
 Places at which 2 persons who had plague were employed do... A.B.
 Do. do. do. resided do... (a) (b)
 Boundaries of the Wards into which the City proper is divided do... -----

