

## **Small-pox and its diffusion / by Alexander Collie.**

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# SMALL-POX AND ITS DIFFUSION

BY

ALEXANDER COLLIE, M.D. (Aberd.)

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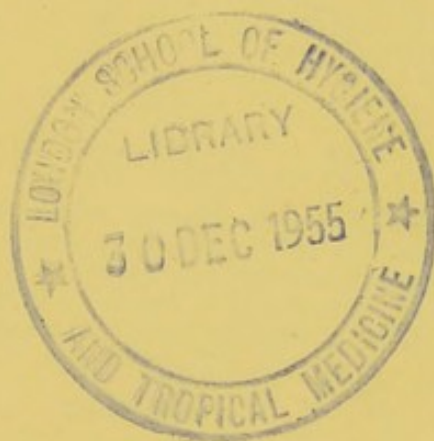
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# SMALL-POX AND ITS DIFFUSION

BY

ALEXANDER COLLIE, M.D. (Aberd.)

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AUTHOR OF

ARTICLE, "SMALL-POX," QUAIN'S DICTIONARY OF MEDICINE (1ST AND 2ND ED.);  
ARTICLE, "TYPHUS," CYCLOPÆDIA OF DISEASES OF CHILDREN, ETC.; VARIOUS  
PAPERS, TRANSLATIONS AND REPORTS ON SMALL-POX, ON FEVER, AND ON SMALL-  
POX HOSPITALS IN RELATION TO PUBLIC HEALTH.

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*Ne Quid Falsi Dicere Audeat ;  
Ne Quid Veri Non Audeat.*

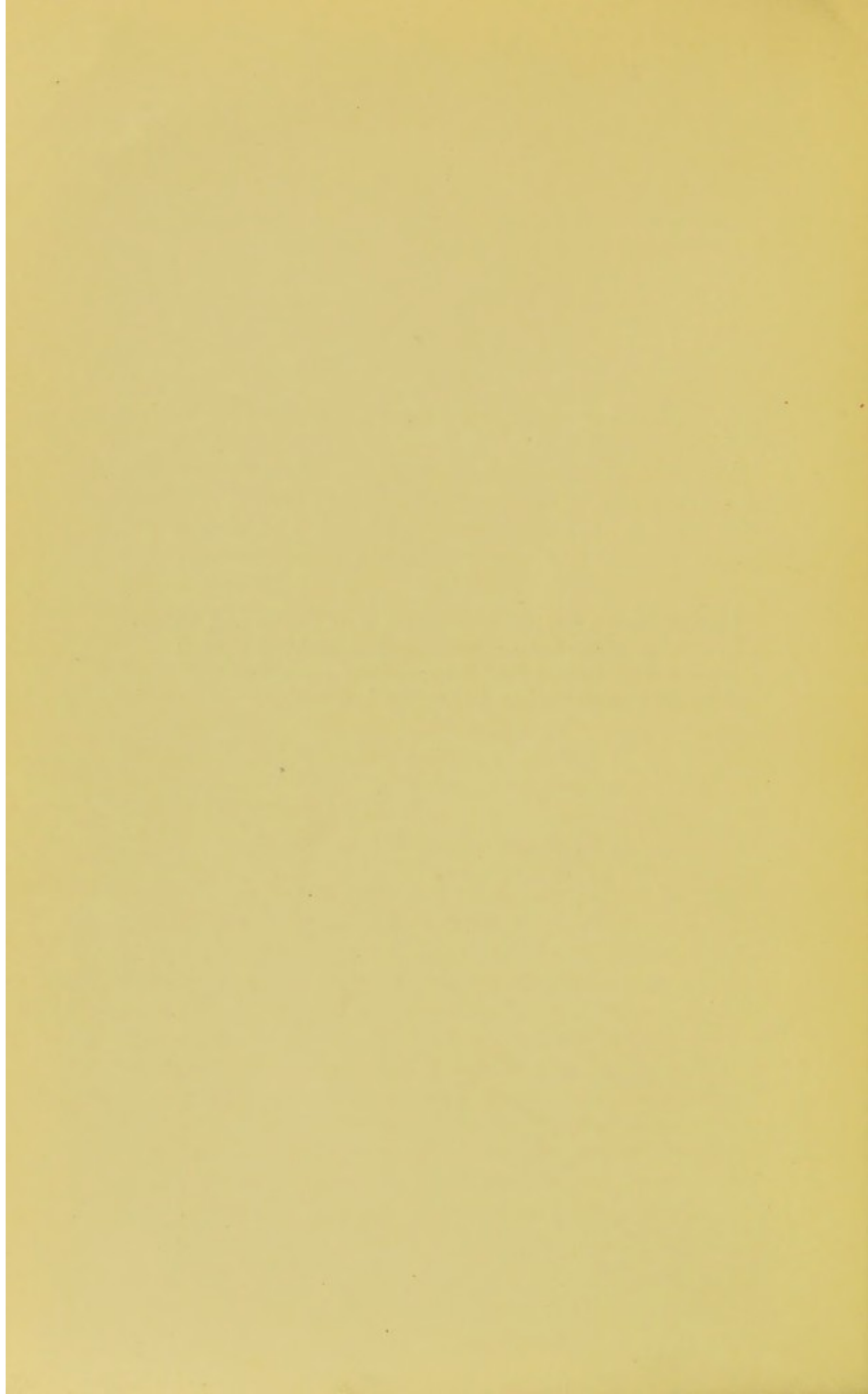
*—Tusculan Disputations.*



My best thanks are due to Miss Gray, of Nottingham, to Dr. Philip, of Boulogne s. Mer, quondam Resident Medical Officers at the Eastern Hospitals, and to H. H. Odling, Esq., of St. John's, Cambridge, for reading the proofs.

A. C.





## SMALL-POX AND ITS DIFFUSION

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### DISTAL AERIAL DISSEMINATION.

THE object of this monograph is to show that this hypothesis is unsupported by the evidence, and that those who initiated and organized the Small-pox and Fever Hospitals of London, rendered an inestimable service not only to London but to the world. In the opinion of the writer, who had personal experience of five of them, they were placed where they ought to have been placed,—that is, as near as practicable to places where small-pox and fever are usually more or less prevalent. Their administrators made, as was inevitable, some mistakes, and future administrators will do the same. It was unfortunate in respect of the hospital at Hampstead that it was not administered from the Fleet Road, instead of from Haverstock Hill. Had that been done, no nuisance would have been created at Hampstead, the hospital would have been as near as practicable to districts where small-pox is from time to time more or less prevalent,—to wit, Kentish Town and Camden Town,—and a mischievous and expensive litigation would have been avoided. But whilst it must be admitted that the small-pox hospital at Hampstead was a nuisance “insupportable” to Sir Rowland Hill, its next-door neighbour, and to the residents in Hampstead generally; as a matter of fact, setting aside artificial lines, municipal and other, there was no incidence of small-pox in Hampstead, near or far from the hospital. The incidence complained of was really in Kentish Town, which was riddled with small-pox up to the very confines of



the hospital, before, and long before, a single small-pox patient entered it (STEVENSON); and it was because this "fact" had not been sufficiently considered that the Lord Chancellor of the day (Selborne?) granted a new trial in the case of Hill and others. So far from there being any incidence of small-pox in the immediate neighbourhood of the hospital, the contrary was the fact. In Pond Street, for instance, and upon that side of it nearest to the hospital, there was not only no incidence, but no case. The experience of the Roman Catholic Schools, which are within the precincts of the hospital, was exactly the same, and the "sisters" assured this writer that they preferred as neighbours the small-pox to the idiots.

Obviously these are facts for which there is no explanation whatever on the aerial convection theory. If the hospital had diffused small-pox to its neighbourhood, all Hampstead could not have failed to suffer, for the simple reason that large numbers of business men resident there, passed within the precincts of the hospital every morning and evening on their way to and from the city, some of whom, *ex hypothesi*, must have contracted small-pox which they would have spread throughout Hampstead, and Mr. Pearson Hill's contention was that such small-pox as existed was confined to the neighbourhood of the Hospital, or nearly so.

In the course of inquiries which extended over some years the writer had conversations with "all sorts and conditions of men" there. He administered the hospital for over twelve months, and made a careful inquiry for evidence in favour of distal aerial dissemination, but he never could find any.

In considering distal aerial dissemination for the first time, it seemed to the writer that any inquiry into the aerial influence of a hospital in London, with its 3,000,000 inhabitants, and the relations of these with the world, would *forcément* be an impossible one, because the various factors concerned in determining the question could not be found, and



consequently could not be estimated. The place to conduct an inquiry of this kind is a country hospital, where everybody is known ; where visits by strangers are rare ; where, when they occur, the visitors' footsteps may be followed and their influence traced. Dr. Thorne made such an inquiry, and from his inquiry it was found that the country small-pox hospitals did not spread small-pox. In London the condition of things is very different. The footsteps of its visitors could rarely be followed. The lines of life there contain so many "unknowns," that the data for such an inquiry could not be found. In the first place, obviously, it was necessary to find the cases, which could not be found because there was no complete record of them. There was no compulsory notification, and it is not likely that the private practitioners were ready and willing to make known cases of small-pox which most people wished to conceal. Such cases of small-pox as were found were in the main such pauper cases *as applied for relief*. It is well known that small-pox cases are frequently concealed, and for obvious reasons ; that cases of the modified discrete kind are frequently mistaken for chicken-pox ; that owing to vaccination some cases are so mild that the subjects of them attend to their daily occupations altogether unconscious that there is anything the matter with them, walking pestilences, distributing small-pox everywhere. Amongst 3,000,000 how could these factors in the production of small-pox be known, their effect upon small-pox prevalence estimated and eliminated, so as to justify recourse to distal aerial dissemination ? This writer is not very much impressed with the popular belief (sanctioned by Dr. Gull), that priests of various orders, *religieuses*, nurses, physicians, undertakers, visitors to patients, male attendants, officers living outside the hospital, servants, such as scrubbers, laundry women, etc., workmen in and about the hospital, and tradesmen, largely spread small-pox ; but unless strict precautions are taken, it might, in this personal communication way, be spread widely. With the best management



it must be spread occasionally, with the worst frequently, and in any case it must now and then happen. Granting that the instances are rare, reduced for example to the case of a nurse slipping out now and then without having changed her uniform. One case so arising, might in a crowded neighbourhood give rise to a hundred others, and so, near or far from the hospital, render distal aerial dissemination unnecessary. But how are they to be eliminated? At the time that distal aerial dissemination was produced the conveyance of small-pox patients to the hospitals was far from perfect. For the most part the conveyances were old "four-wheelers," without springs, drawn by rickety old horses, driven by drivers sometimes *gris* from fear of infection. Inside with the patient were usually one, two, or more friends, who not infrequently stopped at the "pubs" by the way. At one of the hospitals this was one of the gravest of the complaints against it. How is the influence of these "ambulatory hospitals" in the causation of small-pox to be found, estimated, and eliminated? Obviously it is impossible; but it must be done before a single step can be taken towards distal aerial dissemination.

A nurse belonging to the Eastern Hospitals found a young man taking a leisurely stroll in Mare Street, Hackney, amusing himself by admiring the newest fashions. She gently but promptly arrested him, and by the least frequented streets led him to the hospital, where he recovered from a well-marked but discrete small-pox. The young ladies who were also admiring the newest fashions were probably very much surprised at the pimples which appeared on their faces some days after, and if they had been asked where they had caught their small-pox, they would have been obliged to say that they did not know; that they could not give the least hint of how they came by it, and distal aerial dissemination quoted this *absence* of evidence in favour of personal communication as if it were evidence in favour of distal aerial dissemination. *C'est épatant!*

"A lad applied on the morning of a certain day to one



of our metropolitan hospitals, for advice concerning an eruption he had observed coming out freely during the previous twelve hours. The diagnosis was made that the disease was small-pox, and he was directed to at once walk to the Highgate Institution. It being hot weather, he was questioned as to whether or not he stayed on the journey for refreshment, to which he replied in the affirmative, thus probably coming into contact with one or more susceptible persons" (GAYTON). In a journey from the city to the Highgate Small-pox Hospital, this lad, on the roads and in the "pubs," met with not a few susceptible persons (like the Hackney ladies), who would not be able to give the slightest hint of where they got their small-pox. A poor woman went to a central London Hospital to consult a physician in respect of an eruption upon her child. After spending two hours in a crowded out-patient room, the physician, not knowing what to make of it, advised her to *walk* to Homerton, a distance of some miles. On her arrival at Homerton, it was seen that the child was suffering from small-pox. As she passed through such crowded roads as Gray's Inn Road, Essex Road, Ball's Pond Road, it is probable (in particular as she had to ask her way several times) that she met with some susceptible persons, and if any of them developed small-pox several days after, it is very probable that they would not have been able to give *even a hint* as to how they came by it. A lady of my acquaintance went from London to a celebrated watering-place. Whilst there she developed small-pox. She sent for the fashionable Æsculapius of the place. This gentleman informed her that she was suffering from a skin eruption which was not infectious, and about which she need not trouble. She spent a few days in the charming society which one usually finds in fashionable seaside neighbourhoods such as Cannes, Mentone, Trouville, etc., mixing with others in the stream of life, discharging upon it  $\times$  millions of small-pox microbes. Thinking her illness very much resembled small-pox, of



which she had a little knowledge from having visited sick people, she determined to return to London, which she did. She took her seat, closely veiled, in a crowded carriage, and when she reached London, this writer was asked to see her. She was the subject of confluent small-pox. The young man who could not give the least hint as to how he came by his small-pox, did not know that the charming barmaid whom he was chaffing over his beer was admitted into the small-pox hospital the morning after. The old gentleman who could not imagine where he had caught his small-pox, did not know that the omnibus conductor who gave him his change was the subject of small-pox. The old lady who had not been out of the house for years, could not imagine where she had caught her small-pox. She did not know that the last dress she had was made in a small-pox room where, for want of ventilation, the atmosphere was pestilential. The city merchant, living in his beautiful suburban villa, who had been nowhere but between his home and his office in the city, had certainly seen no sick person, could not imagine where he caught *his* small-pox. He did not know that the man who sat next to him in the railway carriage had been the day before discharged from a small-pox hospital where they were not too particular about disinfection. But is it necessary to continue? Is it at this time-of-day necessary to show that infectious disease passes but a very few feet from the sick person and that it is invariably carried by the infected person or by the infected thing. Dr. Gull stated that he had carried small-pox to a friend whom he met in the street, after having visited a small-pox patient. It is, of course, possible. Nobody requires to be informed in respect of a well-known fact. If Dr. Gull imagined that he was giving the Royal Commission and the profession information, he was mistaken. If he meant simply that medical men *may* carry infectious disease, no one who knows anything of infectious disease will contradict him; but if he meant that they *must*, this writer dissents. With well-known and easily taken



precautions, no medical man need carry infectious disease. Here are the grounds of this opinion. About thirty years, almost the whole of the writer's professional life, were passed in general and in special hospitals, from the time that it commenced as clinical clerk in the Aberdeen Royal Infirmary, about the year 1860, until it ended in the Eastern Hospitals, about the year 1891. During that period over 30,000 persons were treated by him, one way or another. Of these over 25,000 were cases of infectious disease, the infectious fevers, typhus fever, enteric fever, scarlet fever, cholera, diphtheria, small-pox, and measles, along with 3,000 cases of "other diseases," mostly not infectious. Here is a list of them: Pneumonia, rheumatism, phthisis, mania, bronchitis, pericarditis, pleuritis, nil, tuberculosis, meningitis, jaundice, colic, morbus cordis, cystitis, syphilis, lead poisoning, erysipelas, pyæmia, glanders, puerperal fever, carcinoma uteri, insanity, hysteria, skin disease, "various" malignant pustule (?), dyspepsia, dysmenorrhœa, dementia, gastritis, senile gangrene, melancholia, acute mania, alcoholism, empyema, retention of urine, appendicitis, Menière's disease, starvation, atropine poisoning, abdominal tumour, phlegmasia dolens, spinal disease, mumps, spinal caries, eczema, cancer of pylorus, periostitis, sore throat, dropsy, vaginitis, softening of brain, atrophy of optic nerve, delirium tremens, scabies, metritis, cerebral hæmorrhage, morbus renum, dysentery, cerebral abscess, cerebrospinal meningitis, copaiba rash (sent by a distinguished fellow from a hospital which thought itself "*chic*," even "*très chic*." *Humanum est errare* holds good even for "fellows!"), herpes, whooping-cough, cirrhosis, hip and spine disease, acne, debility, purpura, lichen, etc. He calculates to have made very many thousands of visits—a few thousands one way or the other does not in the least matter; but to the best of his knowledge and belief, he never carried any infectious disease, nor did any one of the other "diseases" in his charge treated under the same administration with infectious disease contract any one of them.



It was adduced as evidence in favour of distal aerial dissemination, that an invalid lady who had never been out of the house contracted small-pox. Therefore she caught it through the window. Can anything more childish be imagined? She had never been *out*. But who had been *in*? Nothing is said of that by distal aerial dissemination. Being an invalid, this lady probably, one may even say certainly, saw from time to time a physician, who probably saw from time to time cases of small-pox, and, like Dr. Gull, carried it. Being an invalid, she probably saw from time to time a priest, who, from having "confessed" a dying small-pox patient, carried on his head and elsewhere  $x$  millions of small-pox microbes. Probably from time to time this invalid lady required clothes, which the *couturière* made in a small-pox room with closed doors and windows. Probably this invalid lady required the *coiffeur* recently engaged in dressing small-pox heads. Perhaps sometimes she required the *pédicure*. Probably from time to time she required shoes, and saw the shoemaker. Possibly she occasionally had need of the dentist. Perhaps now and then she was visited by one or more *religieuses*, who had just visited, amongst others, one or more cases of small-pox, without having paid any great attention to precautions, leaving all that to the care of God. Very likely this lady, being an invalid, from time to time received visitors, received letters from sick friends, etc. She was not in solitary confinement. These possibilities of small-pox propagation were simply ignored. Neither at Hackney nor at Fulham did their existence even appear to be suspected, and they form a considerable factor in the causation of small-pox. But how, divine revelation apart, are they to be found, estimated as a factor in the propagation of small-pox, and eliminated? But until this be done there can be no question of distal aerial dissemination.

An appeal was made to the general practitioners of Fulham and its neighbourhood to report all cases of small-pox known to them. To begin with, this proceeding was useless, because what was wanted was not the cases of small-



pox known to certain practitioners in medicine, but all the cases : of a very considerable number of very discrete cases, they would not have *any* knowledge, and it is not very likely that any practitioner would reveal cases (a not inconsiderable number) which his patients, or their friends, wished to be concealed. Moreover, and this is very important, at the time that this inquiry was being held, it may be said that the general practitioner, and even his superior the consultant, were generally "innocent" of any knowledge of infectious disease. *Forcément* because it was not taught in England. This writer was the first to give regular clinical instruction in infectious disease at the Eastern Hospitals. That it was much needed may be seen from a consideration of the mistakes already noted. Here is a list of the errors for one year, taken at random, for small-pox alone: Varicella, scarlatina, lichen, acne, urticaria, rheumatism with skin eruption, congenital syphilis, copaiba rash (from a well-known hospital), herpes, pneumonia, enteric fever, tonsillitis, — "various," fifty-nine in one epidemic and seventy in another. If any one should think statistics of any real value that are composed of such pauper cases *as applied for relief*, and such cases as the general practitioner chose to reveal (rendered altogether untrustworthy by the aforesaid errors of diagnosis), all that can be said is that he must be left to his opinion.

With these observations on the impossibility of the inquiry, the writer will now consider the basis upon which it rests. The widely spread belief was assumed as an indisputable truth, "and not by fools exclusively," that in hospitals, by reason of the number of the patients, there is necessarily "crowding," which renders the air more or less pestilential, and in consequence dangerous to the surrounding neighbourhood. This notion, *meo judicio*, is erroneous, and can only arise in the minds of persons not familiar with hospitals. Where the cubic space and floor space are sufficient, the ventilation abundant and continuous by night and by day, there is no "crowding." Such patients



are practically *in the open*, in space "not finite." It is not in the hospital that is *as it should be and as it may be*, that there is "crowding," but rather in the homes of the poor, where illness is treated with closed doors and windows, where abundance of air is regarded as some kind of poison. It is there that there is concentration of poison, aggregation of microbes; there that there is danger to tenement houses, danger to neighbourhoods, danger to visitors. In the hospital, with sufficient floor and cubic space, continuous ventilation for each person according to the necessities of his case, each and every patient is practically in a room by himself. This is the real and only meaning of "good ventilation;" and if the conditions stated are "fulfilled," there would not be either aggregation, concentration, crowding, or danger to any neighbourhood in which such a hospital might be placed, however many patients it might contain, if, as patient is added to patient, cubic space and floor space be also added, and sufficient and continuous ventilation be maintained by night and by day. If this be true, the very basis, foundation, and bottom of distal aerial dissemination falls to the ground, for one is bound to assume that in all essentials the administration of the Fulham Small-pox Hospital was excellent.

It was seen on still further examination, that distal aerial dissemination would depend upon the wind, and inasmuch as the wind is a very variable "variable," the contagion simply *could* not spread "invariably," with an incidence diminishing gradually as the distance, until it vanished. It is a simple impossibility. Assuming the incidence, it would sometimes be far from the hospital, at other times it would be near it. Obviously the wind would not blow always with the same force. Sometimes the air would be almost motionless, and drop the microbe at the hospital gate. At other times there would be a gentle breeze, which would carry it into the next street. Now and then there would be a gale, and occasionally a hurricane, which would spread the microbes far from the hospital,



instead of near it, so that a small-pox hospital, wherever placed, would within limits be a danger to everywhere, and therefore should not be placed anywhere.

On three grounds then, *in limine*, the hypothesis cannot be maintained. In the first place, because the cases could not be found; in the second place, because the concentration of contagious matter required did not exist; and in the third place, because, owing to the variability of the wind, it could not travel as alleged.

With these observations on the actual impossibility of the inquiry, the writer now passes to a consideration of what it positively asserts, and endeavours to prove. It declares that small-pox contagion from the Fulham Small-pox Hospital *spread in all directions*. This is the substance, substratum, and body of the hypothesis. According to Dr. Dudfield, the Medical Officer of Health for Kensington, in which the Fulham district is comprised, *it did not so spread*. It spread in certain districts only, leaving considerable areas free of small-pox. He further showed that such small-pox as did exist, could almost invariably be traced to personal communication, and that it spread amongst that class of persons in which small-pox usually spreads when it is prevalent, wholly irrespective of any small-pox hospital. This writer, after careful examination of all the evidence (both from his investigations at Fulham, and from his experience at Aberdeen, Dundee, the London Fever Hospital, and several of the infectious disease hospitals of London), is able to confirm Dr. Dudfield's opinions in respect of small-pox prevalence in and around Fulham. Distal aerial dissemination proved too much, for by the maps it spread small-pox in the Brompton Cemetery!

The question was referred to a Royal Commission. This consisted of men very distinguished in their own spheres; but not one of them had any special knowledge of small-pox or any special experience of the administration of small-pox hospitals. It heard much evidence given by more or less distinguished medical men,—Gayton, Dudfield, Power,



Aveling, Tripe, Pink, Murphy, Bridges, Collie, Munk, Buchanan, Simon, Jenner, Bennett, Gull, etc. Not one of them contributed an iota of evidence in support of distal aerial dissemination.

The conclusions of the Commission were remarkable, *à peine croyable*. Let the reader bear in mind that the hypothesis in question declares that a small-pox hospital, with even a few patients, spreads small-pox over an area of four square miles,—that is, exactly a mile from the hospital in each direction. The Commission did not accept the hypothesis, but it did not quite definitely reject it. It thought, or seemed to think, however, that distal aerial dissemination pointed to a possible danger which should be avoided. Therefore it recommended that as many cases as possible should be sent to the small-pox ship hospitals on the Thames, one of the greatest and most frequented of the world's highways, so that under the influence of the air-currents determined by the river small-pox might be carried to the ends of the earth. This was one of their recommendations. The second was like unto it. That forty of the "severest" acute cases be placed in some ward, or wards, in the land hospitals, which are (or were then) on the public streets. As regards Homerton, on the north contiguous, touching on Clifden Road; on the south on the Grove, where was the hospital gate which adjoined a public school, where the boys played, riding from time to time behind the "rickety four-wheelers," called by courtesy ambulances; on the west on the City of London Union Workhouse, its Infirmary and its *Maternité* (or rather these were in the very grounds of the Small-pox and Fever Hospitals); on the east on Brooksby's Walk, which touched so closely upon the fever wards that patients and residents in the said walk had now and then a little conversation (see diagrams p. 21, 39, 52). Inasmuch as about twenty of the "severest" acute cases of small-pox would about equal one hundred mixed cases (which was the number for which the two first small-pox



hospitals were built), the Royal Commission, by way of protecting the public from danger, "doubled" the quantity of the contagion. As regards the river, the chairman had a clearer idea of the absurdity of the former recommendation, inasmuch as he anticipated the objection here raised; but he thought that the currents in the river would make a difference between the river hospital and the land hospitals. Exactly, just this difference, that the said currents would carry the infection *in front* of the ships as they entered the port, *and would follow and accompany them when they left*. How so very intelligent a gentleman as the Under Secretary for Foreign Affairs did not see the manifest unwisdom of this recommendation, is but another illustration of the proverb, "Ne sutor ultra crepidam." Of the absurdity of "doubling" the quantity of small-pox contagion and placing it in the very same grounds as a workhouse, with its ever-varying population, of from four to five hundred inmates, together with its infirmary and its *maternité*, Lord Blachford did not even appear to be conscious.

Distal aerial dissemination produced a statistical table, showing that the small-pox incidence diminished gradually as the distance from the hospital increased. It is interesting from a psychological point of view; but inasmuch as it was founded upon a "fraction" of the cases, *meo judicio*, it is of no value whatever in reference to distal aerial dissemination.

With these observations on this *hypothèse épatante*, the writer proceeds to record his experience of the Eastern Hospitals, which he believes entirely disposes of distal aerial dissemination.



## THE EASTERN HOSPITALS.

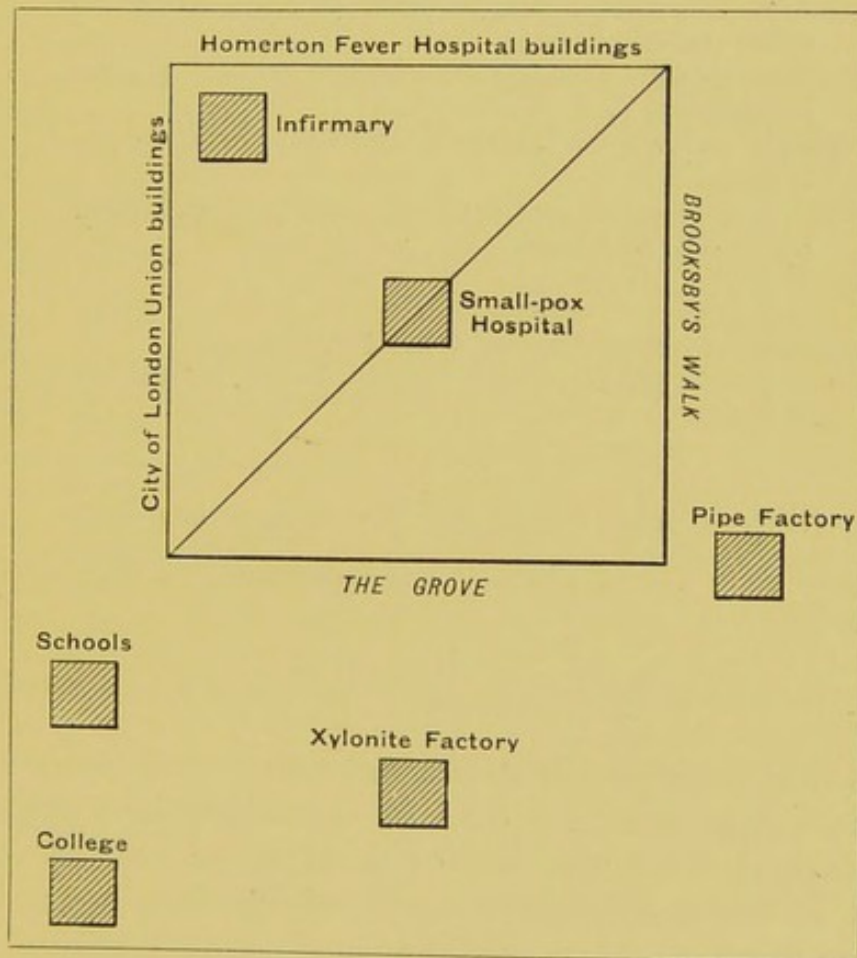
THESE Hospitals, originally the Homerton Fever and Small-pox Hospitals, are situated on the north-eastern confines of Hackney. They were both opened for small-pox in February, 1871, in consequence of the epidemic which was widely prevalent in London, particularly in East London, Hackney and Homerton. The hospitals were not welcomed by the neighbourhood at the time, but their advantages soon became apparent when the people found that the sick could be moved from crowded homes to a hospital at their doors, where they could receive the treatment which they needed (see *Plan I*). Any feeling of opposition which originally existed soon passed away, and the neighbourhood of the hospitals, which on their south-eastern, eastern, and northern sides were for the most part surrounded by empty space, became gradually built over, showing, so far as the public was concerned, that it did not believe there was any danger in living near them.

The advantages derived from the small-pox hospital became so generally recognized that in 1876-77 it became necessary to provide additional accommodation for small-pox. No one recognized the great value of the hospitals more than Dr. Tripe, the Medical Officer of Health for Hackney. He declared that they were an "inestimable boon" to the district, and that in respect of small-pox the "immediate" removal of cases from Hackney had "twice" checked its spread there.

Up to the year 1881 the hospitals continued more and more to gain public confidence, and in consequence the demand for hospital accommodation became so great that the Homerton Hospitals Committee decided to build an



additional hospital for East London at Winchmore Hill. In that year came the Fulham Report. Then, and not till then, did the M.O.H. for Hackney discover that the small-pox hospital was a danger to its neighbourhood, because in certain streets on its southern side there were more small-pox cases in the decennium 1871-80 which



PLAN I.

followed the hospital, than in the decennium 1861-70 which preceded it, which (although nobody knew, because there were "no records") was probably true, but for which there was abundant reason altogether apart from the hospital. The "facts" upon which this opinion is founded are contained in the statistical summary, pp. 22, 23.

## STATISTICAL SUMMARY.

## HACKNEY, 1871-80 AND 1861-70

1871-80		Per 1,000 Population
95 deaths in Streets adjacent to the Hospital	..	4'1
164 deaths in Streets situated within a quarter-mile radius of the Small-pox Hospital	.. ..	2'45
484 deaths amongst 30,177 poor persons living in other small houses	.. ..	1'60
261 deaths amongst 119,400 population, excluding poor population and deaths	.. ..	0'21
912 deaths (addresses known) amongst total population	.. ..	0'58
965 total deaths amongst Hackney residents, including unknown addresses	.. ..	0'64
1861-70		
Total deaths in this district from Small-pox	..	0'167
Deaths within a quarter-mile radius of the Small-pox Hospital	.. ..	0'264

## DEATHS FROM SMALL-POX per 1,000 POPULATION.

1861-70	.. ..	London 28	..	Hackney 17
1871-80	.. ..	.. 46	..	.. 64

NOTE.—The Hospital was not open during any part of the 10 years 1861-70.

The first thing which struck this writer on looking at the summary was the fact that in the decennium preceding the hospital there was small-pox in those very streets in which it reappeared in the decennium following. From this summary it will be seen that in eight of the twenty-two streets which existed in the pre-hospital decennium there were deaths, and it would be absurd to suppose that there were "no cases" in the other fourteen streets. As a matter of fact there is no knowledge whatever of cases in respect of the pre-hospital decennium, and obviously their number cannot be deduced from the deaths, since these do not bear a "constant" ratio to "cases." It must, moreover, be self-evident that since in the decennium



CASES OF AND DEATHS FROM SMALL-POX IN THE STREETS  
WITHIN A QUARTER-MILE RADIUS OF THE SMALL-POX  
HOSPITAL, HOMERTON.

Name of Street	Popu- lation	Cases	Deaths	
		1871-80	1871-80	1861-70
Albert Street, Homerton ..	131	15	6	0
Bridge Street ..	146	14	2	0
Brooksby's Walk ..	500	55	16	1
Churchill Road ..	364	35	9	0
Church Road ..	287	17	3	0
Church Terrace ..	115	15	1	0
College Lane ..	91	12	1	1
College Street ..	173	13	5	0
Cross Street ..	71	9	4	0
Crozier Terrace ..	428	18	6	1
Digby Road ..	602	31	5	1
Farm Place ..	91	8	3	0
Fenn Street ..	68	5	1	0
The Grove ..	198	29	10	0
High Street ..	1,196	51	13	2
Holmbrook Street ..	559	79	25	7
Homerton Row ..	36	6	3	1
John Street ..	127	10	2	0
Marion Street ..	120	27	6	0
Nesbitt Street ..	440	26	2	0
Plough Lane ..	65	10	3	0
Rosina Street ..	128	32	9	0
Sedgwick Street ..	316	42	3	0
Templar Road ..	571	66	29	1
Total ..	6,823	625	167	*15

\* Addresses not known, 3.

1871-80 there appeared the greatest epidemic of the century, and that therefore necessarily there must be more small-pox in a small-pox locality when it is epidemic than when it is not. The importance of the fact that there was small-pox in the pre-hospital decennium in the very same streets as in the post-hospital decennium is manifestly this, that



the district to which the hospital is said to have spread small-pox is a district liable to small-pox altogether independent of the hospital, a district where that disease will always be found when it is prevalent in London. Continuing our examination of the summary, one observes that the small-pox death-rate in London per "thousand" was: for the decennium 1861-70 twenty-eight; for the decennium 1871-80 forty-six, a rate which, taking the population at about 3,000,000, would have given 84,000 deaths from small-pox alone in the earlier decennium, and 138,000 in the later! This observation naturally did not inspire confidence in the statistics; but there is something still more remarkable which further lessens confidence in them. About twelve months after the presentation of the summary to the Homerton and Hackney authorities, Dr. Tripe gave evidence before the Royal Commission, when this summary was reproduced. One naturally expects that the figures had been revised and freed of any errors which they originally might have contained. The figures were revised, and the death-rate became in the respective decennia 28 and 46 per 100,000, instead of per 1000. One naturally concludes that this time the figures are correct. Not at all: the per 1000 and the per 100,000 are both wrong! At first sight one is inclined to think that these errors are mere "slips," which do not affect the substantial accuracy of the summary. Not at all. *Meo judicio*, the said summary is radically unsound. It will be found, according to the summary, that in the post-hospital decennium there were in Nesbitt Street twenty-six cases of small-pox with two deaths, in Sedgwick Street forty-two cases with three deaths; but that in the pre-hospital decennium there were neither cases nor deaths in these streets. This was true; but in the latter decennium these streets did not exist! Notwithstanding, these "slips" might have been forgiven if in substance the summary had been sound. Unfortunately this is not the case. The M.O.H. for Hackney states that



in streets "adjacent" to the hospital the death-rate per 1000 annually is 4.1; but from the adjacent streets he entirely omits the populations in (a) The Fever Hospital; (b) The City of London Union; (c) The Union Infirmary, which form two sides of the square of buildings which encloses the hospital, and are consequently most adjacent to it. He gives the population of Brooksby's Walk, but omits any mention of the workmen of the pipe factory at its southern end. He gives the population of The Grove, but makes no mention of the boys' and girls' school at its western end, where the ambulances pulled up, behind which the boys and girls rode, around which they played hide-and-seek without taking small-pox. He gives us the population of College Lane, along which the majority of the ambulances passed, but he says nothing of the pupils in the college forming one side of it. He records the population of High Street, but leaves out of account about 160 persons engaged in the xylonite factory. The importance of these populations, of which the summary takes no notice whatever, and amongst whom there was no small-pox, will be clear from the accompanying diagram (see p. 21), from which it will be seen that the following populations have been omitted from the summary: (a) The Fever Hospital population; (b) The City of London Union population; (c) The Infirmary population; (d) The pipe factory population; (e) The school population; (f) The college population; (g) The xylonite factory population, and doubtless others. So much for streets adjacent to the hospital. Of streets not adjacent to the hospital, but within a quarter of a mile of it, Dr. Tripe states that amongst a mean population of 6,823 the death-rate annually per 1000 was 2.45, but he omits the population of the Hackney Union. He states that "amongst a mean number of 30,177 poor persons living in other small houses" the death-rate annually was 1.60 per thousand; but what sort and condition of persons are "poor," where these lived, or what their relation to the hospital, there is no information. He tells us that amongst

(a) 761  
mild  
well  
vaccinated  
people



the mean number of "119,400 population, excluding poor population and deaths," the death-rate annually per 1000 was 0.21; that is, by taking the "poor population" where the small-pox was, and excluding it from the population where the small-pox was not, he found that the death-rate of the population where the small-pox was not was still 0.21. He records that amongst the whole population of Hackney in the decennium 1871-80, there were 912 deaths from small-pox, which gave a death-rate of 0.58 per thousand of the population, a rate manifestly much less than that in the streets adjacent to the hospital, omitting, be it observed, the populations represented in the diagram where the rate was 0.0! The fallacy of the method must be manifest, because it is obvious that by taking small-pox from populations where it prevails and distributing it over populations where it is absent, the mortality of (populations where it prevails) + (populations where it does not prevail) must obviously be less than in populations where it prevails. It is by excluding from his statistics a number of persons in the neighbourhood of the hospital equally exposed to small-pox with those whom he included; and by taking the deaths (a wholly unreliable guide to incidence of small-pox), that Dr. Tripe found that in the years 1871-80 they were in proportion to proximity to the hospital as follows: (a) In streets adjacent to the hospital, 4.1; (b) In streets within a quarter-mile radius, 2.45; (c) Amongst 30,177 other persons living in small houses (presumably more distant from the hospital), 1.60. But when correction was made for the populations of the Fever Hospital and the Workhouse alone, the death-rate was as follows: (a) In streets adjacent to the hospital, 0.9; (b) In streets within a quarter-mile radius, 1.1; (c) Amongst 30,177 other persons living in small houses (presumably more distant from the hospital), 1.8.

To these figures, with or without correction, this writer does not attach very much importance, and he produces them not so much to show anything for or against the



small-pox hospitals, as to point out upon what feeble grounds charges have been made against them. These statistics are, moreover, useless from one single point of view, to wit, that all these populations are migratory, and that therefore no one knows exactly what they are. These observations, *meo iudicio*, entirely dispose of this statistical summary; but in addition to these, there are three altogether different grounds, upon any one of which the said summary may be set aside. These are the following:—

(a). Dr. Tripe compared an epidemic decennium with one which was not epidemic, and on this ground no comparison between the two decennia was possible.

(b). He knew nothing whatever of the cases in the decennium 1861-70, and therefore on this second ground no comparison could be made between cases in 1861-70 and cases in 1871-80.

(c). He made no allowance for change in the character of the population, so that on this third ground no comparison was possible.

To this we might have added a fourth objection to his statistics, to wit, the not very insignificant one that he altogether omits any mention of three other small-pox hospitals in the neighbourhood of the Eastern Hospitals, two in Brooksby's Walk, and Mrs. Gladstone's in Lower Clapton. None of these could be isolated, and therefore necessarily distal aerial dissemination had a free hand in respect of all three. In respect of Mrs. Gladstone's hospital, however, the general management was all that could be desired, the supervision, the nursing, the cleanliness, the disinfection, etc., were excellent; whereas in respect of the hospitals in Brooksby's Walk there was no supervision whatever, no nursing worth the name, etc. Day by day the patients might have been seen carrying dinners, etc., from one to the other across the public highway. The patients took their airings in their infected clothing on the public street when they pleased, and visiting was free and uncontrolled. If the Asylums



Board Hospitals spread small-pox with complete isolation and complete supervision, with patients under lock and key until free of infection, the mischief which these two hospitals on the public street must have done must have been appalling ; but the M.O.H. did not even mention them. Obviously, therefore, admitting that the Asylums Board Hospitals spread small-pox, it could not be said to what extent they did so until what these others did had been estimated ; and inasmuch as this could never be estimated, the case against the Asylums Board Hospitals could never be made out.

But to return to the three other grounds which in our opinion entirely set aside Dr. Tripe's contention.

(a). He compared an epidemic decennium with one which was not epidemic. From our point of view the period 1871-80 was epidemic, whereas that of 1861-70 was not. Moreover, not only was the former period epidemic, but in the year 1871 of that decennium the severest epidemic of the century occurred. In that year small-pox was widely prevalent all over London, and the streets mentioned in the Statistical Summary were steeped in it before a single patient entered the hospital. Under these circumstances there was necessarily more small-pox in the neighbourhood of the hospital in the decennium 1871-80 than in the decennium 1861-70, and but for the energetic action of the Asylums Board and their officers on that and on other occasions, the number of cases and the number of deaths in Hackney during the years 1871-80 would have been increased, one knows not to what extent. When this was pointed out to Dr. Tripe, he replied that the decennium 1861-70 was an epidemic period, that in fact there were "three" epidemics during that decennium, the epidemics of 1863, 1866 and 1867. The word epidemic is used very loosely, and we shall not waste time in discussing its precise meaning, but shall consider the actual facts. In the year 1863, the year of the decennium in which the number of deaths was greatest,



we find that they were 1,996. This mortality in a population of 3,000,000 would give 6.6 deaths per annum in a town having a population of 10,000, an extent of prevalence which we submit can in no sense be considered epidemic. But if this be objected to, we find that during the whole decennium 1861-70 the deaths were 8,347, whereas in the two years 1871-2 of the decennium 1871-80 they were 9,698; that is, in two years of the latter decennium there were more deaths than in the whole ten of the former, and in the single year 1871 the deaths were 7,912 to 1,996 in 1863; that is, nearly four times as many in 1871 as there were in 1863, and with extent of prevalence the cases would be out of all proportion to the deaths. Even if we take the two decennia together, the deaths in the earlier were but 8,347 to 15,472 in the later. There would necessarily therefore be more small-pox in Hackney in the one decennium than in the other, because there was more everywhere.

(b). Dr. Tripe had no knowledge of "all" the cases of small pox in Hackney or the neighbourhood of the hospital for the decennium 1861-70, a fact which he himself has admitted. How then can they be compared with cases occurring in 1871-80 if their number be unknown? How can it be asserted that in the neighbourhood of the hospital there were fewer cases in 1861-70 (correction being made for epidemic prevalence, and change in character of population) than in 1871-80, if nobody knows what they were? Dr. Tripe gives certain deaths, but admitting that he had "all" the deaths, that there were no errors of diagnosis, the cases cannot be deduced from the deaths even approximately, because owing to vaccination, deaths do not bear a constant ratio to cases. But this even is not all. Dr. Tripe not only did not know the cases of 1861-70, but upon his own confession he did not know those of 1871-80. All that he knew of cases even in these years were for the most part the "pauper cases," or such as happened to be reported to him for



disinfection purposes. Of cases generally he said, "Cases in respectable houses are rarely reported to me." Of these then he could say nothing; so that his conclusions are confessedly founded upon a bare fraction of the cases among the poorer inhabitants living necessarily in the poorer, and, notwithstanding, respectable, houses on the southern side of the hospital.

(c). Dr. Tripe made no allowance for change in the character of the population.

In the decennium 1861-70 the neighbourhood of the hospital was for the most part open and the inhabitants were comparatively few. There were many old houses standing in their own grounds. The modern speculative builder had not, even in 1870, altogether taken possession of Homerton. Half the area of a circle having a radius of a quarter of a mile round the hospital was unbuilt upon. At or near to Ballance Square in 1870 there stood an old manor house in the midst of almost empty space. That house was taken by Roman Catholic Sisters, and in the course of the decennium a Catholic church arose, and around it a new city. The character of the population entirely changed. The place of the old houses with the large gardens was taken by rows of house-to-house built streets, in which the population increased by thousands. Dr. Tripe said that there was little or no change in the population. This was altogether incorrect. It had wholly changed in character and increased in number by thousands. It was not therefore surprising that there should be more small-pox. These facts and observations, as we think, dispose entirely of Dr. Tripe's indictment, but in addition he himself disposes of it. He affirmed "that the disease (small-pox) was persistently present in the vicinity of the hospital during the whole of the ten years it was open, whilst in other localities, although a severe outbreak occasionally occurred, it did not prevail year after year in the same way as around the hospital." There are here, it will be observed, two distinct statements: first, that the



hospital was open for ten consecutive years ; and second, that " year after year " of these ten years small-pox existed in the vicinity. Very good. Assuming the hospital to be the cause, a cause is what produces an effect ; as the presence of the cause is the presence of the effect, so the absence of the cause is the absence of the effect. The absence of the cause with the presence of the effect would be a contradiction of the law of cause and effect. We are sure, therefore, that whatever can be omitted or withdrawn without making any difference to the effect in question is not the cause or any part of the cause. If we cut a string that we suppose to be the support of a weight, and the weight continues to be supported, the string is not the support. Therefore, manifestly, if we remove the small-pox hospital, and the small-pox remains, the hospital is not the cause of the small-pox. This practically was what happened. Leaving out of account minor periods, for about twenty-one consecutive months of Dr. Tripe's " ten years " the hospital was closed (from September, 1874, to June, 1876) ; but notwithstanding, " year after year " of these ten years, both when the hospital was present and when it was absent, small-pox existed in its vicinity. To resume the simile, the " string " (small-pox hospital) which supported the " weight " (small-pox incidence) was cut, but the " weight " (small-pox incidence) remained.

It does not, however, follow that because the Medical Officer of Health for Hackney has failed to make out his contention, that therefore the Homerton Small-pox Hospital did not spread small-pox " somehow or other " to its neighbourhood near and far. There remains to be explained the notable " fact," however produced, that during the post-hospital period the death-rate in Hackney had largely increased out of all proportion to that of London, a fact which to some people would be sufficient proof that it did. We proceed to demonstrate the contrary from the reports of the Homerton Hospital and from the returns of the Registrar General.



*Deaths from Small-pox per 10,000 Inhabitants in London and Hackney in the Decennia 1861-70 and 1871-80.*

				London			Hackney
1861	..	..	..	·64	..	..	·12
1862	..	..	..	1·03	..	..	·12
1863	..	..	..	6·03	..	..	4·92
1864	..	..	..	1·61	..	..	1·44
1865	..	..	..	1·93	..	..	·72
1866	..	..	..	5·16	..	..	3·62
1867	..	..	..	3·99	..	..	3·36
1868	..	..	..	1·81	..	..	·48
1869	..	..	..	·81	..	..	·40
1870	..	..	..	2·87	..	..	1·92
Total				25·8	17·1		
Average				2·5	1·7 (nearly)		
<hr/>							
1871	..	..	..	23·62	..	..	32·0
1872	..	..	..	5·34	..	..	10·08
1873	..	..	..	·34	..	..	·64
1874	..	..	..	·16	..	..	·56
1875	..	..	..	·22	..	..	·08
1876	..	..	..	2·21	..	..	9·36
1877	..	..	..	7·63	..	..	23·52
1878	..	..	..	4·24	..	..	7·68
1879	..	..	..	1·37	..	..	·56
1880	..	..	..	1·42	..	..	5·52
Total				46·0	90·0		
Average				4·6	9·0 (nearly)		

It will be manifest from the figures that during the years 1861-70 (when there was no small-pox hospital) the small-pox death-rate in Hackney was "invariably" under that of London, and that during the years 1871-80 (when there was a small-pox hospital), with two insignificant exceptions, it largely exceeded that of London. Was this due, as was alleged, to the small-pox hospital there? Let us see. It will be seen from an examination of the death-rates in the earlier decennium, that although year by year the Hackney rate was lower than the London rate, nevertheless for some reason or other, even in that pre-hospital period, there was



a tendency on the part of the Hackney death-rate to rise, and in 1867, three years before the Small-pox Hospital was open, the two rates are practically equal. Obviously, therefore, there was some cause, other than the small-pox hospital, producing an increased small-pox death-rate in Hackney "years" before the Hospital existed. This influence, whatever it was, showed itself in a most marked manner in 1871, when the Hackney rate was 32 to London's 23, and in the following year it is twice that of London. Granted: but what has this to do with the Small-pox Hospital, seeing that small-pox was all over Hackney, Homerton, and the whole of East London before a single small-pox patient entered its walls? The epidemic was far and away beyond control before the hospital gates were opened. Homerton was a hotbed of small-pox; Hackney was steeped up to the ears in it; and all over East London it was rampant. Clearly the Small-pox Hospital had nothing whatever to do with what happened before it existed. (AVELING, Medical Officer, City of London Union Infirmary and Workhouse, Homerton). What the hospital did do was to limit sensibly the spread of the epidemic by the removal of hundreds of cases from the homes of the poor, a fact of which there could not be any statistical evidence, because such evidence would be evidence of events which did not happen. But does anyone outside an asylum doubt that the removal of hundreds of cases of small-pox from the crowded homes of the Hackney poor largely controlled the epidemic of small-pox there in the years 1871-72?

"Much has been said about the peculiar certainty of mathematical reasoning, but it is only certainty of deductive reasoning, and equal certainty attaches to all correct logical deduction. If a triangle be right-angled, the square on the hypotenuse will undoubtedly equal the sum of the two squares on the other sides; but I can never be sure that a triangle is right-angled" (*Principles of Science*, JEVONS). But we can be sure that small-pox is infectious, and this being so, it follows by strict deductive reasoning, that the



removal of "hundreds of cases," the subjects of small-pox, from their crowded homes, saved many lives and much suffering, as certainly as that, given a right-angled triangle, the square on the hypotenuse shall be equal to the sum of the squares on the two other sides. It follows, necessarily, that with the great outbreak of small-pox in Hackney in 1871-72, the small-pox hospital had nothing whatever to do. During the years 1873, 1874 and 1875 small-pox did not quite disappear from Hackney, but it ceased to be very prevalent there until 1876, when its death-rate rises to four times that of London. Was this due to the Small-pox Hospital? Assuming that it was, the hospital would be its "cause," and the increased death-rate its "effect." It will be at once admitted that a "cause" must precede and an "effect" follow. Let us now see if the "cause" (Small-pox Hospital) preceded the "effect" (increased death-rate in Hackney in 1876).

"On the 1st of January, 1875, there were in the hospital 34 patients suffering from scarlet fever; all of these were discharged convalescent by the third of the following month; the building, clothing, etc., being again thoroughly disinfected, remained unused until October last, when, owing to the Fever Hospital having a larger number of cases than it could accommodate, I was directed by you to be in readiness to act as an auxiliary.

"On the 22nd October the admissions commenced. The Parishes and Unions supplying the patients are as follows:—

St. Pancras	..	..	..	..	11
Bethnal Green	..	..	..	..	10
Islington	..	..	..	..	7
St. Marylebone	..	..	..	..	7
Hackney	..	..	..	..	6
Mile End Old Town	..	..	..	..	3
Shoreditch	..	..	..	..	3
St. George's-in-the-East	..	..	..	..	1
Whitechapel	..	..	..	..	1

"From the 22nd of October to the 31st of December,



1875, 49 cases of scarlet fever were received ; of these, 25 were males, and 24 females ; the following table shows that the majority were under the age of puberty " (Report of the Medical Superintendent of the Homerton Small-pox Hospital for the year 1875, dated Feb. 7th, 1876).

" Late in May, 1876, several cases of small-pox arose in the Homerton District ; these were sent to the sister institution at Stockwell, which had, during the time the Homerton Small-pox Hospital was used for scarlet fever, undertaken to receive cases from the whole of the Metropolis. Upon the first note of alarm the hospital was thoroughly disinfected and otherwise prepared for its legitimate work, and on July the 1st, there being several cases at Stockwell belonging to the area allotted to the Homerton Hospital, the Committee obtained the consent of the Board to the re-opening of the hospital.

" It was not, however, until the first week in August that patients were admitted ; within eight weeks from that date 86 cases were received, the disease having reappeared in nearly all the northern and eastern portions of London, and with especial virulence in Islington " (Report of the Committee of Management of the Homerton Fever and Small-pox Hospitals for the year 1876, dated April, 1877).

It follows, necessarily, that the small-pox hospital at Homerton could not have been the cause of the small-pox increase in Hackney, seeing that during the whole of 1875 and the first half of 1876 it was empty. In this case, as in others of the same kind, the hospital was the " effect," and the small-pox in Hackney, " the northern and eastern portions of London," the " cause." The next increase of small-pox which took place in Hackney in the decade 1871-80, was in the latter year. From .56 per 10,000, the death-rate rose to 5.52, " four times " that of London. Was the Homerton Small-pox Hospital the cause of that ? Let us see.

" The cleaning and alterations considered necessary in the building being completed, it was not re-opened for the



reception of small-pox patients until March 1st, 1879 : from that date until September 19th, 1879, it was so used, the number of patients admitted being 69, and the particulars of which will be found in the appended Tables.

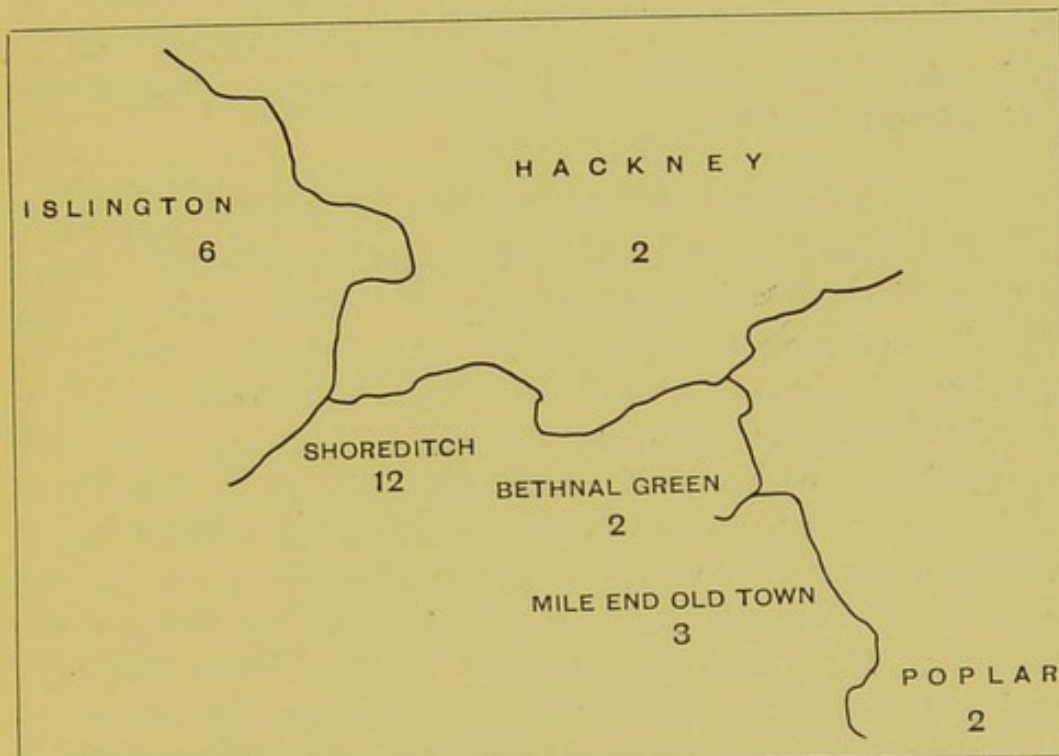
“ The most important event in the history of the hospital during the past year was its utilization for the treatment of enteric fever. On the 25th of September last the Committee decided upon temporarily receiving this class of disease, or rather such as could not be admitted into the Fever Hospital : there were at that time 11 cases of small-pox under treatment : in order to comply with the instructions then given, these were transferred to the Deptford Hospital, the necessary disinfection was at once commenced, and on the 30th of September, or five days after the matter was finally decided, 30 patients were received from the Fever Hospital ” (Report of the Medical Superintendent of the Homerton Small-pox Hospital for the year 1879, dated March, 1880).

During the year 1879 the small-pox admissions to the Small-pox Hospital were as follows :—

1879.					
January	..	..	..	..	0
February	..	..	..	..	0
March	..	..	..	(1 vaccinated)	2
April	..	..	..	..	0
May	..	..	..	(6 vaccinated)	9
June	..	..	..	(17 vaccinated)	22
July	..	..	..	(16 vaccinated)	18
August	..	..	..	(8 vaccinated)	15
September	..	..	..	(3 vaccinated)	3
October	..	..	..	..	0
November	..	..	..	..	0
December	..	..	..	..	0
1880.					
January	..	..	..	..	0

In this third and last period of the decade, then, when small-pox increased in Hackney, it will be observed that small-pox was in Hackney when there was none in the hospital, and further, that the hospital had been almost

empty during the whole of the year preceding that increase, only seventeen cases of true variola having been admitted in the months of May, June, July, and August. Three modified variolas were admitted in September, in which month the hospital was closed. It remained absolutely empty during the following four months, and what is particularly significant, when it was opened in February, it was found that small-pox was present in



PLAN II.—Showing Hackney with its bordering districts.

Hackney and “all along” the Hackney border, from Poplar on the east, through Mile End, Bethnal Green and Shoreditch, to Islington on the west, as the accompanying sketch (*Plan II*), with the numbers of the small-pox admissions to the hospital in February, when it opened, will show. To resume our simile, the “string” (small-pox hospital) had been cut, but the “weight” (small-pox incidence) remained.

With these observations on the indictment of the Medical Officer of Health for Hackney, we shall now endeavour



to show that the experience of Homerton by itself entirely disposes of distal aerial dissemination. At various periods from 1871 to "about" 1885, certain populations in the immediate neighbourhood of the Homerton Small-pox Hospital and of the Homerton Fever Hospital, used as a small-pox hospital, were entirely free of small-pox incidence under circumstances in which, according to the theory, they should have severely suffered. The facts concerning these populations and their immunities from small-pox shall now be recorded from the year 1871 up to the year 1885, when small-pox ceased to be received at the Eastern Hospitals.

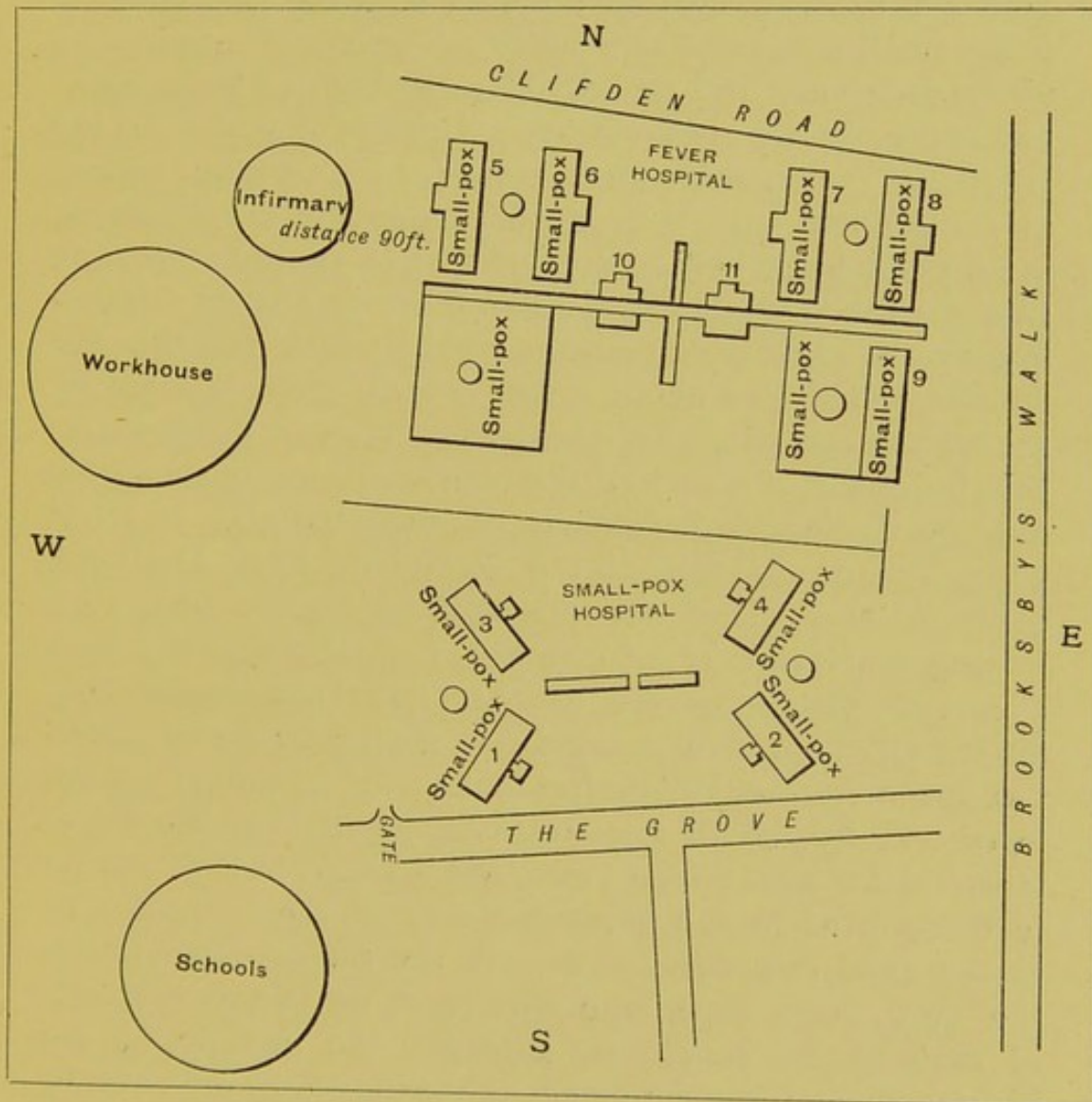
#### THE EXPERIENCE OF THE YEAR 1871.

"The Small-pox Hospital was opened on the 1st February, 1871, and being filled almost immediately, it was found necessary to appropriate the Fever Hospital to small-pox purposes, and the whole 200 beds which it provided were occupied by the end of February. As the epidemic increased, more beds were placed in the wards and some were fitted up in the corridors for convalescents, and the pressure became so great that tents had to be erected in the grounds, until the total accommodation in June, 1871, amounted to 284 at the Fever Hospital, and 152 at the Small-pox Hospital. In July the admission of cases into the Fever Hospital was discontinued" (Report of Committee of Homerton Hospitals from 1871 to December, 1875, dated 22nd March, 1876).

During the period, February - July 1871, sixty cases of "other disease" were admitted into the Fever Hospital, certified to be cases of small-pox. These cases were treated in two special wards, numbered 10 and 11 on the accompanying plan (*Plan III*), an inspection of which will show that these sixty persons in these special wards were surrounded by small-pox in nine pavilions and six tents (represented by the circles), within a few feet of them. The average number of cases daily during the five months was over 400,



about 100 of which would be "severe acute." Obviously, on the theory, there should have been an incidence of small-pox upon these sixty individuals, each of whom would be exposed for about six weeks to this "mass" of small-pox,



PLAN III.

but not one of them contracted it, notwithstanding their susceptibility, which was proved by the fact that before their discharge each was vaccinated with success. The next most remarkable immunity from small-pox, according



to the theory of distal aerial dissemination, is that of the City of London Union Infirmary.

This Infirmary stands at a distance of about 90 feet from the westmost pavilion of the Fever Hospital, its relation to which is shown on the accompanying plan. During the period already referred to there were in the said pavilion forty small-pox beds constantly occupied. The windows of the Infirmary and the pavilion directly face each other, and were almost always open. Amongst the sick in the Infirmary, who, *inter alia*, consisted of young women in confinement and their unvaccinated new-born infants, there must have been some susceptible subjects; in any case all new-born infants, of whom there were about twenty-five yearly (AVELING, *Question* 5069), which for the five months would give about "ten." Here then, apparently, are all the conditions for the transmission of small-pox to this Infirmary, if it be true that the contagion of small-pox may be carried long distances through the air. It stood within about 90 feet of the Fever Hospital small-pox pavilion, and within the precincts of eight others, containing together over 400 cases of small-pox, of whom over 100 were "severe acute;" but notwithstanding, during all these five months not a single case of small-pox arose in the Union Infirmary, and although scarlet fever was treated in this westmost pavilion of the Fever Hospital for about nine years, not a single case of scarlet fever occurred in the lying-in wards of the Infirmary or in the children's dormitories. In the same circumstances the very same experience was repeated in the epidemic of 1876-77, no small-pox amongst the inmates of the Infirmary, and none among the fifty cases of "other disease" admitted to the special wards marked 10 and 11 of the Fever Hospital, for the second time used as a small-pox hospital. The case of the Workhouse is hardly less striking. It stands practically in the same grounds as the Small-pox and Fever Hospitals, separated only by a wall about nine feet high, and "at all times within



perhaps from about 110 to 115 feet of small-pox when the Small-pox Hospital was open" (AVELING, *Question* 5053, Royal Commission Report, Small-pox and Fever Hospitals).

Its position is shown on *Plan III* above. The population at the time the Small-pox and Fever Hospitals were rapidly filling up with small-pox in February, 1871, was about 450. It had not been re-vaccinated, and it may be fairly inferred that such primary vaccination as it had, was like that of its neighbours in East London, where small-pox at the time was widely prevalent. Note, too, that the authorities of the "house" were fond of fresh air, a fact which the writer inferred from observing that the windows were nearly always open. About the presence of small-pox at their door, over 400 cases, about 100 of which were "severe acute" in the Small-pox Hospital, in the Fever Hospital, and the tents at their side, there could not be any doubt. That there was an "aggregation" of cases is manifest. It commenced in the Small-pox Hospital proper on the 1st of February, and for a week increased at an average of fifteen cases daily. Between the 1st and the 7th of February, 1871, both days inclusive, the number of small-pox patients admitted to the Homerton Small-pox Hospital was 105, of whom 52 were vaccinated, 29 unvaccinated, and 24 were without evidence of vaccination (GAYTON, private letter). We have here, then, a wholly exceptional "aggregation" of acute small-pox, which commenced upon the 1st of February, and it is of the essence of the theory that it is at the commencement of aggregation that excess of small-pox makes its appearance round a small-pox hospital. On this point here are Dr. Buchanan's own words:—

"I find that at the *commencement of aggregation of cases* the same excess of small-pox prevalence round the hospital has been witnessed in epidemic after epidemic. It is during the commencement of aggregation, and *then only*, that the excessive incidence upon neighbouring houses shows itself" (*Question* 3846).



On the evening of the 1st of February, then, there were about fifteen cases of severe acute small-pox in the Homerton Small-pox Hospital more than there were in the Fulham Small-pox Hospital, when the "notable outburst" occurred at Fulham. We may say then for certain, that the aggregation commenced on the morning of the 2nd, so that, accepting Mr. Power's incubation period of fourteen days, and Dr. Buchanan's "commencement of aggregation," we should have expected an excess of small-pox in the "house" about the 16th. Very good. On the following page is the list of the small-pox and fever cases which occurred in the Union from January, 1871, to December, 1881, the period up to the time of the inquiry by the Royal Commission.

From these cases W. R. must be eliminated because he contracted his small-pox before the hospital was opened. The portress must be eliminated because she did not belong to the "house," but to the "lodge," in the neighbourhood where small-pox was widely prevalent, to which she was specially exposed by going out on leave, and by constant contact with visitors and tradesmen at the gate. The master's clerk must be eliminated because he caught his small-pox when the Small-pox Hospital was closed. This leaves 16 cases of small-pox which occurred in the "house" during eleven years at periods when the hospital was open. From these 16, two cases have to be deducted because they were traced to personal contact (Aveling), which leaves 14 as *ex hypothesi* due to the hospital, which, in a population of 450 persons, would be an incidence of  $\frac{1}{31}$  of a case per annum. As we have said, according to the theory there should have been an outburst of small-pox in the "house" about the 16th February; but not only was there no "outburst," but not a single case in the Infirmary or the house during the remaining days of February, the whole of March, and the first three weeks of April. The first cases which occurred in the house were recognized on the 22nd April, so that, allowing about fourteen days for incubation,



they arrive about *nine weeks* too late. From February the 16th to the 28th there are twelve days; in March there are thirty-one, and in April up to the 22nd there are twenty-one days, a total of sixty-four. When the cases do occur they

*Cases of Small-pox and Fever which occurred in the  
City of London Union Workhouse, Homerton,  
from January, 1871, to December, 1881.*

Date	Name	Age	Case
1871			
Feb. 4 ..	W. R. ..	15 months. ..	Small-pox
Mar. 18 ..	Barrett ..	(?) ..	do.
Mar. 18 ..	A. L. ..	16 years ..	do.
April 22 ..	C. C. ..	17 ..	do.
April 22 ..	A. H. ..	18 ..	do.
April 22 ..	E. H. ..	18 ..	do.
June 6 or 10 ..	R. T. ..	33 ..	do.
Sept. 9 ..	A. W. ..	33 ..	do.
1872.			
Jan. 27 ..	Louise Gobert ..	36 ..	Scarlet Fever
Feb. 3 ..	E. C. ..	35 ..	Tonsillitis
May 18 ..	E. H. ..	27 ..	Small-pox
Dec. 21 ..	W. T. ..	53 ..	do.
1876.			
April 1 ..	R. R. ..	12 months ..	Measles
April 1 ..	A. C. ..	18 ..	do.
Nov. 11 ..	E. S. ..	8 years ..	Small-pox
Nov. 28 or			
Dec. 2 ..	E. M. ..	64 ..	?
Dec. 9 ..	G. P. ..	49 ..	Small-pox
Dec. 30 ..	T. T. ..	6 ..	do.
1878.			
April 13 ..	E. P. ..	4 ..	Small-pox
1879.			
Oct. 11 ..	James Carter *	?	do.
1880.			
April 3 ..	T. M. ..	50 years ..	Small-pox
Dec. 11 ..	R. H. †	31 ..	do.
1881.			
May 28 ..	W. Larder ‡	?	Scarlet Fever
July 16 ..	R. L. ..	60 ..	Small-pox
Dec. 3 ..	C. F. ..	45 ..	Typhus Fever

\* Master's Clerk, sent to Deptford Hospital.

† Sent to Deptford Hospital,

‡ Labour Master.



are three in number in a population of about 450 persons who had not been re-vaccinated! Having produced this magnificent outburst (which, when what was due to personal communication from visitors, etc., was deducted, would amount to nothing), the hospital appears to have ceased to act, for there is no further "outburst" until the 6th of June, when there is one case, and this (be it observed) in a floating population more or less frequently bringing different persons under the influence of the contagion. Clearly distal aerial dissemination derives no support from this 1871 Homerton experience, an opinion which has the independent support of Dr. Aveling (M.D. Lond., etc.), the Medical Officer of the Union. Here are his *ipsissima verba*:

"Question 5033.—Chairman: Have you found that small-pox or fever has been propagated from the Homerton Hospital?

"Answer.—Dr. Aveling: No. I believe on the question of mere proximity we are perfectly safe, and the ground I take up is this, that if being so near were a danger to us, we should show a much larger percentage of small-pox and fever than, for example, a Union situated a quarter of a mile off. I selected that Union because I could inquire into all the circumstances of the cases sent from there, and also had the power of finding out all about the cases that had gone from my own Union.

"Question 5034.—What was that other Union?

"Answer.—The Hackney Union, about a quarter of a mile off. When I first made the inquiry I found that the figures proved what seemed an improbability, namely, that the Hackney Union had a much larger proportion of cases than we; but on inquiring more accurately into the matter, I found that although more cases had been sent from their Union (to hospital) than from ours, the reason was that many cases had been sent from outside into the Hackney Union in the incubation stage; that is, at a stage when they had contracted the disease but had not shown it, whereas in my case there had



been only one so sent in. The real truth is that the two Unions, as regards small-pox, are almost exactly upon a par. The percentage of cases for all practical purposes may be taken to be the same; that is to say, in Hackney Union, which is a quarter of a mile off, they had the same proportion of cases among the inmates as was the case with my Union" (Royal Commission Report).

The number of cases of small-pox which occurred in the Hackney Union, "one quarter of a mile" distant from the Homerton Small-pox Hospital, from 1871 to 1881, excluding twelve admitted in the incubation stage, is as follows:—

1871	..	..	..	..	..	..	2
1872	..	..	..	..	..	..	3
1873	Small-pox Hospital open	..	..	..	..	..	0
1874	..	..	..	..	..	..	1
1875	Small-pox Hospital open Oct., Nov., Dec.	..	..	..	..	..	1
1876	..	..	..	..	..	..	1
1877	..	..	..	..	..	..	3
1878	..	..	..	..	..	..	4
1879	Small-pox Hospital open May to September	..	..	..	..	..	0
1880	..	..	..	..	..	..	2
1881	Small-pox Hospital open to 7th October	..	..	..	..	..	4
							<hr/> 20

Assuming that the same proportion were traced to personal communication, this would reduce the number in the Hackney Union to 16,

$$20 : 15 :: x : 3$$

a practical agreement between the two Unions; but what becomes of "distal aerial dissemination" if the incidence of small-pox in a house at "the door" of a small-pox hospital be the same as that of a house a quarter of a mile distant?

#### EXPERIENCE OF THE HOMERTON FEVER HOSPITAL FROM OCTOBER, 1871, TO DECEMBER, 1874.

From February to September, 1871, the Fever Hospital was occupied with small-pox. On the 1st of October it was opened for "fever." It continued to be occupied with fever



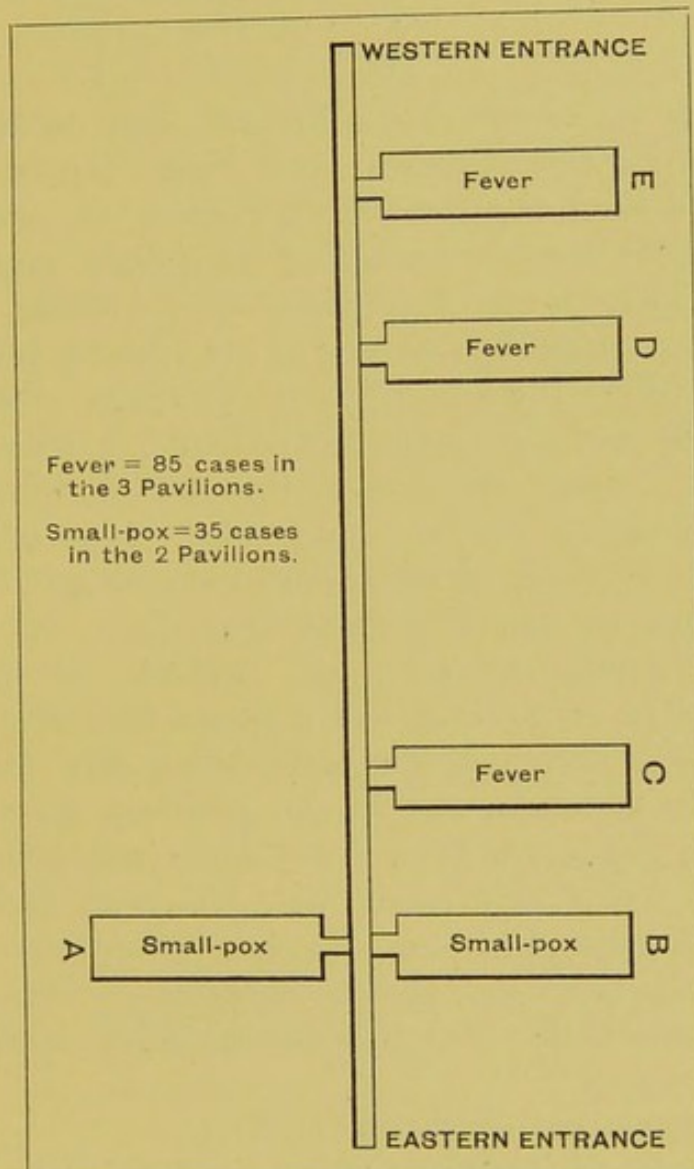
whilst the Small-pox Hospital was occupied with small-pox up to the end of 1874. During that period about 3,178 cases of small-pox were treated in the Small-pox Hospital, and about 2,611 cases of fever and *other diseases* in the Fever Hospital; but during all that time no case of small-pox "arose" in the Fever Hospital, *although in 1872 seventeen cases, and in 1874 one case, were admitted certified to be fever.* During the year 1875 the Small-pox Hospital was for the most part occupied with fever, and did not deal with small-pox until June, 1876. No case of small-pox arose in the Fever Hospital in 1876. In December of that year the Fever Hospital was opened for small-pox, and continued occupied with that disease until the 27th September, 1877. During the three months, October, November, and December, 400 cases of fever and other diseases were admitted to the Fever Hospital, and during the same period 364 cases of small-pox were admitted to the Small-pox Hospital. During these three months six cases of small-pox arose in the fever wards, and continued to spread until the spring of the following year.

The first cases were traced to personal communication with infected persons and possibly with infected linen; but all were not so traced, the missing link case (too slight to be recognized) so generally ignored, probably explaining why in some cases; and a too strict adherence to current notions on incubation periods explaining why, in other cases, they could not be traced to personal communication.

#### THE EXPERIENCE OF THE YEARS 1876-77.

On the eighth day of December, 1876, in consequence of continued pressure from small-pox, it was decided to transfer the fever cases in the Fever Hospital at Homerton to another hospital, and to prepare it for small-pox. As it had been foreseen that some such step would be necessary, 100 beds were ready, and on the following day, whilst there were 125 cases of fever in the Fever Hospital, 35 cases of acute small-pox were admitted and 40 cases of fever trans-

ferred. On the morning of the 10th there were 49 cases of small-pox in the Fever Hospital, lying side by side with 85 cases of fever. There was no communication between them, because they were all in bed. The medical officers,



PLAN IV.—The relation of Small-pox to Fever patients on the morning of December 10th, 1876.

nurses, laundries, etc., were distinct, and as the small-pox was admitted at the eastern entrance of the hospital, the fever was transferred to another hospital at the western. The following statement shows the numbers day by day, from the 9th to the 18th of December, when



the remaining 13 fever patients, who could not be transferred, were re-vaccinated.

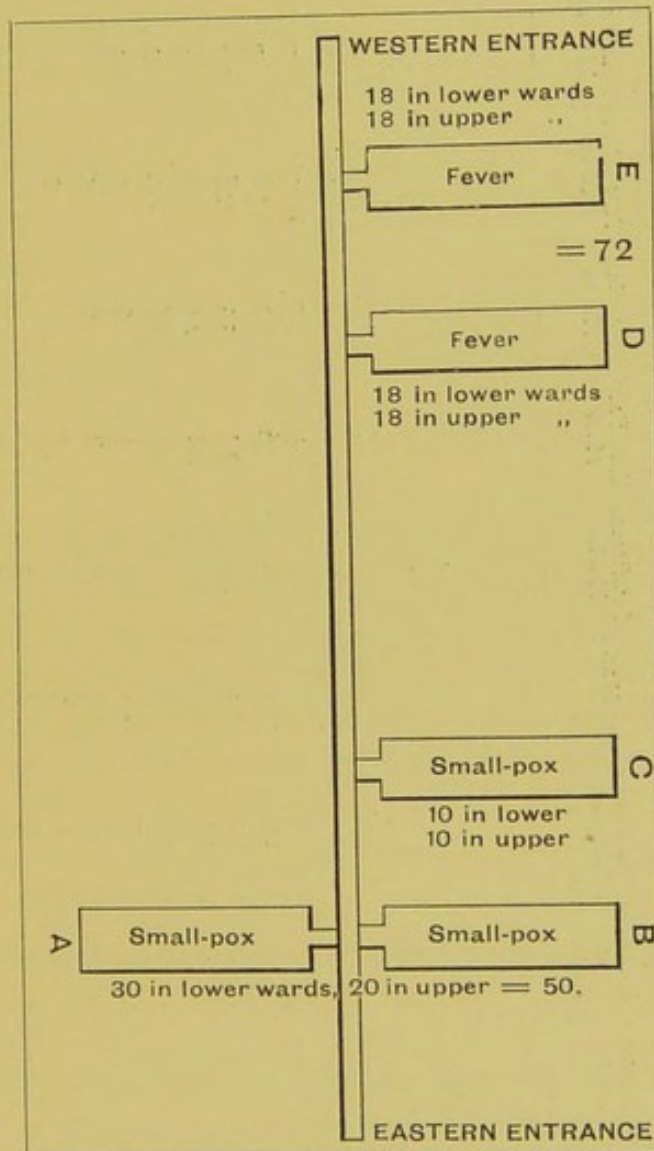
	Small-pox	Fever		Small-pox	Fever
Dec. 9th ..	35 ..	125	Dec. 14th ..	125 ..	37
„ 10th ..	49 ..	85	„ 15th ..	139 ..	27
„ 11th ..	70 ..	72	„ 16th ..	151 ..	13
„ 12th ..	93 ..	51	„ 17th ..	165 ..	13
„ 13th ..	114 ..	38	„ 18th ..	169 ..	13

From this statement it will be seen that on the 18th of December thirteen persons had been exposed to the contagion arising from thirty-five cases of severe acute small-pox, the number increasing by a daily average of 16 to 165 on the 17th for about eight days without contracting small-pox. On the morning of the 15th 27 persons had been exposed to the contagion of 35 cases of small-pox, increasing by a daily average of 16 to 139 for about five days, with similar immunity. On the morning of the 14th thirty-seven persons had been exposed to the contagion of 35 cases of small-pox, increasing by the same daily average to 125 for about four days, but without contracting small-pox, etc., etc. Briefly, of the whole 125 cases of fever more or less exposed to contract small-pox from 169 severe acute cases lying side by side of them, at the distances and in the positions shown in the diagrams on pages 49, 51, 52, no single individual did so. Negative evidence, says some one. Yes, very indeed!

There is obviously but one objection to this *experimentum crucis*, and that is absence of "susceptibility." On this point the condition of their vaccination is conclusive. Here it is:—

Unvaccinated .. ..	20
No evidence of vaccination .. ..	12
Said to be vaccinated .. ..	12
Bad marks .. ..	10
Indifferent marks.. ..	25
	— 79
One fair mark .. ..	13
Two fair marks .. ..	20
	— 33
Four fair marks .. ..	8
Five or more .. ..	5
	— 13
	125

No fever patient had been re-vaccinated, but one had had small-pox. So far, then, as protection by vaccination is concerned, it will be seen that of the whole 125 persons, 79 were practically unprotected; 33 were but partially protected, and of 13 only could the vaccination be said to



PLAN V.—Relation of Small-pox and Fever patients on December 11, 1876.

be of the "first class." Their condition as to vaccination was practically the same as that of the 915 cases of small-pox admitted to the fever wards of the Eastern Hospitals during the epidemic, as the following table will show:

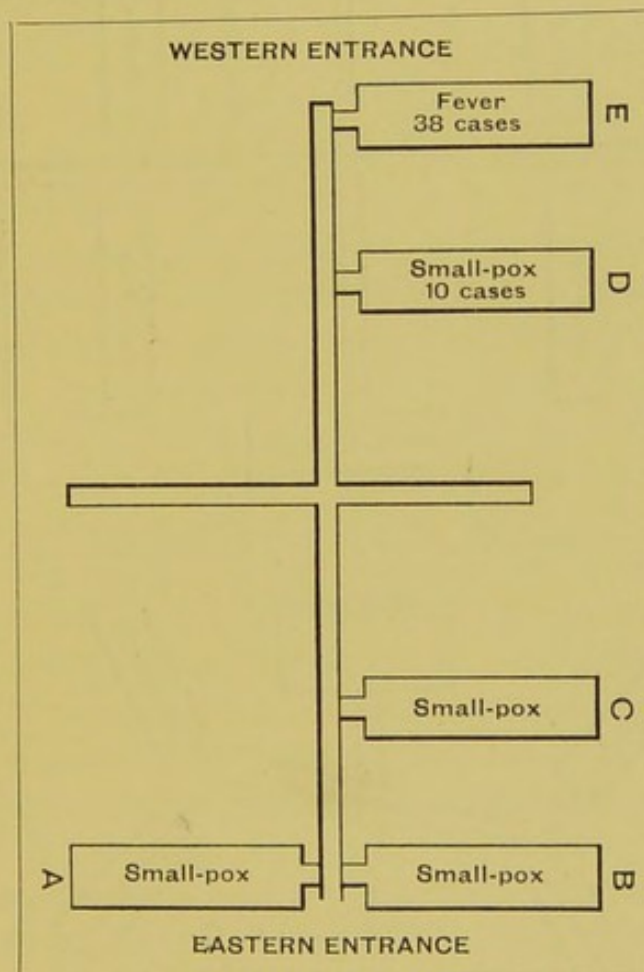


## VACCINATION STATISTICS.—SMALL-POX EPIDEMIC OF 1876-7.

TABLE I.—Showing Age, Number, and Vaccination of Patients Admitted.

	Unvaccinated	No Evidence of Vaccination	Said to be Vaccinated	Bad Marks	Indifferent Marks	One Fair Mark	Two Fair Marks	Three Fair Marks	Four Fair Marks	Five or more Fair Marks	Total
Under 1 Year	12	..	..	..	..	..	..	1	..	..	13
" 2 Years	8	2	1	..	1	..	..	..	..	..	12
" 3 "	7	2	..	..	1	..	1	..	..	..	11
" 4 "	7	6	1	..	..	1	..	..	1	..	16
" 5 "	8	5	..	..	..	..	1	2	1	1	18
5 to 9	40	26	5	5	7	5	9	7	7	3	114
10 " 14	25	9	12	13	23	16	21	18	9	3	149
15 " 19	10	2	12	14	24	22	33	28	10	4	159
20 " 24	7	8	16	17	38	22	45	16	4	3	176
25 " 29	3	6	11	5	14	15	18	9	2	..	83
30 " 34	3	8	12	11	13	4	9	3	3	2	68
35 " 39	1	5	7	4	5	6	6	1	..	..	35
40 " 44	..	2	4	4	4	3	..	2	..	1	20
45 " 49	..	5	1	4	4	..	..	..	..	..	14
50 and above	..	4	8	1	2	3	4	..	..	..	22
Not stated	..	1	..	1	..	1	2	..	..	..	5
Total	131	91	90	79	136	98	149	87	37	17	915

Saving and excepting the cases of "other disease" which were treated in the special wards surrounded by small-pox, this experience is probably unique, and its significance conclusive. It is, moreover, in complete agreement with the further experience of the Fever Hospital up to the year 1885, when small-pox ceased to be treated at Homerton.



PLAN VI.—Relation of Small-pox and Fever patients from 13th and 14th to 18th December, 1876.

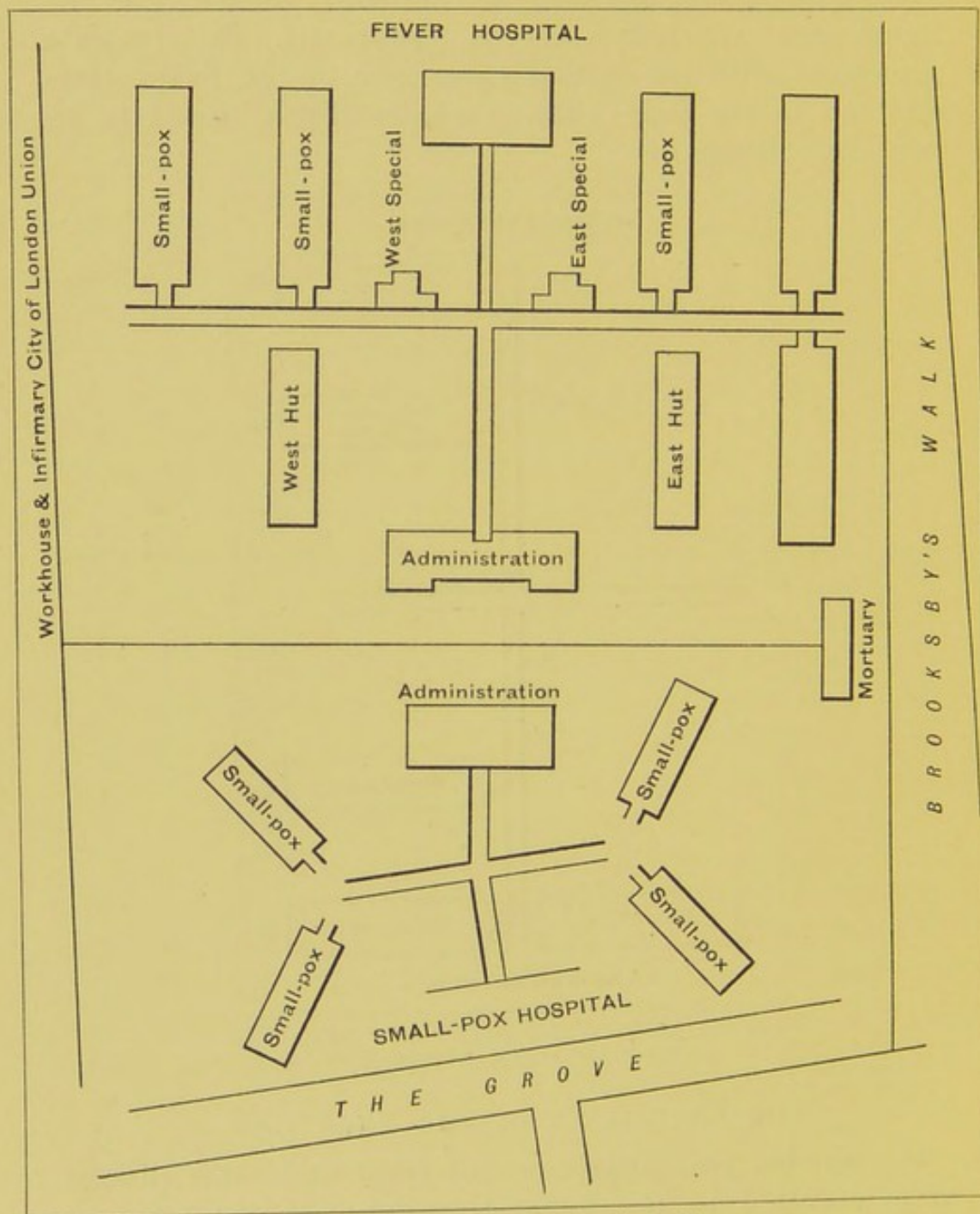
### THE EXPERIENCE OF THE YEAR 1878.

During this year 1048 cases of fever and other disease were admitted to the Fever Hospital, and 964 cases of small-pox were admitted to the Small-pox Hospital, but not a single case of small-pox arose in the Fever Hospital, although the original vaccination was of the usually defective kind.



## THE EXPERIENCE OF THE YEAR 1879.

During this year 937 cases of fever and other disease were



PLAN VII.—Small-pox epidemic of 1881.

admitted to the Fever Hospital, and 69 cases of small-pox to the Small-pox Hospital, but there was no case of small-pox amongst the fever patients.

## THE EXPERIENCE OF THE YEAR 1880.

During this year 1061 cases of fever and other disease were admitted to the Fever Hospital, eight of which were small-pox certified as fever. From the 8th of February to the end of the year 813 cases of small-pox were admitted to the Small-pox Hospital, but not a single case of small-pox arose in the Fever Hospital.

## THE EXPERIENCE OF THE YEAR 1881.

The work of the hospitals for this year is somewhat complicated by the fact that the small-pox and fever pavilions were alternately used for each. One fact, however, stands out clear and distinct: Whilst the Small-pox Hospital proper was full of small-pox, it was decided, owing to the continued pressure from that disease, to open for its accommodation three of the fever pavilions. This was done on May 1st, and between that date and July 16th 707 cases of small-pox were admitted into the fever wards, together with 62 cases of "other disease." These latter cases were treated in the two special wards, and the two huts marked upon *Plan VII*, page 52. It will be seen from the sketch that these 62 persons, for the most part young adults, were surrounded by small-pox, all "severe acute," because at the time the milder cases were sent to hospitals out of London. During the three months of May, June, and July, the daily average number of acute small-pox would be over two hundred, and at the opening of the fever pavilions they were admitted at the rate of about thirty daily (Committee's Report for the Year 1881). It will be manifest that there was enough and to spare of acute small-pox in the immediate neighbourhood to infect these 62 persons, and that the admissions daily were at a fairly rapid rate. The condition of their vaccination was as follows:—

Unvaccinated .. .. .	10
Doubtfully vaccinated .. .. .	14
Somehow vaccinated .. .. .	38
	—
	62



Two were vaccinated with four "good" marks, no one had been re-vaccinated, and no one had had small-pox. They were therefore more or less "susceptible," their vaccination being practically the same as that of the small-pox patients surrounding them. Manifestly here are, and in obvious excess, all the conditions required by distal aerial dissemination. For three months small-pox, "severe acute," had been charging these sixty-two unfortunates with its infective particles; for three months they had been breathing a small-pox-in-excess saturated atmosphere enclosing them on all sides, and with what result? Not one of them contracted small-pox! In this connection, however, it should be stated (although the facts recorded are in no way affected) that during the earlier months of the year, before the Fever Hospital was occupied by small-pox, six deaths from small-pox occurred among patients recovering from scarlet fever. Of these the report of the hospital for the year says, "The deaths include also six cases which died of small-pox contracted in the hospital after recovery from scarlet fever."

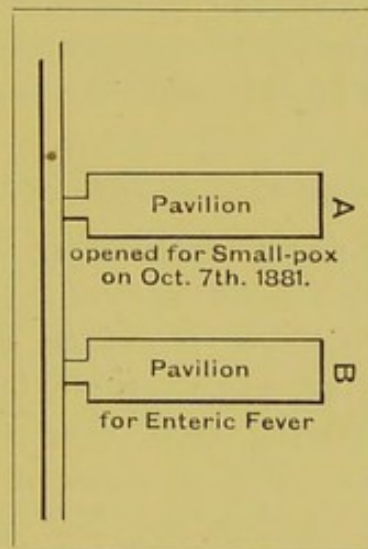
"The deaths from small-pox occurred in the earlier months of the year, and the source of infection was traceable in most cases, probably in all, to cases of small-pox sent to the hospital as fever, in whom the distinctive features of small-pox did not develop till after admission."

THE EXPERIENCE FROM OCTOBER 7TH, 1881, TO  
FEBRUARY 23RD, 1882.

On October 7th, 1881, the pavilion of the Fever Hospital, marked *A* on the diagram, *Plan VIII*, was opened for the treatment of acute small-pox. Between that date and February 23rd, 1882, eighty-one cases were admitted. In the pavilion marked *B*, parallel and about 60 feet distant, with parallel windows which were continuously open, there were on the morning of October 7th, 33 cases of enteric fever, and between that date and February



23rd, 1882, 194 cases of that fever and other disease were admitted there. The daily average of patients in the enteric pavilion *B* would be about 30 to 40, and in pavilion *A* about 15 to 20; but this bare number could not represent the *quantity* of small-pox, because these cases were cases of severe acute small-pox which could not be sent to more distant hospitals. Between these pavilions there was no personal communication. The nursing and attendance were quite distinct. No patient in the eastern or enteric fever pavilion had had small-pox, and no one had been re-vaccinated, whilst their original vaccination was



PLAN VIII.

like that of the period, for the most part defective, but the notes of it have been lost. These people, then, were susceptible. A case of small-pox occurred in the enteric fever pavilion, the only one that arose during the time these pavilions were respectively used for small-pox and fever. For about three months, therefore, small-pox in considerable quantity stood parallel to and within sixty feet of enteric fever and other disease, with complete immunity of the latter from *incidence* of small-pox. To both pavilions there would be (from East London where small-pox was prevalent) two or three visitors daily to



cases dangerously ill, and so small-pox might have been introduced, but it is a notable circumstance that on the theory of distal aerial dissemination a small-pox community should have been side by side of a community free from that disease for three months without producing a single case of small-pox, and for four months with the production of but one.

#### THE EXPERIENCE OF THE YEAR 1882.

During this year the Small-pox Hospital was occupied by fever, but into two wards of the Fever Hospital 170 cases of small-pox were admitted and treated side by side of 1,252 cases of fever and other disease, amongst which three cases of small-pox appeared which were not traced. An incidence of one in 417 cases in twelve months.

#### THE EXPERIENCE OF THE YEAR 1883.

This is a singularly interesting experience. From January 1st to March 7th, 62 cases of small-pox were treated in a pavilion of the Fever Hospital, and from the latter date to December 31st, 305 were treated in the Small-pox Hospital proper. During that year the report for the Fever Hospital says: "Eleven cases of small-pox occurred in the fever wards during the last two months of the year. It is worthy of note that the cases were scattered all over the hospital, with the exception of the wards used for small-pox at the beginning of the year." Inasmuch as the small-pox in the Small-pox Hospital and the small-pox in the Fever Hospital were in operation throughout the year, if that had been the cause it would follow that small-pox is infectious at one time and not at another, which is the same thing as to say that it is infectious and not infectious, (cause + conditions being present), since, having regard to the vaccination of the period, among 1,038 cases of fever and other disease from the East-end of London there could not have failed to be some susceptible subjects.



## THE EXPERIENCE OF THE YEAR 1884.

During this year 2,303 cases of small-pox and 1,107 cases of fever were admitted to the Eastern Hospitals, but not a single case of small-pox arose in the fever wards.

## THE EXPERIENCE OF THE YEAR 1885.

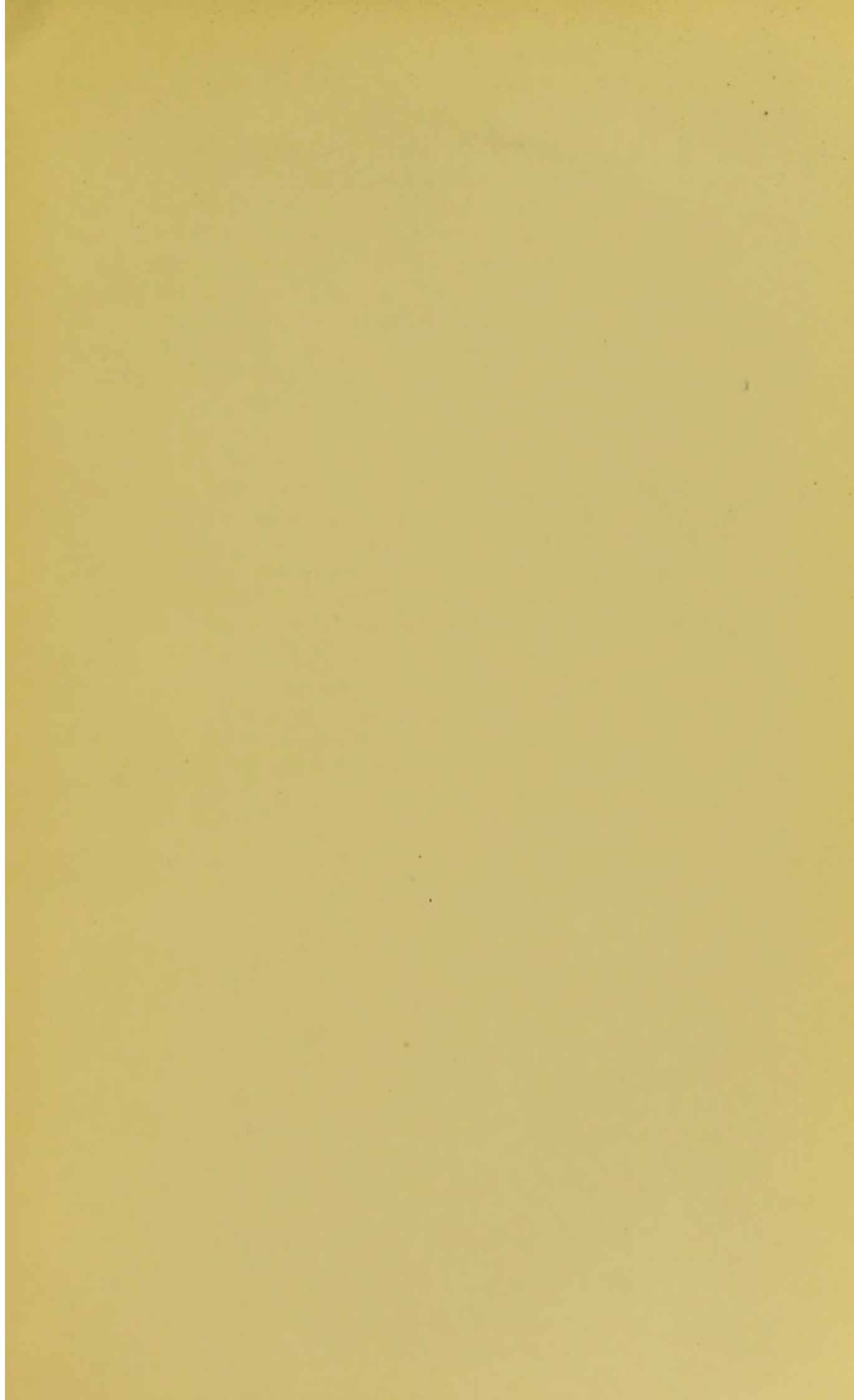
This was the last year in which fever wards were set apart for small-pox at the Eastern Hospitals. During the greater part of that year Dr. Bruce was in charge of the hospitals, and he informs me that there were several cases of small-pox among the fever patients, but that the records in respect of them have been lost. He says, "As far as I can remember, the cases were few in number, occurring sporadically in different wards, and the incidence showed no preference for the wards nearest to the Small-pox Hospital. Their origin, however, was not traced." During the year, 1,038 cases of fever and "other disease" were admitted, together with 559 cases of small-pox which were treated side by side of these fever cases. Amongst the latter there were certain cases of small-pox, "few in number," a fact which would not be surprising in respect of any institution in East London; but in seeking for the cause of small-pox appearing in the Fever Hospital, two important facts have to be continually borne in mind: (a) That small-pox is actually introduced to the Fever Hospital certified as fever, in respect of which no correct diagnosis can at the moment of admission be made, but which afterwards turns out to be small-pox. (b) That the Fever Hospital is visited daily by about twenty persons from all the infected areas of East London, a fact which would explain a considerable incidence of small-pox in it, apart from its neighbour the Small-pox Hospital.

To sum up! during fourteen years 15,000 cases of acute small-pox were treated at the Eastern Hospitals side by side with 13,000 cases of fever, to which over 100,000 visits were made from all the infected districts of East London,



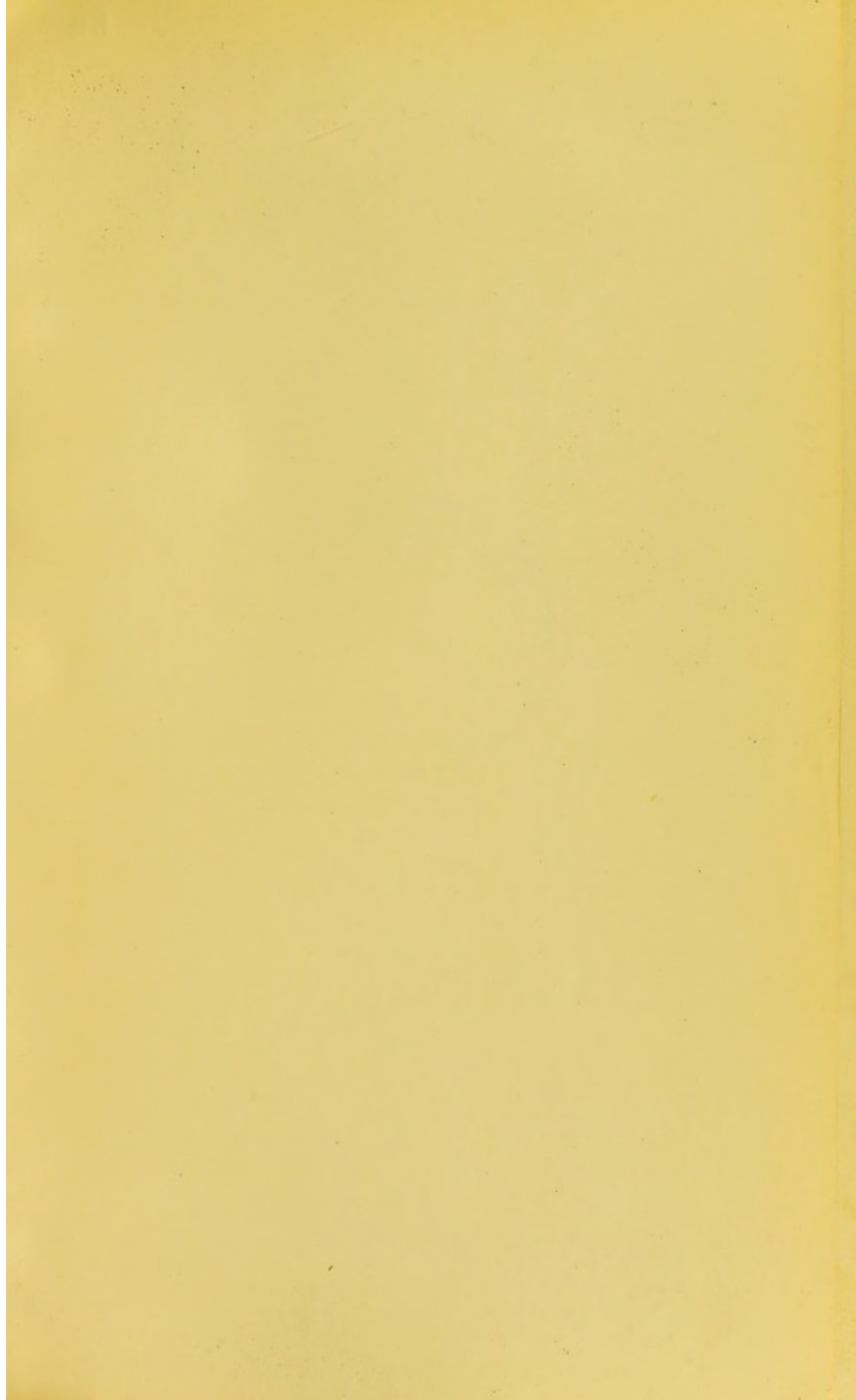
and the net result is that 65 cases of small-pox arose among these 13,000 persons (allowing 11 for the "few in number" of the year 1885, which was the number which occurred in the year 1883 with exactly the same number of patients). Of this number 31 were traced to personal contact, leaving 34, about two and a half cases per year, as on the theory of distal aerial dissemination possibly due to the hospital which was *ex hypothesi* charging the atmosphere with infectious particles over an area of "four square miles in all directions." If any one should think this an excessive incidence of small-pox, there is nothing for it but to leave him to his opinion.

Les expériences en apparence les plus convaincantes n'ont jamais constitué un élément immédiat de démonstration quand elles heurtent des idées depuis longtemps admises. Galilée l'apprit à ses dépens : ayant réuni tous les professeurs de la célèbre université de Pise, il s'imagina leur prouver par l'expérience que, contrairement aux idées alors reçues, les corps de poids différents tombent avec la même vitesse. La démonstration de Galilée fut très concluante, mais les professeurs se bornèrent à invoquer l'autorité d'Aristote et ne modifièrent nullement leur opinion. (*La Naissance et l'Evanouissement de la matière*).



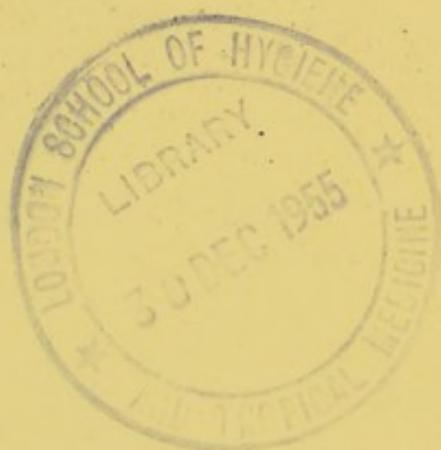








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