

Diary of an Epidemic: Scotter 1890

Moira Eminson

Thirteen people died in Scotter during the epidemic of 1890, and a further eight in the nearby villages of Scotton and Messingham: a frighteningly high number in this small rural community, but hardly warranting a government-level enquiry. And yet, because of a serious difference of opinion between the two doctors most closely involved with this episode, the authorities in London were asked to instigate a ‘local medical inquiry’.

The two men concerned, Henry Wright, Medical Officer of the Gainsborough Rural Sanitary Authority, and Franklin Eminson, physician and surgeon of Scotter, clashed over the question of how the disease was being transmitted. In Henry Wright’s opinion, ‘inclement and variable weather’ had spread the disease, but a month later, considered that ‘direct infection from person to person’ was a more likely explanation.¹ Franklin Eminson, the only doctor to have attended epidemic victims and survived, was convinced Scotter’s south sewer was the primary cause. In a process he described as indirect infection,² he explained how ‘sewer air ... would carry the specific germ into the outside atmosphere’.³ The chief purpose of the inquiry was to resolve this question of infection, and work began on 9 July, three months after the first victim died in Scotter.

James Barker, a bricklayer, had died on 10 April. An active eighty-two year old, living on his own in a thatched cottage on The Green, he was not at church on Easter Sunday, although he had been seen working in his garden the day before. Found collapsed on his bedroom floor, he died four days later. Robert Eminson, registrar of births and deaths (and father of Franklin) gave the cause of death as old age⁴ – his usual diagnosis for any patient dying over the age of eighty, and naturally assumed to be worn out.⁵

Three weeks and six deaths later, the two doctors were still no nearer to identifying the fatal disease. Although rales (rattles) in some victims’ lungs indicated a form of pneumonia, the epidemic presented in different forms, as can be seen from some of the given causes of death: old age, diarrhoea, cerebral congestion, apoplexy and influenza pleuro-pneumonia.⁶ For this reason the doctors did not immediately recognise they were

dealing with the same infection, and Franklin Eminson was to remember the many anxious conversations with his father: Robert Eminson had said that in all his fifty-five years of medical practice in Scotter, ‘he had never seen anything resembling this epidemic’.⁷

Unlike a classic pneumonia, the incubation period was too short, twenty-four to forty-eight hours,⁸ and death too sudden and unexpected. There was also no clear pattern of infection. The early cases had occurred singly, and mostly in the houses nearest to the south sewer – yet despite the closest of contacts between patient and nurse – eating the victim’s leftover food, for example, and sharing the same bed, sometimes for the entire illness,⁹ there were no multiple cases in these households. Without evidence of contagion, and the identity of the disease itself still uncertain, the doctors did not report the outbreak, but as a precaution in early May, disinfected some of the more suspect sewer inlets with carbolic acid, and perchloride of mercury.¹⁰

Only with the death of the tenth victim, Henry Chantry, did the Eminsons consider they had a case of direct infection. He had been at the bedside of his sick mother in Scotter for three nights, after walking from Susworth every evening after work, and home again next morning.¹¹ Mrs Harriet Chantry died on 30 April, and five days later, her son too was dead. That day, 5 May,¹² Franklin Eminson informed the Medical Officer by letter, of a disease with an ‘undoubted infectious nature’, and asked for assistance.¹³ Robert Eminson reported the death to the Board of Guardians in Gainsborough – this time as typhoid pneumonia.

On 8 May, the ‘owd’ doctor himself was suddenly stricken, and blamed the contaminated air in Henry Chantry’s wretchedly fetid sickroom for his illness.¹⁴

The only case whose history lends any support to the belief that the disease may be contracted through breathing air with solid particles derived from the bowels, is that of my father. The condition ... existing at the house where he believed he contracted pneumonia was simply terrible. A room no larger than a closet, and incapable of efficient ventilation; a patient helpless and afflicted with uncontrollable diarrhoea; the bed saturated and skilled nursing entirely absent ... he was nauseated and believed that it was the polluted atmosphere which caused his illness.¹⁵

Yet even in this case, Franklin Eminson thought the sewer a more likely source of his father’s sickness. Robert Eminson had told him ‘he had long known the south sewer was not safe’,¹⁶ and going about the village on his medical rounds, could not avoid the harmful stench. Even in his garden at Mount House, he could not escape the foul smells from the outfall, which was some distance away.

Almost as Robert Eminson fell ill, heavy rain began to flush the stinking filth from the sewer. Early on the

morning of 11 May, Franklin Eminson stood above the outfall on the banks of the River Eau and watched the rising water turn black with nauseous effluent pouring from the pipes.¹⁷ In the evening, and back at the river, he found the water-level had risen by two feet.

About the same time, the deadly infection was unexpectedly identified in *The British Medical Journal* of 10 May 1890. This carried the synopsis of a local medical inquiry into the three hundred and sixty-nine epidemic deaths in Middlesbrough in 1888. The Inspector, Dr Edward Ballard, had invited the pioneering bacteriologist, Dr Edward Emanuel Kline, to examine the organs of some Middlesbrough victims, and he had successfully isolated a small bacillus, 'hitherto undescribed', in their lungs and in samples of fresh sputum.¹⁹ As a result, Dr Ballard had declared the outbreak 'A new specific fever: pleuro-pneumonic fever',¹⁹ and the symptoms described were immediately familiar to Franklin Eminson: he had already seen them in his patients.

With his father ill, and the epidemic claiming a second victim in the nearby village of Scotton on 9 May, it must have seemed to him that north Lincolnshire was on the verge of an epidemic of Middlesbrough proportions. On 15 May, and increasingly alarmed by the lack of response from the Sanitary Authority, Franklin Eminson took matters into his own hands. He wrote to the Local Government Board in London, and informed the Principal Medical Officer, Dr George Buchanan, of a very serious epidemic in Scotter – an epidemic with many of the characteristics of pleuro-pneumonic fever.

The day his letter arrived in London, 16 May, the Local Government Board acted. An immediate letter was sent to the Authority in Gainsborough, and minuted at their monthly meeting on 20 May:²⁰

... they [the Local Government Board] had received information that exceptional mortality from inflammatory disease of the lungs has recently been observed in the Parish of Scotter, and requesting the authority to obtain from the Medical Officer of Health a report on the extent and fatality of the disease in the District ... and of the circumstances in which it has prevailed.

The minutes also record the Medical Officer's *Special Report*, his opinion that the onset of cold, wet weather was responsible for the epidemic deaths. The Committee agreed his report should be sent to London, but there is no record in the minutes of Franklin Eminson's letter of 5 May, notifying Henry Wright of a deadly, infectious disease at Scotter.

On 22 May, Dr Ballard wrote to Franklin Eminson. He needed evidence to prove the Scotter epidemic was the same pleuro-pneumonic fever found in

Middlesbrough, and asked the doctor to conduct a very simple experiment on white mice.²¹ He was to feed them with bread soaked in the sputa of the sick and the dying. As the mice died, so their bodies were to be posted immediately to Dr Klein, at the Brown Animal Institute in Wandsworth.

Franklin Eminson took three weeks to find suitably tame mice, preoccupied as he was with the dying of his brother, and father, the further spread of the disease to Messingham, and in writing Robert Eminson's obituary for *The British Medical Journal*:²²

In less than three weeks, he devotedly attended about ten cases of this terrible disease, most of them being fatal, several dying within a few hours, and hardly one extending over a week. His own case has been the most protracted observed, beginning suddenly early on the morning of May 8th and terminating in death on June 8th ... His end was hastened by the news of the death of his third son of the same disease.

Robert Astley Cooper Eminson, aged forty-one, was buried on 31 May, followed by Robert Eminson, aged eighty-one, on 11 June. On 13 June, Franklin Eminson settled to his experiments with the mice,²³ and to answering Henry Wright's *Special Report* of 20 May.

At this time, when pneumonia was known as 'a disease of chill',²⁴ unsettled cool weather was a valid medical reason for lung infections. Unfortunately for the Medical Officer, Scotter had been experiencing unseasonably dry and warm conditions when the first ten epidemic victims died – conditions that had been in place since early February 1890. With less than half the usual rainfall,²⁵ the sewer had remained unflushed, and sewage from eighty-six houses, four or five farm yards, two slaughter houses, the school urinal and solid excreta from the one W.C. in the village (the Rector's),²⁶ had fermented in the pipes and became, in Franklin Eminson's words, 'the breeding grounds of the disease germ'.²⁷

Like many other doctors in the late nineteenth century, Franklin Eminson's concern about drain effluvia²⁸ was driven by a growing understanding of the connection between dirt and disease: 'that filth and sewer air are capable of causing pneumonia'.²⁹ Scotter folk, however, were not to be persuaded. They believed in the maxim, a 'wholesome stench will hurt no one',³⁰ and regarded noxious smells from the sewer as an unavoidable evil.³¹ 'Gross surface filth' around the village was a fact of life, as was the persistent stink from the sewer.³²

Unlike the villagers, Franklin Eminson knew the history of the south sewer. It had been built, fourteen years earlier, to carry water, not sewage. Consequently it had none of the necessary safeguards, like traps and ventilation shafts, in place. Essentially a storm drain,

and constructed with loose joints, it was designed to divert contaminated surface water away from the village wells, and into the Eau, so putting an end to the frequent outbreaks of typhoid that had made Scotter notorious.³³

In 1868, when the village was suffering a worse than usual summer of typhoid,³⁴ Robert Eminson had realised that the wells were the source of the fever. Many were shallow, only six to twelve feet deep in some parts of the village, and in hot weather their water levels dropped. He had noted how often typhoid broke out after thunderstorms when heavy rain had filled the wells with water that had washed through the human, and animal, waste stored close to the cottages. As this was a valuable source of income to many village families, and sold to local farmers and gardeners as manure,³⁵ the only solution was to drain the foul water away from the yards and streets, and into the Eau.

By 1874, when Robert Eminson was appointed the first Medical Officer of Health to the newly constituted Gainsborough Rural Sanitary Authority,³⁶ a drainage system for Scotter was already being planned. The following year, and under his direction, nine-inch diameter pipes were laid along the main street, eighteen inches deep, with connecting branches into the cottage yards. Completed in 1876, at a cost to the Scotter ratepayers of £356, the results were dramatic. During the ten years from 1882, when Franklin Eminson first joined his father in the Scotter practice, only five cases of typhoid fever were recorded, and all exceptionally mild.³⁷

Almost as dramatic was the rise in cases of pneumonia – and the increasing quantities of sewage in a system built for flash floods. A new sewer was recommended to the Sanitary Authority, at the meeting on 25 March 1890, and the Surveyor, William Eyre,³⁸ ordered to take levels, but the question of buying a new spirit level was adjourned. On 22 April the Surveyor was authorised to find, and buy, a second-hand level, but had no success, as Gravenor Roadley of Scotter Manor informed the meeting on 20 May. At this point, with the Local Government Board demanding a report on the Authority's response to the Scotter epidemic, there were few options left: the Surveyor was given permission to buy a new level at a cost of £14 10 shillings.³⁹

No doubt Franklin Eminson learnt at this same meeting that his letter of 5 May had not been brought to the attention of the Sanitary Authority, for after the funerals of his brother and father he wrote a second letter, again emphasising the dangers of indirect infection from the Scotter sewer. This was briefly minuted at the 17 June meeting as, 'read a letter from Mr T. B. F. Eminson as to this epidemic'.⁴⁰ Henry Wright's report, his reconsidered

opinion that direct infection was responsible for the spread of the epidemic, was minuted equally crisply, 'also read the Medical Officer's Report on the subject'.

In view of the conflicting professional opinions, the Sanitary Authority had no alternative. A unanimous resolution was passed, referring the matter to London:⁴¹

... a letter be written to the Local Government Board asking them to cause a local inquiry to be held with a view of ascertaining the origin and cause of the outbreak and suggesting any necessary steps to prevent any similar outbreak in any part of the District.

With their letter went Mr Gravenor Roadley's plan of Scotter parish, showing the sewer and the houses affected, together with an extract from the Medical Officer's Report giving his newly-formed opinion on direct infection.⁴²

Meanwhile, at Gonerby House, centre of the practice, and home to Franklin and Clara Eminson and their three small boys, experiments with the mice continued. On 26 June, the doctor was surprised by the death of two mice within thirty hours of eating infected bread, instead of the usual four to seven days.⁴³

In London, Dr Klein found their lungs 'intensely congested, dark-purple in colour, and ... red-hepatized' (like liver)⁴⁴ – very similar to the lungs of the victims of the Middlesbrough epidemic. Significantly, he also succeeded in isolating the same 'short bacillus ... in the juice expressed from the inflamed lung' – confirmation that the Scotter and Middlesbrough epidemics were indeed caused by the same bacilli.⁴⁵

The sputum that killed the two mice had come from a Scotton farmer, John Clark. The onset of his disease had been signalled by a rigor in the early hours of 19 June, after a visit to Scotter, and a long, wet day working his fields and garden. The course of his illness followed much the same pattern as other victims: the same high temperature when he first took to his bed complaining of a headache, and the same pain over the liver region, yet by 26 June, he appeared to be recovering. Five days later, when his temperature was almost normal, he unexpectedly died 'early on the morning of July 1st, having sat up in bed to sing a hymn with his children shortly before'.⁴⁶ The death toll for Scotter and district had now reached fifteen.

John Clark's death coincided with an extra meeting called by the Sanitary Authority for 1 July. On the agenda were two letters about Scotter's infected sewer. One, from Franklin Eminson, enclosed a sketch map of the village with each epidemic case marked.⁴⁷ This showed that twelve of the sixteen cases were in houses closest to the south sewer, evidence that the drain was the primary source of the fatal pneumonia.⁴⁸

The other, dated 30 June, from William Eyre, Surveyor and Inspector of Nuisances, reported the first repairs to the Scotter sewer: the replacement of the four decaying mason's traps⁴⁹ in the main street with earthenware gullies.⁵⁰ He had also opened one section of the pipes and found it 'perfectly clean', with no signs of leakage from the joints. 'This, I think proves' he wrote 'that there can have been no smell arise from the course of the sewer',⁵¹ but he made three recommendations: flushing in dry weather, manholes to facilitate regular inspections and ventilation shafts. The Committee ordered the Surveyor of Highways to proceed with the work, and confirmed William Eyre's annual retainer of £22 10 shillings.

In London, on 2 July, the Local Government Board instructed Dr Henry Franklin Parsons to undertake a local medical inquiry at Scotter, into a 'very serious and fatal epidemic of a disease described as pleuro-pneumonia',⁵² establish the origin and cause of the outbreak and suggest how it could be contained. A week later, on 9 July, he arrived in Scotter, and immediately began investigations into the most likely sources of infection: the sewer, the water supply and the home-cured bacon.

He examined the main sewer in two places and found it clean, but defective and untrapped.⁵³ Cause for concern was the condition of the pipes closest to the houses on The Green, the centre of the outbreak. These were still choked with black sediment.⁵⁴ The wells, he was told, were kept reasonably unpolluted by a constant supply of underground water from Scotton Common, but saw for himself that many were unhealthily close to household privies and drains, and warned of the risk of contamination.⁵⁵

The bacon proved safe. A sample from John Clarke's house at Scotton, had been sent to Dr Klein on 11 July and fed to laboratory mice. They survived the Lincolnshire bacon unscathed.⁵⁶ In contrast, the mice fed on Middlesbrough bacon in 1888, had died: their lungs had been found 'congested, and cultivations made from the organs yielded the bacillus *pneumoniae*'.⁵⁷ Franklin Eminson explained the reason. Scotter bacon was home-cured, and thoroughly cooked. Middlesbrough bacon was cured in sheds and yards, exposed to contaminated air and eaten raw, or occasionally warmed through on a fork.⁵⁸

By 18 July, Dr Parsons had concluded his initial inquiry, and a long meeting with the members of the Sanitary Authority, the body responsible for financing the local inquiry. Eight days later, on 26 July, his written report was complete, although he later added a postscript dated 2 September 1890. This recorded information received of the death of a second doctor, Mr Arthur Wellesley Wales. A young Irishman from

Belfast, he had died on 16 August at Burringham, leaving a heavily pregnant widow. His patient, Thomas Wakefield of Messingham, had died three days earlier.

Two reasons account for the speed of the Parsons' inquiry. Firstly, it was too late. By 9 July, the epidemic in Scotter was almost over, flooded out of the sewer by the rains of 9 to 11 May, or so Franklin Eminson came to believe. There were no emanations⁵⁹ from untrapped drain inlets to be investigated, and no sudden onsets of pleuro-pneumonic cases to examine – only three convalescent patients, and the relatives and friends of the dead to interview. The only professionally qualified witness of the events of April and May 1890 was Franklin Eminson himself, and Henry Parsons acknowledged his help: 'most of the circumstances mentioned in this report had already been ascertained, and put on record by him'.⁶⁰

And this, 'putting on record' was the second reason for the completion of the inquiry, and report, within seventeen days. Franklin Eminson not only supplied most of the essential information, but also wrote seven of the report's twenty-one pages – a measure of the close working relationship between the two men. They had much in common. Both had trained at St Mary's Hospital, London, and both were district medical officers of health, Franklin Eminson for Scotter and District, and Henry Parsons for Selby and Goole.

Franklin Eminson's contribution to their joint publication was twofold. A full account of the malignant sewer, and seven clinical histories, each one selected to illustrate the varied symptoms of pleuro-pneumonic fever. There was a record of Astley Eminson's last ten days, his temperature, pulse and respiration rates. The others were medical notes, still echoing with the Lincolnshire voices of Dr Franklin's patients.⁶¹

Case 1: G. H. J. aged 37 farm labourer [Scotton]⁶²
[George H. Jackson]

Present Illness: He began to be ailing about April 24th, but did not lay by entirely, and on Saturday, April 26th, he came down to Scotter, a distance of a mile or more, but felt done up on his return, and wrote a letter to me to ask for a little medicine as he was 'sick and bilious' and had a 'bad cough'. The following day April 27th I was sent for ...

George Jackson died, delirious, four days later, with Dr Franklin, as he was known in the village, at his bedside, where he had been since the previous night.

On 2 December 1890, the Parsons' Report was laid on the table at the meeting of the Authority,⁶³ 'and, a long letter was read by the Chairman from Mr T. B. F. Eminson addressed to Mr Osborne, afterwards destroyed when the Medical Officer explained his opinion.' The minutes leave no clue to the reason for this extraordinary action, but the report itself appears a possible cause.

Henry Parsons had steered a magisterial course between the two warring doctors but, despite an evident sympathy for Franklin Eminson, exhibited some reservations about indirect infection.⁶⁴

I admit that infected sewer and drain air may probably have been at Scotter one of the channels by which the contagion of the disease was conveyed ... but I do not think that this view alone explains all the facts of the case, and some other agency ... perhaps unsuspected, seems to be required for the propagation of the disease in outlying places ... I think it likely that direct infection played a larger part than Mr Franklin Eminson is willing to allow.

This statement, with its implicit endorsement of Henry Wright's views on direct infection, probably stung, but the inclusion of William Eyre's letter with the Parsons' *Report* seems a more likely explanation for the doctor's strong letter. The Surveyor's claim that 'there can have been no smell arise from the course of the sewer', not only raised questions about Franklin Eminson's professional judgement, but neatly absolved the Sanitary Authority of any responsibility for the epidemic deaths.

The doctor did not let matters rest with an explosive letter. With all the confidence of a man who had won the Pharmaceutical Society's Botany and Materia Medica Medal in 1875, and 'carried off both the two gold medals offered by the Society of Apothecaries' in 1878,⁶⁵ he went into print.

Epidemic Pneumonia at Scotter and Neighbourhood: its History Causes and Future Prevention was published in 1892. Written for the information of the inhabitants of the district,⁶⁶ the underlying message was stark: if the sewers were not rebuilt, and the heaps of rotting filth not cleared from the cottage yards, and streets, then further and more dreadful epidemics were inevitable. The most terrible of them all, Franklin Eminson reminded his readers, was the Black Death of 1348-50, and the Scotter tradition that skeletons found on the east side of The Green could have been its victims.⁶⁷

Could it be that his destroyed letter to the Sanitary Authority had raised the possibility that the Scotter epidemic of 1890 was, in reality, plague? In 1892 conservative medical opinion believed that such manifestations had been extinct in England since the Great Plague of 1665,⁶⁸ but as knowledge of bacteriology increased, so interest in the subject had grown, both in Europe and in England.⁶⁹ Franklin Eminson had perhaps hoped that his patients' symptoms, carefully detailed in the Parsons' *Report*, would have attracted informed debate; details like the large abscess on the elbow of George Jackson's young daughter a week before her father fell ill, or the round, punched out ulcers on the swollen leg of the Scotter horse-breaker.⁷⁰ Were these recorded because he thought he had found examples

of buboes, the tell-tale swellings in the armpit, neck or groin that announced bubonic plague? There is no evidence of any response to these descriptions.

His speculations about how the disease had reached beyond the Scotter sewer were also inconclusive, but hint at remembered stories of how pestilence came to Eyam in Derbyshire – on a length of cloth infested with plague fleas. Franklin Eminson suggested that soiled bedding, inherited from a Scotter epidemic victim, had carried the infection to the two nearby villages, but could find no corroborative evidence.⁷¹ At Scotton, the epidemic had broken out before the blankets reached the village, and at Messingham, the pneumonia case was at some distance from the home of the recipients.

Plague fleas could also account for indirect infection – the lack of multiple cases among the ten neighbours who had cared for James Barker during his last four days. Only three had fallen ill. Rebecca Vickers had sat with him for one night, and helped lay him out after death. Harriet Chantry had also watched at his bedside and, later, been involved with clearing his cottage. Edwin Fieldstone had been a pallbearer, the only time he had been inside the old man's house.

Franklin Eminson noted that the two women were not sick until the day after they had washed James Barker's effects (on different days), and that they had both emptied their dirty soapsuds into the untrapped sewer inlet, beneath James Barker's pump.⁷² The doctor reasoned their water must have forced out an equal volume of germ-laden gases, although fleas, trapped in the dirty bedding or clothes, could be an equally convincing explanation, as could water droplets. Mrs Vickers was up again after only a few days in bed; Mrs Chantry died six days after her close contact with the inlet.

Edwin Fieldstone recovered within six weeks, but his mother-in-law, Mrs Julie Ann Foster died on 26 April, after only four visits to her sick son-in-law. Her neighbour, eighty-two year old Mrs Francis Hutson laid her out, and washed her clothes using one of the untrapped inlets close to her own back door.⁷³ Fanny Hutson died on 17 May, the first death in Scotter to be recorded as pleuro-pneumonic fever.⁷⁴

Franklin Eminson was to change his mind about pleuro-pneumonic fever. One of his conclusions to *Epidemic Pneumonia* was that the 1890 outbreak was not, after all, a new disease but a more virulent strain of a pneumonia endemic to Scotter.⁷⁵ He never wavered, however, in his absolute certainty that the infection came from the sewer – a conviction driven, perhaps, by an unspoken fear that the 1890 outbreak could be the harbinger of an even deadlier epidemic,

... the disease may, in a few cases, have been caused secondarily apart from sewer and filth emanations.

That it may be thus caused is all but proved by the infection of the mice through eating sputa in their food. The danger from such secondary causes, however was slight compared with the original sewer danger.⁷⁶

Postscript

In 1980, a Middlesbrough surgeon, G. Stout, took another look at Dr Klein's description of the *bacillus pneumoniae* discovered during the 1888 epidemic.⁷⁷ He realised there were marked similarities with the *bacillus pestis*, first described in 1894 during a pandemic of bubonic plague in Hong Kong. In 1896, Dr Klein himself isolated a strain of *bacillus pestis* in a case from the London docks, but does not appear to have revisited either the Middlesbrough or Scotter epidemics. By 1902 plague was being reported from the great ports of Hull, Liverpool, Bristol, Glasgow and London.⁷⁸

In the early 1900s, Franklin Eminson's *Epidemic Pneumonia*, briefly, became a quoted reference work in the *British Medical Journal*, but only on questions of the incubation period of this pneumonia.

Notes

1. Dr Parsons, *Report to the Local Government Board on an Epidemic of Pneumonia at Scotter, Lincolnshire, and in the Neighbouring Places* (1890), p.9.
2. T. B. Franklin Eminson, *Epidemic Pneumonia at Scotter and Neighbourhood: Its History, Causes and Future Prevention* (1892), p.27.
3. T. B. Franklin Eminson, 'Pleuro-pneumonic fever at Scotter in 1890: the supposed method of extension of the disease to neighbouring places', *The Lancet*, 137, issue 3526 (28 March 1891), p.716.
4. Dr Parsons, *Report to the Local Government Board*, p.3.
5. Eminson, *Epidemic Pneumonia at Scotter*, p.26.
6. Dr Parsons, *Report to the Local Government Board*, p.15.
7. Eminson, *Epidemic Pneumonia at Scotter*, p.26.
8. *Ibid.*, p.43.
9. *Ibid.*, p.45.
10. *Ibid.*
11. *Ibid.*
12. *Ibid.*, p.27.
13. *Ibid.*, p.26.
14. *Ibid.*, p.39.
15. *Ibid.*, p.40.
16. *Ibid.*, p.26.
17. *Ibid.*, p.35.
18. Edward Ballard, 'A new specific fever: pleuro-pneumonic fever', *The British Medical Journal* (hereafter *BrMedJ*), (20 April 1889), pp.899-900.
19. *Ibid.*
20. Lincolnshire Archives, PL/4/804/1, 3 September 1872-July 1890.
21. Eminson, *Epidemic Pneumonia at Scotter*, p.25.
22. T. B. Franklin Eminson, 'Robert Eminson, obituary', *BrMedJ* (21 June 1890), p.1466.
23. Eminson, *Epidemic Pneumonia at Scotter*, p.25.
24. Octavius Sturges, letter, 'Special correspondence – Pneumonic fever, old and new', *BrMedJ* (4 May 1889), pp.1030-31, esp. p.1031.
25. Eminson, *Epidemic Pneumonia at Scotter*, p.33.
26. *Ibid.*, p.10. Note that WCs with poor drainage were blamed for contributing to enteric fever in Dublin in the 1870s, see the summary report on the 'Dublin Royal Sanitary Commission' in *BrMedJ* (18 October 1879), pp.632-34, esp. p.634.
27. Eminson, *Epidemic Pneumonia at Scotter*, p.65.
28. Dr Parsons, *Report to the Local Government Board*, p.9.
29. Eminson, *Epidemic Pneumonia at Scotter*, p.26.
30. *Ibid.*, p.65.
31. *Ibid.*, p.11.
32. *Ibid.*
33. *Ibid.*, p.6.
34. *Ibid.*, p.5.
35. E. Gillett and J. D. Hughes, 'Public health in Lincolnshire in the nineteenth century, part 2', *Public Health*, 69 (3), (1955), pp.55-60.
36. Lincolnshire Archives, PL/4/804/1 3 September 1872-July 1890.
37. Eminson, *Epidemic Pneumonia at Scotter*, p.10.
38. William Eyre is listed in W. White, *Directory of Lincolnshire* (1892), p.347 as 'architect, surveyor & surveyor and inspector to Rural Sanitary Authority', with his home being 158 Trinity Street, Gainsborough.
39. Lincolnshire Archives, PL/4/804/1 3 September 1872-July 1890, pp.430-34.
40. *Ibid.*
41. *Ibid.*, 3 September 1872-July 1890, 17 June 1890.
42. *Ibid.*
43. Eminson, *Epidemic Pneumonia at Scotter*, p.25.
44. Dr Parsons, *Report to the Local Government Board*, p.4, footnote.
45. Dr Henry Franklin Parsons, 'Pleuro-pneumonic fever', *BrMedJ* (15 November 1890), pp.1133-34.
46. Dr Parsons, *Report to the Local Government Board*, p.1.
47. Lincolnshire Archives, PL/4/804/2 5 July 1890-14 January 1896, 15 July 1890.
48. Eminson, *Epidemic Pneumonia at Scotter*, p.15.
49. *Ibid.*, p.10.
50. *Ibid.*, p.10.
51. Dr Parsons, *Report to the Local Government Board*, p.20.
52. *Ibid.*, p.2.
53. *Twentieth Annual Report of the Local Government Board 1890-91* (1891), p.47.
54. Dr Parsons, *Report to the Local Government Board*, p.2.
55. *Twentieth Annual Report of the Local Government Board 1890-91* (1891), p.47.
56. Dr Parsons, *Report to the Local Government Board*, p.9.
57. Eminson, *Epidemic Pneumonia at Scotter*, p.38.
58. *Ibid.*, p.39.
59. *Ibid.*, p.56.
60. Dr Parsons, *Report to the Local Government Board*, p.14.
61. *Ibid.*, p.16
62. In the original document the farm labourer's domicile is given as 'Scotter'. This is a printing error for 'Scotton'.
63. Lincolnshire Archives, PU 4/804/2 5 July 1890 -14 January 1896.
64. Dr Parsons, *Report to the Local Government Board*, p.109, Supplement.
65. 'The opening of the session at the Medical Schools', *BrMedJ* (5 October 1878), pp.535-37, see under St Mary's Hospital, p.536.
66. Eminson, *Epidemic Pneumonia at Scotter*, Preface.
67. *Ibid.*, p.3; notes in the Lincolnshire Historic Environment Record (Scotter parish file) by R. G. Smith citing John Cragg, 'Topographical Notes of Lincolnshire' (c.1824-31), p.174, MS Lincolnshire Archives, [Cragg/1/1].
68. Charles Creighton, *A History of Epidemics in Great Britain: AD 664-1893, vol.1 From AD 664 to the Extinction of the Plague, vol.2 From the Extinction of the Plague to the Present Time* (Cambridge, 1891 and 1894), vol.1, p.692.

69. See for example Augustus Jessopp's review of volume one of Charles Creighton, *A History of Epidemics in Great Britain* and Francis Aidan Gasquet, *The Great Pestilence (1348-9), now commonly known as the Black Death (1893)*, in *English Historical Review*, 9, no.34 (July 1894), pp.567-70.
70. Dr Parsons, *Report to the Local Government Board*, pp.16 and 17.
71. Eminson, *Epidemic Pneumonia at Scotter*, p.48.
72. *Ibid.*, p.43.
73. *Ibid.*, p.35.
74. Dr Parsons, *Report to the Local Government Board*, pp.16 and 17.
75. Eminson, *Epidemic Pneumonia at Scotter*, p.55.
76. *Ibid.*, p.56.
77. G. Stout, 'The 1888 pneumonia in Middlesbrough', *Journal of the Royal Society of Medicine*, 73 (1980), pp.664-68.
78. R[obert] Bruce Low, *Reports and Papers on Bubonic Plague*, issued by the Local Government Board (1902).