Report to the board of supervision as to outbreak of typhoid fever at Crosshill, parish of Cathcart, and county of Renfrewshire / by Henry D. Littlejohn, M.D., F.R.C.S.

REPORT

TO THE

BOARD OF SUPERVISION

AS TO

OUTBREAK OF TYPHOID FEVER AT CROSSHILL,

PARISH OF CATHCART, AND COUNTY OF RENFREW.

BY

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817

REPORT.

In obedience to the instructions of the Board of Supervision, I visited Crosshill on Wednesday, 3d March 1875, for the purpose of inquiring into an outbreak of fever in the burgh. I had, in the first instance, an interview with the Provost, Bailie Sellars, Chairman of the Sanitary Committee, and Messrs. Chalmers, Ramsay, and Simpson, members of the Sanitary Committee,—the Town Clerk, and Mr. Grozier, the Sanitary Inspector, being also present. From the Provost I received a general statement as to the health of the burgh, and the circumstances attending the epidemic; and I was assured by him and the other gentlemen present, of their desire to adopt any precautions, regardless of expense, that could be recommended in the present inquiry. Shortly thereafter, accompanied by the Provost and the Inspector, I had an interview with four of the medical practitioners in Crosshill, viz. Dr. Morton, Dr. Duncan, Dr. Ronald, and Dr. M'Kim, and I received from them full particulars of the nature of the disease, its distribution in the burgh, and the probable cause of the outbreak. There could be little doubt of the formidable character of the disease, when I was assured by these four medical gentlemen, that since the middle of January 120 cases of Typhoid Fever had been treated by them, and that there must be other cases attended by medical practitioners living outside the burgh. The mortality fortunately had been low, only two deaths having occurred. I visited several cases, and had no difficulty in recognising the ordinary symptoms of Typhoid Fever. Opinions were somewhat divided as to the origin of the disease; while some, from careful analysis of the cases, had come to the conclusion that the disease was propagated by means of milk, others were not so confident, and suspected that the escape of sewage gas, in consequence of imperfect fittings, might have originated the fever. The Local Authority had, on the day of my visit, issued bills (see copy Appendix No. I.) calling upon the inhabitants to boil their milk, and to use disinfectants in their sanitary conveniences. I found, on inquiry, that the chief supply of milk in the burgh came from three well-known shops, viz. those of Colville, Ralston, and Smith, and that a large proportion of the milk sold in these shops was supplied by Mr. John Aitken, Polnoon Lodge, Eaglesham. In one of these shops a death had occurred on the day of my visit; and the supply of milk from these premises was at once stopped. From what I learned, in the course of my conversation with the medical men, I considered it my duty at once to proceed to Eaglesham and examine its sanitary condition, and, more especially, to inquire into that of the dairy farm there which supplied milk to Crosshill. Accompanied by Mr. Grozier the Sanitary Inspector of Crosshill (who impressed me as an intelligent and efficient officer), I proceeded to Eaglesham, and put myself into communication with Dr. Mack, one of the medical officers of the parish, and whom I luckily found at home. From him I ascertained that during the winter Typhoid Fever had been prevalent in the village; that 26 cases

No. 1 on Plan. See Appendix No. II.

out of a population of 1237 had come under his notice, while others had been attended, he believed, by other medical men; that the disease had been of a mild type, and that but one death had taken place. I accompanied him to the Wauker farm, in the immediate neighbourhood of Eaglesham, and distant from the centre of the village about half a mile, where he showed me two young patients, aged respectively six and four years, presenting all the appearances of being convalescent from some febrile affection. Dr. Mack assured me that the illness was undoubtedly Typhoid Fever. The farm-house and dairy were scrupulously clean; but I observed that the byre ventilated into the house, and that the apartment in which the milk and utensils were kept formed a part of the house, and were situated close to the byre. The cows were thirty in number, and in excellent condition. The daily yield of milk about 100 pints. The water supply was derived from a well at the south end of the buildings, in close proximity to the byres and to a large collection of manure, from which much liquid refuse escaped. I was informed that the well was furnished with a supplementary supply of water from a spring which rose in a field lying between the farm and the

No. 2 on Plan.

south end of the village of Eaglesham, and it was easily seen that this supply-pipe, in its passage to the well, lay in soil dangerously soaked with the midden refuse. So far as the water supply of this farm was concerned, nothing could be more objectionable. Crossing the meadows, we reached the so-called spring—the product of the irrigation of a field of some acres. The source of the water thus supplied deserves

No. 4 on Plan.

special notice. The southmost cottage in the village has a very large midden immediately adjacent to it. This mass of manure drains into the ditch at the roadside, and after running a distance of forty-four feet, comes

No. 3 on Plan.

into close proximity to a well within two or three feet of the gutter, and so placed, that on any sudden increase of the sewage in the gutter this overflowed directly into the well. Generally, however, the overflow of the well passed into the gutter, and the combined stream, after continuing its course at the side of the road about twelve yards, crossed it and was distributed on the field. The water supply of the Wauker farm was therefore liable to a double contamination,—1*st*, from the result of the irrigation with contaminated water; and, 2*d*, from the dangerous position of its special well. A specimen of the water supply of the farm was obtained from the pumps in the yard; but on proceeding to take a specimen from the well by the roadside, it appeared that the residenters in the nearest house had emptied the well and allowed its contents to escape. On

No. 4 on Plan.

inquiry I learned that two cases of Typhoid Fever had occurred in this house, and one, a boy, æt. 7, had required medical attendance to the end of December 1874; and that the discharges from these patients had

No. 6 on Plan.

been thrown, either on the manure heap, or into the ditch already mentioned.

Struck with the number of young persons who had been affected, and learning that the fever had at last attacked the family of the schoolmaster, I was anxious to inspect the schoolhouse premises, and examine its water supply, and sanitary arrangements. I found the house a perfect hospital. Out of eight of a family, six were struck down—the ages of those affected ranging from four to twenty years; the ages of the two who had escaped being twenty-one and seventeen. The house itself was all that could be desired as to cleanliness, and precautions had been taken to separate the sick from the healthy, and to procure for the convalescent opportunities for exercise and change of air. There was no W.C., and the water supply was derived from a well close to one extremity of the garden, and at the foot of a cultivated knoll. This well appeared to me to be in dangerous proximity to highly-manured soil, and I determined to take a specimen for analysis. The schoolmaster, a most intelligent person, assured me that the well was unexceptionable, and that he never had a complaint

879

to make of the character of the water. I inquired as to the place where the excreta of the patients were deposited, and was conducted to a large midden communicating directly with the privy belonging to the house, and, what to my mind was of more importance, with the privy of the public school, so that the one ventilated directly into the other. The position of the well rendered it exceedingly unlikely that any soakage from the midden should reach it; but I certainly thought that after the higher ground in its immediate vicinity was manured with the contents of the midden, the well would be highly charged with organic matter. To enable me to judge more accurately of the water supply of the village, I took another specimen from a well in a meadow to the east of the village, and in front of the doctor's house. I next visited Polnoon Lodge, apparently a kind of clearing house for the milk of the district. Mr. Aitken, the manager, was not at home, but I saw the owner Mrs. Macpherson. There also everything was scrupulously clean, and I was allowed free liberty to inspect the premises. I was assured by Mrs. Macpherson that no milk was brought into the lodge, and that the milk, so soon as it was delivered in the road before the house, was despatched to Glasgow.

No. 5 on Plan, App. II.
No. 7 on Plan.

The specimens of water were conveyed to Edinburgh, and handed to the City Analyst, Mr. J. F. King, for analysis, and I append his reports, dated 19th March 1875 (Appendix No. III.). The conclusions at which Mr. King arrives are, that the water supply at Wauker farm is decidedly impure, and should not be used for dietetic purposes; and that the specimens from the schoolhouse and from the well in the green are impure, but that the amount of impurity is so small as not to render the waters unfit for use.

App. No. III., pages 3 and 7.

As the result of my visit to Eaglesham, I am of opinion that the locality was an infected one, and that the disease, however originating in the first instance, had spread by means of the excreta of the patients contaminating, 1*st*, the air of the houses; 2*d*, the air of the neighbourhood, from having been exposed on middens and in water-courses; and, *lastly*, the water supply. Each case, so to speak, formed a fresh centre of infection; and the privy of the public school appeared to me a ready means of spreading the disease. As to the cases at Wauker farm, these could be satisfactorily accounted for by the attendance of the children at school, and the use of the water supply at the farm must have predisposed them to the infection of the fever. The excreta of the patients at this farm were thrown on the midden; the parties in attendance on the sick superintended the arrangements as to the collection and disposal of the milk; and the connection between the dairy and the rest of the house was free and open. Again, the milk utensils were washed with water of suspicious character.

As to the origin of the disease in Eaglesham, I learned from Dr. Mack that the first case occurred about 26th August 1874. A young man came from Glasgow (where he was employed during the week) suffering from what was supposed to be a severe cold. It soon proved to be Typhoid Fever. Shortly after this young man removed to Eaglesham, two other cases of fever occurred in the lodgings he had left in Glasgow. At Eaglesham, a young woman residing in the same house where the patient from Glasgow lay, was a short time afterwards (six or seven weeks) seized with the same fever, and had a severe attack. No other cases came under Dr. Mack's notice till about the 20th of November, when the disease became, and has continued to be, unusually prevalent. The school returns show that the first scholar left on the 21st November 1874. Of the schoolmaster's own family, all those affected attended school with the exception of the youngest, aged four. The first set of his children who became affected, lay down on 27th December. The following dates are important: The case of William Melville, æt. 7, residing in the southmost house in the village, already referred to (page 4), was first seen by the doctor on 26th November. Of the two Mathers at the Wauker farm, only one is of

school age. 'He left school on the 5th December, and returned on 4th January,—illness reported to be cold. Again left on the third week of January, and has not again returned.' The disease appears to have made its first appearance in Crosshill about 18th January 1875, and on the 14th February broke out in Colville's dairy—the first case proving fatal on the 4th of March. After the middle of February, the disease became epidemic in Crosshill.

In the meantime, pending the analysis of the specimens of water from Eaglesham, I made a survey of the sanitary state of Crosshill. I was very favourably impressed with its general cleanliness. The system of ash-pits prevails, but I could detect no undue accumulation; and I satisfied myself that the contents of these ash-pits were chiefly cinders and dry *debris*. I saw no ash-pits that could be looked upon as nuisances. The cleansing of these receptacles, however, is left to the discretion of the householders; and I thought it advisable, under the circumstances, to recommend the authorities to insist on a general emptying of the ash-pits throughout the burgh. In several of the houses that I visited, I had complaints as to what was believed to be the escape of sewage gas. On inquiry, I found that for some ten or twelve days prior to my visit, the authorities had, by means of a competent tradesman, been examining the internal house-fittings throughout the burgh, for the purpose of detecting any imperfection in the apparatus; and that they had also called the attention of Mr. Colledge, the Burgh Surveyor, to the state of the general system of drainage.

See Plan, App. No. IV.

Crosshill stands at a considerable elevation above the Clyde, into which it drains; and I could not help suspecting that its very position exposed it to the risk of great pneumatic pressure in its drains, and that this circumstance might account for the complaints just referred to. Accompanied by Mr. Colledge I carefully examined the main drains, and ascertained that Crosshill occupies the summit of three drainage systems. The eastward portion of the burgh draining into an open ditch, running east into the Mire Burn, and thence to the Clyde. The western and northern portions by a brick sewer (Langside Road), formerly called the Blind Burn, running directly north; and an elongated narrow portion to the south by a brick sewer (City of Glasgow), formerly called the Kinning-house Burn, passing westwards.

Coloured *Blue* on Plan.

Coloured *Purple.*

Coloured *Red.*

In the case of the eastern part of the burgh, the free ventilation afforded by the open ditch, was a sufficient guarantee that no undue pressure existed in that drainage area, and no complaints were made from that quarter. It was otherwise in the other drainage areas—draining directly into large built drains. What struck me as remarkable, however, was that the main drains of these two areas were ventilated by suitable openings in the streets along their course, apparently in an efficient manner. These openings were examined, and from only one of them was there a marked escape of sewage gas. This opening was situated on the drain passing to the west. The condition of the main drains was found to be excellent. There was no deposit, and the contents, comparatively small in amount, were running freely. I remarked that while the course of the drains was ventilated, the highest points of each drain and of its various branches were not trapped and ventilated. Mr. Colledge agreed with me that at the sites in question openings should be made; and the authorities at once gave the requisite instructions for this being done.

As to the house drainage, I found in nearly every case that the drains were ventilated by pipes passing to the roof, and that in this respect Crosshill contrasted very favourably with Edinburgh and other places which I had examined. The construction of the houses, which were excellent, so far as cubic space was concerned, was faulty as regards the position of the sanitary conveniences. In all cases the W.C. was ventilated. This was directly outwards in the better class of houses, while in the flatted tenements the opening was into the common stair. Internally these conveniences

821

ventilated directly into the house. I carefully investigated several houses, which were pointed out to me by the various medical men, with the assistance of a skilled Sanitary Inspector. In some of the highest rented, the faulty arrangement existed of a bath-room containing a fixed basin and a W.C., all ranged in lines communicating with the same pipe. If the bath was suddenly emptied, the consequence was, that the traps of the basin and the W.C. were simultaneously emptied, and free access given to gases from the drain. And this escape would more certainly occur at night, when doors and windows were shut, and fires were burning briskly. The impression produced on my mind by this examination of the drainage was, that Crosshill was exposed to backward drainage pressure, that the general ventilation was defective, and that the position of the house conveniences was faulty. In whatever way the fever had been introduced, it was evident to me that the excreta of the patients being passed into the drains and undergoing decomposition, there would be great risk of the emanations from them being carried directly backwards into the houses, and in favourable conditions spreading the disease. But as it was possible that the special poison had been introduced into the drains between Crosshill and the drainage outfalls into the Clyde, I addressed queries to the Medical Officer of Health of the City of Glasgow, the Burgh Authorities of Govan and Kinning Park, and to the Local Authority for Govan Parish; and from these various sources I learned that Typhoid Fever was either entirely absent from these localities, or that they were unusually free from that disease. I give in the Appendix No. V. the answers I received. App. No. V.

I next directed my attention to the water supply. I found that it was constant, so far as that required for drinking and cooking purposes was concerned, and that the sanitary conveniences were supplied from cisterns. The waste-pipes were, on the whole, satisfactorily connected, and in but few instances could I detect any flaw in the general arrangements. I was informed, however, that for several weeks during the last severe frost there had been a scarcity of water owing to the freezing of the supply-pipes, and, in consequence, there can be little doubt that the traps of the conveniences must have been rendered inoperative, and the amount of run in the main drains seriously diminished. To guard against the possibility of a mistake in the character of the water supply, I on two occasions took specimens of the water as supplied to Crosshill, and handed them to Mr. King for analysis. Two of these were taken from cisterns; and from the deposit that subsequently took place in the specimens, it was evident that the filtration of the water was imperfect. The cisterns themselves were clean, though this could not be said of all those which were examined. I was informed that the water supply of Crosshill was mainly derived from the Gorbals Gravitation Works, and that a certain amount of the Loch Katrine water was mixed with it. From Mr. King's Reports (Appendix No. VI.), it will be observed that as a water supply for ordinary domestic purposes, the water supply to the inhabitants of Crosshill cannot be looked upon as satisfactory,—it could not, in my opinion, be recommended, were it proposed to be introduced *de novo*. And the questions arise which I could only answer with some degree of hesitation:—1*st*. Would the use of this water tend to the production of Enteric disease? and 2*d*, If the so-called germs or seeds of Enteric or Typhoid disease were once introduced into the body, might not the use of this water tend to develope the more marked symptoms of the disease? App. No. VI., pages 20 and 24.

It will be observed that as the area of investigation was being extended, fresh possible sources of fallacy in the determination of the cause of the outbreak were cropping up, and I had no hesitation in recommending to the Local Authority,—1*st*, That a census should be taken of the inhabitants of the burgh, specifying the houses affected, the ages of those attacked, the source of the milk supply, together with the position of the houses on the

various lines of drainage. And *2nd*, that the private and public drains should be daily disinfected; and, to ensure that the disinfectants were regularly employed by the citizens, that a suitable staff should be employed to visit each house in the burgh at least once daily, and wherever they had reason to suppose that disinfection had been neglected, to disinfect the drains on the spot. These suggestions were at once adopted by the authorities, and faithfully carried out. I have already mentioned that a death from Typhoid Fever had occurred in a shop from which Eaglesham milk had been supplied. Little difficulty was experienced in shutting up this place of business, and the milk supply was transferred to Ralston's, another source of supply of Eaglesham milk. There also, and at Smith's, a house adjoined the shop, with which there was a free communication. This could not but be looked upon as highly objectionable in the circumstances, and I recommended to the authorities that fresh premises should be obtained for both these parties, where their milk sales could be carried on apart from any direct connection with inhabited rooms. This suggestion was at once carried into effect.

See App. No. VII. p. 25.

Meanwhile the census was completed, and gave the following interesting results:—Of 504 inhabited houses in the burgh, there were no fewer than 112 in which the disease had appeared. Of these 112 houses, 94, or 84 per cent., were supplied, wholly or partially, with milk from Eaglesham, leaving 18, or 16 per cent., to be accounted for otherwise, occurring as they did in houses supplied by other seven dairymen who had no connection with Eaglesham. No dairyman who drew his milk from Eaglesham escaped having disease among his customers, and, as we have seen, to a large extent; while there were seven dairymen (in addition to the seven mentioned above) who had their milk supply from other districts, and had no disease among their customers at all.

The 112 infected houses furnished 153 cases of the disease. The ages were ascertained to be as follows:—Above 12 years, 63; under 12 years, 90. I was anxious to observe the influence of the various lines of drainage on the distribution of these cases, and the authorities willingly undertook this fresh investigation. It was found that the 153 cases grouped themselves as follows:—

See App. No. VIII. p. 27.

	Langside Road Sewer.	City of Glasgow Sewer.	Open Ditch.	Totals.
Population, ...	2210	417	173	2800
Fever Cases, ...	112	37	4	153
Percentage, ...	5·09	8·87	2·03	5·46

Of the 112 cases occurring in houses draining into the Langside Road sewer, 86, or 77 per cent., had their milk supply, wholly or partially, from Eaglesham. Of the 37 cases from houses draining into the City of Glasgow sewer, 34, or 92 per cent., were similarly supplied; while out of a population of 173 in houses draining to the east by the Open Ditch, only four were affected, but in these four cases the milk was obtained from Eaglesham. It is interesting to observe, that along the drainage line where the sewer ventilation was defective, and where the house-fittings were found to be least perfect, 26 cases, or 23 per cent., of the disease occurred, the origin of which could not be satisfactorily traced to infected milk; while along the line of the City of Glasgow sewer, only three cases, or 8 per cent., were un-

823

accounted for by reference to the milk supply; and in the area draining to the eastward in an open ditch, where the ventilation of the drains was remarkably free, every case of the disease was traced to suspected milk supply.

I have already drawn attention to the fact that in Crosshill, with superior and more complete appliances than those met with in any populous place that I have examined during the last twenty years, there were numerous avenues for the entrance of sewage gas in our present complicated system of house drainage, and that the sewage connections of the burgh were such, that it became a matter of great nicety to determine from a limited area of inspection how much of the present outbreak might not be due to some possible contamination at a lower level.

Learning, accidentally, that some cases of the disease had been reported at Langside, a district the drainage of which is quite distinct from that of Crosshill, being carried directly to the Cart, I considered it of importance to institute a personal independent investigation, which was satisfactorily completed with the following results. The disease, I found, was confined to the villa residences of the district, the village proper of Langside being unaffected, and free from the disease. Out of forty-two villas, the disease had appeared in six. Of the six, five were supplied from Colville's dairy, and one from Ralston's, both dairies getting their milk from Eaglesham; and these were the only villas, in the whole number of forty-two, which had their milk supply from the infected dairies of Eaglesham. In the six infected villas there were sixteen cases of fever, thirteen being children under twelve years, and three being servants. The sanitary arrangements of the villas were pretty much alike, and in no case were any serious defects detected. In the village of Langside there are twenty-eight families, consisting of 114 persons above twelve years of age, and forty-three children. The milk supply is furnished by local dealers, and none of it comes from Eaglesham. There was not a single case of illness in the village, although its sanitary condition was inferior to that of the neighbouring villas. These facts speak for themselves.

See App. No. IX. p. 29.

See App. No. X. p. 81.

We have thus seen that there is every probability, if not absolute certainty, that the fever did not originate in Crosshill, that it was imported, and that the vehicle of importation was milk. A great impetus was given to the dissemination of the poison by the disease breaking out in Colville's premises, and there can be little doubt that the milk that passed through that establishment was specially tainted. There were, however, sanitary conditions in Crosshill that undoubtedly favoured the spread and the continuance of the fever. I refer especially to those points which I have already mentioned, viz. drainage deficiencies, both in the main sewers and house connections, and also unsatisfactory water supply, aided by the continuance of north-easterly winds, and of severe frost before the outbreak. These conditions were not, in my opinion, sufficient to account for the origin of the disease and its subsequent spread. From my experience of house construction in Edinburgh, and in towns throughout Scotland, I feel justified in saying so. But the disease once introduced among a population, the large proportion of which was predisposed from the use of tainted milk, and exposure to air contaminated with sewage gas (the drains themselves becoming fresh sources of infection), its rapid extension in an epidemic form is at once accounted for.

The lessons that I am inclined to draw from the foregoing history have reference—

1*st*. To the most suitable means of preventing the introduction of infected articles of diet.

2*d*. To the best methods of dealing with such a disease as Typhoid Fever, when it makes its appearance; and

3*d*. Of preventing its spread in an epidemic form.

Our Public Health Act, which, in the present imperfect state of knowledge of sanitary matters among medical practitioners and the general public, can only be regarded as a tentative measure, has no reference to the dangers arising from the importation of disease by the medium of milk. These have only been prominently noticed of late years. Clause 49 of the Public Health (Scotland) Act, 1867, is the only one applicable to the sale of milk from infected premises, and provision is made against the sale of 'Bedding, Clothing, Rags, or other things which have been exposed to infection from such (infectious) disorders.' This clause may be held to include milk; but, unfortunately, the previous part of the sentence renders only those persons liable who, 'without previous disinfection, knowingly sell, transmit,' etc, showing clearly that at the time the Act was framed, the opinion that milk might be a vehicle of infection was not entertained generally by the medical profession.

But legislation should go further, and Local Authorities should be empowered, in town and country districts, to license dairies, with special provision that not only should the presence of disease in the cows be notified to the Sanitary Inspector, but that all illness of an infectious character among the inmates of the farm or retail dairy should also be reported to the proper authority. In after years, it will be regarded as monstrous that every care should be taken by legal enactments to protect our herds from contamination with infected animals, but that all freedom is allowed to a citizen to have in his house an amount of infection sufficient to contaminate a whole parish or city, entailing not only discomfort and expense, but the greatest possible misery and the loss of valuable lives, without the slightest guarantee that ordinary care is taken to prevent the spread of mischievously infectious disease. The interest of the farmer or retailer is naturally to keep the fact of illness being on the premises as quiet as possible, and however stringent were the penalties attached to non-intimation to the Local Authority, I fear the temptation to silence is too strong. I am convinced that it is absolutely required for the protection of the public, that in all cases of infectious disease it should be rendered imperative on the parent and guardian, and *also* on the medical attendant, to report them to the sanitary headquarters. To ensure the hearty co-operation of the medical profession, a fee should be paid for each intimation. This small addition to our sanitary expenditure would be soon repaid by the rapid extinction of outbreaks of epidemic disease. I allow, that even with such guarantees, slight cases of disease might escape detection; and experience has shown that great evil has resulted from these apparently harmless illnesses. But to meet contingencies like these, we must look to the spread of household knowledge of disease, and also to the formation of a really efficient sanitary supervision.

Here is Eaglesham, for months a perfect magazine of infection, in close proximity to a great city which has enough to do to cope with its own proclivities to disease, without being exposed day after day to its importation in the shape of Typhoid Fever. This disease is allowed to pursue its course unchecked among mill-workers and children in a country village, and none can tell how large the area of infection may have become. It is notorious that cases of the disease have travelled from Crosshill as far as Dublin on the one side, and Edinburgh on the other, and have necessarily exposed both these cities to considerable risk. From neglect of ordinary sanitary precautions, it breaks out in a solitary farmhouse, and thence, in my opinion, it was imported into Crosshill. No notice, so far as I am aware, was ever taken of the epidemic quietly spreading during the winter in Eaglesham. The Local Registrar does not notice it in his quarterly or monthly reports to the Registrar-General until the disease has run its course. The medical officers of the parish have not been appointed Officers of Health under the Public Health (Scotland) Act, 1867,

825

and are not called upon to take any sanitary supervision of the villages in the parish. The Sanitary Inspector is also Poor Law Officer, and has the supervision of a very large parish, and the salary he receives for sanitary work is nearly nominal. The parish school in its turn becomes a fresh source of infection, and with the arrangements common to Scotch villages, of middens, wells, and water-courses, disease germinates freely in all directions.

Under a proper system of sanitary surveillance the first case of Typhoid Fever that occurred in Eaglesham would, so to speak, have been isolated,—the excreta of the patient suitably disinfected before being thrown out, and the air of the apartment and house rendered pure and wholesome. This imported case from Glasgow should have been a solitary one in Eaglesham, and so soon as its true nature was ascertained, the fact of its occurrence there, should have been notified to the authorities in Glasgow, by whom steps would at once have been taken to discover the cause, and prevent its continued operation. Had this trifling exercise of sanitary forethought been performed, the winter's mortality and sickness at Eaglesham would have been prevented, and, of course, all subsequent extension of the disease. But supposing that through inadvertence the fever was allowed to progress, its area might at once have been circumscribed by means of house to house visitation, the liberal use of disinfectants in houses, on middens, and along water-courses; and, in the case of the poor, where several patients were struck down in the same cottage, and suitable nursing was not available, by the prompt removal of the sick to an Epidemic Hospital. Should the disease unfortunately break out in a dairy farm, the Medical Officer of Health and the Sanitary Inspector would at once take steps to isolate the case, and shut off any communication between the house and the milk-room; and should any suspicion attach to the water supply, an analysis would be made without delay.

By the use of the means indicated, such a disease as Typhoid Fever might be kept within proper limits, and prevented assuming the epidemic form. But should the disease have unfortunately been allowed to spread unchecked, then I hold that it can only be met by the use of similar precautions to those adopted by the Crosshill Authorities. Should milk be suspected to be the vehicle of infection, the sources of contamination should be dealt with as I have previously recommended. In addition, the inhabitants should be enjoined to boil all the milk they use; the drainage and water supply should be looked to; disinfection should be freely practised, and a house to house visitation should be instituted to ascertain the number of the inhabitants affected, the sanitary condition of their houses, and to see that the domestic conveniences have been suitably disinfected. However advisable the removal of the sick to special hospitals may be, in the case of the poor and badly housed, so far as the inhabitants of Crosshill are concerned I saw no necessity for resorting to this precaution. The general circumstances of comfort in the burgh, and the excellent house accommodation which the inhabitants possess, would have certainly rendered it, in my opinion, a harsh measure to have insisted on compulsory removal to an Epidemic Hospital. And, accordingly, I could not advise the authorities to take any steps in that direction.

See Appendix, No. XI. p. 33.

At the same time, I was forcibly impressed with the inadequate character of our modern house construction. Every class of houses in Crosshill was constructed on bad sanitary principles, and, as I have shown, afforded ready avenues for the entrance of tainted germs. Greater powers should be given to the Local Authority to enforce certain simple rules by which—1*st*, Every water-closet should be built out from the house, with a separate cistern, have a cross draught through a window on either side, and its discharge-pipe, duly ventilated to the roof, and should be the only communication with the main drains; 2*d*, All other pipes, including those from the

roof, from the cistern, from the sinks, from the fixed basins, and from the baths, should open freely to the air, and discharge themselves into a trapped grating; 3*d*, The water service should be constant; and if cisterns are used for the storage of drinking water, they should on no account supply the W. C.; and, 4*th*, An official inspection should be made of all cisterns and water apparatus at least once a year, and at the same time the cistern itself should be thoroughly cleansed. So long as our houses are constructed on defective principles, so long must there exist numerous avenues for the entrance of disease; and my investigations in connection with the present epidemic have convinced me of the truth of the principle I have long maintained, that as we have advanced in the luxuries of life in one department of house accommodation, we have, by our neglect of simple sanitary laws, exposed ourselves to dangers, and to certain diseases that are comparatively unknown in the houses of the poor which possess no sanitary conveniences, and are entirely free from sewage emanations.

I have only further to add, that by the 14th of March the fever had left
P. 35.
Eaglesham, and that a month later only nineteen cases were under treatment in Crosshill; the full statistics to that date are given in Appendix No. XII.

From the medical and other gentlemen I have already mentioned, I received willing and valuable assistance; but I have specially to name Provost Brown, who throughout the inquiry displayed the greatest anxiety as to the progress of the epidemic, and at all times heartily co-operated with me and the other medical men in adopting measures to arrest the disease.

HENRY D. LITTLEJOHN, M.D.,
Medical Officer of the Board of Supervision.

[The papers in the Appendix have not been printed. They will be seen in the hands of the Secretary to the Board of Supervision, and such of them as are material may appear in the next Annual Report of the Board.]

125 George Street,
Edinburgh, 28*th April* 1875.