

Dr. R. Bruce Low's report to the local government board on an outbreak of enteric fever at Helmsley, in the Helmsley rural district, North Riding of Yorkshire.

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**Dr. R. Bruce Low's Report to the Local Government Board
on an Outbreak of Enteric Fever at Helmsley, in the
Helmsley Rural District, North Riding of Yorkshire.**

R. THORNE THORNE,
Medical Officer,
February 5th, 1896.

ON August 24th, 1895, pursuant to the requirements of the Board's General Order, the Medical Officer of Health for the Helmsley Division of the Helmsley Rural District notified to the Board that an outbreak of enteric fever had occurred in the town of Helmsley. Two days later a communication was received from a local source, calling the Board's attention to the fever outbreak, and alleging the existence of various insanitary conditions at Helmsley and lack of sufficient sanitary supervision of the district. At the Board's request a special report on the fever prevalence was prepared by the Medical Officer of Health, and this was received by the Board on August 31st. This report was found to inculcate a particular milk service as having been concerned in the diffusion of the disease. It appeared further that there had been at first some conflict of medical opinion respecting the precise nature of the current malady, which had been notified to the Rural Council under several different names. Whilst the report was under consideration, the Board received from the vicar of Helmsley, on September 13th, a letter urging an official inquiry into the circumstances of the fever outbreak. On the same date, a letter was also received from the Medical Officer of Health, asking for an investigation of the epidemic by an Inspector of the Local Government Board "in view of the difficulty (owing to local conditions) of arriving at the causes of the outbreak." On September 13th, too, the Rural District Council sent a communication requesting the Board to make "a special inquiry as to the serious outbreak" in Helmsley. As a result, it was decided that the facts of this epidemic should be investigated by an Inspector of the Board's Medical Department, and the duty of collecting the facts was entrusted to me. I accordingly visited Helmsley on September 18th, and made inquiry there on that and subsequent days.

THE HELMSLEY RURAL DISTRICT.

This district had at the last census an area of 67,641 acres, and a population numbering 5,626, distributed over 27 townships. The district lies on the edge of the North-eastern Moorlands of Yorkshire, and consists in large part of moor and mountain, intersected by numerous valleys or "dales," some of the latter being well wooded. The highest elevation reached is about 1,300 feet above Ordnance Datum. The River Rye flows through the district, and along with its numerous tributary streams supplies the natural drainage of the locality. Geologically, the southern and western portions of the district are situated upon the Middle and Upper Oolites; but the moors

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1896.

in the northern part rest on the Lower Oolitic beds, which the valley of the Rye has cut through deep into the subjacent Lias.

For administrative purposes, the Helmsley Rural district is divided into two parts, each with a separate Medical Officer of Health, viz., (1) the Helmsley Division, and (2) the Oswaldkirk Division. These divisions are coterminous with the two Poor law medical relief districts included in the Helmsley Union, and the health officer is also in each instance district medical officer for purposes of poor relief. One inspector of nuisances acts for the whole Rural District. The distribution of the population in the two divisions, and other information, is given in the subjoined Table I.

TABLE I., Giving the AREA and POPULATION, with the NAME of MEDICAL OFFICER OF HEALTH and his ANNUAL SALARY, of each of the TWO DIVISIONS of the HELMSLEY RURAL DISTRICT.

—	Area in Acres.	Population (1891).	Medical Officer of Health.	Annual Salary of Medical Officer of Health.	Year when Medical Officer of Health was appointed.
Helmsley Division -	51,598	3,718	Dr. J. F. Porter	£ 30	1888
Oswaldkirk Division -	16,043	1,908	Dr. J. R. Reid	20	1890
Total for Rural District	67,641	5,626	—	—	—

There are no great centres of population in either division. The largest and most populous place is the town of Helmsley, where the fever outbreak under consideration occurred.

Helmsley is a small market town, with an estimated present population of 1,350,* situated on the north bank of the River Rye, at the extreme western end of the vale of Pickering. The land on which the town is built slopes gently upwards from the river. The rising ground behind the town is well wooded, and Helmsley may be said to be almost shut in by hills on three sides. Through the High Street and Castlegate (see Map appended) flows the Boro' Beck, a tributary of the Rye, which it joins within the limits of the town at the upper end of Ryegate. Helmsley is the market centre of a wide, thinly populated agricultural district. Owing to its picturesque surroundings, and its proximity to places of historical and antiquarian interest, the town and neighbourhood are much frequented, especially in the summer months, by tourists and holiday visitors. The inhabitants of Helmsley are chiefly engaged in agriculture, in shop-keeping, and in the various occupations pertaining to a small country town. A number of persons find employment in the woods, and in other ways, on the extensive estates of the Earl of Feversham, whose seat, Duncombe Park, is situated close to the town.

The Water Supply of the town is derived from the Foothead spring, situated in a valley, a mile from Helmsley; it is piped to a covered reservoir in Beckdale, and distributed thence by gravitation to the houses. There is no filtration of this water. The works are the property of the Earl of Feversham.

About two-thirds of Helmsley is provided with *sewers*, the outfalls of which discharge into the Rye directly or indirectly. The rest of the houses discharge their sewage by separate or by conjoined drains into the Boro' Beck. (See also pages 5-7.)

Excrement and Refuse Disposal is mainly by means of ashpit or midden privies, the contents of which are removed from time to time by the householders, and utilised on garden ground. There are about 35 waterclosets in the town.

Cottage Dwellings.—For some years old houses have been gradually replaced by new ones of a better kind; but there are still left some of antiquated construction, with damp walls, and with low roofs sometimes of thatch, which occasionally is not weather proof. Ventilation and cubic space in such

* The population of the *parish*, at the 1891 census, was 1,508.

MAP OF HELMSLEY.



The Enteric Fever Cases of August & September 1895 are shown thus —●



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dwellings are often deficient, especially in bedrooms, which sometimes are unprovided with fireplaces. Some houses are in bad repair and dilapidated. Usually each house is provided with garden space, but in a few instances, as in Smith's and Simpson's yards, there is none. Sometimes cows and pigs are kept too close to human habitations. Some houses have no means of access at the back, and the midden contents have, in process of their removal, to be carried through the dwellings to the street.

ENTERIC FEVER.

There has been no outbreak of this fever in Helmsley for some years; only sporadic cases generally traced to importation. The disease was not recognised in the town during 1893 or 1894, though it has to be mentioned that two cases notified as "continued fever" occurred in two children in a house in Pottergate, in November 1893. No definite information could be obtained as to the origin of these two cases. The present outbreak appears to have first shown itself about the middle of August (1895); and from that time till the end of September, no fewer than 43 persons were attacked, and of these eight died.

During September a number of cases of the same disease were notified as occurring at Newton and Stonegrave in the Oswaldkirk Division of the Helmsley Rural District; several cases were also reported at Nunnington, in the Kirkbymoorside Rural District, and one case in September from Butterwick, another riverside village, 4 miles below Nunnington, in the Malton Rural District. These places are situated along the valley of the River Rye below Helmsley. The cases in these riverside localities numbered 17, not including some six cases of unnotified illness of an enteric character occurring in members of invaded households, or among fellow workers in the harvest fields. Of the riverside cases, only one proved fatal. In Table II., I give the total number of cases of enteric fever which occurred in the two outbreaks; together with information as to population, &c., of the places invaded.

TABLE II., Giving the NUMBER of CASES of ENTERIC FEVER occurring in each of certain LOCALITIES during the Four Months, July, August, September, and October 1895.

Sanitary District.	Place invaded by Enteric Fever.	Population (1891).	July.	Aug.	Sept.	Oct.	Total.
Helmsley Rural District	Helmsley town - -	1,350	—	34	9	—	43
Helmsley Rural District	Stonegrave and Newton.	175	—	—	5*	—	5
Kirkbymoorside Rural District.	Nunnington - -	354	—	—	10	1†	11
Malton Rural District -	Butterwick - -	69	—	—	1	—	1
		—	—	34	25	1	60

In what follows I propose to deal with the two outbreaks separately, giving the facts as to the Helmsley town cases first, and then briefly relating the circumstances connected with the outlying cases in Ryedale.

I.—ENTERIC FEVER AT HELMSLEY.

The first intimation that Dr. Porter, the Medical Officer of Health, had of the presence of enteric fever in the town was the occurrence of two cases in his own private practice. These cases were recognised as true enteric fever on August 15th. About the same time he received notice from Dr. Muil, of Kirkbymoorside, that a young servant girl had come home ill from Helmsley to Nawton, suffering from enteric fever. On August 19th Dr. Reid

* There were six other cases of illness during September, characterised by headache, feverishness, and diarrhoea, followed by debility and anaemia, in persons who were members of invaded households or otherwise associated with notified cases of enteric fever.

† A secondary case in a house already invaded.

sent Dr. Porter nine notifications of cases in Helmsley, five of them being certified as suffering from "relapsing fever," three from "remittent fever," and one from "remittent or relapsing fever." From this time till the 1st of September cases were notified nearly every day. In addition, no fewer than eight persons who had been residing in Helmsley during the first week of August or earlier, were found to have developed the disease during that month in places some distance away to which they had removed.

The 43 cases comprised in the Helmsley outbreak were limited to 27 households, 22 of them being invaded during August, and only five during September.

A plurality of cases of fever occurred in eight houses; in 19 there were only single cases met with. The following Table III. gives the age and sex in each instance.

TABLE III., SHOWING CASES OF ENTERIC FEVER IN HELMSLEY AND DEATHS THEREFROM, DISTRIBUTED IN AGE PERIODS.

Age Periods.	Cases.			Deaths.		
	Males.	Females.	Total.	Males.	Females.	Total.
Under 1 year - - - - -	—	—	—	—	—	—
1 to 5 years - - - - -	2	6	8	—	1	1
5 to 15 years - - - - -	10	5	15	—	—	—
15 to 25 years - - - - -	3	3	6	2	3	5
25 to 60 years - - - - -	2	12	14	1	1	2
60 years and upwards - - - - -	—	—	—	—	—	—
	17	26	43*	3	5	8

The greater incidence of the fever upon adult females is no doubt accounted for by the fact that some of them acquired the disease while nursing other sick persons in the family. One case occurred in a trained nurse who was in attendance on a family attacked by the fever. A few (three or more) of the Helmsley cases were not, for one reason or another, officially notified.

In reference to the question of disputed diagnosis, already mentioned, I visited a number of convalescent cases, and from the sufferers themselves or from their parents, I obtained an account of the symptoms observed in each instance. From the statements made to me, it would appear that some of the earlier cases did not run altogether a typical course. Some of them had constipation throughout the attack, a fact which was locally considered at first as discounting a diagnosis of true enteric or typhoid fever. Added to this, the cases among children had a shorter duration than is usual in typical enteric fever; some of them were regarded as having been ill only 10 to 14 days. This, again, was looked upon at the time as throwing doubt on a diagnosis of true enteric fever. Some cases were described as having had fever, constipation, flushing of the face, and occasionally a little delirium; it was said that in these instances no "spots" were seen, and no abdominal symptoms noted. But side by side with these mild, irregular, or anomalous cases, or occurring more usually as secondary cases in households already invaded, were other attacks presenting a number of symptoms typical of enteric fever, though in some cases constipation persisted throughout the illness. In some of the originally milder cases occurring in young adults, there was a serious return of the fever, with severe abdominal symptoms of an aggravated character, following a premature indulgence in solid food, or, as in one instance, following the use of purgative medicine administered by a well-intentioned though misguided relative. In these cases violent diarrhoea supervened, with hæmorrhage from the bowels: and several of the patients died with symptoms pointing to perforation of the bowel.

I also visited a few of the secondary cases which were acutely ill at the time of my inquiry, and I had no doubt in my own mind as to the

* Including eight persons who were attacked during August subsequently to their removal from Helmsley.

nature of their ailment. It deserves mention that in about a third of the adult cases one of the first symptoms complained of by the patient was acute pain in the neck followed by stiffness, which gradually disappeared with the development of the graver symptoms of the fever. Some other cases were complicated by sore throat. The same pain and stiffness in the neck was observed in some of the enteric fever cases at Nunnington during September.

Although the earlier cases departed somewhat from the usual type, and notwithstanding that some of them, from various causes, had relapses or remissions, in none could the illness be properly described either as "relapsing" or as "remittent" fever, in the sense that these terms are now generally understood; the former is a famine fever and the latter a disease of malarial origin. In three households, where fever, under the above designations, had been notified, five secondary cases, occurring chiefly among persons who had nursed the primary cases, were subsequently notified as "typhoid fever." In a particular house from which two notifications were received on the same day, one person was referred to as suffering from "relapsing fever," the other from "remittent fever"; while 11 days later a third case in the same household was notified as "typhoid fever."

The terms used in the notification of these earlier cases must be regarded as misleading to those immediately responsible for taking measures to prevent the spread of the infection. Later in the course of the epidemic, doubts as to the nature of the prevailing illness seem to have altogether disappeared, and all cases came to be notified as suffering from "enteric" or "typhoid" fever.

[During the outbreak a charge was brought against the medical man who had certified cases under the above-mentioned misleading names, that he had been attending fever patients for some time previous to notifying them; that he had neglected to notify to the District Council the cases *forthwith* as required by law. No reliable evidence in support of such charge was, however, forthcoming, and it may be dismissed from further consideration here.]

THE ORIGIN OF THE OUTBREAK.

On my arrival in Helmsley I made a careful inquiry as to the origin of the outbreak. It will be remembered that the report of Dr. Porter, the Medical Officer of Health, inculpated a particular milk service as having been concerned in the diffusion of the disease. Two other theories were also advanced locally; one of these attributed the epidemic to a temporary contamination of the public water supply, while the other alleged that the absence of proper sewerage in the High Street, along with neglected scavenging of midden privies and other insanitary conditions, had conduced to propagate infection which had been introduced from without.

A brief reference to each of these three hypotheses is necessary, and for convenience I take them in the following order:—

- (1.) The influence of insanitary conditions, including deficient sewerage.
- (2.) The alleged pollution of the public water supply.
- (3.) The asserted contamination of a particular milk service.

(1.) *The Influence of Insanitary Conditions existing in Helmsley, including the present Sewerage and Drainage.*—In a report which I prepared for the Board in 1893 "on an outbreak of enteric fever in certain villages situated on the River Rye," I gave some details as to the sewerage of Helmsley, and noted that untreated sewage was discharged by this town into that river. The facts briefly recapitulated are as follows:—

The town, roughly speaking, has sewers provided for two-thirds of its population; with two outfalls, one direct into the Boro' Beck close to its confluence with the Rye, the second into a tank on the banks of the Rye with overflow into the stream. The tank has not been properly attended to, and might as well have never been constructed for any useful purpose that it serves at present. The remainder of the town, which is unsewered, comprises the High Street, Church Street, and Castlegate, practically one long, wide, straight street, through which flows the Boro' Beck (see Map). Near the top of the High Street stands the workhouse, with five waterclosets

discharging into a culverted portion of the Beck. Two other parts of the stream are covered in. Into one or another of the three culverted portions of the stream several waterclosets discharge, and into the lowest portion, the main outfall of one of the sewered sections of the town also discharges. The bed of the Beck within the covered parts is not prepared in any way; loose stones lie in it, and a good deal of garbage and house refuse is cast under the archways. Broken crockery, discarded dishcloths, old pots and pans, as well as other refuse materials, help to obstruct the channel. To these articles the filth discharged from drains and soil pipes clings, and decomposition of this sewage gives rise to bad smells in the vicinity of the archways. The worst, in this sense, of these archways, is naturally that situated lowest down, and which receives the most filth. At the date of my visit, the stench from the place where the Boro' Beck emerges from the last archway just before joining the Rye was exceedingly offensive, especially in the evening. One or two houses, including the police station, having waterclosets, deliver their sewage by pipes emptying independently on the margin of the uncovered portions of the Beck; and when the water in the stream is low, excrement accumulates in unsightly heaps at points along the bank. When a flood comes all this filth is swept away to the Rye. The condition of the bed of the Beck, and especially the condition of the channel within the three culverted portions of this stream, has formed the subject of reports by the Medical Officer of Health to the Rural Council in past years. Since 1876 the necessity for proper sewerage in the High Street has been pointed out by the sanitary officers. In 1878, a number of cases of enteric fever and of diarrhoea occurred in houses along the banks of this stream in the High Street. Some cases in schoolboys were attributed to their having adventured within these filthy tunnels. A scheme for sewerage of this portion of the town and for diverting the sewage from the Beck was then proposed. Ultimately an engineer was consulted and plans were prepared and discussed by the Sanitary Authority during 1878. The scheme, indeed, appeared to be in a fair way of being undertaken, when, unfortunately, early in 1879, the residence of the Earl of Feversham, to whom the plans had been submitted for approval, was burnt down. It was thought, at the time, that the sewerage plans had perished in the flames, but I have been informed that this was not the case. From this date, however, the question, notwithstanding annual reminders by the Medical Officer of Health to the Sanitary Authority, was allowed to drop, and nothing was done. However, in 1893, as the result of the inquiry into fever in Ryedale, found to be associated with contamination of the River Rye by the sewage of Helmsley, the sewerage question was again brought to the front. An engineer was engaged by the Rural Sanitary Authority, and plans were prepared dealing also with the disposal of sewage at the outfall. The plans were, during 1895, submitted to the Local Government Board in connexion with an application to contract a loan to carry out the work. But it is to be observed that to reach this stage it has taken the Sanitary Authority nearly 20 years, though the necessity for such works of sewerage has been pressed on their notice by the sanitary officers more or less during the whole time. The delay has doubtless been detrimental to those villages in Ryedale, below Helmsley, taking their drinking water from the Rye.* There can be no doubt that in 1895 the specific discharges from some of the early cases of enteric fever in Helmsley reached the Boro' Beck and the Rye, and it is likely also that in the first stages of most of the other cases before the fever diagnosis was made, the washings from linen soiled by the patients' bowel discharges similarly found their way into the water courses in question.

Much of the house drainage in Helmsley is defective. Faulty gradients, bad joints, and unskilled workmanship have combined, in certain instances, to cause frequent stoppages. For example, in making, recently, connexion of new house drains with a sewer, an unskilled labourer was employed, who laid improperly jointed pipes to the sewer, in which a hole was knocked and the pipe shoved through. Some houses have no connexion at all with the sewers. Slop water, in such cases, is thrown out upon bushes or tree roots in the garden. In one or two cases a hole has been dug in the garden and slop water

* While this report is passing through the press, I learn that sanction to the loan has been given by the Board.

conveyed there by a rough channel, and allowed to soak into the soil. Sometimes slop water is thrown into the open privy middens.

A considerable number of houses have covered ashpits, but there are many uncovered privy middens; these middens are sometimes merely holes dug at the back of the privy, without any brickwork to enclose them, and without paving at the bottom. Surface water, as well as the drip from the privy roof, finds access to them. Middens deep, wet, and foul, are occasionally found close to the back doors of cottages. Some privies are in a dilapidated state. A few years ago a large number of unwholesome middens were dealt with by the agent of the Duncome Park Estate, and replaced by others of a more modern type. It is to be regretted that this much-needed improvement was not completed, for some of the old middens remaining are a constant source of danger to health. This question of privy accommodation and refuse disposal is one that demands the serious attention of the Rural District Council. Some even of the modern ashpits were found overflowing at the date of my visit.

Though insanitary conditions have been found to favour the spread of enteric fever, the unwholesome state of some portions of Helmsley does not seem, in the present instance, to have affected the diffusion of the disease in any marked manner. No particular insanitary circumstance was common to any group of the August cases.

The only condition likely to have had any general effect upon the health of the town was the state of the Boro' Beck, and especially of the culverted portions in which masses of filth accumulate during dry weather when the stream runs low.

On July 26th, an extraordinary thunderstorm broke over the neighbourhood of Helmsley, and an enormous quantity of rain fell within a very short space of time, causing a sudden and unprecedented flooding of the Boro' Beck. So sudden and great a rise in the stream had not occurred, it is said, during the present generation. The Beck overflowed its banks and scoured away parts of the roadway in the High Street. The archways were swept free of filth accumulations. Between the culverted portions of the Beck in the High Street the water extended itself on either side as behind a dam. When the flood subsided, there was left behind a quantity of gravel, sand, and mud on the sides of the stream. Complaints were made that this mud had a foul odour. On September 18th, the roadmen raked together this débris left by the flood, and used it for mending the injured portions of the roadway, and some of it was used to repair a path just below the windows of two adjacent houses in the High Street, in which two fatal cases of fever afterwards occurred at the end of the month. It has been suggested that mud and sand which had been washed through the first archway, had dried, and had been wafted by the wind into the open windows of the two invaded houses; that it had contained infection; and that the poison had in this way reached the persons attacked, perhaps through contamination of food, or in some other fashion, after its entrance into the house.

It was also thought by some that the fouling of the surface, produced by deposit of infected mud, might have accounted for the fact that the largest number of houses attacked by the fever were situated in the High Street and Castlegate. But, as will be seen further on, a more complete explanation of their invasion is afforded in another way. It is, however, interesting to note that the accumulations of filth in the archway highest on the Beck (which is some 80 yards long) had in all probability been infected by the poison of enteric fever. For on July 11th two persons just convalescent from that disease arrived in Helmsley and proceeded to their respective homes, which were both situated above the first archway in the High Street. One patient had travelled from Bannockburn, the other from Colchester. It is asserted that possibly the bowel discharges of one or both of these cases on and after their arrival at Helmsley still contained the specific poison of enteric fever, and this is not at all unlikely. At least two, if not three, attacks occurring in children during September were attributed to their having played upon, and dug in, a heap of rubbish containing, among other things, some spent gas lime. In this heap had been buried, during a fortnight or more, the bowel discharges of an adult enteric fever case which

occurred in a house in Smith's Yard, to which there was no garden attached in which the dejections could be buried. I saw the heap alluded to, on an open space called "the bowling green," behind the gasworks. On the surface of the heap were portions of human excrement, and it is easy to understand that children digging among the rubbish would with their hands come in contact, and thus might infect themselves, with the faecal matter.

At a house called Canon's Garth, in which a fatal fever case occurred in August, there was, in September, a blocking of the drains which discharged to the Boro' Beck. In the process of unstopping these drains, considerable nuisance was created, and to this two of the later fever cases were locally attributed. This theory, however, may be dismissed, as both of the cases had developed or were developing enteric fever symptoms when the drains were opened (that is, during the last week in September), and could not, therefore, have been caused by the emanations escaping from the drains during the process of unstopping.

(2.) *The alleged Pollution of the Public Water Supply as a Cause of the Outbreak.*—As has been stated, the Helmsley supply is obtained from a spring a mile from the town, situated at the higher end of Beckdale. The spring is covered in by masonry, and 9-inch glazed stoneware pipes, with Stamford joints, convey the water to a covered reservoir, whence it flows to the town by gravitation. The water is therefore under cover, and protected throughout its course from the spring to the town. The reservoir situated in Beckdale has a capacity of 100,000 gallons, and is constructed of bricks faced with cement; the top is arched. It is cleaned out once a year, when a little sand, it is said, is all that needs removing. There is an opening with an iron cover on the top of the reservoir, and level with the ground, by which entrance can be obtained. An overflow pipe from the reservoir discharges into the Beck, which flows close by. Formerly the water supply of Helmsley was taken direct from this Beck (the Boro' Beck), from which an opening in the bank communicated at once with the reservoir. In those days, as soon as any storm water was in the Beck, the water supplied to Helmsley was for the time discoloured and muddy. To obviate this, Lord Feversham, in 1884, piped the water direct from the spring to the reservoir, and the connexion with the Beck was shut off. In the dry summer of 1893 the supply ran short, owing partly to the wasteful habits of some of the townfolk, who leave their yard taps running night and day all the year round, some having the idea they are by this means flushing their house drains; and, pending arrangements for increasing the amount of the supply, the Beck water was temporarily admitted to the reservoir. But as soon as the drought ended, the connexion was again closed. Another spring was selected, and in the present year (1895) pipes were laid a distance of some 500 or 600 yards to connect the "new spring" with the original, the Foothead Spring. The masonry enclosing the Foothead Spring was broken open, I am informed, at the beginning of September, to complete the connexions. The Foothead Spring, in 1884, was covered over by stone flags, the joints of which were cemented, and the whole was covered by a layer of clay. At the date of my visit to the spring (September 21st) I found the stone flags had been replaced after the connexion with the other spring was completed, but that no attempt had been made to fill in the joints with cement, or to otherwise render them watertight. *On the top of these flags some person had evacuated his bowels*, and it only needed a smart shower of rain to wash the human excrement that I saw there through the open joints of the stone flags into the water below, whence it would have been conveyed to Helmsley and to Duncombe Park, which also derives its supply from this source. The culpable negligence of the employés of the Duncombe Park estate office in leaving their work unfinished exposed the inhabitants of the town to the danger of drinking water polluted by human excrement; and had the evacuation above mentioned been that of an ambulant enteric fever patient, or that of a person incubating or one recently convalescent from the disease, there might have followed an epidemic on a far larger scale even than that now under consideration. Since the outbreak began early in August, the uncovering and exposure of the Foothead Spring in September could have had no concern

in the production of the fever. It is right to state here that as soon as the attention of Lord Feversham was called to the danger above described, he gave orders to have the covering-in of the spring completed at once.

The flood which occurred in the Boro' Beck on July 26th, swept down Beckdale (a narrow valley with steep wooded sides), where the stream overflowed its banks. From Mr. R. Sturdy, who has charge of the waterworks, I ascertained that the reservoir was for a short time submerged on this occasion, but that no water gained access to it through the manhole, the cover of which fits tightly. Some storm water at first backed up the overflow pipe, which, however, soon got choked up by leaves and sand, so as to plug the pipe and prevent any more flood water backing up into the reservoir. On opening the manhole cover next day to inspect the interior of the reservoir, Mr. Sturdy says that a little fine sand was the only trace that remained of the admission of flood water to the reservoir.

The fact that there were two convalescents from enteric fever residing in Helmsley during the last three weeks of July adds to the possibility that specific dejections might have been deposited by them in the narrow valley of Beckdale, or on its wooded sides, above the point where the reservoir is situated; in which case the flood might have washed the dejections down to the reservoir. Although the date of the flood (July 26th) and the recognition of the first group of cases (on August 15th to 19th) is quite consistent with the theory above indicated, yet the distribution of the cases in the town hardly lends much support to it; and for the rest there is little other evidence forthcoming in its favour. Of the 22 houses invaded during August, seven were situated in the High Street, four in Castlegate, four in the Market Place, three in Bondgate, and one each in four other parts of the town.

The exceptional incidence of the fever on the High Street and Castlegate* was held by some persons as supporting a theory that the pollution by sewage of the Boro' Beck, which flows through these streets, had more to do with the outbreak than had the water supply. But this excess of invaded households in the High Street and Castlegate is capable of other explanation. When the remaining theory comes to be discussed, it will be seen that a more definite and complete explanation of the origin and spread of the fever outbreak is forthcoming, altogether independent of circumstances connected with the public water service or with the Boro' Beck.

Before leaving the subject of water supply, it may be well to mention that at Helmsley there has recently been opened and repaired a shallow well, situated on the roadside in Bondgate, that was long ago closed. This well is only 20 feet deep. The steining of the sides is open. The surrounding soil is porous; a kitchen garden abuts upon the well, and there is an open, wet, privy-midden within 20 yards of the pump. The water is now being used by persons resident hereabouts, so it is said, for washing their butter, some of which is sold to the public. The water, in my opinion, is liable to pollution, and the surroundings of the well are such as to condemn it; it should be at once closed.

(3.) *Specific Contamination of a particular Milk Service.*—There are only nine registered milk sellers in Helmsley. No regulations are in force in the district, under the Dairies, Cowsheds, and Milkshops Order, prescribing the precautions to be taken to protect milk from infection. Many cottagers in Helmsley keep a cow. At present some 50 persons have the right to pasture their cows close to the town. The milk supply is therefore much subdivided; often persons possessing a cow supply their next door neighbours, but do not publicly sell milk. Although nine milk businesses are registered at the present time, five are on a small scale and hardly need mention here. The remaining four milk vendors do not at present keep more than three or four cows apiece, and the business done being somewhat similar in amount in each instance affords a basis of comparison.

The number of households served by each of these milk vendors does not vary very much, and ranges from 35 to 40. On inquiry it was found that

* There were 11 houses invaded in August along the course of the Boro' Beck in the High Street, Church Street, and Castlegate, comprising between them some 88 inhabited houses; the rest of the town, comprising about 180 inhabited houses, had only 11 invaded houses.

among these four milk sellers, the incidence of the fever upon their customers was as follows: milk sellers Nos. 1, 2, and 3 had *none* attacked; while milk seller No. 4 had, out of the 35 households usually supplied, *no less than 20 invaded in August*. So that practically, upon this milk service alone fell the full force of the fever outbreak. Of the 22 households (out of a total of some 274 in the town) invaded in Helmsley in August, 20 had been regularly supplied by this milk from vendor No. 4; in one more case the milk was taken in by the patient's grandmother, at whose house the child in question had on frequent occasions partaken of meals. There remains, therefore, only one household invaded in August unaccounted for. The mother in this instance refused to supply information or to give any help in the inquiry. Her neighbours say she neglected her children, who were badly fed. On certain occasions, charitable persons in the town took pity on the children and gave them food. It is therefore possible, that even this household might have derived fever infection from the inculcated milk supply, in food given, perhaps, in charity to the child who was attacked. Many of the persons prostrated by enteric fever in August were "milk drinkers." Some of them had milk (unboiled) each night for supper. Several of them were servant girls, who would have opportunities of getting milk that had stood in the house some time, and which was consequently more dangerous than fresh milk. The earlier cases were, in a number of instances, children.

The five households invaded during September could mostly be accounted for by personal contact of one or other of their inmates with previous cases. The outbreak appeared suddenly in August and subsided as suddenly in September. In short, the epidemic followed the usual course of a milk-borne outburst of enteric fever.

When at Helmsley I found that some difficulty had been experienced by the Medical Officer of Health in obtaining any information from the inculcated milk seller, who is a widow. From her own statements, corroborated in some degree by her neighbours, and from various other sources, I ultimately compiled the following history, which suggests the mode in which the introduction of the specific poison into her house may have been effected.

She had a daughter, Mrs. C., married to a corporal in the Army Hospital Corps, stationed at Colchester. Mrs. C. began to be ill with enteric fever on May 28th, 1895, and was nursed throughout her illness by her husband. On July 11th,* by permission, it is stated of her medical attendants, she travelled from Colchester to Helmsley accompanied by her husband, who was not feeling well. When Mrs. C. came to Helmsley the neighbours in the High Street observed that she looked "very poorly," but that "after a bit" she seemed better and began to assist her mother in the household work, and in the operations of the milk business. The corporal also looked ill. He had some obscure abdominal symptoms. He left Helmsley on August 10th, leaving his wife behind; she returned to Colchester on August 24th. On his return home Corporal C. is said to have received medical treatment for what is stated to have been "typhlitis." The milk seller's family at home consists of two children, a girl aged six and a boy aged eight. The former appears to have had some febrile disturbance on or about August 2nd. It is said she did not then see a medical man, but her mother fetched some medicine from the doctor for her. This little girl has had, on former occasions, so it was said, similar febrile attacks. On August 16th, Dr. Reid was sent for to see her, and on August 19th he notified the case as "relapsing fever." There were no other recognised cases of illness during July and August in this household. The house is the last one at the higher end of the High Street, on the right hand side of the Boro' Beck, into which the drains of the house discharge. The privy belonging to the house is

* With respect to the other person convalescent from fever who arrived in Helmsley, also on July 11th, from Bannockburn, where he had been detained for some weeks in an isolation hospital and dismissed as cured, no evidence could be discovered connecting him in any way with this fever outbreak: except in so far as he may have added a share of infection to the highest culverted portion of the Boro' Beck, with which the drains of the house where he stayed were connected.

in a yard between the house and the Beck, not many yards distant from the latter. The privy has no separate receptacle; the excrement goes into an open midden little better than a hole dug in the ground, the sides and bottom being in no way protected. This midden had been cleaned out just before my visit. The house itself is comparatively new. The cow-stable adjoins one end of it. The dairy is inside the house; it is situated on one side of the entrance, the kitchen or living apartment being on the other. The dairy was clean, and there appeared to be nothing connected with it of a sort to excite suspicion as to how the milk became infected. The three cows had been out at grass all the summer, and were said to be healthy. The milk seller herself did the milking, and the milk, she says, was delivered night and morning to the customers without being stored in the house. She denied that her daughter, Mrs. C., was ill in any way on her arrival in Helmsley; or that she brought any soiled linen with her from Colchester; or, further, that Corporal C. had any illness likely to have been enteric fever while at Helmsley. How far these denials are genuine it is impossible to say. But it is quite possible that Mrs. C. was still, through her dejections, in an infective state on her arrival at Helmsley from Colchester on July 11th. It is possible, too, that she may have brought with her linen that had not been completely disinfected, even though it might have been washed, at Colchester. It is also possible that the corporal had a mild or ambulant attack which gave rise later on to symptoms of "typhlitis" or threatened "perityphlitic abscess." If the milk seller washed her daughter's linen, and if she milked her cows with undisinfected hands, which from my own observation of her I think it not unlikely that she may have done, it is not difficult to understand how infection of the milk service occurred. She may have also in handling the food of the family conveyed infection to her little girl, who was ill on August 2nd; or, if this child's attack was not, as is contended, enteric fever, the child may nevertheless about that date have become infected, like other people, through the milk supply, and later on, developed a true attack of enteric fever, for which medical advice was sought on August 16th.

In whatever way the fever poison may have actually reached the milk after the infection had been brought to the house, there can be no doubt that this milk supply did become infected, and that as a consequence enteric fever was spread among the customers by means of the milk. The occurrence of a number of the cases in the High Street has been already mentioned. Exceptional incidence on this locality might in some measure have been due to the fact that a considerable number of persons residing in the High Street took their milk supply from this dealer, as her dairy was nearest at hand and most convenient for them.

As soon as Dr. Porter, the Medical Officer of Health, satisfied himself that this particular milk service was likely to have been concerned in the spread of the fever, *i.e.*, on August 19th, he ordered sale of the milk to be stopped. Arrangements were made, it is stated, whereby the business was transferred meanwhile to other hands, and as a result, allowing for the average incubation period of enteric fever, the outbreak at once subsided. The few later cases in September were referable, as has been said, to infection from previous cases, or were secondary cases in already invaded households.

Measures taken to Prevent the Spread of the Fever.

The first step, as has been mentioned, was the stopping of the sale of the incriminated milk on August 19th. Dr. Porter also drew up the draft of a handbill, advising certain precautions, to be issued to the townsfolk, but this was not printed by the District Council. It seems a supply of old bills, issued on a former occasion some years ago, were found at the clerk's office, and these were distributed instead. Disinfectants (Calvert's Carbolic powder, and chloride of lime) were supplied gratuitously to all applicants. Steps were also taken to have the town sewers flushed. The Rural District Council, it is said, then engaged two men of the labouring class to go round Helmsley to examine into the state of the house drains and yard gullies. These men appear to have made a special examination of trapped gullies receiving the rain-water from downfall pipes, and they seem to have devoted particular

attention to houses of the better class. They reported that "all was right at Helmsley" in this respect, except with regard to the trapped gullies attached to the premises of the vicar, the medical officer of health, and the local banker. The drainage of all three houses is of modern construction, and perhaps the best in Helmsley. These labouring men, when they found some little black deposit left by the roof washings (containing soot) in the gully traps, reported such traps as *foul* and in *bad condition*. This examination of house drainage may be regarded as almost a burlesque inspection, and has reflected little credit upon the so-called "inspectors" or upon the District Council who employed them.

In the panic which followed the occurrence of a plurality of cases of fever in Helmsley during August, the vicar (to whom the Helmsley people owe their thanks for his well-considered efforts to help them) published in the "Parish Magazine" certain recommendations as to boiling of water and milk, and as to taking other precautions. Further, in his desire to prevent what was already occurring in some families, namely, the infection, through want of care, of those nursing the sick, he caused to be printed and distributed to all invaded houses a handbill containing special "warnings as to nursing cases" of enteric fever, a copy of which is appended.

In some instances, the patient's bowel evacuations were cast, without any attempt at disinfection, into the open privy midden. It is to be feared that a number of middens were in this way specifically infected. It is to be hoped that the emptying of such middens and the spreading of their contents on grass land or gardens near houses will not give rise later on to fresh cases. In the later stages of the epidemic more care was taken of the dejections, which were in most cases carefully disinfected and then buried.

All the cases were treated at their homes. Several domestic servants and apprentices went home early in their illness to be nursed by their parents in adjoining districts. In some five or six households, where the expense could be borne, trained nurses from York were employed to attend upon the fever-stricken persons. One of the trained nurses, as has been mentioned, contracted the disease.

One case, connected with the riverside outbreak to be presently described, in a person residing at Sproxton, a mile from Helmsley, but who had been for some weeks harvesting at Newton, was removed to Helmsley Workhouse for treatment on September 25th. This case is not included in the number of the Helmsley cases, but has been referred to the township (Newton) in which it was contracted. At the Helmsley Workhouse there is no trained nursing, but a trained nurse was employed at the Earl of Feversham's expense to attend to this fever case, a nomadic harvester, during his stay at the workhouse.

SANITARY ADMINISTRATION BY THE HELMSLEY RURAL DISTRICT COUNCIL.

The Helmsley Rural District Council have no byelaws; no regulations as to dairies, cowsheds, and milkshops;* no hospital accommodation for the isolation of cases of infectious disease; and no proper apparatus for the disinfection of clothing, bedding, &c.

The Infectious Disease (Notification) Act, 1889, has been adopted, and came into force on October 2nd, 1893; but no part of the Infectious Disease (Prevention) Act, 1890, or of the Public Health Acts Amendment Act, 1890, has been adopted as yet.

As has been mentioned in the early portion of this report, there are two Medical Officers of Health, viz., Dr. J. F. Porter (B.A., M.D. Trin. Coll., Dublin, M.R.C.S. Eng., Coroner for the North Riding) for the Helmsley Division; and Dr. J. Robertson Reid (M.B. and C.M. Aberdeen) for the Oswaldkirk Division.

These gentlemen are also Poor Law District Medical Officers and Public Vaccinators; both reside in the town of Helmsley. Neither of them

* While this report is passing through the press, I am informed that regulations under the Dairies, Cowsheds, and Milkshops Order have now been adopted by the Rural District Council.

has as yet taken steps to acquire a special qualification in Public Health. It is a matter of regret that at present no regular and systematic house-to-house inspections by the Medical Officers of Health, in company of the Inspector of Nuisances, are carried out in either of the divisions of this Rural District; special visits, however, are paid, and reports made when occasion arises.

The Inspector of Nuisances, Mr. George Jones (not certificated), has held office since 1873, and has performed his duties conscientiously and satisfactorily until quite recently, when, owing to ill-health, he has been unable to do his work. His salary is 20*l.* per annum; a small salary for the supervision of a district comprising nearly 68,000 acres. He also holds the post of bailiff to the county court. During September 1895, Mr. Jones, with the concurrence of the Rural District Council, nominated a deputy to act for him during his illness, and I am given to understand that if Mr. Jones finds his health still unsatisfactory in the spring of 1896 he will resign his office. Perhaps to the illness of Mr. Jones is due the unsatisfactory condition of many ashpits, middens, &c., in Helmsley, for here, as elsewhere, there are people who do not trouble about unwholesome accumulations close to their dwellings, unless someone forcibly draws their attention to the nuisance by serving a notice.*

The Rural District Council appear to take little interest in sanitary matters, judged by what they have expended in sanitary works for improving the condition of the district. According to a recent return the expenditure for sanitary work in the Helmsley Rural District was the lowest in the North Riding with two exceptions. Among the members of the Council are found a few who, recognising the advantages likely to accrue to public health, are desirous to improve the local conditions; but there are others who for a series of years have opposed all schemes proposed in connexion with the sanitation of the district, posing to the public as protectors of the ratepayer's pocket, deaf to reason and blind to facts. Besides these two classes is the main body of the Councillors, which is apathetic, leaving discussions to the others, and content to go on "in the good old way" so long as trouble be avoided.

The apathy of the Rural Council has been recognised by the Helmsley Parish Council, who, desirous to improve the town, appointed, some months ago, a committee of their own body to make an inspection of Helmsley. This committee reported a number of insanitary conditions, structural and other, needing attention; but these, I am led to understand, have not yet been satisfactorily dealt with. The present sanitary condition of Helmsley leaves much to be desired, though from its numerous natural advantages, the town ought to be one of the healthiest as well as one of the most beautiful in the kingdom. It is hoped that the recent outbreak of fever may have served the useful purpose (though at the cost of life and suffering) of awakening local public opinion, and of arousing some of the rural councillors from their apathy and neglect of duty.

II.—ENTERIC FEVER IN RIVERSIDE LOCALITIES BELOW HELMSLEY.

In September and October, subsequent to the outburst of enteric fever at Helmsley, there appeared a number of cases of this disease at Newton, Nunnington, and Butterwick, villages situated in Ryedale, along the course of the River Rye. These cases numbered 17, viz., five connected with Newton, 11 with Nunnington, and one with Butterwick. Of the five cases connected with Newton, one resided at Stonegrave, where also occurred six other unnotified cases during September, presenting symptoms of an enteric kind, including headache, feverishness, diarrhœa, debility, and anæmia; the duration of the illness in these six cases was short—about a week it

* In the yard attached to a slaughter-house I observed, for example, an accumulation of manure estimated at over 20 loads.

is stated. Regarding them as mild or abortive cases of enteric fever, we have to deal altogether with 23 cases, eight of which resided at Stonegrave, though all had probably contracted their illness elsewhere, having been engaged in harvesting at farms adjacent to the Rye. In each instance the patient admitted having drunk raw river water.

The earlier cases appeared at the beginning of September. During the first fortnight (*i.e.*, from September 1st to the 14th) no fewer than 18 out of the total 23 cases developed the first symptoms of their fever attack; other four occurred in the latter half of the month. Only one case, a secondary one, occurred in October.

Only one of these 23 cases proved fatal, though several others were reported by their medical attendants as being, for a time, in a critical state and as likely to die.

Newton-with-Laysthorpe is a township in the Oswaldkirk Division of the Helmsley Rural District, and in the ecclesiastical parish of Stonegrave. The area of Newton township is 940 acres, and its population at the last Census was 51. There is no village, the population being distributed among three farmhouses and some scattered cottages. The River Rye skirts the township, the land sloping somewhat sharply up from the river to the crest of a ridge or spur of the Hambleton range.

Nunnington railway station is in Newton township, and the station-master's house has practically no water supply at all; the water used is brought daily from Helmsley by passenger train—a distance of $3\frac{1}{2}$ miles. Two of the farmhouses depend on rain-water stored in underground cisterns. During the summer of 1895 this supply failed, and water was led in carts from the Rye to the farmhouses. These rain-water cisterns receive surface water, in one case from the kitchen garden, in the other from the yard and garden where there is an open privy midden; the drainage from the midden flows in wet weather along the ground towards the cistern, the top of which is not protected against the entrance of surface water. This privy midden is not many yards away from the cistern. The privy is built against the gable of the house, and adjoins the pantry, the walls of which are stained by soakage of fluid from the midden outside. Over the open midden is a bedroom window. The rain-water in the cistern has a bad smell. Complaint is also made of smells inside the house, coming from the wall against which the privy is erected. At the third farmhouse there is a well about 40 feet deep close to the back door. The top of the well is not properly protected from surface washings. The amount of water in the well is insufficient for the purposes of the farm. At each of the three farmhouses cases of enteric fever occurred either in the family, among the servants, or among temporary harvesters. In each instance water from the Rye had been led in carts to supply the house, and for the harvesters in the fields. Some of the latter, when working in riverside fields, drank the water direct from the stream. One of the fever patients, as has been mentioned, a nomadic harvester, who had been at work at Newton, was removed on September 25th to Helmsley Workhouse for treatment; another, a servant lad, feeling unable to work, went home to a village in the Kirkbymoorside Rural District, where he passed through a severe and typical attack of enteric fever.

Newton needs a new water supply, for, owing to the insufficiency of the present supply, the inhabitants are compelled, in the summer time, to resort to the river; moreover the rain-water which they store is at best a precarious supply, and is, under present conditions, dangerously polluted.

Stonegrave, a township in the Oswaldkirk Division of the Helmsley Rural District, has a population of 124 and an area of 915 acres. The village does not lie near the Rye, but is separated from it by the ridge or spur already mentioned, Stonegrave being situated upon the south side of it and Nunnington on the north side. The two villages are a little over a mile apart. Two cases of enteric fever were, as has been said, notified from Stonegrave; one patient contracted her illness at Newton, as also probably did the six mild or abortive cases already alluded to; the other notified patient came home ill from his situation at Nunnington, where he had taken

the disease. Stonegrave has an inadequate water supply. A small brook skirts the southern side of the village, and from it water is often taken for domestic purposes. This brook, a tributary of the Rye, is polluted above Stonegrave, and as a source of supply is unsafe. There are several wells in use; the least shallow of them, I am told, is not more than 36 feet deep.

The village lies on a sharp slope, and as the wells are mostly at the foot of the slope, soakage of fluids from midden privies, &c., is likely to travel towards them. Half of the villagers have, for a time, used water from the Rectory well, which is 25 feet deep, and fairly well protected against surface impurities. This well, however, can soon be pumped dry, and its water does not suffice to supply those desirous of using it. Recently the landowners (the Rutson trustees) have sunk several new wells with a view to remedy the inadequacy of the supply. The water in one new well has a sulphurous smell, and is, at times, opaque or milky. The people do not care to use it in consequence. Another well 12 feet deep or so, is near the churchyard, the slope being from the latter to the well. As the village is not sewered, and as there are open privy middens close to the houses, local wells here are liable to pollution. Nothing short of a scheme to supply the village from a source free from all chances of pollution can be regarded as satisfactory. Steps have indeed been taken by the villagers to obtain water from a spring some 2,000 yards away. An engineer was employed by a committee of the parish, plans and estimates were prepared, and there seemed a likelihood of the scheme being carried out. But delay has occurred in consequence of later proposals to include Newton in the arrangement, and in that event a gravitation scheme would be prepared.* It is affirmed that the water of a spring at Prior's Ridge, on the Hambleton Hills, could be obtained, by arrangement, from Lord Feversham, and that this water would be sufficient for Newton and Stonegrave, supplying outlying farmhouses on the way, and, perhaps, even for Nunnington.

Nunnington is a village with a population of 354, situated on the banks of the Rye and in the Rural District of Kirkbymoorside, about five miles below Helmsley. The sanitary condition of this village was described in my report, already alluded to, on an outbreak of enteric fever in Ryedale at the end of 1892 and beginning of 1893. Many persons here, in spite of warnings, continue to use the Rye water for domestic purposes. Since the issue of that report, the landowners (the Rutson trustees) have sunk two new wells to a depth, I am told, of 65 feet, in limestone rock. They have also re-opened and deepened by boring a well that was closed some years ago at the instance of Dr. Muil, the Medical Officer of Health, owing to its polluted condition. The water in these wells is more or less hard, and the people do not care much for it, preferring the softer river water. The new wells were hardly in working order at the time of my visit. The water pumped up was muddy or opaque. A turnip field abuts upon one well, and there are houses on the slopes above both new wells. In Nunnington there are open and wet privy middens, permitting soakage of excremental matters into the soil. There is no proper sewerage, though there are some drain pipes laid in the lower parts of the village. The limestone rock yields a hard water, and there is a possibility of the existence of cracks and crevices in the rock allowing of ready passage from the superficial soil of foul liquid to the wells. If the gravitation scheme proposed for Stonegrave and Newton could be extended to Nunnington, a satisfactory solution of the constantly recurring difficulties in connexion with its present water supply would be obtained. The efforts of the landowners, though commendable, do not go far enough, and a comprehensive scheme must sooner or later be carried out.

Ten cases of enteric fever occurred in Nunnington in September 1895, and one in October (a parent whose son was already fever-smitten); the 10 cases occurring in September had all drunk Rye water.† In the outbreak which occurred here in the latter part of 1892 and beginning of 1893 there were

* Under date of November 16th, I learn that the Helmsley Rural District Council have declined to take any steps with regard to obtaining a new supply of wholesome water for Stonegrave.

† In one case it was denied that the patient, aged eight, had drunk unboiled river water. The cottage abutted on the Rye. The boy played daily on its banks, and he visited his companions' homes where only raw Rye water was used. He had ample opportunities for getting the Rye water, and though his mother denies it, it is considered certain this boy at times drank Rye water with his companions.

21 cases. This village therefore has had an exceptional amount of fever in it within the last three years. Under the circumstances it is very desirable that comprehensive measures should be taken to secure for it a pure and plentiful supply of water from a source free from all liability to contamination.

Butterwick is a village with a population of 69, situated on the banks of the Rye, about four miles below Nunnington. It is in the Malton Rural District. In my report on the outbreak of 1892-93, above referred to, this village was described. Only one case of enteric fever was notified in September 1895 from Butterwick, a child, who I am informed by his medical attendant, Dr. Sprent, drank Rye water.

The riverside villages of Ness (population 95) and Brawby (population 148), which also suffered from fever in the outbreak of 1892-93, appear to have escaped entirely in 1895. The strongly pressed advice the inhabitants received from their respective Medical Officers of Health to avoid the use of river water may be thought of as having had a good effect.

The Source of the Outbreak.

There can be little doubt that these fever cases in Newton, Stonegrave, Nunnington, and Butterwick, were due to the drinking of specifically infected water taken from the River Rye. The water supply was the only condition common to all the cases occurring as they did at the same time in three different sanitary districts. The pollution of the Rye by the sewage of Helmsley, and the contamination of this sewage by the specific dejections of enteric fever patients have already been described, and need not be further insisted upon. In my own experience I have met with no clearer examples of river-borne enteric fever than these. The use of the river water has been the cause of the mischief now as in former years. The remedy has already been indicated, *i.e.*, the provision of water supplies from sources other than a polluted stream.

Measures taken to Check the Spread of the Disease.

At Newton and Stonegrave, Dr. Reid, the Medical Officer of Health, urged the boiling of all potable water. At Nunnington, as in 1893, Dr. Muil, the Medical Officer of Health, issued a handbill (copy appended) as to the water supply; and again with good effect. At Butterwick, and other riverside places in the Malton Rural District, Dr. Ernest Colby issued printed placards, strongly advising people not to drink Rye water, and in any case to boil all water used for drinking purposes. In each locality precautions were taken to disinfect the fever patients' bowel discharges and to bury them in the ground.

I append an extract from meteorological observations taken by E. K. Spiegelhalter, Esq., F.R.M.S., of Malton, to whom I beg here to express my obligations, dealing with the temperature and rainfall during July, August, and September 1895. Malton,* where the observations were made, is 15 miles from Helmsley, and about 10 from Nunnington; no records could be obtained nearer to the scene of the outbreaks.

In conclusion, I have to thank the medical men of the locality for their co-operation in my inquiry, and for information regarding the cases occurring in their several practices. My thanks are also due to the officers of the Helmsley Rural District Council for their assistance in my investigations, to Dr. Muil, the Medical Officer of Health for the Kirkbymoorside Rural District, and to Dr. Ernest Colby, Medical Officer of Health for the Malton Rural District.

November 18th, 1895.

R. BRUCE LOW.

* I made inquiry, when in the locality, of medical men and others as to recent occurrence of enteric fever at Malton, which, some years ago, suffered from an exceptional amount of that disease. I learned that cases of enteric fever in 1895 had been few, mostly imported. During September, two cases were notified to the Medical Officer of Health, both being importations (one of them from Helmsley). The riverside well supplying the town of Malton is now protected from pollution from the floods in the Rye by means of a raised embankment. I am informed that since the embankment was heightened no muddy water has been delivered to the town, and that there have been no more outbreaks of diarrhoea.

RECOMMENDATIONS.

I. The Helmsley Rural District Council should use their best endeavours to hasten the completion of the new sewerage scheme so as to put an end to the pollution of the Boro' Beck and of the River Rye.

II. The Rural District Council should direct their attention to the condition of the midden privies in the district, which, as at present constructed, are a source of nuisance of a grave kind and cannot fail to be injurious to health. Where efficient sewers and an adequate supply of water are at hand, waterclosets may with advantage be substituted. But where fixed receptacles for excrement are retained they should be reduced to the smallest practicable dimensions, and so constructed as to keep out all unnecessary moisture, and to facilitate the mingling of ashes with excrement. All privies causing nuisance should be dealt with as such.

III. Inspection of the district for the discovery of nuisances should be conducted thoroughly and systematically in accordance with Section 92 of the Public Health Act. Nuisances should be *sought out* and the provisions of the Public Health Act for their repression should be enforced independently of complaints from private individuals.

IV. With a view to the more effective sanitary administration of Helmsley the Rural District Council should apply to the Local Government Board for urban powers in respect of the town of Helmsley, and should adopt byelaws for this contributory place based on the Board's model series relating to—

1. Nuisances.
2. Scavenging.
3. Common lodging-houses.
4. Slaughter-houses.
5. New streets and buildings.

V. The Rural District Council should carefully consider the question of availing themselves of the provisions of the Infectious Disease (Prevention) Act, 1890, and of those provisions of the Public Health Acts Amendment Act, 1890, which may be put in force by adoption or may be rendered applicable by the action of the Local Government Board under Section 5.

VI. The Rural District Council should provide, by themselves or in combination with some neighbouring authority or authorities, and keep in readiness, a hospital for the isolation of persons suffering from infectious disease. It is not necessary that the accommodation provided in the first instance should be on a large or costly scale, but it is essential that it should be ready beforehand, in order that, by prompt isolation of first cases, outbreaks of infectious disease may be cut short at their onset.

APPENDIX I.

(Copy of Handbill issued by the Vicar of Helmsley.)

TYPHOID FEVER.

Warnings as to Nursing Cases.

It should be clearly understood that in nine cases out of ten the disease is conveyed by food or drink through the mouth; rarely through the lungs.

- (1.) Be careful where you keep your food; away from untrapped drains, privies, &c. Boil all water and milk before you drink them when typhoid is about.
- (2.) The person who waits on the patient should be extremely careful. Infection is only conveyed by what comes from them; the stools and urine should be passed direct into strong disinfectant, Jeyes' or carbolic, and buried at once in the ground. After the vessel has been cleansed well with disinfectant, your own hands must be *thoroughly washed* in a basin of strong Jeyes' disinfectant before you touch food or any vessel or thing that has to do with food. A big basin of strong Jeyes' should be kept for this purpose handy and changed three times a day.

Also all soiled linen from the patient should be steeped in strong carbolic, and washed out separately. It must be understood that the seeds of the disease are in the stools and urine. To handle food or food vessels after handling vessels containing these is *most dangerous*. If the person who nurses is the same as the one who prepares the food the greatest care must be taken.

C. N. G.

APPENDIX II.

(Copy of Poster issued by Dr. Muil, at Nunnington.)

TYPHOID FEVER.

All persons are hereby again reminded of the danger of using water taken from the River Rye for drinking purposes, unless it has previously been *well* boiled (filtration alone being insufficient), and all parents are earnestly requested to impress this necessary precaution on their children.

WILLIAM MUIL, M.D.,

Medical Officer of Health,

Kirkbymoorside Rural District Council.

18th September 1895.

METEOROLOGICAL OBSERVATIONS taken at MALTON, by E. K. SPIEGELHALTER, Esq.,
F.R.M.S.

JULY 1895.

Day of Month.	Thermometer.		Rainfall.	Remarks.
	Maximum.	Minimum.		
			Inches.	
1	71·5	54·	·36	Fair, overcast, heavy showers, thunder.
2	67·5	55·	·12	Fair, overcast, heavy showers, thunder.
3	66·9	53·	·10	Fair, overcast, showery.
4	65·6	48·4	·02	
5	68·	40·	—	Fine, warm.
6	75·	39·	—	Fine, warm, clear, sunny.
7	76·2	47·	—	Fine, warm, clear, sunny.
8	79·	46·	—	Fine, overcast, hazy.
9	72·	58·	—	Fine, overcast, hazy.
10	72·8	55·	—	Fine, overcast, hazy.
11	68·	50·	·47	Dull, steady rain all night.
12	70·	48·	·01	Dull, showery.
13	69·3	47·5	·01	Dull, cooler.
14	68·	45·	·06	Fair, very gusty, showery.
15	70·	43·	·09	Dull, rainy.
16	68·5	44·9	—	Fair.
17	73·5	45·	1·01	Fine, close, heavy rain all night.
18	74·5	43·	·06	Dull, rainy.
19	69·	57·	·12	
20	68·7	50·	—	Sky overcast.
21	67·6	51·	·30	Fair, overcast, showery, heavy rain at night.
22	67·	49·6	·28	Fair, overcast, showery, thunder.
23	66·7	50·	·21	Dull, rainy.
24	66·	49·5	·40	Dull, rainy, bright intervals.
25	63·8	49·	·33	Dull, rainy.
26	74·	54·	·71	Dull, close, very warm, sheet lightning.
27	67·5	59·2	·09	Dull, very unsettled, heavy showers.
28	68·5	52·	·01	Dull, overcast, cooler, bright intervals.
29	64·	53·	—	Dull.
30	66·	47·6	—	Fine, clear, sunny.
31	69·	48·	—	Fair, cool, overcast.
		Total	4·76	

METEOROLOGICAL OBSERVATIONS taken at MALTON, by E. K. SPIEGELHALTER, Esq.,
F.R.M.S.

AUGUST 1895.

Day of Month.	Thermometer.		Rainfall.	Remarks.
	Maximum.	Minimum.		
			Inches.	
1	63·	47·	·03	Dull, cool, rainy, thunder.
2	69·5	49·	·07	Dull, cool, rainy, thunder.
3	67·4	47·5	·30	Dull, cool, rainy, heavy showers.
4	63·	48·	·02	Dull, cool, showery.
5	66·	52·	·01	Dull, cool, showers, bright intervals.
6	66·5	46·	·08	Fair.
7	68·6	47·	·01	Fine, warm, overcast, showers.
8	70·	43·	·07	Fine, warm, overcast, showers.
9	73·5	52·	·03	Fine, warm, overcast, showers.
10	72·	51·	·01	Fair, sunny, showery.
11	73·	53·	·06	Fine, overcast, heavy showers.
12	72·5	51·5	·13	Fair, bright intervals, heavy rain till evening.
13	67·5	51·	·07	Fine, overcast, showers.
14	66·5	50·	·30	Fine, warm, oppressive.
15	72·5	54·	·01	Fine, warm, oppressive.
16	71·	55·	—	Fine, warm, very warm, more settled.
17	74·	56·	—	Fine, warm, sunny.

Day of Month.	Thermometer.		Rainfall.	Remarks.
	Maximum.	Minimum.		
			Inches.	
18	71·	59·	—	Fine, warm, sunny.
19	76·	60·	—	Fine, warm, sunny.
20	78·5	52·	—	Fine, warm, very clear and sunny.
21	76·4	49·	—	Showery, dull, warm, thunder.
22	74·3	50·	—	Showery, dull, warm, thunder.
23	77·2	56·	·15	Showery, dull, warm, thunder.
24	69·8	45·	·20	Fair, overcast, cool, fine.
25	70·	42·	·05	Fine, sunny, heavy showers at night.
26	69·5	38·	·24	Fine, sunny, heavy showers at night.
27	68·2	46·	·10	Fair, showery.
28	72·	50·	·02	Fair, showery.
29	74·	51·	·03	Fair, showery.
30	71·	47·	—	Fine, overcast.
31	73·	49·	—	Fine, gusty.
		Total -	1·99	

METEOROLOGICAL OBSERVATIONS taken at MALTON, by E. K. SPIEGELHALTER, Esq.,
F.R.M.S.

SEPTEMBER 1895.

Day of Month.	Thermometer.		Rainfall.	Remarks.
	Maximum.	Minimum.		
			Inches.	
1	75·	47·	—	Very fine, clear, sunny, cool.
2	81·	45·	·23	Very fine, clear.
3	73·3	51·5	·05	Very fine, heavy showers.
4	68·	50·	·07	Very fine, heavy showers.
5	65·	47·	·62	Fair, showery.
6	70·	45·	—	Fine, clear, sunny, heavy rain at night.
7	71·	59·	—	Fair.
8	70·5	47·	—	Fair, clear, warm, sunny.
9	77·	45·	—	Fine, warm, sunny.
10	74·	48·	·15	Fine, close, rainy.
11	71·	50·5	—	Dull, changeable.
12	65·5	47·	·02	Dull, changeable, showery.
13	65·	42·	—	Fine, cool.
14	64·	36·5	—	Fine, cool.
15	70·	37·	—	Fine, cool, hazy.
16	69·	39·5	—	Fine, cool, sunny.
17	64·	38·	·02	Dull, overcast, showery.
18	62·5	41·	—	Fine, clear, sunny.
19	67·	39·	—	Fine, clear, sunny.
20	63·	37·6	—	Fine, clear, sunny.
21	65·	42·	—	Fine, clear, sunny.
22	76·	34·	—	Fine, clear, sunny, very warm.
23	78·	37·	—	Fine, clear, sunny, very warm.
24	79·5	40·	·03	Fine, clear, sunny.
25	80·	35·5	—	Fine, clear, sunny.
26	79·8	49·	—	Fine, clear, sunny, very hot.
27	80·5	56·	—	Fine, clear, sunny, very hot.
28	80·9	58·5	—	Fine, clear, sunny, very hot.
29	79·5	56·	—	Fine, clear, sunny, very hot.
30	74·	47·	·01	Very foggy at first, fine, warm later, heavy dew.
		Total -	1·20	