

**Report on outbreak of enteric fever in West-end of Glasgow and Hillhead,
with ; Memorandum on the milk supply of Glasgow in relation to the
dissemination of infectious disease by milk / by James B. Russell, M.D.,
Medical Officer of Health, Glasgow.**

Contributors

Russell, James Burn, 1837-1904.
Glasgow (Scotland). Town Council.
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Publication/Creation

Glasgow : printed by Robert Anderson, 1878.

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ON
OUTBREAK OF ENTERIC FEVER
IN
WEST-END OF GLASGOW AND HILLHEAD;
WITH
MEMORANDUM ON THE MILK SUPPLY OF GLASGOW
IN RELATION TO
THE DISSEMINATION OF INFECTIOUS DISEASE BY MILK.

BY
JAMES B. RUSSELL, M.D.,
MEDICAL OFFICER OF HEALTH, GLASGOW.

PRINTED BY ORDER OF THE MAGISTRATES AND COUNCIL OF GLASGOW.

GLASGOW:
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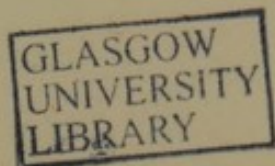
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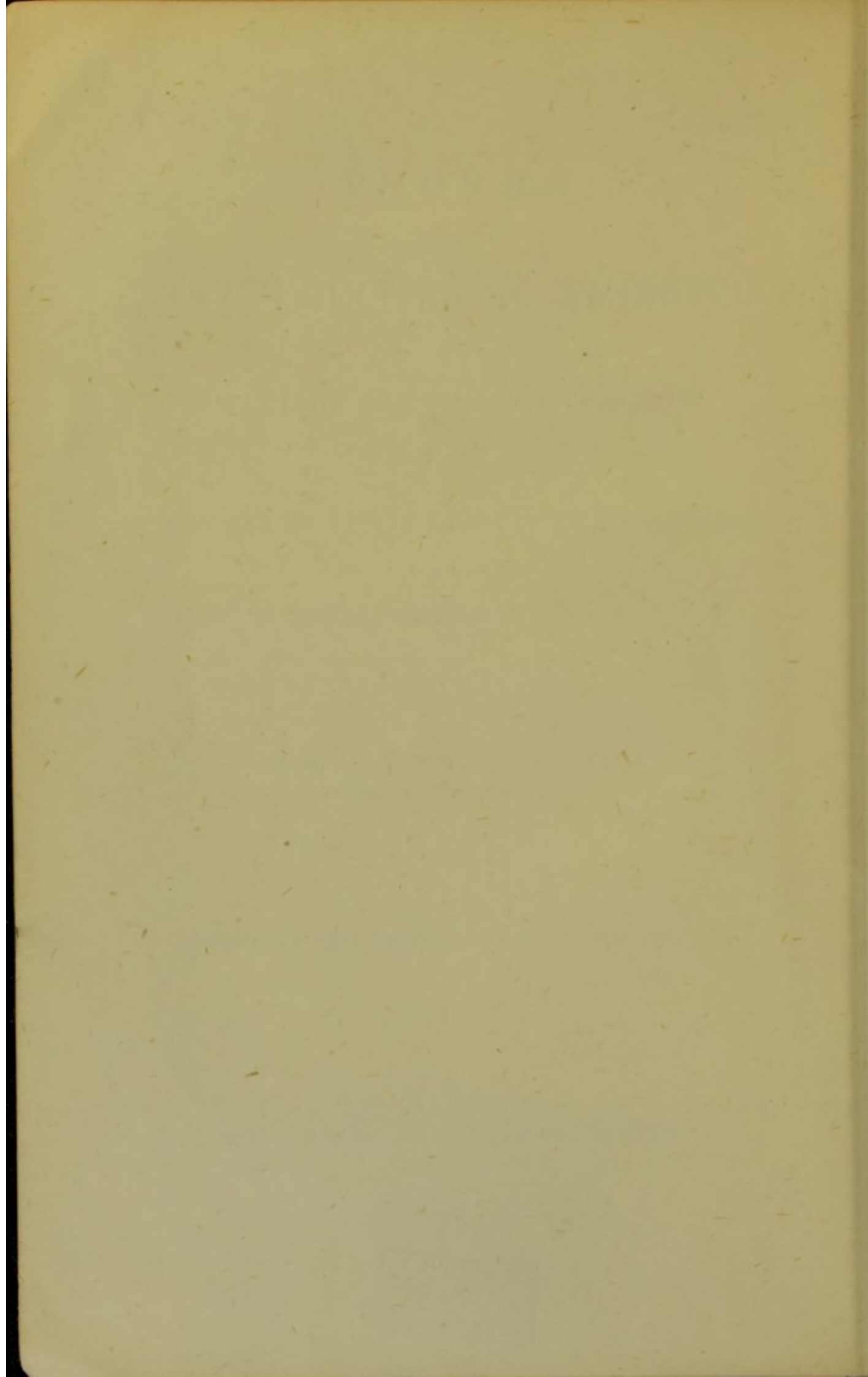
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REPORT

ON

OUTBREAK OF ENTERIC FEVER IN WEST-END OF GLASGOW AND HILLHEAD.

N.B.—The following Report was submitted to the Committee of Health, 14th January, 1878. Excepting the alteration of the figures and the incorporation of all the facts necessary to make the Report complete, now that the epidemic is at an end, it is unchanged. (28th Feb.)

It will serve more than one useful purpose to give, in the following special report upon the outbreak of enteric fever in the West-End of Glasgow and the Burgh of Hillhead, the history of my investigation rather than merely the conclusions to which that investigation has led. I shall therefore detail, in their chronological order, the various stages of the inquiry, beginning with the facts which brought the outbreak under my notice.

On Wednesday, 2nd January, a medical man called at the Sanitary Office to request the removal to hospital of two servant maids suffering from enteric fever from a house in Berkeley Terrace. He was unable to account for their illness, and my officers were told at the house that the source of milk-supply was thought to be a cart—a statement which proved to be a mistake. I may remark, that in all cases of infectious disease in Glasgow this inquiry as to the milk-supply has for some years now been made, among others as to internal sewer connections, water-supply, &c.

On Friday, 4th January, I received a private letter, stating that there were cases of enteric fever in Hillhead and in Woodlands Road; that the families affected were supplied with milk from

Morrison's dairy in Hillhead; and that suspicion was entertained by the medical attendant that the milk might be the cause. I at once wrote to the Medical Officer of the Burgh of Hillhead informing him of this statement, and saying, that "in similar circumstances, if the dairy were within my jurisdiction, I should make an inspection thereof and of the employés, and also an inquiry regarding the health of any farmers whose milk may be there retailed. I shall be obliged by your undertaking this inquiry, seeing the dairy is within your jurisdiction, and informing me of the result. I hear there are more cases than I mention similarly supplied." I also issued a circular letter to 13 of the leading West-End practitioners in these terms:—"I have become aware of the existence of an unusual number of cases of enteric fever in the West-End, chiefly about the West-End Park District and along Woodlands Road. It would greatly facilitate my inquiries into the same if you would kindly send me a memorandum of any cases you may be attending, with any information you may possess as to the milk-supply or other possible cause. The source of any information you may give will, of course, be strictly confidential." On making inquiry at Belvidere Hospital, by private wire, I found that the two servants referred to were able to state that the family in which they served was supplied with milk by Morrison. To expedite matters it seemed judicious to institute independent inquiries as to this dairy; and in this way I had ascertained in the course of the same day (1) that there was no sickness on Morrison's premises; (2) that besides the produce of their own cows, that dairy retailed milk which was obtained directly from one farm near Maryhill, and indirectly from three milk-dealers, one of whom was the firm of Semple & Wilson, whose premises are immediately north of Morrison's. The names and addresses of all the farmers whose milk was passed on by these three dealers to this dairy were obtained, except one, which Messrs. Semple & Wilson subsequently added. They were eight in number, as originally given, and were situated at East Kilpatrick, Old Kilpatrick, Campsie, Cadder, Symington, Thankerton, and Lesmahagow. The farm which was added to the list on Monday, 7th January, was between Stonehouse and Strathaven. I also learned that a child of Mr. Semple's had been ailing since the 2nd, but was supposed by the

medical attendant to be suffering from simple derangement of the stomach. Mr. Semple had himself been suffering from a cold since the end of December.

In the course of Saturday, 5th January, sufficient information was gathered from various sources to warrant me in writing again to the Medical Officer of Hillhead in these terms:—"Since my letter to you of yesterday, relative to Morrison's dairy, I have collected a deal of information from medical men and by other means, which leaves no doubt in my mind (1) that a smart outbreak of enteric fever prevails both in the West-End of Glasgow and in Hillhead; and (2) that all the families affected are supplied by Morrison. [Here the addresses of some Hillhead cases were given.] I trust you will use every endeavour (1) to ascertain that the milk is not now exposed; and (2) to discover the history of the circumstances in which the dairy and all its tributaries have been for the past six weeks or two months. I shall call at your house on Monday at 10 A.M. to learn about it." Still desirous of expediting the discovery of the source of infection, I consulted with Mr. Macleod, and instituted an inspection of the farms enumerated above, by Mr. Walker, the Food Inspector of the Department. I adopted this course, as the most speedy and satisfactory, for two reasons—(1) because of the difficulty, amounting sometimes to impossibility, of ascertaining the Local Authority within whose district farms are situated; and (2) because of my former experience of the delay and the otherwise unsatisfactory results of such investigations when conducted by correspondence. On Saturday evening I learned that the medical attendant on Mr. Semple's child suspected that the disease from which it suffered was enteric fever, and on Sunday I thought it my duty to inform the lady who manages Mr. Morrison's dairy of the circumstance, the result of which information was that no more milk was received from Messrs. Semple & Wilson. *Therefore, Sunday, 6th January, was the last day on which milk from this source was distributed to Mr. Morrison's customers.*

On Monday, 7th January, I called on the Medical Officer of Hillhead according to promise, and found that he had been confined to bed since the 5th, but that he had inspected the dairies on the 4th, and had arranged that Provost Cowan, Bailie Alexander,

and the Burgh Sanitary Inspector should meet him that morning for the purpose of consultation. Unfortunately, he was still too ill to engage in business, but I had the pleasure of meeting those gentlemen, and we proceeded to inspect the dairies together. I found Mr. Morrison's to be well-contrived, in admirable order, and in all respects a model of what a dairy should be. There had been no sickness about it, excepting a severe attack of bronchitis in the latter end of November, without the slightest symptom or suspicion of fever. Of this I am satisfied from the statement so frankly made by the medical attendant. There was at the time of the visit no one ailing in any degree. Messrs. Semple & Wilson's dairy cannot be similarly praised, as a slight description will show. From Smith Street you step down into the milk-house, the roof of which is low and the air decidedly close and heavy. By a door on the left access is obtained through a small apartment, used for business, to the centre of the dwelling-house, and by a door right opposite the street entrance you pass into the washing-house, where a boiler is provided for washing clothes, and another for scalding milk cans, &c., beside it. The doors into this milk-house are scarcely ever shut. Milk was standing about in it in open vessels. Besides the doors, there is in the partition dividing off the washing-house an oblong aperture covered with wire gauze, and almost on a level with the tops of the boilers. The flags are badly jointed and sloppy. The child was still ailing, but the private attendant was said to be less inclined to pronounce it fever.

Next morning I again met the Burgh Sanitary Inspector by appointment on Semple & Wilson's premises. The child had now been certified, and was about to be removed to the Joint Burghs Hospital. I saw it for the first time, and the disease was well-marked enteric fever. It lay in a room used as a sleeping and dining room, in and out of which dairymaids and others passed freely. However, all risk of infection originating within this dairy was terminated by the removal of the child. From the evidence which had been accumulating in my hands from day to day, derived from house-to-house visitation within my own district, and from the medical gentlemen who were kind enough to answer my circular, regarding both Glasgow and Hillhead, it became apparent that the problem before us was somewhat complicated.

The first cases of fever in both districts had occurred in the middle of December, and although they were principally among Morrison's customers, an increasing number was reported among the customers of Semple & Wilson, but chiefly in Hillhead. Reviewing the whole facts, the source of infection to which they pointed was one which passed through Semple & Wilson to Morrison, and yet which was divided between the two dairies. The evidence of this was, that the infection had attacked the customers of both, but the milk went only one way—viz., from Semple & Wilson to Morrison. The child had only been infected contemporaneously with the customers, which showed that a portion of the milk which went to Morrison had been retained in the supply retailed by Semple & Wilson, and partaken of by the child. The area of investigation was therefore now narrowed (1) to the milk from those farms which Semple & Wilson as middlemen or agents passed on to Morrison; and (2) to farms, part of whose milk was retained by Semple & Wilson, and part handed over to Morrison.

Working out this restricted area during Wednesday, the Food Inspector of this Department visited farms at Symington, Thankerton, and Lesmahagow, and on Thursday, 10th January, went to Stonehouse. In the forenoon of that day, Mr. Simpson, Sanitary Inspector of Hillhead, called to show me a letter dated 5th January, sent by Messrs. Semple & Wilson to a farmer near Stonehouse, informing him of the prevalence of fever in their vicinity, and "that several of the medical staff are loud in their assertions that it has been mainly spread by the milk supplied," concluding, "you will be kind enough to let us know by return whether all your people are in good health. We believe the Sanitary Authorities are making independent inquiries." The original was returned with this certificate written on the fly-leaf, dated 8th January, and signed by a medical gentleman—"In answer to the above communication, I have to state that Mr. ——— has been suffering from mild remittent fever for three weeks. A boy has been laid up with the same complaint within the last week." I advised Mr. Simpson to take immediate steps to stop the milk from this farm. He had not long left the office when our inspector wired his discovery to me, and on his return in the evening, after hearing his report, I wired to the farmer to send no more of his milk into

Glasgow, and that I would visit and inspect his premises next day. *The last of this milk was distributed to Messrs. Semple & Wilson's customers on Thursday, 10th January.*

On the 11th I inspected the premises in question. They stand in a most picturesque situation at a bend of the Avon. The house and all the outhouses are *en suite*. From the kitchen you pass into the byre, beside the door at the far end of which, and against the wall, stands a privy. From the middle you enter on the right into the washing-house, where also the milk tins are scalded, and through it into the milk-house. The water-supply is derived from two sources, from both of which we took samples, which were sent to Dr. Wallace for analysis. The water which is chiefly used is dipped from a well in the court or "close," beside a puddle which communicates with a built drain running below the washing-house to the back, and thence by a trench to the Avon.* On the inspector's visit the servant lad was lying in the kitchen bed, but

*Chemical Laboratory, 138 Bath Street,
Glasgow, 18th January, 1878.

Analysis of two samples of water received on the 12th inst. from
Kenneth M. Macleod, Esq., Sanitary Inspector:—

CONTENTS PER GALLON IN GRAINS.

	No. 1 (Dip Well).	No. 2 (Pump Well).
Carbonate of Lime,	4.21	19.60
Carbonate of Magnesia, .....	.28	.56
Sulphate of Lime,	1.68	.91
Sulphate of Magnesia, .....	...	8.89
Nitrate of Lime,	2.66	...
Nitrate of Magnesia,	2.38	1.26
Chloride of Sodium,	2.17	1.19
Phosphate of Lime and Alumina, ..	.14	.28
Silica, .....	.14	.42
Organic and Volatile Matters,	1.47	1.89
Total Solids,	15.12	35.00
Hardness in degrees per gallon, ...	8.8	29.1
“ after boiling,	6.3	10.8
	Grs. per Gallon.	Grs. per Gallon.
Oxydizable Organic Matter, .....	.40	.32
Ammonia, Free or Saline, .....	.021	.014
“ Albuminoid or Organic, .....	.021	.010

REMARKS.—These waters are practically clear and colourless. The analyses show that both are contaminated, the "dip well" very decidedly,

he had in the interval been removed upstairs. He had the characteristic eruption of enteric fever, and was smartly ill. The son referred to in the doctor's certificate is convalescent from the same disease. He sickened on 1st December, and was first seen by the doctor on the 9th. A servant girl sickened on the 20th December, and went at once to her parents' house in the village of Stonehouse, where I saw her in company with her medical attendant. She is convalescent from the same disease. The boy sickened on 27th December. The work of the dairy was carried on by the persons who attended to the patients, and on inquiring how they disposed of their excreta, I was informed that the chamber-pots were emptied into "the grip," which it may be well to explain is the channel, running on each side of the central passage, provided in byres for the reception of the cattle droppings. It is scarcely necessary to say that this was a capital forcing bed, from its heat and moisture, for the enteric contagia. I pointed out the impropriety of such a proceeding, gave some advice as to the general arrangements, and came to an agreement that no milk should be sent off the premises until the boy had recovered or was removed. I learned that a message from Messrs. Semple & Wilson had been received almost at the same time as mine, ordering it to be discontinued.

The average quantity of milk delivered daily from this farm to Messrs. Semple & Wilson was 25 gallons. Of this, 8 gallons sweet milk were at once passed on to Morrison, and the remaining 17 gallons were distributed by Messrs. Semple & Wilson among their wholesale and retail customers. They have a branch in Elderslie Street and another in Springburn (to which, however, none of the suspected milk was sent, and in connection with which there has

and the "pump well" to an appreciable but, at the same time, very small extent. The impurity of the pump well can scarcely be derived from sewage, as the proportion of chloride of sodium is unusually small. Possibly it may be owing to the solution of matters applied as manures; but, however this may be, I do not regard the impurity as being of a nature likely to be injurious to health. It is a hard water, and more suited for drinking than for cooking or washing.

The water of the "dip well" contains conclusive indications of organic impurity, and I am clearly of opinion that it ought not to be used for dietetic purposes.

WILLIAM WALLACE.

been no fever), and also supply various subsidiary milk shops in the Anderston district. It is evident, therefore, that it will be most difficult, if not impossible, to trace the full effects of this impure supply, from the wide area over which from time to time in the course of their daily distribution it may have been sent, and from the indirectness of the ultimate channels. The circumstances which directed public attention first to Morrison's dairy are these: their customers being numerous, all supplied direct, and of a class whose sickness attracts immediate attention.

From first to last, we have ascertained the existence among the consumers of this milk in Glasgow proper of 72 cases of enteric fever. Of these the first 3 sickened on 15th December; and thereafter, in the week ending 22nd December, 9; ending 29th December, 22; ending 5th January, 30; ending 12th January, 7; and the last case sickened on 20th January.

Another distinct area of infection is amongst the students of the University, who, on the 21st December, were dispersed over the country for their Christmas holidays. There are now some absentees from illness, and I have obtained the names of 16 of these who have already been discovered to have enteric fever. Of that small number three died—at Kilwinning, at Langloan, and in Islay. The refreshment room in the University was supplied with milk by Semple & Wilson. It was largely patronized by the students, and those men are known to have partaken of the milk.

There are some facts in reference to the nature and distribution of the contagia or infecting elements of such diseases as enteric fever which have been established by experiment, and a clear understanding of which will enable you better to reconcile all the features of this outbreak with the theory and circumstances of milk-infection. Whatever theory we adopt as to contagious, or zymotic diseases, whether germ theory or glandular, on one point all epidemiologists are agreed—that the infecting element is a solid. It is "particulate," having dimensions, and therefore is subject to the same laws as visible, tangible bodies in its distribution through air or water or on the surface of solids. Therefore, if these particles be in air we have to conceive of them as being transported by currents, as settling down in stagnant air, as damped and drowned down by moisture, &c. If they be in a fluid,

according to the specific gravity and viscosity of the fluid will they tend to float or to sink, and like all bodies which can only be mechanically suspended in fluids, not dissolved, their distribution will be irregular, so that in equal measures dipped from the bulk of the fluid you cannot get equal numbers of these particles, and consequently not equal infecting power. Now, it has been proved by experiment with infecting material, say of lymph, or some ferment, as that of putrefaction, that if you introduce it in two different but carefully measured proportions into two quantities of fluid, so that one shall be weaker than the other; if you then divide each into equal parts, and test the relative infecting power of each part in an appropriate way, you will find that a larger number of the portions of the strong solution will infect than of the weak, though in neither case will all succeed if both be below a certain degree of dilution. Keep before your mind the idea of floating particles unequally disseminated and you will at once understand how this is. The analogy between these facts demonstrated experimentally and the facts of milk-epidemics is perfect. Let us take a few illustrations from the present case:—

In Hill Street, Garnethill, there are 7 families supplied with suspected milk, of whom 3 are infected, and 181 supplied otherwise, not one of whom is infected.

In Berkeley Terrace there are 7 families supplied with suspected milk, of whom 1 is infected, and 31 otherwise supplied, not one of whom is infected.

In Royal Terrace there is 1 family supplied with suspected milk, which is infected, and 28 otherwise supplied, not one of whom is infected.

In Lynedoch Crescent there are 2 families supplied with suspected milk, of whom 1 is infected, and 14 otherwise supplied, not one of whom is infected.

In Park Street, East, there are 5 families supplied with suspected milk, of whom 1 is infected, and 8 otherwise supplied, not one of whom is infected.

In Park Circus there are 9 families supplied with suspected milk, of whom 2 are infected, and 20 otherwise supplied, not one of whom is infected.

In Park Gardens 2 families are supplied with suspected milk, 1

of whom is infected, and 4 supplied otherwise, not one of whom is infected.

In Park Quadrant, 6 families are supplied with suspected milk, of whom 1 is infected, and 12 are otherwise supplied, not one of whom is infected.

In Park Terrace Lane, 2 families are supplied with suspected milk, of whom 1 is infected, and 9 are otherwise supplied, not one of whom is infected.

In West-End Park Street (in occupied houses), 38 families are supplied with suspected milk, of whom 3 are infected, and 95 are otherwise supplied, not one of whom is infected.

In Woodlands Terrace there are 6 families supplied with suspected milk, of whom 3 are infected, and 15 supplied otherwise, not one of whom is infected.

In Clairmont Terrace there are 7 families supplied with suspected milk, of whom 3 are infected, and 5 supplied otherwise, not one of whom is infected.

In Woodside Crescent there are 4 families supplied with suspected milk, 1 of whom is infected, and 13 supplied otherwise, not one of whom is infected.

In Woodside Terrace, 4 families are supplied with suspected milk, and 1 is infected, and 17 are otherwise supplied, not one of whom is infected.

In Newton Place, 5 families are supplied with suspected milk, and 2 are infected, and 22 otherwise supplied, not one of whom is infected.

In Newton Terrace, 3 families are supplied with suspected milk, and 1 is infected, and 15 are otherwise supplied, not one of whom is infected.

In Bath Street, West of Campbell Street (in occupied houses), 14 families are supplied with suspected milk, of whom 3 are infected, and 168 are otherwise supplied, of whom only 1 is infected.

So that in a house-to-house visitation embracing all the occupied houses in those streets, out of 779 families 122 were supplied with suspected milk, of whom 29 were infected, and 657 were otherwise supplied, of whom only 1 was infected.

Now, in the experiments referred to, the infecting material was

known to be present, and the phenomena were as described. In the facts detailed above we recognize the same phenomena in the distribution of the infecting elements of enteric fever. We have the milk charged with those elements at Stonehouse, and distributed among those West-End families. We have what chemists call a blank experiment, *i.e.*, one without the foreign ingredient, to show that the original substance is pure, made by the distribution of milk from other sources in the same streets, at the same time, to families in every way alike. In the former case a variable proportion of families is infected; in the latter not one is infected. The only difference between the experiment made in the laboratory and that made in the West-End of Glasgow is that we have not actually seen contagious particles put into the milk. But there is an end to all progress in science, and to all belief in the consistency of nature's processes, if we cannot, from the recognition of phenomena, repeatedly observed to follow an experimental act, reason back to that act in circumstances where the phenomena first present themselves to our observation, and where in the nature of the case no exactly similar experiment can be made. It seems to me, however, that had there been any doubt as to the nature of the disease on that farm at Stonehouse, no more conclusive experiment could have been planned than that which has been unintentionally carried out among the inhabitants of Glasgow and Hillhead.

At the date of the original report (14th January) no authentic information could be got as to the extent of the epidemic within the Burgh of Hillhead, although I suggested to the Commissioners, at my interview on 7th January, the importance of a house-to-house visitation to ascertain this. On the 22nd I wrote to the Provost of Hillhead referring to the statement regarding Glasgow, which had then been some time published, and pointing out "how important it would be to have the great gap filled up by similar facts regarding that Burgh which otherwise will continue to be apparent in the history of the outbreak." He was good enough to call next day, and undertook to have a statement made up. On the 8th February this was received. Captain Anderson also

informed me of a small development of the outbreak in Kelvinside. The following is therefore a complete summary of the extent of the epidemic, which it will be observed invaded the areas of three Local Authorities :—

	Cases.	Deaths.
In Glasgow proper,	72	5
In Hillhead Burgh,	71	7
In Kelvinside,	7	1
Among University Students, ...	16	3
Total,	<hr/> 166	<hr/> 16

The dates of sickening of the Hillhead cases are not stated, but I understand they perfectly coincide with the Glasgow section in their commencement and cessation. It will be observed that the death-rate over all was 9·6 per cent., but it was much heavier in the trans-Kelvin districts than in Glasgow. This is found on closer analysis to depend upon the channel through which the milk reached the consumer. Of the total 166 persons infected, exactly one-half were customers of Morrison and one-half of Semple & Wilson; but while 5 of the former died, 11 of the latter died. The death-rate among those of Morrison's customers who were infected was therefore 6 per cent. and among Semple & Wilson's customers 13·2 per cent. The explanation of this remarkable difference, no doubt, is to be sought in some difference in the manner of conducting the business, and it is probably this: While Morrison's various milks were sent out so that no one milk could reach the same consumer day after day, or without more or less admixture with some other milk, Semple & Wilson's milks for the most part went out either in bulk or so that they could rarely get commingled. It is also to be remembered that the freshest portion of the Stonehouse milk (the morning milk) went to Morrison, while the portion milked the previous evening was retained by Semple & Wilson. These circumstances tended to give the customers of the latter a larger proportion of the enteric poison in the same volume of the milk, as well as to subject them to repeated doses.

MEMORANDUM
ON
THE MILK-SUPPLY OF GLASGOW,
AND THE
MEANS TO BE ADOPTED FOR PREVENTING THE
INTRODUCTION AND DISSEMINATION OF
INFECTIOUS DISEASE BY MILK.

IN view of the remit made by the Magistrates and Council to the Committee of Health, to consider the means by which the introduction and dissemination of infectious disease by milk may be prevented, I have thought that the Committee might desire something from me in the shape of a Memorandum, containing information and suggestions, on the basis of which this most important subject might be discussed.

I shall arrange this Memorandum under three heads :—(1) The sources from which our milk-supply is derived, and their sanitary defects ; (2) The channels by which our milk-supply is distributed among the inhabitants, and their sanitary defects ; (3) The means existing, and to be desired, for the removal of the sanitary defects described.

1. *The sources from which our milk-supply is derived.*—These are two—from cows kept within, or in urban districts immediately beyond, our own jurisdiction, and from dairy farms situated in the country, within the jurisdiction of rural sanitary authorities. The amount of milk obtained from the former source is, as might be anticipated, quite insignificant as compared with that derived from the latter. The milk trade is conducted by firms or individuals

who generally have a variable number of cows of their own, but who also largely supplement their supply from farmers. As the demand is greatest in the winter months, when families have returned to town, and when the yield of milk is smallest, the number of contributing farms is very great, and the extent of country over which these farms are spread is very wide. In order to furnish some evidence of this, I have been obligingly provided by two of the most extensive milk-agents in Glasgow with a list of the farms which at this moment send in daily supplies of milk. In the one instance they number 26 and in the other 57, in all 83 farms. These are situated on the various lines of rail which converge from all points of the compass upon Glasgow, and at different distances, the extremes of which are Ecclefechan on the south, Auchterarder and Tullibardine on the north, Milnathort and Dolphinton on the east, and Rothesay on the west. I have every reason to believe that milk is sometimes brought from places even beyond the most distant of these. From local inspections recently made, embracing about 100 farms taken at random, I can safely assert that few of those farms are without some obvious source of risk of contamination of the milk which they despatch, in the event of disease of a communicable character being present in the household ; and while some are well managed, and even satisfactory as to drainage and water-supply, in very many, if not the majority, all the circumstances exist which led to such disastrous effects in the case of this Hillhead and West-End epidemic, excepting the actual presence of disease. Given the source of specific infection, the same results may follow at any time in the hands of the agents who daily distribute the milk from these farms in Glasgow.

2. *The channels by which our milk-supply is distributed among the inhabitants.*—In the recent outbreak of fever, as I remarked in my Report, the circumstance that the consumers of the infected milk for the most part belonged to the upper classes, to whom it was delivered in large quantities every day, made it comparatively easy to recognize and to trace the infection home to the milk. But the majority of the inhabitants are supplied through the further agency of shops distributed over the city ; and had this infected milk formed part of the stock of an agent who passed it on say into the Cowcaddens, or Anderston, or Bridgeton, where it

would have been retailed over the counter to purchasers of small quantities, often obtained by children sent out at uncertain times to buy at the most convenient shops, it is evident how disastrous the consequences would have been, as well as how difficult, if not impossible, to trace to their real cause. This is the explanation of the fact that in former milk epidemics, such as the Washington Street and Kingston outbreaks, accompanying the nucleus of clearly proven cases of milk-infection there have always been a number of cases in the same locality, but in the poorer districts, distinctly associated in the time of their appearance and cessation with the bulk of the epidemic, but not capable of being otherwise attached to the common cause. Hence, also, it is that the number of local transitory outbreaks in which I have had the strongest suspicion of the milk-supply, but have been unable to prove the case so clearly as to warrant a definite report of my suspicion, exceeds the number in which I have been able to lead satisfactory evidence.

But we must look at the circumstances of the retail of milk through these small shops, not merely as obscuring the effects of milk already contaminated, but as exposing milk which has hitherto been pure to the risk of contamination before it reaches the consumers. Here we find ourselves brought face to face with a very large and important question of public health—the conjunction, which is so very common, of dwelling-houses and shops for the sale of provisions of all kinds. Indeed, in many cases the shop and the house may be described as combined in one, rather than merely conjoined, though assigned to separate apartments. Sleeping in such shops is not uncommon; and it is quite common that families are reared and pass through all their sicknesses in rooms which are *en suite* with the shop, and frequently even have no access or egress excepting *through* the shop. There is no necessity to condescend upon details to convince you how disgusting, as well as dangerous to the public health, such arrangements are. I have seen children lying ill of scarlet fever and other infectious diseases in cradles behind counters, which is only a degree worse than lying in apartments in open communication with the provisions exposed for sale, and dispensed by parents running from the bedside to attend the call of customers. The

most malignant outbreak of scarlet fever which has come under my official notice prevailed in a small street near Cranstonhill, and began in such a shop, where the milk stood among other articles, and the convalescent children were running freely about, with their skin detaching itself, impregnating the air, and making this shop a source of deadly infection to the neighbourhood.*

3. *We come now to the means existing, or to be desired, for removing these sanitary defects.*—It is evident that as regards the sanitary defects existing at the sources of our milk-supply in the dairy farms, we must look for their removal to nothing less than the improvement of the entire sanitary organization of the country, if we can rightly speak of the improvement of an organization which, so far as any practical good accomplished is an evidence of its existence, does not exist at all. In proof that my opinion is neither unjust nor singular, I may appeal to Sheriff Spens' able book on the Sanitary System of Scotland, in which you will find a chapter entitled, "Incompetency and Inadequacy of the present Rural Sanitary Authorities." But the pressing practical question for us to consider is this—Are the Local Authorities of Glasgow

* Even the largest and on the whole best managed of the Glasgow milk agencies display great slovenliness in some details of their business, especially in the employment of dirty children in the delivery of their milk. This is peculiarly culpable in a city, which, so far back as 1809, had, in the "Willowbank Dairy," established by William Harley, a model of sanitary arrangement. A minute description of Mr. Harley's premises, with plans, and an account of all the administrative details, will be found in an octavo volume, entitled, "The Harleian Dairy System, and an account of the various methods of Dairy Husbandry pursued by the Dutch, &c., &c., by William Harley; London, 1829." The author describes the "high price and inferior quality" of Glasgow milk, and "the filthy mode of bringing it to market." By these circumstances, he "was forcibly impressed with the necessity of having the premises intended for his establishment erected in an airy situation, to be properly ventilated, and to be kept perfectly clean. He was, therefore, led to devise a completely new arrangement of the necessary buildings, as well as a new system of management applicable to the details of the business; and, above all things, he resolved that *cleanliness* should extend not only to every utensil used in the concern, but to every individual in the establishment" (p. 4.) The commercial result was thoroughly satisfactory, and the elevating influence of competition upon the general trade was so remarkable that we could wish to see the experiment renewed. Mr. Harley tells us that the greatest difficulty he had to contend with was that "which has been so happily ridiculed in the *Cottagers of Glenburnie*—'O! we ken weel enough about kye, and we canna be fashed wi' thae new-fangled ways.'"

and other large towns to wait until this national defect is rectified by legislation, and meanwhile, for an apparently indefinite length of time, expose the masses of population whose health is in their keeping, to the risk of repeated invasions of infectious disease from the landward districts; or can something not be done by special legislation to obtain some power of self-protection? Bailie Ure has already reminded the Council that in 1875, in compliance with a suggestion which emanated from this Committee, the Board of Supervision issued a circular to all Local Authorities under the Public Health Act (25th November, 1875), stating "that disease, especially enteric fever, has been transmitted through the agency of milk," and enjoining "the following Rules and Precautions":—

"1. All such dairies and farms, together with their steadings and other surrounding circumstances, should be carefully inspected from time to time with reference to their water-supply and their general sanitary arrangements—such as the arrangements as to washing-houses and disposal of excrement, and the position of midden-steads.

"2. The Local Authority should also cause inquiries to be made from time to time as to the existence of contagious or infectious disease at such dairies and farms, and whenever such disease is found to exist at any of them, they should immediately (1) take such steps as their Medical Officer may advise, with a view to prevent the dissemination of the disease, and (2) give notice of the facts to any other Local Authority within whose district milk from the infected premises may be distributed or sold."

After reading this circular, which is so clear and specific as to the sanitary defects which are the main causes of milk-infection, and recalling my account of the results of our recent inspection of farms, we may with reason conclude that everything has been got out of the existing general powers and organization which can be got even under the spur of the Board of Supervision, and that has been practically nothing. It is remarkable that although milk is "distributed or sold" in Glasgow daily from hundreds of farms, this circular has not led their respective Local Authorities to "give notice" to us of a single case of infectious disease in three years! We are allowed to discover them by the disease which they establish

among us! The most advanced local legislative powers in existence, specially directed to the control of milk-infection, are those obtained under the Greenock Police Act, 1877, sections 200 and 201, the rubrics of which run:—(200) “Provision for inspection of farm-houses from which contaminated milk is supplied within town,” such power extending over the entire county of Renfrew; (201) “Sheriff may prohibit sale of milk from such farm-houses.” In section 229 of the same Act it is enacted that “the 26th section of ‘The Public Health (Scotland) Act, 1867,’ shall be read and have effect as if the words ‘corn, bread, cheese, flour, or milk,’ were included in the articles named therein;” thus enabling the Sanitary Inspector to seize those articles without warrant if they “appear to him to be unfit for human food.” But those provisions, while ample to enable the authorities of Greenock to stop the importation of infected milk when “it is probable that contagious or infectious disease is being spread, or is likely to be spread,” thereby, confer no power to anticipate and prevent such an occurrence. One of the features of a milk epidemic is that before suspicion is excited in the mind even of the most observant and watchful, the mischief has been done.

We are thus brought back to the consideration of measures which shall secure the protection, at the place of production, of the milk sent into towns. But for the inefficiency of rural sanitary supervision, it would not have been possible for such combinations of circumstances to have existed as those in which milk epidemics invariably originate. The discovery of milk infection is recent, though now put beyond question by repeated outbreaks and official investigations. All that towns can ask when the cause is ascertained and the remedy obvious, is, that the Local Authority responsible for the area in which infection may originate should remove the cause and exercise continuous supervision. A certain amount of co-operation between the officials of the town and of the country would be necessary, and, in any case, special legislation, conferring new powers to meet the newly-detected circumstances of milk-infection must be obtained; but there can be no doubt that *the* great difficulty in the way of the protection of towns from this source of disease is the want of a working sanitary organization in the country. To create this

must be a work of time. Meanwhile, it seems imperative that in self-defence the towns should seek powers which would, directly or indirectly, enable them to take cognizance of farms which, by the transmission of milk, propagate within their bounds the effects of distant nuisances and negligences in the management of infectious disease. The ultimate responsibility rests with the rural Authorities; and it would be quite an efficient, as well as a reasonable, protection from the consequences of their negligence to give the Authorities of towns power to exclude from sale milk which comes from an insanitary source. This implies a right of inspection of farm premises wherever situated, whose occupiers desire to open up trade relations with a town.

We are thus introduced to questions of law, which I must leave to your legal adviser, Mr. Lang. I may mention that Mr. Sheriff Spens has favoured me with a perusal of a draft Bill for the Regulation of Places of Milk-supply, which Mr. Lang has also read, and which I understand to be now in the hands of a committee of citizens. We are presently so utterly without any special powers to cope with the dangers arising in the course of the milk-supply of towns, that any special powers which can be got could not fail to be of service; and it would be well to make for a short, tentative measure, based upon the licensing of places of milk-supply within towns, and the power to stop the introduction of milk from sources actually exposed to infection or obviously insanitary as to drainage, water-supply, and general domestic arrangements.

I need not dwell upon the control of the retail of milk within the city as a part of the general question of the relation of provision shops and sleeping apartments. With regard to the sale of articles of food which are infected, or may reasonably be supposed to be infected, it is a remarkable fact that, while it is a penal act to sell an old coat or to pawn a blanket which has even been "*exposed* to infection," milk, sweetmeats, and other articles of human consumption may be sold with impunity. If section 49 of the Public Health Act were made to apply to such articles as well as to bedding, clothing, and the like, it would be a valuable addition to our preventive powers, so far as the prospect of punishment upon detection and conviction goes. This, however,

is but one of many details in which progress in sanitary knowledge during the period of ten years which has elapsed since the passing of this Act has left it behind, and made it entirely insufficient and antiquated.

JAS. B. RUSSELL.

P.S.—Since the above was written, Mr. Lang has directed my attention to the “Contagious Diseases (Animals) Bill,” introduced in the House of Lords by the Government, and especially to section 28, which runs as follows :—

“*Dairies and Cow-sheds.*—28. The Privy Council may from time to time make such orders as they think fit, subject and according to the provisions of this Act, for the following purposes, or any of them :—

- “(i.) For prescribing and regulating the ventilation, drainage, and water-supply of dairies and cow-sheds in the occupation of cow-keepers or dairymen.
- “(ii.) For securing the cleanliness of milk-shops, and of milk-vessels used for containing milk for sale.
- “(iii.) For prescribing precautions to be taken for protecting milk against infection or contamination.
- “(iv.) For authorizing a local authority to make regulations for the purposes aforesaid, or any of them, subject to such conditions, if any, as the Privy Council prescribe.”

If these clauses pass even as they stand they will be valuable, but by a slight extension of the “purposes” for which the Privy Council may under this section “make orders,” and may authorize Local Authorities “to make regulations,” they may be made much more efficient. Thus, the primary object of the Bill being to limit the *Contagious Diseases of Animals*, we find (p. 9, line 20) that the very first “purpose” for which the Privy Council may make orders in reference to such diseases is this :—

“(1) *For prescribing and regulating the notice of disease, or of the illness of an animal, to be given to or by any person or authority.*”

Surely an equally necessary and strictly parallel “purpose,” in reference to the contamination of milk by human diseases, for which the Privy Council might make orders, would be to this effect :—

For prescribing and regulating the notice of disease of a dangerous, infectious, or contagious sort in the family or household of any cow-keeper or dairyman, or of any person employed about the dairy or cow-shed, or in the sale or delivery of milk, to be given to or by any Local Authority.

Another most necessary and just provision would be to enable one Local Authority to prohibit the sale within its jurisdiction of milk produced within the jurisdiction of another Local Authority, on a farm the occupant of which does not produce written evidence that its water-supply, drainage, ventilation, and general arrangements are to the satisfaction of that Local Authority. In this way the burden of proof would be thrown upon the farmer desiring to open up trade communications with our towns, and rural authorities would be compelled to inspect and supervise the dairy-farms in their districts.

It seems to me that these clauses, with some such amendments, afford a satisfactory amount of protection against risks which are at present utterly unprovided for, and that measures should be adopted by the Local Authority of Glasgow and other large towns to secure, if possible, those amendments, with any other in the executive machinery of the Bill as applied to Scotland which the Clerk of the Local Authority may advise, and to watch the passage of those clauses through both Houses.

J. B. R.

