

Observations of the Medical Officer of Health upon the Report of Dr. R.J. Reece to the Local Government Board on smallpox and smallpox hospitals at Liverpool, 1902-03. Ordered by the Port Sanitary and Hospitals Committee to be printed 27th April, 1905. / [by E.W. Hope].

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CITY OF LIVERPOOL.

OBSERVATIONS
OF THE
MEDICAL OFFICER OF HEALTH
UPON THE
REPORT OF DR. R. J. REECE
TO THE
LOCAL GOVERNMENT BOARD
ON
SMALLPOX AND SMALLPOX HOSPITALS AT LIVERPOOL, 1902-03.

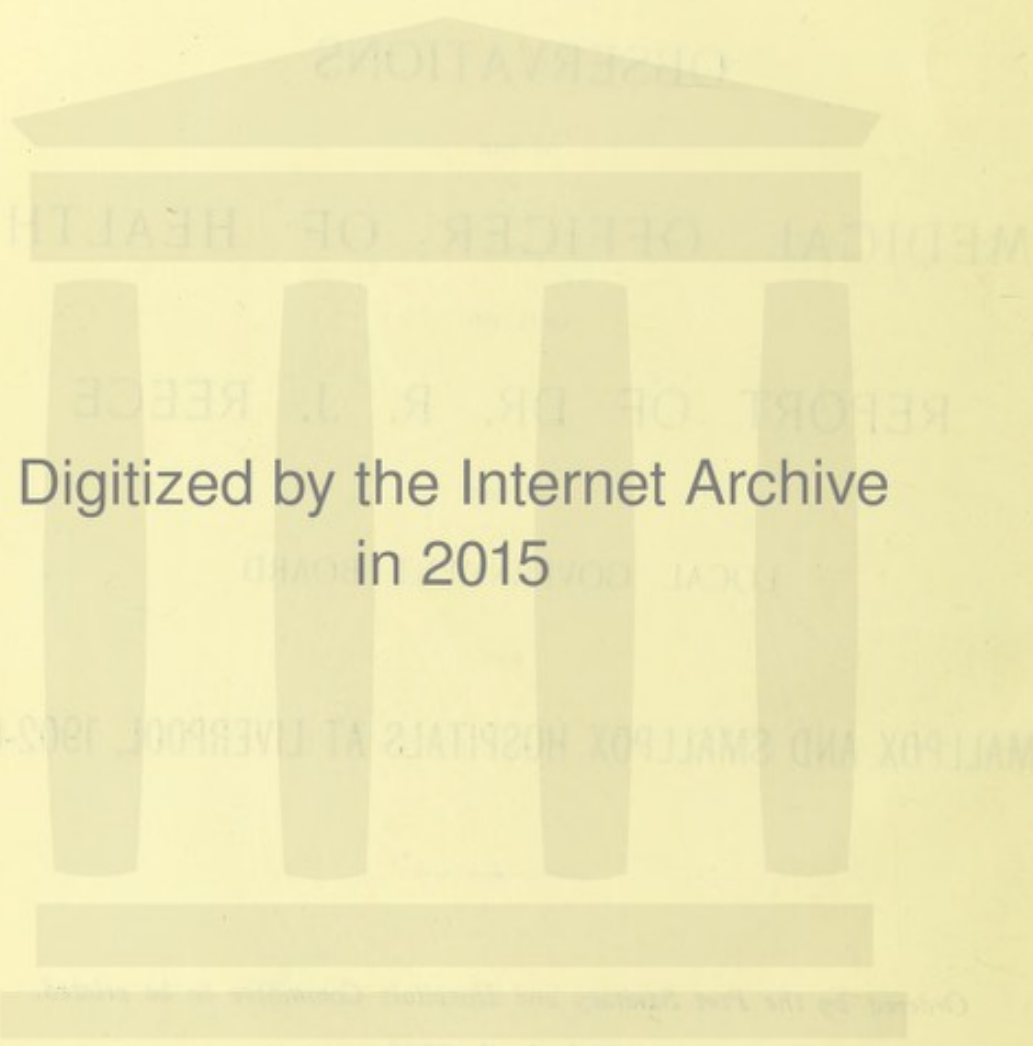
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OBSERVATIONS of the MEDICAL OFFICER OF HEALTH upon the Report by Dr. R. J. Reece to the Local Government Board, on Smallpox and Smallpox Hospitals, at Liverpool, 1902-03.

The Port Sanitary and Hospitals Committee on March 30th, 1905, had under consideration the Report by Dr. R. J. Reece to the Local Government Board on Smallpox and Smallpox Hospitals at Liverpool, 1902-3, and passed the following resolution:—

“That the Medical Officer be requested to furnish the Committee with his observations upon the Report.”

In pursuance of that resolution the following observations are submitted:—

The investigation made by Dr. Reece extended over nearly twelve months, namely, from March, 1904, to February, 1905, and he devoted the closest personal attention to those aspects of the outbreak respecting which the Local Government Board desired information, and which may be presumed to be those dealt with in the Report.

After mentioning the area of the City, viz., 23 square miles, the population, 723,430, and certain other statistical details, an acknowledgment is made of the cordial co-operation and assistance given locally in the course of the investigation. The Medical Officer of Health arranged that every book and every record should be placed at Dr. Reece's disposal; also that every member of the staff whom he desired to interview personally should be available for the purpose. In this way every incident and every detail were placed before him.

After these preliminaries, the Report proceeds to deal with three important matters connected with the outbreak, which it will be convenient to consider in their order, viz.:—

- 1.—The administrative arrangements available for dealing with importations of smallpox into the City, and for preventing and limiting its spread.
- 2.—The administration of the hospitals.
- 3.—The influence exerted by the hospitals themselves in the diffusion of smallpox by what has been called “aerial convection.”

1.—GENERAL ADMINISTRATIVE ARRANGEMENTS.

Dr. Reece's description of these is moderately detailed and substantially correct. He mentions, “Liverpool, as a seaport town, attracting as it does a large number of persons of the working and vagrant classes from a great variety of sources at home and abroad, has been especially prone to receive smallpox, and to a

corresponding extent has had abundant opportunities of perfecting its administration in regard of this disease," and speaks in terms of approval of the administrative arrangements. Regarding the action of the Health Committee in promoting vaccination and re-vaccination, he says: "There can be no doubt that the prompt offer of vaccination and re-vaccination to contacts, and to those living in houses adjacent to the infected dwellings, along with almost universal acceptance of such offer by these people, very materially limited the amount of smallpox in Liverpool."

Want of practical experience of the sanitary administration of cities has led Dr. Reece to make observations which convey a wrong impression. His complaint on page 4, that no list had been kept of contacts placed under observation, suggests a laxity which did not occur. The addresses not only of all contacts, but of all outworkers, with all the names necessary, were carefully kept, and each officer engaged in visiting them had them duly recorded, together with his visits in his work books. A fac-simile of the record sheets is in Appendix B. These sheets, as well as the officers' work books, were entirely at Dr. Reece's disposal, just as every other document was, and he might, and no doubt did, convince himself as to the accuracy of their records. No useful purpose, but rather waste of time, would have resulted from transcribing these lists into any other books, nor is there the least need to encumber the bookrooms by preserving these records after their purpose has been served.

On page 7 Dr. Reece complains that the names of patients are not recorded in a particular book, a book, it may be observed, which is not intended for their record. But there were placed in his hands volumes in which the name, age, address and date of every patient is recorded, one of them being a volume especially kept for that purpose, and the other being a book recording the admission of patients into hospital. A third is the hospital case book, one being appropriated to each hospital. It is not apparent, therefore, why a complaint of this character is made.

He further complains that he failed after every inquiry to obtain the facts respecting one or two cases. It is regrettable that even at a time of very strenuous effort, when some at least of the greatly augmented staff* are not fully conversant with their duties, that a few clerical errors should creep in; but it would not be a matter for complaint or surprise to any one with a sufficient experience of the sanitary administration of cities to appreciate the difficulties to be overcome.

Dr. Reece complains (page 10) that spot maps of disease are not made systematically in the Health Department. It is not quite clear what he means by this, whether or no we are to infer that spot maps of disease are made in other places, but not in Liverpool. His remark appears to arise from a misapprehension of the objects aimed at by Medical Officers of Health in preparing spot maps. They are only prepared when some useful purpose will be served by their preparation, and when such maps are necessary to explain or simplify reports which might otherwise be obscure.

* Upon the advice of the Medical Officer of Health, the following temporary additions were made to that section of the Staff which was dealing with the outbreak of smallpox:—

7 Medical Men.	6 Additional Inspectors.	3 Clerks.
3 Ambulance Inspectors.	7 Disinfecting Inspectors.	40 Strippers.

2.—HOSPITAL ADMINISTRATION.

With regard to the internal administration of the hospitals, some important observations are made by Dr. Reece. He criticises the methods in which the hospital registers and books have been kept, and suggests that it may be accounted for by the Resident Medical Officers having had no previous experience of such work, and that their stay in the hospital is usually brief. He lays emphasis upon the consequence of the failure from time to time of the Resident Medical Officers of the hospitals to notify the Medical Officer of Health of cases received into the institution in other than the ordinary channel, viz., by the Ambulance Department of the Medical Officer of Health, and also of their failure from time to time to notify modifications of diagnosis, omissions, however, which it is only just to the Residents to say are relatively rare. He quotes, as an instance, a woman who carried her child to the hospital, and alludes to a number of other cases.

It may be pointed out, however, that this trouble is of old standing. Indeed, as far back as the 18th October, 1894, upon the recommendation of the Medical Officer of Health, this matter was the subject of a specific instruction of the Port Sanitary and Hospitals Committee in the following terms:—"That it be an instruction to the Resident Medical Officers to the City Hospitals to furnish the Medical Officer of Health with the names, addresses, and mode of conveyance of patients admitted into the Hospitals otherwise than by the direction of the Medical Officer of Health, and also as to any patients admitted to the hospitals found to be suffering from a disease other than that specified upon the certificate of admission, such information to be supplied in writing as soon as possible." Those instructions, printed and framed, hang in the room of every Resident Medical Officer at each of the City Hospitals, but the Committee may be disposed to deal more seriously with any recurrence of a disregard of their orders in this direction.

Dr. Reece says: "In this Report the City Hospitals receiving smallpox cases are alone dealt with; but it is manifest that the scheme of supervision of the whole of the City Hospitals merits the attention of the Hospitals Committee of the Corporation."

This observation, suggesting negligence on the part of the Hospitals Committee of the Corporation is too general in character to admit of comment. Dr. Reece does not appear to have visited these institutions, nor to have taken steps to acquaint himself with the method of their supervision.

He also takes occasion to observe (page 6) that the Medical Officer of Health has no direct administrative control over the various City Hospitals. Here again the very full explanations given him of the relationships of the Medical Officer of Health with the Hospitals have not enabled him to grasp the actual position, nor the nature of the connection between the Medical Officer of Health's Department and the Hospitals. No one with practical knowledge of the sanitary administration of cities would suggest that the Medical Officer of Health of any large City such as Liverpool, Glasgow, Manchester, Leeds, Birmingham, Sheffield, &c., could possibly exercise direct administrative control over the City Hospitals. In a smaller district the Medical Officer of Health can, and frequently has with great advantage, the direct administrative control of the Fever Hospitals; but it would be impracticable in the large cities.

3. THE ALLEGED INFLUENCE OF THE HOSPITALS.

It is, however, with the third matter that the great bulk of Dr. Reece's Report deals, and the importance of this section calls for more detailed examination, since if Dr. Reece's assertions are well founded the Hospital for Smallpox, erected upon a site carefully selected for the purpose, and approved of by the Local Government Board after full and complete inquiries by the Board's experienced Inspectors, must be closed as a public danger.

The Corporation of Liverpool and the Hospitals Committee, as well as the Local Government Board, are therefore seriously concerned to know whether the conclusion come to by Dr. Reece—viz., "I am compelled to consider that the influence of these hospitals has been responsible in material degree for the considerable and sustained prevalence of smallpox in Liverpool in 1902-3"—is justified by the facts available for his consideration, or whether the suppression and disregard of these facts (for no reference has been made to them in his Report) render his conclusions valueless.

It is necessary for the information of the Committee to make some preliminary observations upon the general question of smallpox diffusion by air, and the evidence upon which it is based.

It was in 1882 that some valuable Reports were placed before the Local Government Board by the late Sir Richard Thorne Thorne, and by Mr. W. H. Power, the former dealing with Fever Hospitals, the latter with Smallpox Hospitals; both Reports have exerted an exceedingly beneficial influence in this country, in regard to hospital construction, location, and administration.

In regard to the question now under consideration, special interest attaches to the Report of Mr. W. H. Power, the present Medical Adviser of the Local Government Board, who, as the result of careful and prolonged investigation into the circumstances attending the use of the Fulham Hospital for Smallpox, was led to the conclusion that under certain conditions, smallpox had been spread from the hospital by means which could not be ascribed to any of the ordinary channels of infection, but which pointed, as his evidence showed, to atmospheric diffusion, or aerial convection.

The care and impartiality in examining and weighing evidence, and the conciseness and lucidity of his Report, rendered the conclusions very convincing, and the inferences received a wide acceptance. But Mr. Power was careful to point out that "Smallpox is a disease infectious beyond all others of its class. Not only does it spread with greater facility than, for instance, scarlatina or typhus, but the measures of isolation and other precautions against dissemination which suffice with those diseases are, as regards smallpox, altogether futile. Not only is it unsafe to place smallpox in hospitals side by side with other infectious diseases, but it is also unsafe to deal with linen, blankets, bedding, &c., of smallpox patients in any but a separate laundry. Further, smallpox can without doubt be readily transmitted to others by persons who have been in close relation with the disease, though they themselves may not suffer from it; and similarly, smallpox may be transmitted with comparative readiness in clothing, parcels, &c., from an infected to a previously uninfected dwelling. . . ."

"Cases of smallpox, themselves so little serious as to be mistaken for 'chicken pox,' have in our ordinary experience the power of producing in unprotected persons severe attacks of the disease.

And other slight cases of smallpox, not mistaken, but purposely concealed, do much in all experience to spread the disease in an epidemic form.

Mr. Power would regard it, therefore, as manifestly improper to ascribe all the outbreaks of smallpox in the vicinity of hospitals to aerial convection, without weighing other sources of infection.

At the time these investigations were carried out, a very essential aid to investigation, namely, the Infectious Disease Notification Act, was lacking, and in the progress of years, circumstances have arisen in connection with smallpox hospitals, which suggest that the sources of infection in the neighbourhood were not invariably to be ascribed to aerial convection, but were not infrequently due to the same causes which give rise to smallpox in places remote from hospitals, as Mr. Power pointed out in the Report quoted.

The position then briefly is this, that the explanations which the careful researches of twenty years ago gave rise to, have resulted in calling attention to the necessity for the suitable location of smallpox hospitals, and for their suitable administration.

It must be remembered that information regarding smallpox is more easily obtainable now than formerly, owing to the important legislation of recent years. This legislation is not designed merely to supply information, but to aid Sanitary Authorities in safeguarding the public from extension of the disease.

Under the terms of the Infectious Diseases (Notification) Act, which was passed in 1889, the medical attendant and the person in charge of a smallpox patient are required to notify the case to the Medical Officer of Health. Chickenpox was also scheduled for compulsory notification in Liverpool in 1902, because this disease is the one with which modified smallpox is most commonly confused. Fifty-four patients, reported during the outbreak in question as cases of chickenpox, were found to be suffering from smallpox.

But even this legislation is not sufficient to meet all the necessities of this insidious disease. Many enquiries have to be made, and it is not an uncommon thing for the friends or relatives of patients to give untrue replies to those enquiries. Hence it was that the Liverpool Corporation, in 1902, obtained most important and most useful Parliamentary powers to deal with persons guilty of wilful suppression of the truth, or of giving false information, in regard to smallpox, and they obtained an important clause* rendering offences of this character penal.

Still further to lessen danger arising by persons trespassing upon the hospital grounds, scaling the walls and fences, and even entering the hospital premises, the Liverpool Corporation, in the same Act, obtained powers to prevent persons from entering such hospitals or their grounds, excepting with the consent in writing of the Medical Officer of Health.

* This clause is as follows:—

“The occupier of any building in the City which is used for human habitation, and in which there is or has been any person suffering from a dangerous infectious disease, shall, on the application of the Medical Officer of Health, or the Deputy or Assistant Medical Officer of Health for the City at any time during the illness of such person, or within six weeks from the occurrence of such illness, furnish such information within his knowledge, as the Medical Officer of Health, or the Deputy or Assistant Medical Officer of Health, may reasonably require for the purpose of enabling measures to be taken to prevent the spread of the disease. Any occupier refusing to furnish such information, or knowingly furnishing false information, shall be liable on summary conviction to a penalty not exceeding forty shillings.”

The valuable assistance in tracing disease and verifying the sources of infection, which each and all of the foregoing Acts of Parliament now afford, were of course not available until the respective dates at which they were passed, but they were all available during the outbreak under discussion, and the following paragraph was inserted by the Medical Officer of Health, in his Report to the Health Committee on the Liverpool outbreak, dated December 31st, 1903:—

“Doubt as to the nature of the illness proved another fruitful source of dissemination; owing to the fact that a large number of cases, modified by vaccination, were regarded by the medical attendant as chicken-pox, it became necessary to schedule chicken-pox as a notifiable disease, in order that doubtful cases might be visited by a medical officer experienced in smallpox. The value of this measure is confirmed by the fact that 54 cases of smallpox, which were under treatment as chicken-pox, were discovered and dealt with. Unfortunately, however, there were still many cases of so mild a type that no medical man was called in, and it was only after the severe infection of others by these cases that the real nature of the disease was evident. A further mischief connected with this mild form of the disease arose from the patients going in public conveyances to places of public resort, or to places of business, laundries, tobacco works, tailors' shops, &c., not only infecting those with whom they associated, but infecting articles which they handled. Children and other inmates of their houses were also going to and fro to their daily duties. In several cases the patient, in doubt as to the nature of his illness, had sought advice at the out-patient department of the Charitable Medical Institutions, and had sat amongst the crowded occupants of the waiting room until his turn came to see the doctor. Re-introductions of the disease were frequent, by tramps, labourers, and others, the disease being carried by them into the workhouses, common lodging-houses, tramp sheds, gaol, &c.”

The special powers enjoyed by Liverpool unquestionably contributed very materially to the discovery and to the tracing of the sources of infection of a considerable number of the very large proportion of the total cases that were traced.

In investigating the causes and progress of the extension of an outbreak of smallpox, no circumstance should be rejected which has an obvious and distinct bearing upon the outbreak, and in preparing a statement for the judgment of others, it is well, in matters of doubt, to state the facts of both sides of the question. This is the course adopted in all scientific or official Reports, and which has been conspicuously followed in the Reports on the subject of smallpox referred to by Dr. Reece (page 9). No reason is assigned for the departure from it in his own Report, and hence it becomes necessary to go with more detail than would otherwise have been needful into a careful consideration of the methods, and the evidence, which have led him to the conclusions arrived at.

DR. REECE'S ONLY EXPLANATION.

It will be seen that before entering into the investigation at all, Dr. Reece declares that there is only one explanation of smallpox incidence around hospitals, viz., dissemination of infection by aerial convection, and that that explanation is completely satisfactory to him. So reluctant is he to disturb that satisfaction, that he rejects all

the considerations upon which so much stress is laid by Mr. Power and other observers, and makes no reference whatever to the volume of proof laid before him as to other definite sources of infection.

He says (page 9):—"The generally accepted, and so far as I am aware the only completely satisfactory, explanation of the peculiarities of smallpox incidence around hospitals receiving acute cases of the disease, is dissemination of infection by aerial convection."

It must at once be pointed out that the statement that the theory is generally accepted is without justification. The theory is not generally accepted by experts; it is not generally accepted by Medical Officers of Health, and it has been rejected by the High Courts of Justice, both in Ireland and in England, when the theory has been put forward with a view to restrain the use of certain sites for smallpox hospital purposes. The latest important case in point may be referred to.

An action, which occupied the attention of the Chancery Division of the High Court for an entire week, was brought against the Corporation of Nottingham, to prevent the use of a site for a smallpox hospital, the opposition practically resting upon the question of aerial convection, the evidence brought in support of it being clearly and ably put by eminent counsel; but the learned Judge, Mr. Justice Farwell, who tried the case, having heard evidence of both sides, said in regard to this question of aerial convection, "if the case had rested on the plaintiffs' evidence alone, I should have had great difficulty in adopting the conclusions as sufficiently proved"; he also observed, "with regard to the plaintiffs' historical instances, if I may so call them, they have already figured in former actions . . . and have never been accepted as sufficient."

It is not, however, the intention in these observations to discuss the theory of aerial convection, but to state fully the facts of the case, which will leave no doubt whatever that so far as the Liverpool outbreak is concerned, the extension was due to other ascertained causes, and the hospitals themselves contributed in no way to the spread of the disease.

METHOD ADOPTED.

Dr. Reece describes the method he has followed in carrying out the investigation in the following terms:—

"In order to study the facts as regards Liverpool, I prepared from the large scale map made for me in the City Engineer's Office, 'spot' maps of Liverpool, in fortnightly periods, showing the position of the smallpox-invaded houses from the time that the first cases of smallpox occurred in the City in December, 1901, until the end of the epidemic in 1903. Certain of these maps are appended to this report. No case of smallpox that was imported into the town from the shipping, and no case brought by tramps, have been taken into consideration when the smallpox has developed within less than two weeks of such persons' arrival in Liverpool. Persons in this category clearly did not acquire their infection in the City of Liverpool. On the appended maps invaded houses are alone indicated, and no house that during the epidemic was once infected has been, on secondary cases occurring in it, again

marked on the maps, no matter what period elapsed between the attacks of the inmates. Study of these maps shows that the first case of smallpox, of the epidemic that is under review, occurred near the centre of the City. This house, which is a common lodging-house, became infected by an imported case from the shipping, the first Liverpool patient being a resident in the house. Omitting imported cases, no further Liverpool person was attacked until the second week in January, 1902. The patients from these houses earliest invaded, as well as imported cases from the shipping, were, as has been stated, removed to the Priory Road Hospital. Having obtained these data, I had to study the Liverpool Smallpox Hospitals, singly and in the aggregate, in reference to considerations which follow:—

- “(1) Has the inhabited area within a mile in each instance of hospital suffered more severely than the rest of Liverpool? And, if so,
- “(2) Has the exceptional incidence within that area corresponded in point of time (having regard, of course, to the period of incubation of smallpox), to the use of the hospital for the treatment of acute smallpox cases? And—
- “(3) Is there evidence that within the several ‘one-mile areas,’ as they may be termed, dwellings nearer to hospital sustained a heavier incidence of smallpox than those farther away?

“It must be remembered that smallpox has a definite incubative period, and that the earliest symptom of the disease does not declare itself until some twelve days after infection, consequently the figures in the tables of this report must be considered with due recognition of this fact.”

* * * * *

His answer to these questions, on page 15 of his Report, are as follows:—

- “(1) Inhabited areas within a mile of each of the three Liverpool Smallpox Hospitals have suffered more severely from smallpox than the City as a whole.
- “(2) Exceptional incidence of smallpox within these areas has corresponded in point of time with the use of these hospitals for the treatment of acute smallpox cases.
- “(3) Broadly speaking, within these hospital areas the dwellings nearer to hospital have sustained a far heavier incidence of smallpox than those farther away.”

It is clear that Dr. Reece bases his case and his conclusions upon maps, carefully prepared, and of admitted accuracy. So confident is he that this view comprehends the entire question that no other consideration of the kind suggested by Mr. Power is deemed worthy even of mention.

If the results are plainly due to some cause or causes which find no reference in his Report, and which he has deliberately excluded, his conclusions must fall to the ground.

The question may, therefore, conveniently be discussed in the first place from Dr. Reece's standpoint, and the further evidence considered subsequently.

In preparing his spot maps, Dr. Reece has recorded not the actual number of cases of smallpox, but the different houses invaded. It might be thought that this is an admission of the possibility that a second or subsequent case in the same house may be due to infection from the first case in the house; but Dr. Reece cannot accept any such suggestion, and appears to be not unwilling to ascribe a second or subsequent case in the same house to a second or subsequent invasion by hospital influence in no way connected with the first case.* This is consistent with his view, and a good step towards ignoring the possibilities which Mr. Power suggested of personal infection having occurred between neighbours, relations and friends having social or business intercourse.

Dr. Reece's attention has been particularly called to whole series of such instances; instances, in fact, so numerous that if he were willing to admit the possibility of such infection the whole of his spot maps would be wasted labour. These facts have been brought under his notice, but he prefers to abide by his conclusion that all these cases are due to aerial convection, thus claiming for aerial convection selective qualities which nobody else has claimed for it, and for which no explanation is offered. Dr. Reece may disclaim this view, but if he disclaims it, he must modify his spot maps and conclusions founded on them.

OBSERVATIONS UPON THE HOSPITALS.

Priory Road Hospital.

Commenting upon the hospitals in the order in which they are taken, we find in regard to Priory Road Hospital that in the 54 weeks ending December 20th, 1902, upwards of 400 acute cases were treated, and furthermore, that during that period not one single house within the quarter-mile radius was invaded. This fact is lightly brushed aside by Dr. Reece, because the number of houses, he says, is sparse; as a matter of fact, a mixed population of nearly 500 people have lived in absolute security there during that period, a period in which, according to Dr. Reece's Report, the danger must have been greatest.

During the succeeding eight months only one house was invaded, and this, it will be noted, at a time when the numbers sent to hospital were lessening; there was nothing to connect the hospital with that invasion.

The fact that during the entire period of the use of the hospital, viz., upwards of a year and a half, only one house within its quarter-mile radius was invaded, cannot be made to harmonise, even

* See Appendix p. 23.

"broadly speaking"—as Dr. Reece expresses it—with his conclusion that "the dwellings nearer to hospital have sustained a far heavier incidence of smallpox than those further away." The case of Priory Road, like that of Fazakerley, negatives the conclusion absolutely, notwithstanding any plea for indulgence for inaccuracies set up by the saving phrase, "broadly speaking."

The very large number of cases in which the infection was clearly traced, furnishes a sufficient explanation for the incidence of smallpox within the other zones of this Hospital, and there is therefore no occasion to theorise when the infection can be shown to have arisen in other ways.

Parkhill Hospital.

Prior to the use on January 12th, 1903, of the Parkhill Hospital for the treatment of smallpox, the disease had repeatedly been present in its vicinity, on one occasion within fifty yards of the boundary walls; in January, 1902, a house within the three-quarter mile zone was invaded by smallpox; in February, 1902, one house was invaded within the quarter mile zone, and two houses within the half to three-quarter mile zone; in March, 1902, a house within the half to three-quarter mile zone was invaded, and one between the three-quarter and mile zone; in November, 1902, one house in the three-quarter to mile zone was invaded; in January, 1903, three houses were invaded within the half and three-quarter mile zone; and one house between the three-quarter and mile zone.

There were therefore twelve separate and distinct invasions of houses within the alleged zone of influence before the hospital received its first case of smallpox on January 12th, 1903.

Figures are given in Dr. Reece's Report indicating an enormously greater incidence in house invasion within the quarter-mile radius of this hospital than at Priory Road, although there are only 86 more houses in it than in the Priory Road Hospital quarter-mile area, the number of inhabitants being about double. The house invasion in the Parkhill Hospital area is stated to be 526 per 10,000, as against 85 for the rest of the City, excluding the hospital areas.

Five hundred and twenty-six is a very large figure to use, and it is a relief to know that it means the invasion of only nine houses.

During the six months of the use of the Parkhill Hospital for smallpox patients nine houses were invaded within the quarter mile zone of the hospital. What probability is there of these nine invasions having an origin analogous in character to the twelve, which occurred in the vicinity before this hospital was used for smallpox at all? If the origin of any of them can be proved to have no more connection with the hospital than the Netherfield cases had with Netherfield Road Hospital (see comparison, page 15), the table ceases to support the theories drawn from it. Four of the nine patients had, it was known, been exposed to infection elsewhere.

In the same way, proceeding outwards from the quarter-mile zone to the wider ones, there is a very long series of instances of infection from person to person, a few of which, illustrative of the rest, are given in the appendix, those without the zones and those within the zones receiving or imparting infection in the same way.

There are besides instances in which the patient's illness had been of so slight a kind that he had not sought any medical advice, but as soon as he felt able, had roamed about from place to place in the district in an infectious condition, until the fact of his having had smallpox came to light by the development of more serious illnesses in places he had frequented. He was then removed to hospital for disinfection of his clothing and person, or for such short detention as was deemed necessary. These cases are on all fours with those alluded to by Mr. Power in his Report in 1882. Dr. Reece, however, ignores them altogether, being apparently unable or unwilling to appreciate their significance, for not one of these facts find a single reference in his Report; he is satisfied to deal with maps, and to construct diagrams upon them, and to close his eyes to every other consideration, and to claim, no doubt with sincere belief, that his views are generally accepted.

Fazakerley Hospital.

Turning finally to Fazakerley Hospital, a most telling table is constructed to prove that within the quarter-mile to half-mile zone the proportion of houses invaded was about fifteen times as great as it was in all the rest of Liverpool outside the three hospital areas; whilst in the half-mile to three-quarter mile zone it was twenty-two or twenty-three times as great, thus leaving the residents within the nearer zones to draw what scraps of comfort they can from the fact that they at least were more secure from hospital influence than those who were in the more distant zone.

Fazakerley Hospital has only nine houses within the quarter-mile zone, and a total of 175 houses within a half-mile zone from the hospital. Similarly the number of houses within a mile is relatively very trifling, as compared with the other two hospitals. There were only two houses invaded within the entire half-mile circle, and it is a wilful misuse of figures to prepare a table which suggests an enormous house invasion upon facts such as these.

Furthermore, most of the few cases within the mile zone occurred at the time when the hospital was least used; there were fewest houses infected when the Hospital was at its fullest use. (See Diagram in Appendix.)

It will not be out of place to say a word or two more with regard to Fazakerley Hospital, showing that not only was extreme care taken by the Corporation and their advisers in the selection of a site for smallpox, but that they had the advantage of the views of three of the Inspectors of the Local Government Board in the matter.

Fazakerley Hospital is an institution, the site of which received the most careful consideration by the City Council, by whom it was purchased on account of the favourable situation and the large area, namely, 118 acres. The site, moreover, received the entire approval of the Local Government Board to its use for smallpox purposes.

The Corporation were desirous to place their principal smallpox hospital in such a position that it should not be encroached upon in the future, and that patients should, during their illness and convalescence, have such aids to recovery as fresh air could afford them.

In 1898 the site was visited by one of the Board's most experienced Inspectors, and received his warm approval. Subsequently to that a further purchase of a small piece of adjoining land brought another Inspector of equal experience and standing to the site, and he also approved it.

Finally, upon a third application for money for hospital purposes being made to the Board, a third Inspector visited the site and had nothing to say against it.

It will be seen, therefore, that this site was the best which money could procure, and which foresight could suggest.

It is, of course, possible that the Inspectors of the Local Government Board, as well as the medical advisers of the Corporation, were wrong, and that Dr. Reece alone is right; but it cannot be expected that his allegations will be accepted unless they rest upon a surer basis than that of preconceived opinion, nor until some evidence is brought forward in their support. Obviously, if a site so chosen, and at so great a cost, is as unfit as Dr. Reece alleges it to be, there can be but few sites available in the kingdom, for very few public bodies would be in the position to pay so large a sum for a site at all.

According to Dr. Reece's table, on page 14 of his Report, the house invasion within the quarter to half mile zone of the Fazakerley Hospital has been more than three times as great, relative to the City invasion, as it was in the quarter to half mile zone at Priory Road Hospital, while the half to three-quarter mile zone at Fazakerley shows a house invasion sixteen times as great, relative to the City invasion, as in the corresponding zone of the Priory Road Hospital, while in the three-quarter to one mile zone it is ten times as great.

Therefore whatever condemnation may be implied in regard to Priory Road Hospital, that condemnation is infinitely stronger in regard to the Fazakerley Hospital. Moreover, Fazakerley Hospital shares the general condemnation that "the influence of these hospitals has been responsible in material degree for the considerable and sustained prevalence of smallpox in Liverpool in 1902-3," and it is also singled out by the expression "it is noteworthy that at the time when smallpox had ceased to occur in the other hospital areas, such smallpox as Liverpool continued to suffer was to be found mainly in the neighbourhood of Fazakerley Hospital."*

The circumstances of the Netherfield Road Hospital.

Dr. Reece's conclusions are based on the allegation that in certain hospitals there has been a graduated incidence of invasion of houses in the various zones, the incidence being highest in the zones nearest the hospital. The implication, in other words, is that if the hospital had not been where it is, the houses would not have been invaded. But if this method is applied to a hospital which had no smallpox in it, precisely the same result is obtained.

This has been done in the case of the Netherfield Road Hospital, the situation of which is now shown on the map, and concentric rings in blue at quarter-mile distances are made round it. The proportion of house-invasion, and the gradation of such house-invasion in the various zones, are such that if taken alone, as Dr.

* While this Report is passing through the press, the President of the Local Government Board has, in answer to inquiries addressed to him in the House of Commons, stated that Dr. Reece has not condemned the Fazakerley Hospital, and that the Medical Officer of the Local Government Board has not expressed any opinion in explanation of the facts recorded by Dr. Reece.

Reece has taken the other hospitals, the evidence that the Netherfield Road Hospital was the cause of the smallpox in its neighbourhood would be of exactly the same kind as the evidence connecting the other hospitals with smallpox in their vicinity. The table is as follows:—

Table, showing per 10,000 houses, and for the period 8th December, 1901, to 9th November, 1903, houses invaded by smallpox in areas respectively within one mile, within three-quarters of a mile, within half a mile, and within quarter of a mile of the Hospital in Netherfield Road, which was not used for smallpox. The corresponding rate for the rest of the City (including the three Hospital areas of Parkhill, Fazakerley and Priory Road) is given for comparison:—

Period of the Outbreak of Smallpox in the City.	Netherfield Road Hospital Area :				House Invasion per 10,000 houses in rest of City of Liverpool, including Smallpox Hospital Areas.
	House Invasion per 10,000 houses, within :—				
	1 mile of the Hospital.	$\frac{3}{4}$ -mile of the Hospital.	$\frac{1}{2}$ -mile of the Hospital.	$\frac{1}{4}$ -mile of the Hospital.	
8th December, 1901 to 9th November, 1903 (23 months)	163·8	176·7	199·8	311·7	96·3

The table shows the gradations in the areas surrounding the hospital, and the next table shows it in quarter-mile zones from the hospital with the rate of houses invaded per 10,000 houses in each zone:—

ZONES.	0— $\frac{1}{4}$ mile Zone. (Number of houses 4,716).	$\frac{1}{4}$ — $\frac{1}{2}$ mile Zone. (Number of houses 11,944).	$\frac{1}{2}$ — $\frac{3}{4}$ mile Zone. (Number of houses 17,692).	$\frac{3}{4}$ —1 mile Zone. (Number of houses 14,354).	All the rest of the City of Liverpool. (Number of houses 87,494).
Invaded Houses— Rate per 10,000	311·7	155·7	154·8	133·0	96·3

The Netherfield Road Hospital was formerly the one to which smallpox cases were sent, but its use for that purpose has been discontinued for many years, so that no hospital influence can explain the incidence of the disease in these zones. There is no reason to doubt the conclusions which would have been drawn had smallpox been dealt with in that hospital; the circumstance would have been cited as conclusive evidence of aerial convection. But the presence of smallpox in the neighbourhood of the Netherfield Road Hospital is, in a very large proportion of cases, clearly traceable to other sources, which have been already defined and described in the Medical Officer's Reports. It has also been proved in an equally large proportion of cases that the presence of smallpox in the vicinity of the smallpox hospitals had a similar origin, whilst there is no shadow of proof, but conjecture merely, to connect any of them with any other source of infection.

Port Sanitary Hospital.

References are made to the Port Sanitary Hospital, New Ferry, which was used for smallpox. One of them is as follows:—"The cases taken to the New Ferry (Port Sanitary) Hospital, on the Birkenhead side of the River Mersey, are not included in this list, as this Hospital probably had no concern with spread of smallpox in Liverpool." The hospital, it will be seen, is not acquitted from a share of responsibility for the prevalence of smallpox in Liverpool, but we are informed that "this hospital probably had no concern with spread of smallpox in Liverpool." The fact is that there is not one jot or tittle of evidence to connect New Ferry Hospital with the spread by aerial convection of smallpox in Liverpool or anywhere else, either during the last outbreak or at any other outbreak, and it is difficult to understand Dr. Reece's doubts in the matter. The Medical Officer of Health admits that if this institution were ill-managed, or if patients or nurses or servants were permitted to come from it to Liverpool with infection, that mischief might reasonably be expected to follow; the risk, in fact, would be of the same kind as that which arises when smallpox exists in Toronto, Bombay, or Boston, or any Port in the world with which Liverpool trades. We know that smallpox is brought from these and other distant places, and we know how it is brought, and with what results.

CONCLUSIONS.

1. On the whole the observations of Dr. Reece relating to the administrative arrangements are indicative of an absence of practical acquaintance with the sanitary administration of cities.

2. This is further shown by his general reflection upon the supervision of the whole of the City Hospitals; but in this latter case he might with but little trouble have visited these institutions, or at least, by making inquiries concerning them, have made himself acquainted with the methods of their supervision.

3. The conclusions in the Report are based altogether upon a limited aspect of the geographical distribution of the disease. No other aspect of the question has been taken into consideration, and the geographical one to only such partial extent as will enable it to invest the conclusions with an appearance of accuracy.

4. Spot maps, and tables compiled from them, are alone relied upon. The futility of basing conclusions upon spot maps and tables compiled from them, alone, is illustrated by a comparison of the smallpox incidence in the Parkhill Hospital area with its incidence in the Netherfield Road Hospital area. The two cases are practically parallel so far as geographical incidence is concerned. The gradations in the incidence of the disease are remarkably similar, and as a basis of statistical argument, the case of Netherfield Road Hospital is a much stronger one than Parkhill, because the observations extend over a longer period, viz., twenty-three months as compared with six months, and relate to a considerably larger number of houses.

5. But there is no reason to assume that Netherfield Road Hospital, which was not used for smallpox at all, could have been a source of smallpox infection to the neighbourhood. The presence there of smallpox was due to other causes—the same causes, in fact, which gave rise to it in the neighbourhood of Parkhill.

6. In both cases the prevalence of smallpox was due to causes wholly unconnected with either hospital.

7. Referring to Priory Road Hospital, the spot maps themselves lend no colour to the conclusion sought to be drawn from them. For more than an entire year the hospital was in full use, and the whole population within a quarter of a mile of it lived in entire security during that time.

8. As the site for the Fazakerley Hospital is one which the Corporation, after due deliberation and consultation with the Local Government Board, purchased for a smallpox hospital with the sanction of the Board, questions affecting its fitness for the purpose are of great importance. The cost of the Fazakerley Smallpox Hospital was about £60,000.

But it is apparent that in dealing with this hospital the gravest mistakes have been made by Dr. Reece. It is quite true that a table has been constructed which would ascribe to the Fazakerley Hospital a most damaging influence upon the public health. The allegation, however, rests on the invasion of two houses within the half-mile circle, with an increase of house invasion in the zone more distant from the hospital. In the first place, these figures are far too small to justify tabulation, and the table constitutes a use of figures which is altogether misleading and improper.

9. Neither the Local Government Board nor the Port Sanitary and Hospitals Committee could assent to the continued use of this institution if the allegations contained in Dr. Reece's table are to be regarded seriously.

It does appear that the sole object sought to be served by the table is to lend colour to the preconceived view which is expressed at the outset of the Report.

The Port Sanitary and Hospitals Committee will desire to be satisfied upon this point, and will no doubt confer with the Local Government Board upon the matter.

10. The Committee will, of course, appreciate that Dr. Reece's Report derives its importance from the official position which he holds, and although it does not appear that the Local Government Board have adopted the Report, or have given official acceptance to it, yet no doubt must be allowed to remain as to the views of the Board and the views of the Committee in the matter.

E. W. HOPE.

PUBLIC HEALTH DEPARTMENT,
MUNICIPAL OFFICES,
LIVERPOOL, *April*, 1905.

APPENDIX.

ILLUSTRATIVE CASES.

83, Admiral Street. Henry S. Morris and his father were being treated at this address for chicken-pox. The illness commenced on 18th and 26th February, 1902. On the Assistant Medical Officer visiting the patients on 7th March, both were found to be suffering from smallpox, and were removed to Priory Road Hospital.

A relative of the above persons, named Annie Robinson, living at 14, Balkan Street (which is within fifty yards of Parkhill Hospital walls), was removed the same day (7th March) to Priory Road Hospital suffering from smallpox.

These people had been visiting their relatives who were ill at No. 83, Admiral Street, and were no doubt infected in this way. There were no cases of smallpox in the Parkhill Hospital at this time.

Harriet Manelas, 23, and her daughter, 3, removed on March 7th. James Manelas, removed on March 8th. 10, Lockhart Street. These patients were known to have been in contact with a case of smallpox at 17, Ledward Street, from which house a patient was removed on February 23rd. The usual precautions were taken, and two of the Manelas re-vaccinated and one vaccinated, but too late to ensure complete protection, the illness in each case being modified.

Elizabeth Mason, 35, No. 29, Lockhart Street. Removed 2nd April, 1903. This patient is a sister of the patient removed from No. 43, Sutcliffe Street on 1st April. Sutcliffe Street is situated about two miles away from Lockhart Street, and about 2½ miles from Parkhill Hospital. Evidently these two patients were infected from a common source, but careful inquiry failed to connect these patients with known cases.

Edward Macdonald, 18 years, No. 6, Rankin Street. Removed March 24th. This young man had been known to have been in contact with a man named Black, who was removed to hospital from 30, Northumberland Street on March 9th.

Lewis Cattroll, 14 years, 7, Beresford Place. Removed on 1st April, 1903. This house adjoins No. 8, Rankin Street, from whence a case was removed on March 16th, and is next but one to No. 6, Rankin Street, from whence a case was removed on March 24th.

Ellen Wilkinson, 35 years, 10, Loxdale Street. Removed on 4th April, 1903. This woman was in contact with the patient who was removed from 113, Parkhill Road on March 17th. When it was known that she had been in contact with this patient, she was urged to be re-vaccinated, but declined. The case, unfortunately, proved fatal.

Joseph Hall, 38 years, 452, Mill Street. Removed 12th April. This patient is the brother-in-law of the patient removed from 165, Park Road on March 16th.

Richard Parr, 40 years, 21, Cleopas Street. Removed 17th April. This man is the brother-in-law of a patient removed from No. 12, Mornington Street on March 31st.

Joseph Skillicorn, 32 years, 69, Cockburn Street. Removed 15th April, 1903. This man worked at the Brunswick Station, where other employees had been previously affected.

Albert Simon, 24 years, No. 10, Marmion Terrace. Removed on April 18th. A case was removed from No. 8, Marmion Terrace on 6th April, the patient being a railway goods porter, employed at the Brunswick Station.

Moses Shackle, 22 years, No. 16, Marmion Terrace. Removed 4th May. A friend of this patient, a young man aged 24, was removed from No. 10, Marmion Terrace on April 18th.

William Ockleshaw, aged 21, No. 2, Brancker Street. Removed on June 15th. This man was known to have been in contact with a patient from No. 15, Byles Street, who was removed to Hospital on June 2nd.

Alfred Moore, aged 29, 23, Haylock Street. Peter Downey, aged 22, 1, Moses Street. Both removed on January 5th, 1903. These cases occurred before smallpox had been admitted to Parkhill Hospital, and the men were removed to Priory Road Hospital. One of the men, Alfred Moore, had been in frequent contact with his brother, John Moore, of 32, Haylock Street. On this house being visited, it was found that John Moore was recovering from smallpox. He had not been medically attended, and had continued at his daily employment. John Moore's child also took ill, and was removed to Priory Road Hospital. The father was isolated at Fazakerley Hospital.

Peter Downey worked at the same place as John Moore, and was in frequent contact with him and Alfred Moore.

Thomas Such, aged 33, 6, St. Silas Street. Removed to Parkhill Hospital, February 12th, 1903. This man was the night porter at the common lodging-house, No. 37, Byrom Street, which is about 2½ miles away from the hospital.

A case of smallpox was removed from this lodging-house on January 31st, and Such was known to have been in contact with the patient. As soon as this exposure was known he was re-vaccinated, but too late to prevent an attack of smallpox.

Peter Larkin, aged 21, No. 40, Clevedon Street. Removed to Parkhill Hospital 14th February. At the time when this man's illness was notified, it was discovered that a brother of his had a few weeks previously suffered from what was thought to be an attack of influenza. He quickly recovered, however, but it was so apparent that he had had a highly modified form of smallpox, that he was sent to the hospital for disinfecting purposes, and his apparel and belongings were disinfected. He was then allowed to go. This man had evidently been roaming about the district whilst in an infectious state for nearly three weeks.

A further case was removed from this house to Parkhill Hospital on February 20th. This was the daughter of the family.

Richard Davies, aged 18, No. 11, Toxteth Street. Removed March 20th. On or about March 21st, 22nd and 23rd a small group of persons were removed to hospital from different addresses, all of whom were employed at Brunswick Station, Cheshire Lines Railway. Richard Davies was a goods porter so employed.

Margaret Wainright, aged 28, No. 41, Star Street. Removed to hospital April 9th. This woman was known to have been in contact with the patient who was removed from 28, Star Street, on March 23rd. She was urged to be re-vaccinated on account of this exposure, but she refused.

Walter Longworth, 7 years of age, 21, Hurry Street, removed to Parkhill Hospital on March 18th, 1903, is the son of a man employed at Grain Street Mill with a person named Manelas, who was removed from 10, Lockhart Street to Parkhill Hospital, on March 8th, suffering from smallpox.

Margaret Dutton, aged 25, 16, Nestor Street, removed April 6th, 1903. This woman was a friend of people named Newby, living at 18, Nestor Street, in whose house smallpox had occurred, the patient being discharged from hospital on March 23rd.

Martha Byrne, 12 years, 8, Bright's Terrace, Beloe Street, removed March 12th, 1903. This child had been exposed to infection, and she was on that account vaccinated on March 5th, too late to ensure complete protection.

Henry East, 72, No. 20, Emerald Street, removed 6th May. This patient was probably infected by his son, who, although not a notified case, was found to have recovered from a highly modified attack of smallpox.

One interesting series is that shown on the Diagram marked (DT). The notification by a medical practitioner on 26th January, 1903, of a case of smallpox in an unvaccinated infant at No. 14, Dickson Terrace, brought to light the fact that the mother of the infant, Elizabeth Welch, of 14, Dickson Terrace, was recovering from a very mild attack of smallpox. She had had no medical assistance, but, as soon as she was able to, had followed the usual avocations of a woman living in what is practically a court house in Liverpool.

Dickson Terrace is situated near to the centre of the City, and is not within two miles of any of the hospitals used for smallpox. The house and the court were kept under close observation, and as many friends and acquaintances as could be ascertained were also visited at their homes. The following were the results of those visits:—

On the 31st January, a child, Jane Welch, aged four years, found to be ailing, was removed to hospital, the disease proving to be modified smallpox. On 5th February the woman's husband, Alexander Welch, was removed to Parkhill Hospital. On 16th February a boy, named Kelly, living at 30, Dickson Terrace, a playmate of the Welch's, was removed to Fazakerley Hospital. On the 21st February, William Ireland, dock agent, 5, Dickson Terrace, was removed to Parkhill Hospital, all suffering from smallpox.

On 4th March, Frank McCluskey, of 31, Dickson Terrace, a fellow-workman and visitor to William Ireland, was removed to Parkhill Hospital, and on 6th March, Francis Birrell, of 61, Rishton Street, was removed to Fazakerley Hospital. He also was a fellow-workman of William Ireland.

There is not the least reason to assume that one of these patients, namely, Francis Birrell, did not receive infection from the Dickson Terrace series, but from Priory Road Hospital, because he lived within a mile of that institution; nor to reject the possibility that Birrell may in turn have proved a source of infection within the mile area, just as Welch or Ireland did in Dickson Terrace.

The diagram relating to Travers Street needs but few words of explanation. An unrecognised case of smallpox occurred at a public-house, at No. 57, Everton Brow, which is beyond the mile zone of any smallpox hospital. The patient, a girl named McGlory, was employed as a servant. The nature of her illness was verified after the infection of the manager and his daughter, who were removed to Parkhill Hospital on 3rd February, 1903. Her relatives at No. 13, Travers Street, were also infected, and in turn passed on the infection to fellow-workmen residing severally at Great Howard Street, Gildarts Gardens, Regent Street, Purcell Place and Poplar Street. All of these are outside the mile zone of any smallpox hospital excepting Poplar Street, which is within the mile zone. To Dr. Reece, the only completely satisfactory explanation of the case in Poplar Street is that it must have been infected through the hospital influence. But the behaviour of smallpox within the zones, as the following diagram shows, is the same as it is without the zones. Diagram T.S. illustrates this.

A woman named Owen, of No. 2, Pugin Street, died suddenly on 14th February, 1903. An inquest was held, and a verdict returned that death was due to natural causes. Six cases of smallpox were directly traceable to this house within the next eighteen days, three being removed from 2, Pugin Street, and the others being persons who had visited that house. (See Diagram marked P.S.)

Further illustrations of series of cases are shown on the Diagrams C.C., H.C.

Diagram marked "Fazakerley Hospital."

This diagram shows that the cases in the vicinity were fewest during the fortnight of maximum occupation of the hospital, whilst they attained their maximum after an interval of twelve months, and during the eight weeks that the number of patients in hospital were fewest.

Whilst anxious to avoid unnecessary repetitions, a few more examples may be cited to make the points at issue plainer:—On May 18th, smallpox was reported at No. 116, Delamore Street, the house of an employee of Messrs. G. W. & Co., whose business premises are at Williamson Street, in the centre of the City. Immediate inquiry was made, and it was found that six other employees, living widely apart, were infected with smallpox, the stage of illness in each case indicating exposure to infection at the same time, the intimacy of their association at business pointing to a common origin. (See sketch map.)

The addresses were as follows, viz. :—No. 116, Delamore Street ; No. 55, Downing Street ; No. 163, Anfield Road ; No. 26, Exmouth Street ; No. 14, Makin Street ; No. 15, Picton Grove ; No. 54, Burdett Street. There is not the least reason to assume that the source of infection of the case at No. 163, Anfield Road was the Priory Road Hospital, because Anfield Road is within the quarter to half mile radius, or that the source of infection of the case at No. 54, Burdett Street, was the Parkhill Hospital, because Burdett Street is within the half to three-quarter mile radius ; or that the source of infection of the case at No. 55, Downing Street, was the Priory Road Hospital, because Downing Street is within the three-quarter to one mile radius.

Further amplification of these cases is surely unnecessary to prove to any unprejudiced mind the part played in the recent outbreak by the ordinary channels of infection. It was the knowledge of these facts, and the practical use made of this knowledge, which enabled the staff to discover 470 of the smallpox patients,—nearly one-fourth of the total number attacked during the epidemic—before any medical man had been called in or had had time to notify.

Notwithstanding that these facts were all brought fully to Dr. Reece's notice, not one single reference is made to them in his Report. His whole energies have been absorbed in preparing maps with spots and rings, and nothing coming under his notice during the eleven months of his research has tempted him to any other view of the matter than that which he announced at the outset as the only completely satisfactory one.

COPY OF CORRESPONDENCE WITH DR. REECE.

PUBLIC HEALTH DEPARTMENT,
LIVERPOOL, 31st March, 1905.

DR. R. J. REECE,
LOCAL GOVERNMENT BOARD,
WHITEHALL, S.W.

DEAR DR. REECE,

There is a matter in your Smallpox Report which I should like to be exact about in regard to spot maps.

In your maps the spots indicate invaded houses, and no subsequent cases in the same house are spotted. This, I presume, is done in order to exclude cases which owed their origin to the first case in the house.

I shall be glad if you will tell me whether this inference is a correct one, as I have no doubt it is.

I am,
Yours faithfully,
E. W. HOPE.

LOCAL GOVERNMENT BOARD,
WHITEHALL, 4th April, 1905.

DEAR DR. HOPE,

The spots on each map indicate, as stated in the report, "newly invaded houses," i.e., those in which no cases of smallpox had previously occurred during the epidemic period under review.

In no case was a house deemed twice invaded within the period of the epidemic.

Yours sincerely,
RICHARD J. REECE.

PUBLIC HEALTH DEPARTMENT,
LIVERPOOL, 5th April, 1905.

DR. R. J. REECE,
LOCAL GOVERNMENT BOARD,
WHITEHALL, S.W.

DEAR DR. REECE,

"Spot" Maps.

I am obliged by your letter, dated April 4th, in reply to my inquiry.

I do not appear to have made my inquiry quite clear. The meaning of my question was this—

Was your reason for excluding subsequent cases of smallpox, which arose in houses already infected, due to your belief that those cases owed their origin to the infection already existing in the house?

I am,
Yours faithfully,
E. W. HOPE.

LOCAL GOVERNMENT BOARD,
WHITEHALL, 7th April, 1905.

DEAR DR. HOPE,

I did not entertain "belief" in the matter. My object in not counting any dwelling as invaded more than once in the period under investigation was rather to understate than to overstate the house incidence of smallpox, particularly that in the neighbourhood of the hospitals.

Yours sincerely,
RICHARD J. REECE.

DR. HOPE.

COPIES OF CORRESPONDENCE WITH THE BOARD

Dear Sir,
I have the honor to acknowledge the receipt of your letter of the 14th inst. in relation to the proposed amendments to the rules of the Board of Directors of the National Bank of Commerce, New York, and in reply to inform you that the same have been forwarded to the Board for their consideration. I am sorry to hear that you are unable to attend the meeting of the Board on the 21st inst. and I trust that you will be able to attend the meeting of the Board on the 28th inst. I shall be glad to hear from you again in relation to the proposed amendments to the rules of the Board. I am, Sir, very respectfully,
Yours sincerely,
RICHARD J. BUCK

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Yours sincerely,
RICHARD J. BUCK

DISTRIBUTION OF SMALL-POX IN LIVERPOOL

SPREAD BY BOOTS & NOT DEATH WIND



FAZAKERLEY HOSPITAL

PRIORY ROAD HOSPITAL

PARK HILL HOSPITAL



FAZAKERLEY HOSPITAL

PRIORY ROAD HOSPITAL

NETHERFIELD ROAD HOSPITAL

PARK HILL HOSPITAL

R I V E R M E R S E Y

NOTE: THE NETHERFIELD ROAD HOSPITAL WAS NOT LINED FOR BRILL-PICK, BUT THE OTHER THREE HOSPITALS WERE. THESE LATTER, IN PRIC STATES, WERE RESPONSIBLE IN MATERIAL SENSE FOR THE PREVALENCE OF BRILL-PICK.

PHILIP'S NEW MAP
OF
LIVERPOOL

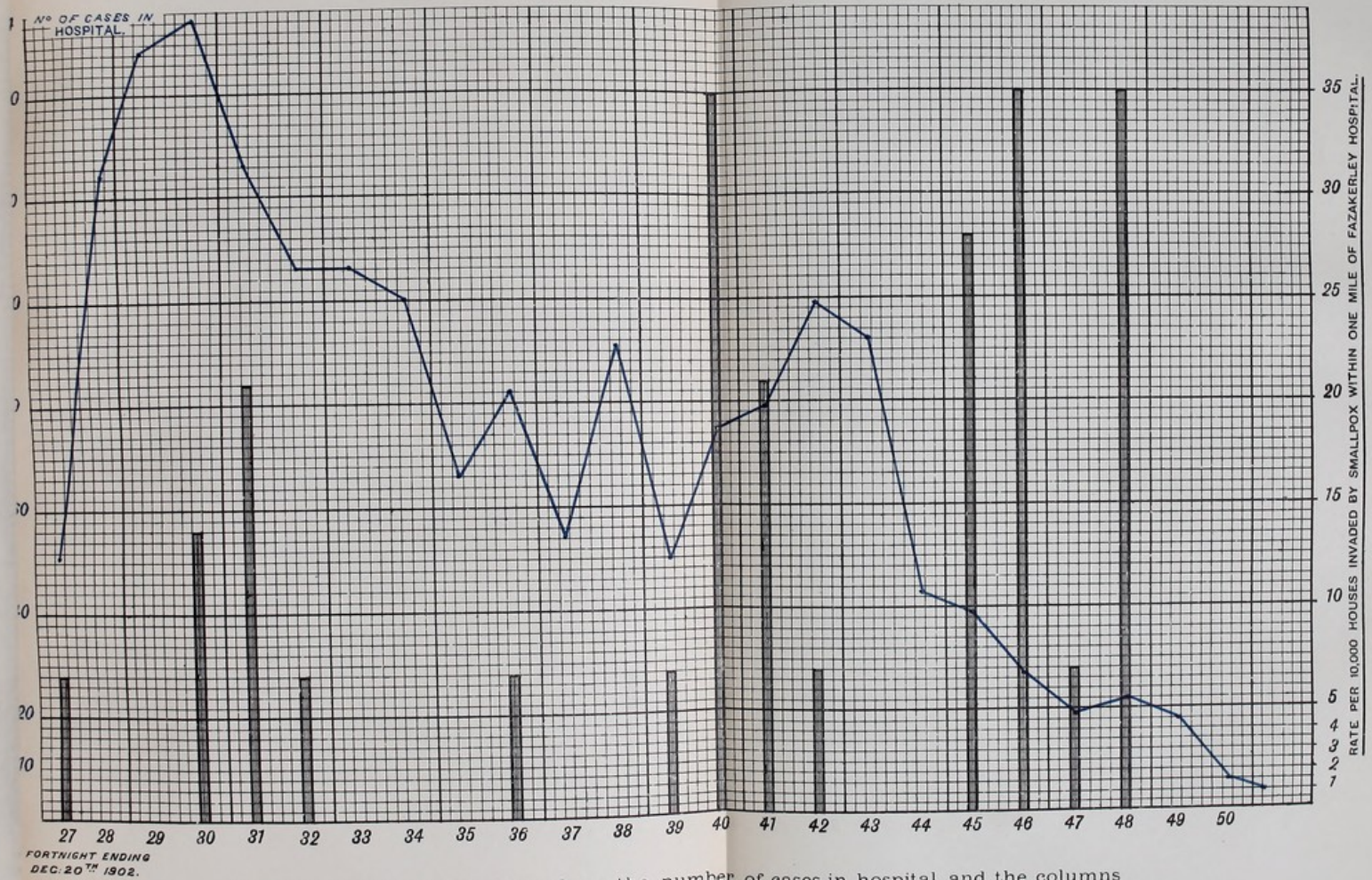
The Plan is divided into half mile squares
Municipal Boundary
Railways
Drainage

EXTENSION OF
GARSTON
BY SANITARIUM

BRILL-PICK & CO. LTD. THE LONDON GEOGRAPHICAL INSTITUTION

FAZAKERLEY HOSPITAL.

This Diagram shows the number of Cases in Fazakerley Hospital, and the rate per 10,000 Houses invaded by Small-pox within one mile of the Hospital.

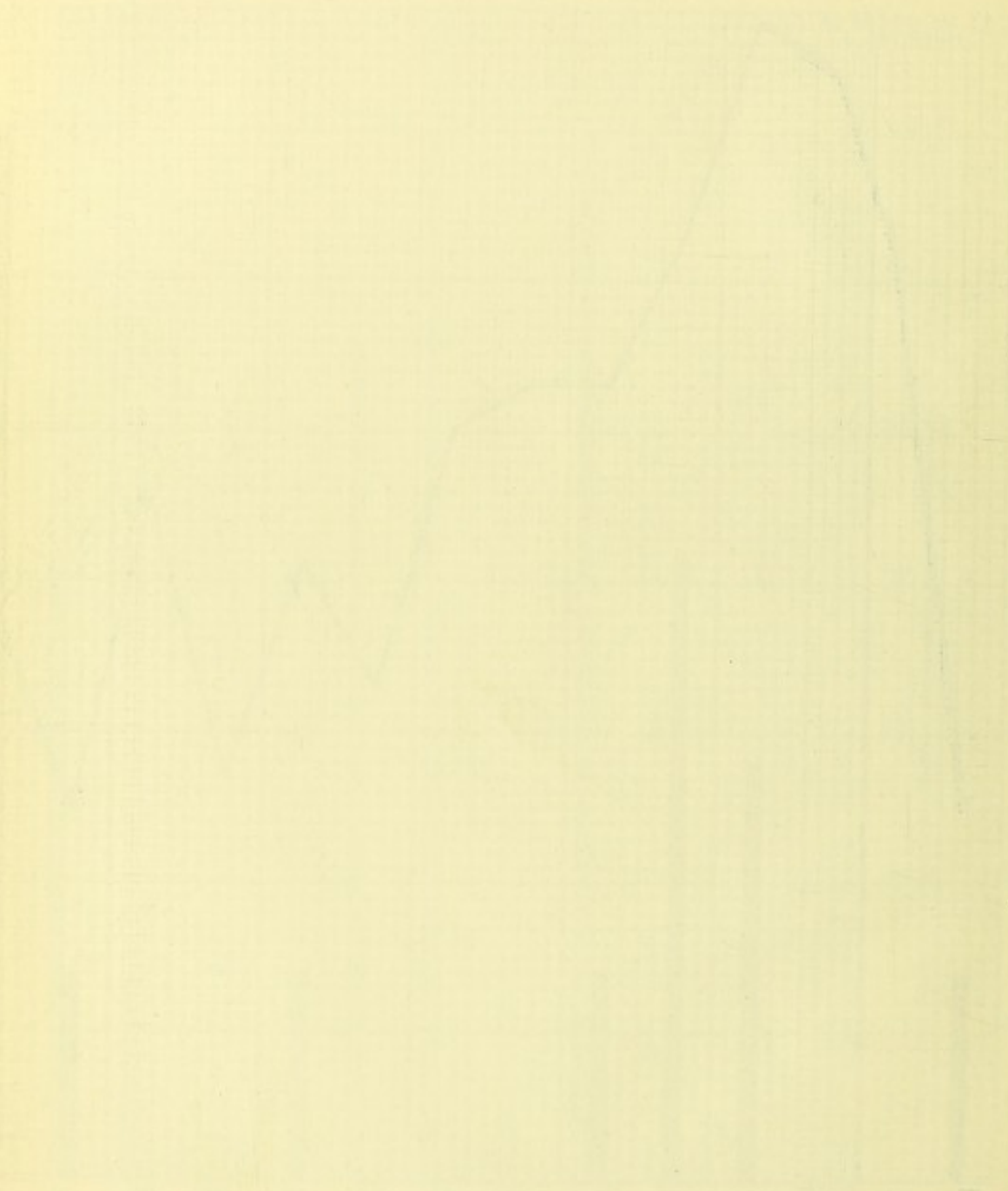


The figures and line in blue show the number of cases in hospital, and the columns and figures in black the rate of invasion per 10,000 houses.

The figures at the bottom of the diagram indicate the consecutive fortnights from No. 27 (ending December 20th, 1902) referred to in Dr. Reece's Report.

EXPERIMENTAL

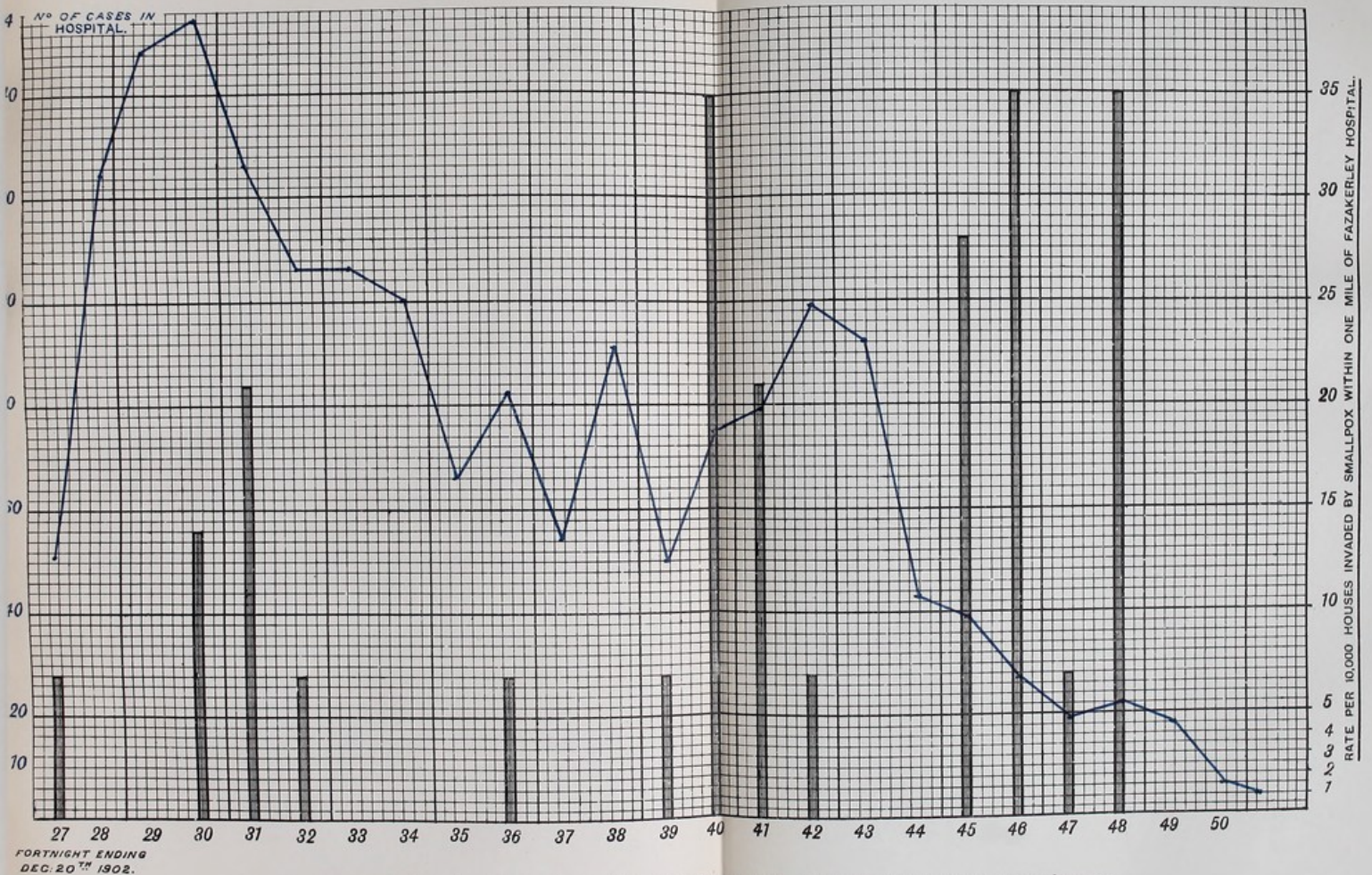
The following is a summary of the results of the experiments conducted by the author on the subject of the effect of the temperature of the atmosphere on the rate of the reaction.



The results of the experiments show that the rate of the reaction is affected by the temperature of the atmosphere. The rate increases with increasing temperature up to a certain point, after which it begins to decrease. This is due to the fact that the rate of the reaction is dependent on the energy of the molecules, which is affected by the temperature of the atmosphere.

FAZAKERLEY HOSPITAL.

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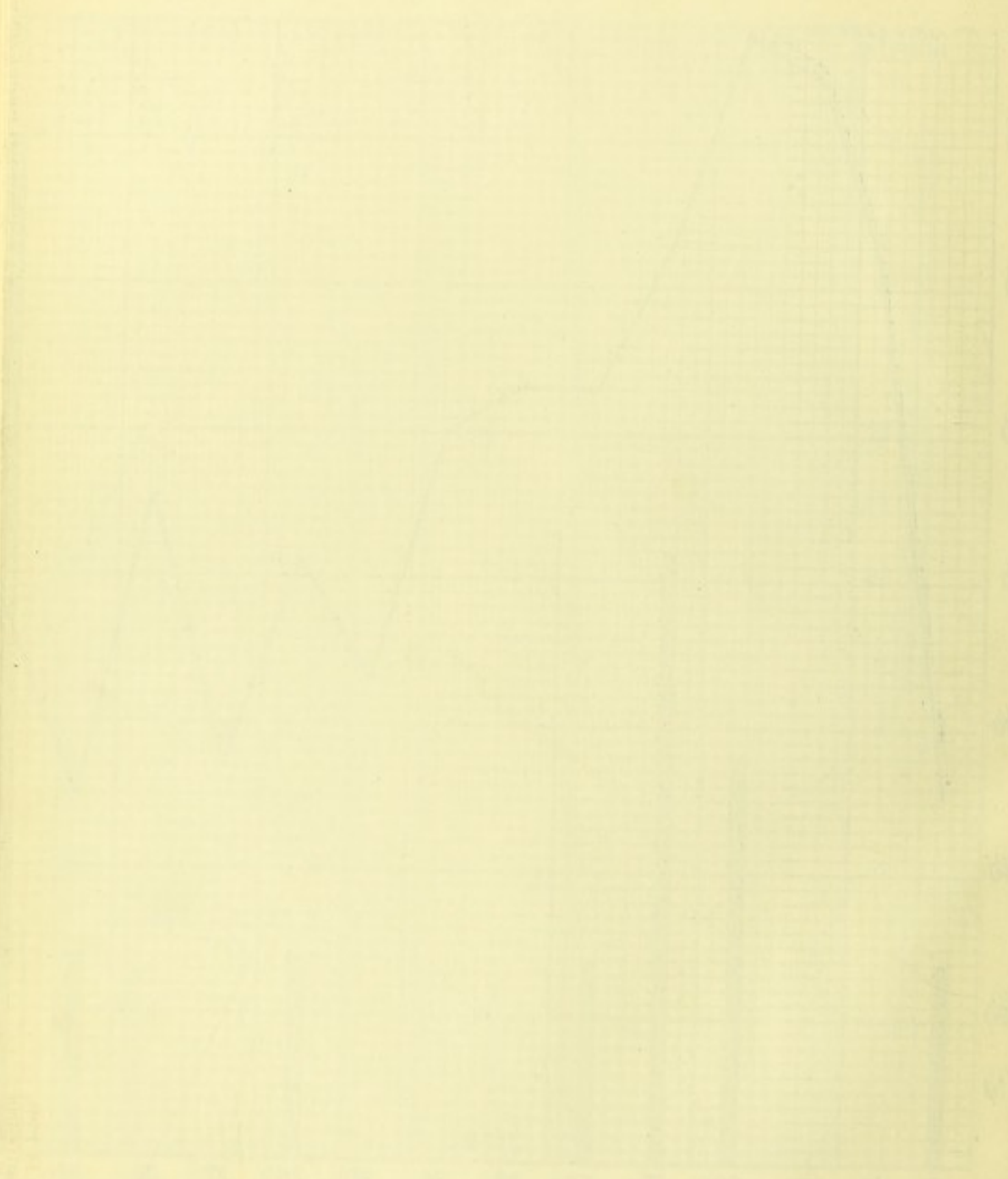
FORTNIGHT ENDING
DEC. 20TH 1902.

The figures and line in blue show the number of cases in hospital, and the columns and figures in black the rate of invasion per 10,000 houses.

The figures at the bottom of the diagram indicate the consecutive fortnights from No. 27 (ending December 20th, 1902) referred to in Dr. Reece's Report.

FAZAKERLEY

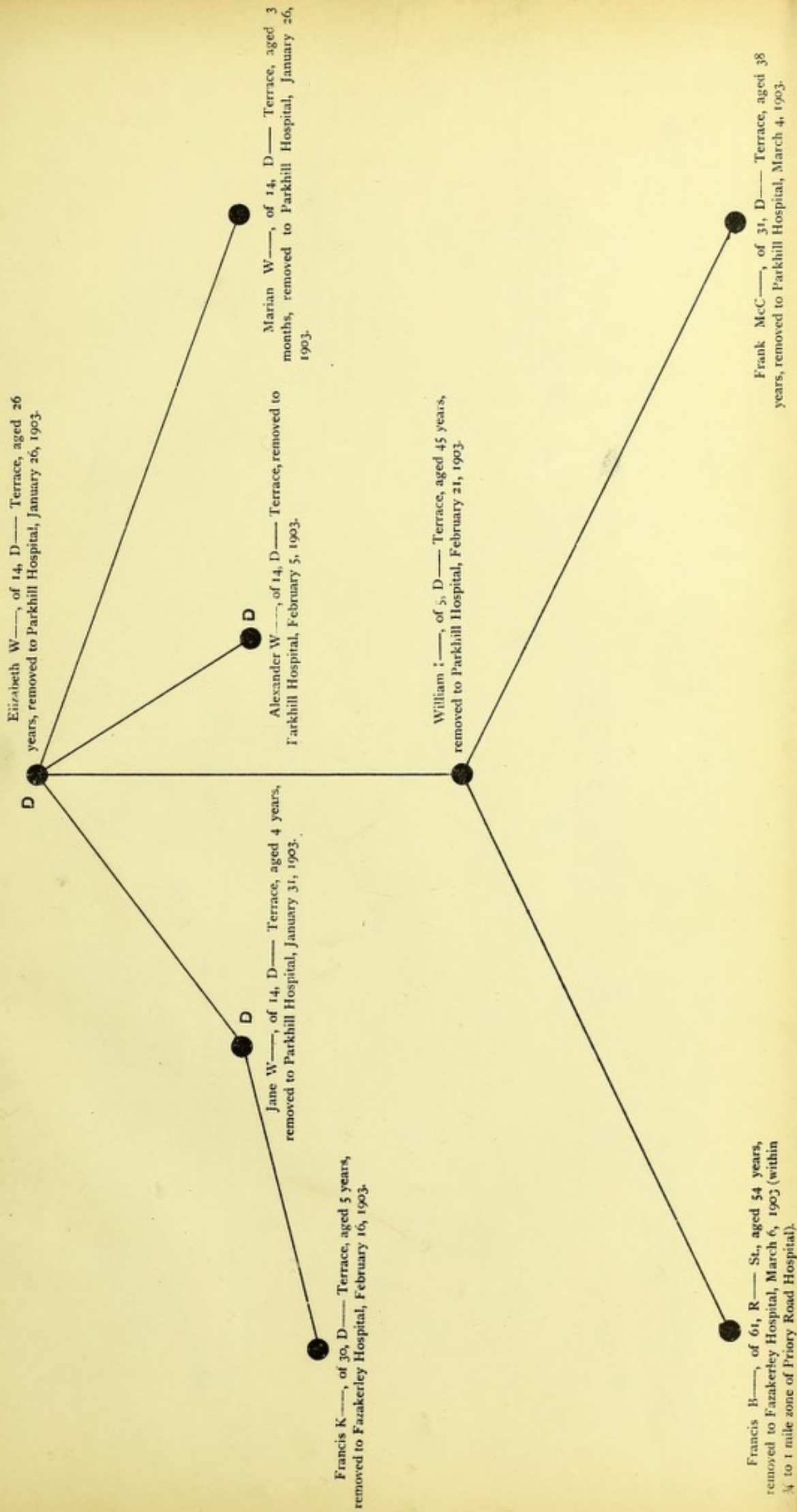
The highest point in the range is 1,000 ft. above sea level. It is situated in the north-west corner of the range.

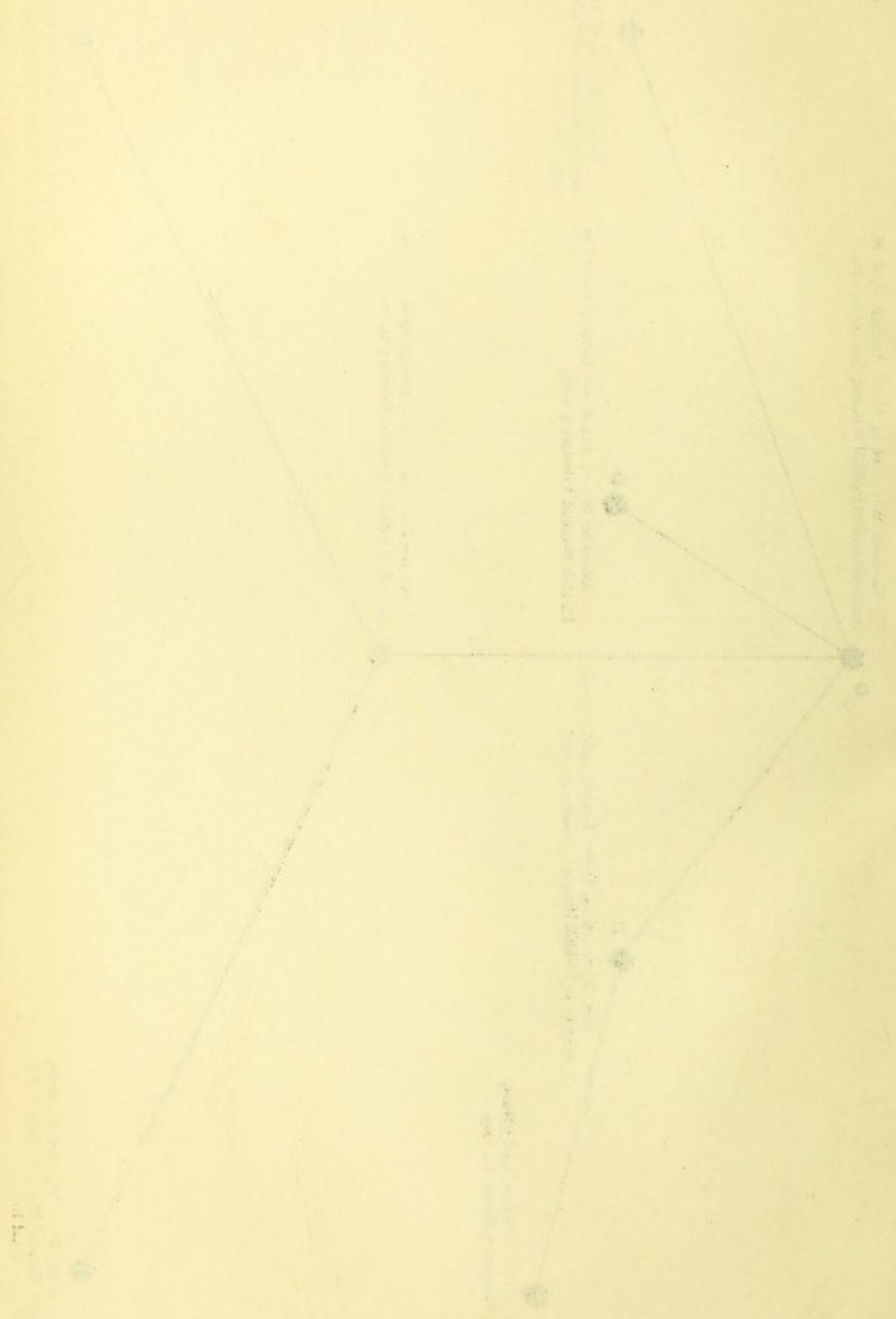


The highest point in the range is 1,000 ft. above sea level. It is situated in the north-west corner of the range. The range extends for about 2 miles in length and 1 mile in width. The highest point is situated in the north-west corner of the range. The range is situated in the north-west corner of the range.

(The letter D indicates that the cases were discovered by the Staff.)

D. T. DIAGRAM.





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PROPOSITION 10

discovered by the Staff).

Servant Girl McG—, of 13, T— St., aged about 20 years, was found to have recovered from Smallpox. She was not removed to hospital.

Mary L—, of 11, T— St., aged 6 years, removed to Fazakerley Hospital, February 28, 1903.

D

John McC—, of 13, T— St., aged 7 years, removed to Fazakerley Hospital, January 27, 1903.

Richard McG—, of 13, T— St., aged 26 years, removed to Parkhill Hospital, January 30, 1903.

George and Minnie D—, of 57, E— Brow, aged 30 and 4 years, removed to Parkhill Hospital, February 3, 1903. The servant girl McG— was employed as servant at this address.

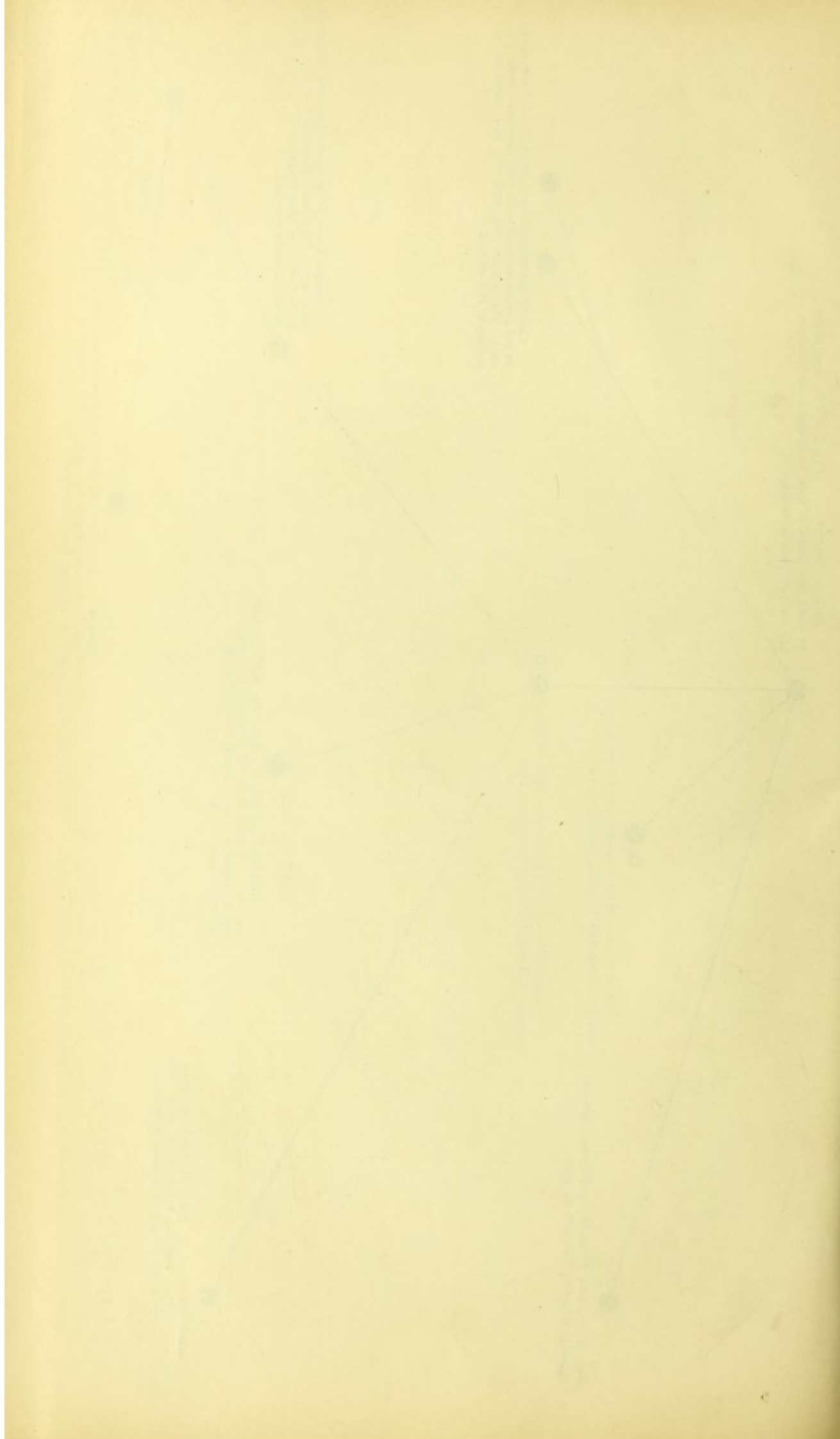
Joseph R—, of 38, G— Gardens, aged 25 years, removed to Fazakerley Hospital, February 16, 1903. Employed as a ship scraper with Richard McG—, whilst the latter was ill.

David R—, of 167, Gt. H— St., aged 34 years, removed to Parkhill Hospital, February 16, 1903. He was employed as a ship scraper, with Richard McG—, whilst the latter was ill.

Edward R—, of 23, R— St., aged 31 years, removed to Parkhill Hospital, February 16, 1903. He was employed as a ship scraper with Richard McG—, whilst he was ill.

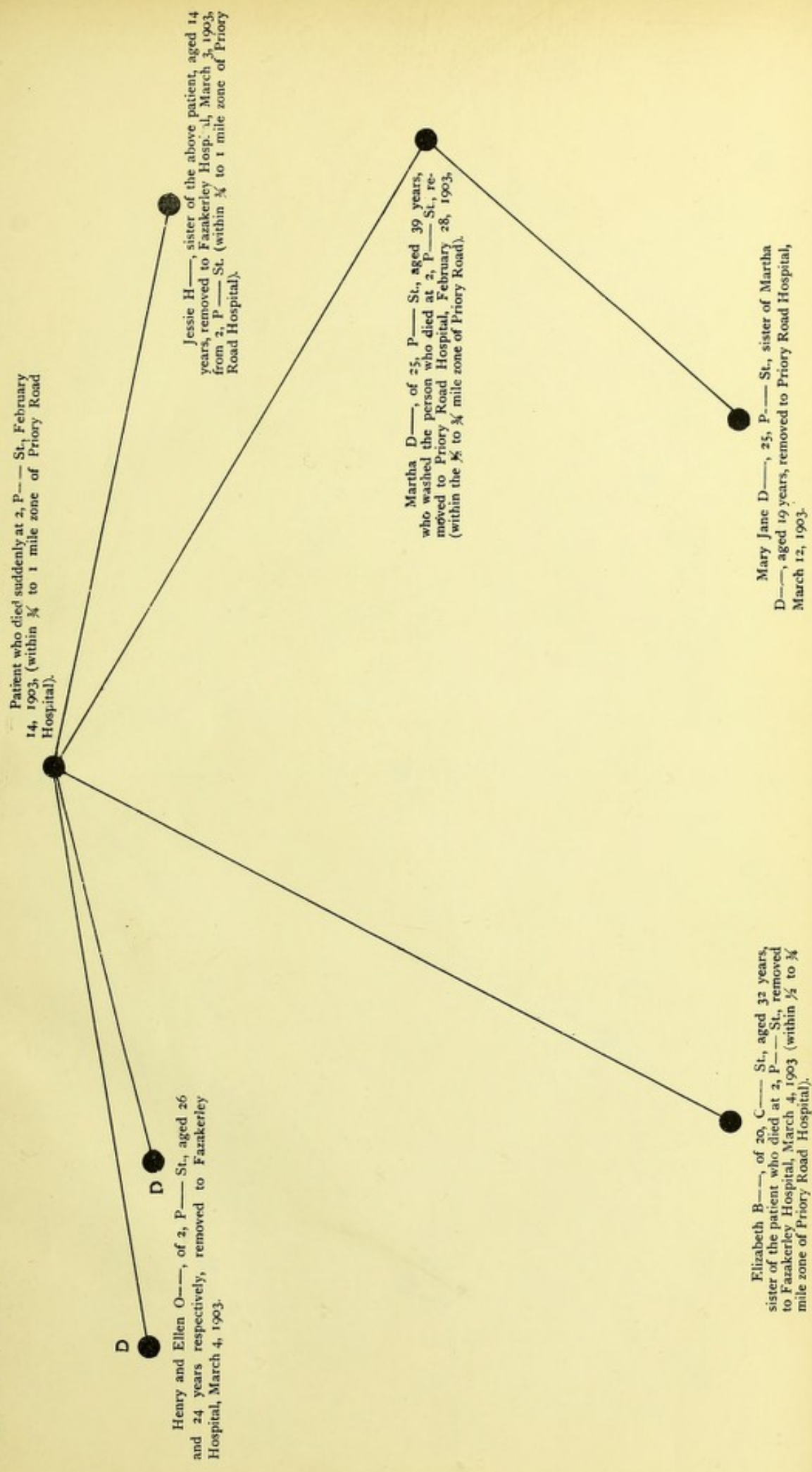
Joseph H—, of 17, P— Place, aged 55 years, removed to Priory Road Hospital March 6, 1903; brother-in-law to Joseph R—

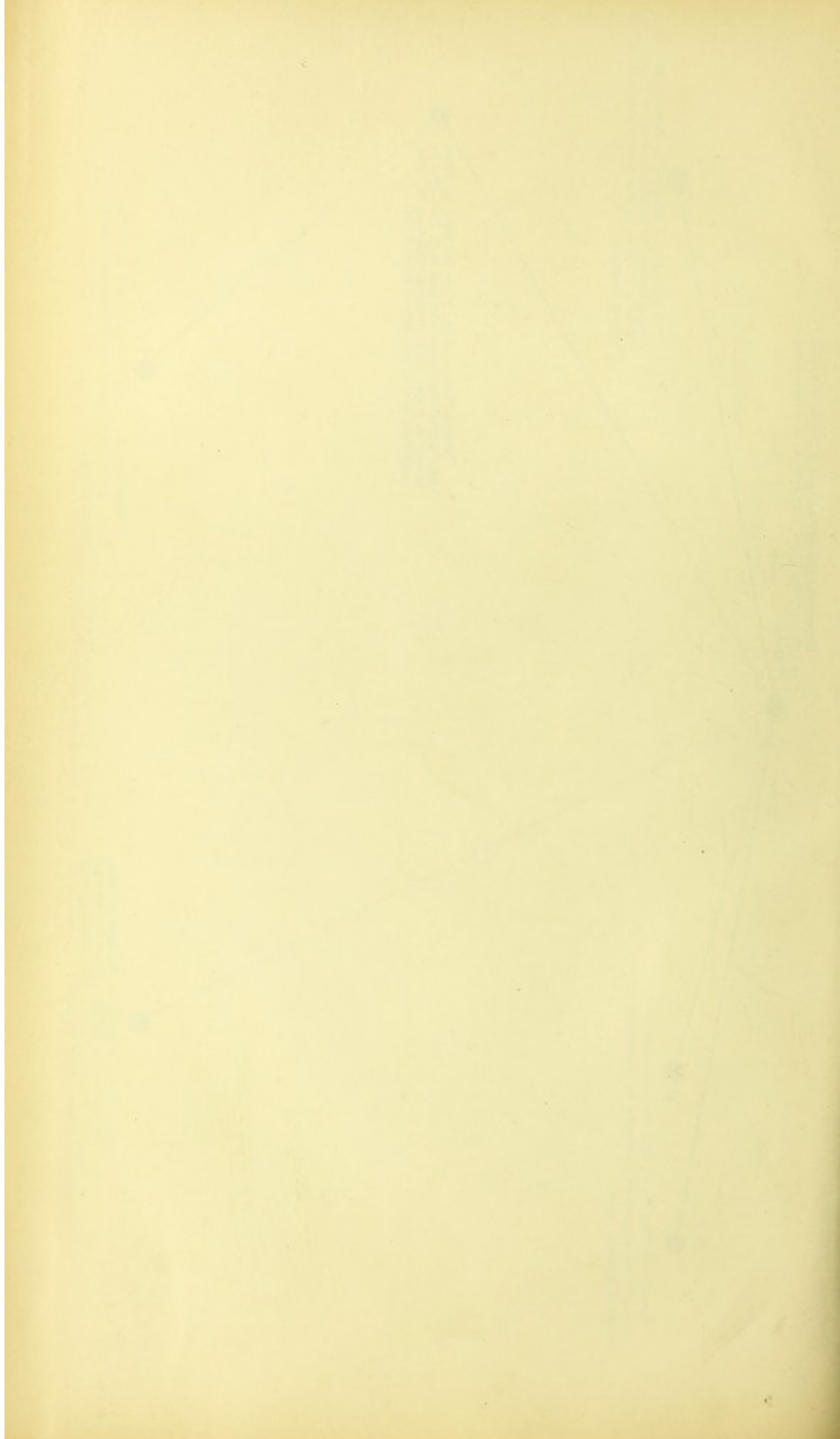
John W—, of 32, P— St., aged 23 years, removed to Parkhill Hospital, March 24, 1903, (within $\frac{3}{4}$ to 1 mile zone of Priory Road Hospital.) This man was a friend of Joseph H—



(The letter D indicates that the cases were discovered by the Staff.)

P. S. DIAGRAM.





(The letter D indicates that the cases were discovered by the Staff.)

G. C. DIAGRAM.

Miss L., of 29, O. St., Tuebrook, a Teacher at C. School. It was owing to her father having contracted the disease that she was found. She had been following her occupation and had had no doctor.

D

D

Eliza B., of 3/8, C. St., aged 12 years, removed to Fazakerley Hospital, June 25, 1903. She attended C. School.

D

Agnes C., of 28, L. Hill, aged 13 years, removed to Fazakerley Hospital, June 11, 1903. She attended C. School.

A teacher at C. School. She resided outside the city at W.

Sister of William A., She attended C. School, and had a suspicious rash on her's fortnight ago.

William A., of 8, T. St., aged 16 years, removed to Fazakerley Hospital, June 27, 1903. Supposed to have been infected by his sister who had apparently recovered from Snaitpox. She attended C. School.

Albert L., aged 47, father of the above patient, removed to Fazakerley Hospital, June 10, 1903.

Mrs. L., of 12, O. Tuebrook, aged 33 years, removed to Fazakerley Hospital, June 15, 1903. She was a friend of Miss L., and had been in contact with her.

D

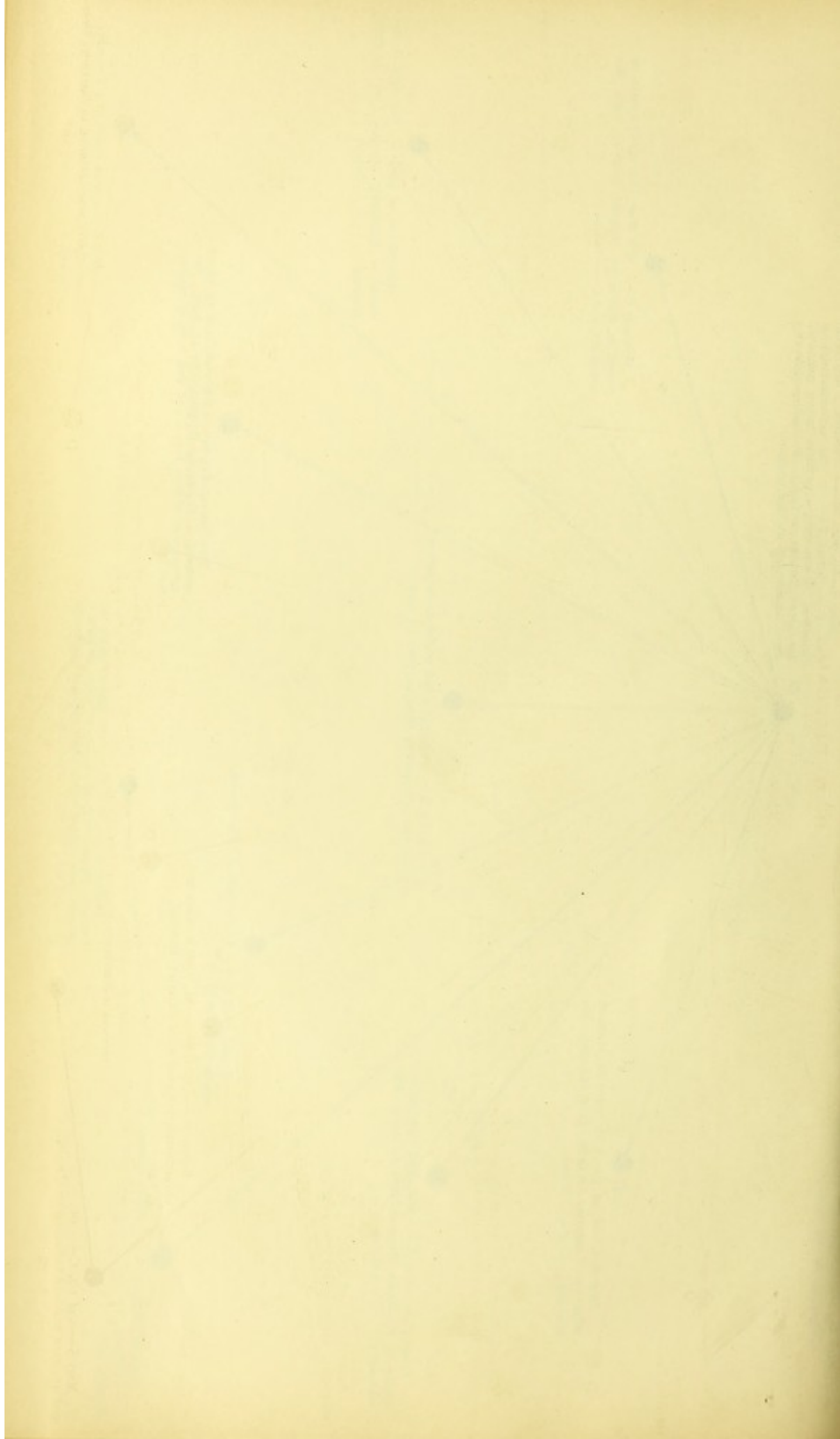
Louisa S., of 20, cellar, L. St., aged 8 years, removed to Fazakerley Hospital, June 13, 1903. She attended C. School.

D

Margaret L., of 6, H. St., aged 12 years, removed to Fazakerley Hospital, June 16, 1903. She attended C. School.

D

Ann W., of 59, G. St., aged 8 years, removed to Fazakerley Hospital, June 12, 1903. She attended C. School.

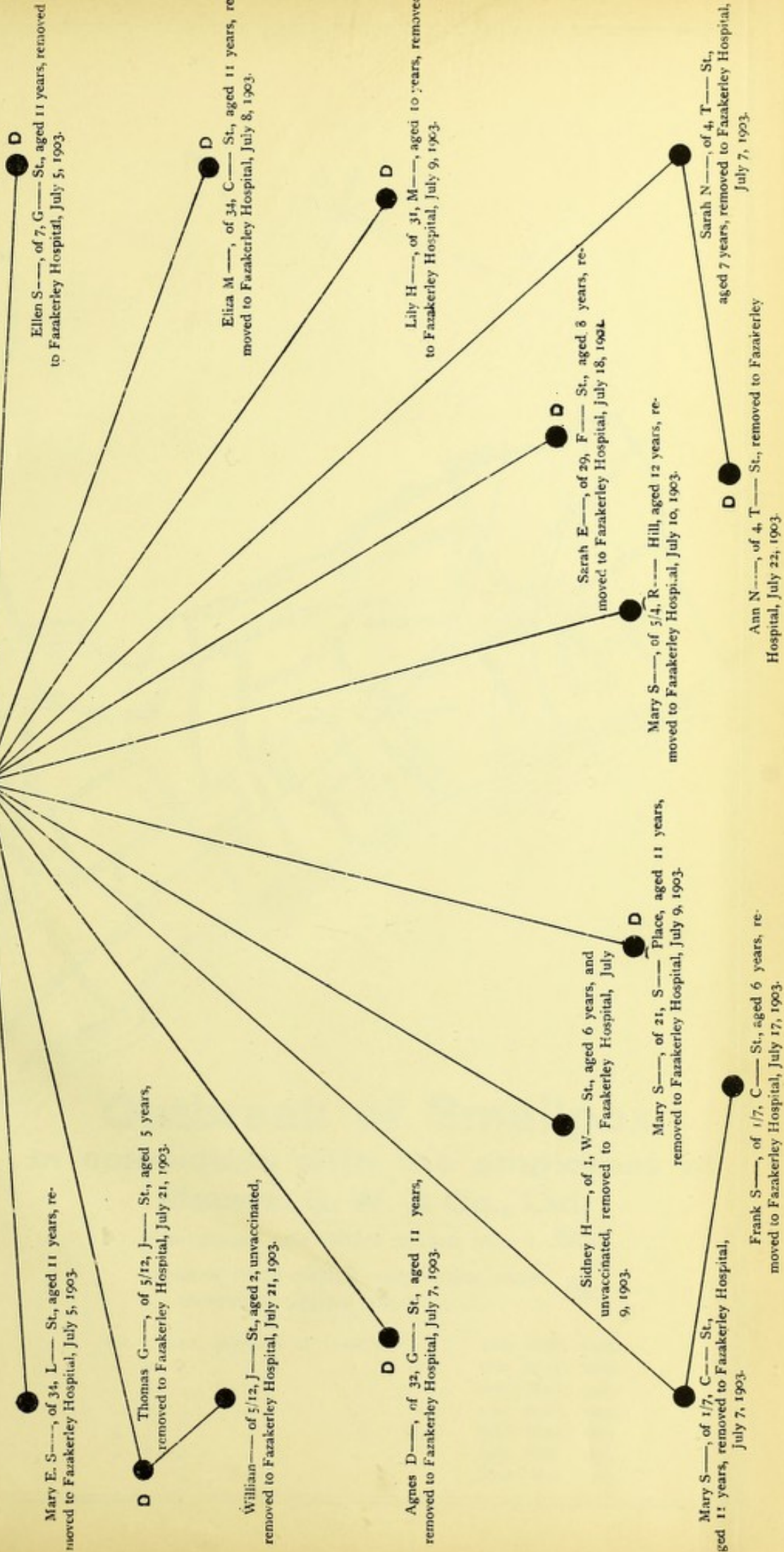


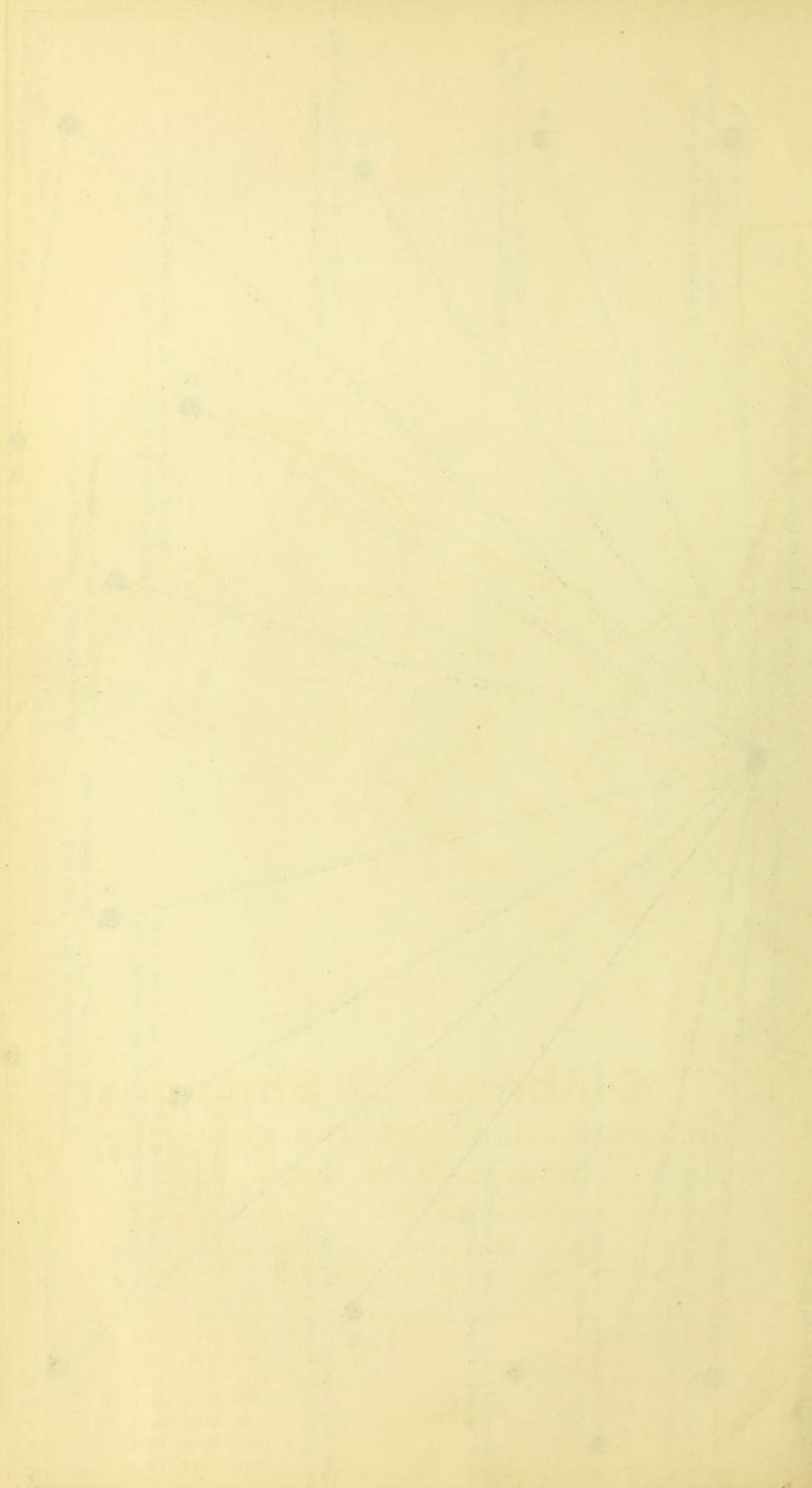
(The letter D indicates that the cases were discovered by the Staff.)

H. C. DIAGRAM.

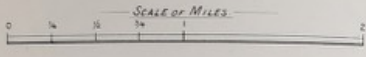
H---- C---- School, F---- St., unknown source. S---- School, F---- St.

The cases are children attending H---- C----





CITY OF LIVERPOOL.

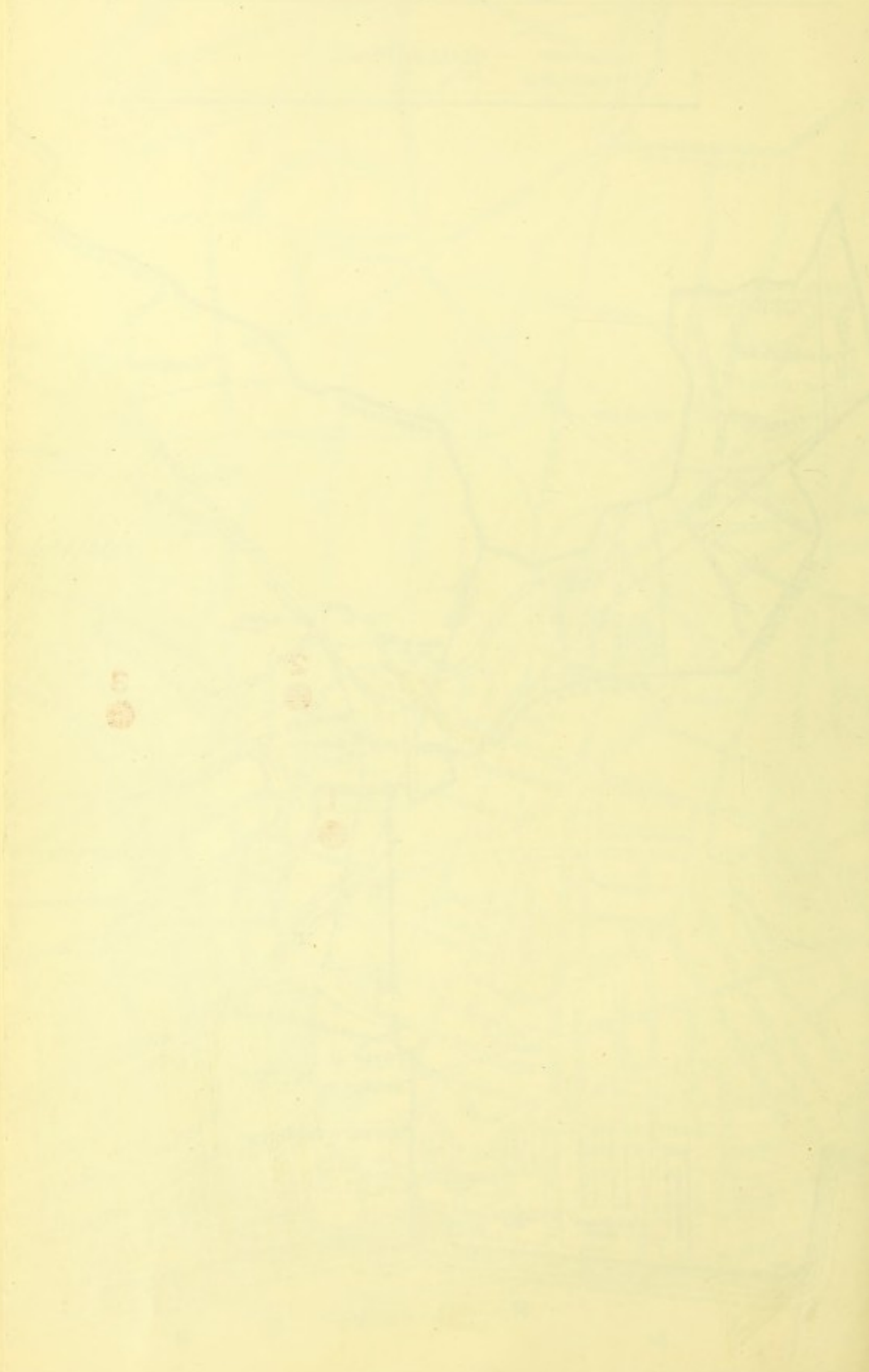


Outbreak of Smallpox in connection with the employees of Messrs. G. W. & Co., Ltd.

Warehouse and Office shown thus ... ■
Houses from which employees were removed shown thus ... ●

No. 1	case removed to Hospital	...	18th	May,	1903.
" 2	"	"	18th	May,	1903.
" 3	"	"	21st	May,	1903.
" 4	"	"	21st	May,	1903.
" 5	"	"	27th	May,	1903.
" 6	"	"	19th	May,	1903.
" 7	"	"	22nd	May,	1903.

CITY OF LIVERPOOL



SMALLPOX INQUIRIES. CONTACTS.

Case removed from _____ **Patient's Name** _____

Date of Visit.	Address.	Name.	Remarks.

Inspector

B.

Patients' Names

Cases removed from

1890

1891

1892

1893

SMALLPOX INQUIRIES. OUT-WORKERS.

Case removed from

Patient's Name

Date of Visit.	Name of Out-worker.	Name and Address of Employers.	Remarks.

Inspector

Case removed from

patient's name