DIARRHOEA AND SCAVENGING.

BY J. SPOTTISWOODE CAMERON, M.D.,

Medical Officer of Health of Leeds.

THE death-rate from diarrhoea is so essentially dependent upon seasonal influences that the mere comparison of one year's rate with that of another, unless account be taken of the meteorological conditions in the autumn quarter, is of very little value. It is, however, better to record the facts, and comment upon them afterwards. During the fifty-two weeks of the year 1899 there were 404 deaths recorded as due to diarrhoea or dysentery. In 1898 the number had been 512; in 1897, 643; in 1896, 284; and in 1895, 621. In the five preceding years the number had averaged 375.

Distribution in Time.—The 404 deaths occurred, 2 in the first, 17 in the second, 361 in the third, and 24 in the fourth quarter of the year. Each of these quarters consisted of thirteen weeks.

According to the Registrar-General, in the first quarter the diarrhoea death-rate in Leeds was 0·04, against 0·15 in the thirty-three large towns. During the second quarter the Leeds rate was 0·17, and that of the large towns 0·19. In the third (diarrhoea quarter) the local rate was 3·31, that of the thirty-three towns 4·16. In the fourth quarter the local rate fell to 0·24, while that of the large towns was 0·34. The rates for the whole year were—for Leeds 0·94, for the great towns 1·21. According to the local statistics for the four quarters respectively, the rates were 0·02, 0·16, 3·42, 0·23, and for the whole year 0·96.

Meteorology.—The mean temperature of the air was higher in the third quarter than in the second quarter of the same or the corresponding quarter of the previous year; the moisture in the atmosphere was less than in the preceding quarter, but greater than in the corresponding quarter of 1898. The diurnal range of the thermometer and the rainfall also were both less than in the second quarter of 1899, and both greater than in the third quarter of the previous year. Some remarks are made in a later paragraph upon the number of hot days in Leeds and some other Yorkshire towns.

Comparison with other Towns.—The Registrar-General, in Table X. of his report for the third quarter, gives the death-rate during the thirteen autumn weeks for each of the thirty-three towns, and for each week of the quarter. It has been already seen that our death-rate in 1899 was 0·9 per 1,000 lower than the average rate of the thirty-three towns. Our rate was lower than in twenty-one, higher

than in eleven, of those towns. The eleven with death-rates lower than that of Leeds were: London, Cardiff, and Croydon, 3·2, all within a decimal point of our rate, Oldham 3·0, Derby and Huddersfield 2·9, Swansea, Birkenhead, and Blackburn with low rates of 2·5, Newcastle 2·4, and Halifax 1·6. The rate in Bradford was 3·4, in Plymouth 3·5, in Bristol 3·6, none of these three differing greatly from our own. In Gateshead and Sunderland it was 3·7 and 3·8. Wolverhampton, Norwich, Leicester, and Hull had death-rates, the three former just below, the latter just above, 5. Sheffield, Bolton, West Ham, Brighton, Nottingham, and Birmingham had rates of 5·6 to 5·9; Portsmouth, Burnley, Manchester, Salford, 6, or a little above it, Liverpool 6·5, and Preston 7·2. The local death-rate was a little below the average rate (3·6) for the ten years 1889-1898, as computed by the Registrar-General.

In Table IX. the Registrar-General gives the diarrhoea death-rate in these ten years for twenty-eight towns. Leeds had a lower death-rate from diarrhoea during the ten years than eight of these towns, a higher death-rate than eighteen. The rate was the same as that of Leeds in one town, Bolton. Excluding Bolton, with a rate of 3·6, the eighteen towns whose death-rate during the decade 1889-98 from diarrhoea was less than that of Leeds were: Birmingham 3·4, Manchester 3·2, Blackburn and Nottingham 3·1, Norwich 3·0, Portsmouth 2·7, Bradford 2·6, Birkenhead 2·4, Cardiff 2·3, Brighton, Newcastle, and Derby 2·2, London 2·1, Plymouth 2·0, Oldham 1·7, Bristol 1·4, Huddersfield 1·0, and Halifax 0·7. Of these nineteen towns, nine only had rates below that of Leeds during last year. They were: London and Cardiff 3·2, Oldham 3·0, Derby and Huddersfield 2·9, Birkenhead and Blackburn 2·5, Newcastle 2·4, Halifax 1·6. The remaining ten had, in 1899, along with all the eight with a higher rate for the decade, rates above that of Leeds.

Another point is also noteworthy. Of the twenty-eight towns, in only four was the death-rate last year below the average which obtained in the previous ten years. These towns were Blackburn, Leicester, Sunderland, and Leeds. In Blackburn, the only one of the three with a lower death-rate than Leeds, the rate fell from a decade average of 3·1 to 2·5 last year. In Leicester, whose rate was considerably above that of Leeds, it fell from an average of 5·1 to 4·7 in 1899. In Sunderland, with a decade rate of 3·9, the rate last year was 3·8.

The fall in death-rate last year in these four towns respectively was the greatest in Blackburn. With an already low decade death-rate, the fall from 3·1 to 2·5 per 1,000 is one of 19 per cent. The

fall in Leicester was less than 8 per cent., in Sunderland a little over $2\frac{1}{2}$ per cent., in Leeds just $8\frac{1}{2}$ per cent.

Comparing Leeds with the five other Yorkshire towns, both Huddersfield and Halifax have for long had low rates from diarrhoea. Both, however, more than doubled their ten years' average last year, while the local rate fell appreciably below its average. Bradford has also generally had a lower death-rate from diarrhoea than Leeds; last year the rate was a little, though only a little, higher. Sheffield has had a higher death-rate previously than Leeds. Its rate was also higher than that of Leeds last year. The same is true of Hull.

It will be noticed that, in regard to these towns, Huddersfield, Halifax, and Bradford stand at greater elevations than Leeds. Sheffield is somewhat similarly situated, though rather more elevated than Leeds, whilst Hull stands in a flat country close to the sea. The towns with a comparatively greater elevation, the town with a similar elevation, and the town with a lower elevation, all had death-rates last year higher than their respective averages during the decade. The Yorkshire towns to the north, to the south, to the east, and to the west of Leeds all increased their death-rate, while that of Leeds fell.

Each of the six Yorkshire towns except Sheffield sends meteorological returns to the Registrar-General. In the report for the third quarter already mentioned, Mr. Glaisher analyzes the daily maximum temperatures of the principal stations for certain hot periods from the 6th to the 22nd of July, from the 29th of July to the 27th of August, and from the 3rd to the 8th of September.

In the first of these the maximum temperature in Huddersfield averaged $71\cdot7^{\circ}$ F., in Bradford $72\cdot8^{\circ}$, in Halifax $72\cdot9^{\circ}$, in Hull $74\cdot3^{\circ}$, and in Leeds $75\cdot2^{\circ}$. In the same order, the number of days in which the temperature reached 78° was two in Huddersfield; on neither of these, however, did it reach 80° ; one in Bradford, the temperature being on that one day above 80° ; two in Halifax, on one of which the temperature exceeded 80° ; five in Hull, on two of which the thermometer went above 80° ; six in Leeds, including two with a temperature above 80° .

In the second period, including the end of July and the greater part of August, the average maximum temperature was $72\cdot2^{\circ}$ F. in Huddersfield; it was $72\cdot8^{\circ}$ in Bradford, $73\cdot8^{\circ}$ in Halifax, $72\cdot2^{\circ}$ in Hull, and, again the highest, $75\cdot7^{\circ}$ in Leeds. In Huddersfield on six days the thermometer was above 80° , on one of these above 85° ; in Bradford on five days above 80° , but never reached 85° ; in Halifax on nine days above 80° , on two of them above 85° ; in Hull

on three days above 80°, on one of which it rose above 85°; in Leeds the temperature was more than 80° on nine days, and on five of these above 85°.

The average maximum temperature in the September period was 68·9° F. in Huddersfield, 69·3° in Bradford, 69·0° in Halifax, 73·2° in Hull, and 73·3° in Leeds. The number of days on which it exceeded 70° was two in Huddersfield, on one of which it rose above 75°; in Bradford it was 70° on two, on both these occasions exceeding 75°; in Halifax the same; in Hull it was above 70° on three days, on two of them above 75°; whilst in Leeds the maximum was upwards of 70° on five days, on two of which it exceeded 75°. The actual reading in Hull on the two hottest days was greater than in Leeds; in the latter it was 77° and 78°, in the other 78° and 84°; but the average maximum temperature, as already pointed out, was higher in Leeds than in Hull during this period.

Shortly, in each of these three hot periods Leeds had a higher average maximum temperature and a larger number of specially hot days than any of the other four Yorkshire towns.

Points noteworthy in regard to Leeds Diarrhoea Rate.—What we have seen, therefore, in regard to the diarrhoea death-rate in the third quarter is:

That (1) in comparison with the thirty-three towns Leeds held a specially favourable position, having a lower death-rate than twenty-one out of the thirty-three in 1899.

That (2) taking into account the average mortality in the corresponding quarter of the preceding decade, given in regard to twenty-eight out of the thirty-three towns, Leeds last year succeeded in attaining a more favourable position than ten out of the eighteen towns which in the preceding decade had the same or a lower diarrhoea death-rate.

That (3) the only four towns showing a lower death-rate from diarrhoea in the third quarter of last year than they had in the third quarter of the preceding decade included Leeds, and the fall in Leeds was proportionately greater than in two out of the remaining three.

That (4) all the Yorkshire towns except Leeds had a higher rate last year than in the decade.

That (5) the fall in Leeds was not due to a lower temperature, as was shown by the fact that of the six Yorkshire towns, in the five who send figures to the Meteorological Office, Leeds had a higher average of maximum temperatures than any, and a larger number of specially hot days.

Possible Explanation.—Unless, therefore, the more favourable position last year in regard to diarrhoea be a fortunate accident,

there must be some discoverable cause for the sudden change. This cause, I am inclined to hope, will be found in the special attention paid last year to the cleansing of the town during the hot weather.

Before the weather attained anything like a high temperature, an extra amount of attention was paid to cleansing in the following respects :

1. Instead of reducing the number of men employed in emptying ashpits to a minimum, as is apt to be done when the actual quantity in the receptacles is lessened, a greater amount of attention was given to getting rid of accumulations than has been usual during the summer months.

2. Instead of using occasional quantities of carbolic acid in the water-carts, a weak solution of chlorinated soda was employed in the first instance, although later, owing to the complaints on the part of the men about their clothes, it was discontinued for a phenol compound.

3. Trough closets received a greater amount of attention, and this attention began earlier than in some previous years.

- (a) The practice, introduced rather too late the year before, of placing a quantity of disinfectant in each trough at the time of its refilling was introduced earlier and continued later last year, although

- (b) The six days' emptying, which had been replaced by a seven days' emptying in all trough closets over which there was a dwelling-room, was resumed ; but the quantity of disinfectant added to the trough on Saturday was doubled, and the increase of quantity extended to all.

4. The flushing of street gullies was carried out more effectively and thoroughly, and commenced earlier last year than formerly.

5. The flushing of the sewers was to some slight extent carried out.

6. A considerable quantity of chlorinated soda solution was put into the river during the hottest part of the year. For some years back manganate of soda has been employed for this purpose, but I am inclined to think that the other solution in the form of chloros is as effective and more manageable, the dissolving of the manganate being a troublesome process.

7. The five earlier mentioned of the above methods were pushed with a considerable amount of extra energy in the south-east registration district, one of the two districts in which diarrhoea has generally been most fatal.

Diarrhoea for Sixteen Years in South-East Leeds.—The variations in the rate of the smaller area for the third quarter of each year

are more marked than those in the whole city, and the death-rates in the district have, with one exception, been always higher than in the city, the exceptional year having been 1899. The district mortality fell nearly to the level of that of the city in the years 1888, 1890, and 1894. With two exceptions, although differing in extent, the district mortality has risen and fallen with that of the city.

In 1887 there was a slight diminution as compared with the previous year in the death-rate of the borough as a whole, but an increase in that of the south-east registration district. In the year 1893 the death-rate in the whole town rose from 3·4 in the preceding year to 5·2, whereas in the south-east registration district it fell from 7·1 to 6·6. This fall was not very noticeable in itself, but was remarkable chiefly because it was only in this district that the diarrhoea rate was lower than it had been in the same quarter of the preceding year. In one district (north) it remained the same; in all the others it rose.

Now, putting aside the rise in 1887 of the district rate, while that of the town fell, as to the cause of which I find no information in any of our records, there are three other remarkable things in connection with the death-rate in the south-east registration district: (1) The fall of the rate in that district in 1893 corresponding to a rise in the rate of the town; (2) the fall in the following year to a rate only a little above that of the town as a whole; and (3) the fall last year, 1899, to a rate below that of the whole city—the first time that such a thing occurred in any of the years to which the statistics go.

After the heavy death-rate in 1892, already referred to, the Health Committee considered the desirability of specially attending to the scavenging of the town, and resolved experimentally to direct particular attention to the south-east registration district by the more systematic flushing of gullies and the more frequent emptying of ashpits and tubs.

This greater attention was bestowed upon this district during the summers of 1893 and 1894. It was in the third quarter of 1893 that the death-rate of the district fell, notwithstanding the rise in that of the city as a whole. In 1894, an exceedingly healthy year, while the rate fell in both, that in the south-east registration district came down nearly to the level of the whole town.

After this the special cleansing of the south-east registration district was, however, less completely carried out. In 1897 the diarrhoea rate was again excessively high in this district, and, although it fell in 1898, it was still considerably above that of the

rest of the town. Last year, before the hot weather began, I urged the desirability of again giving special attention to this district. This was done, and, as already said, for the first time the diarrhoea death-rate of the district fell below that of the city.

There is one other difference that was made in this district. About 1894 the Health Committee pressed upon the Streets and Sewerage Committee the desirability of getting rid of the deep catchpits attached to gullies in the paved streets. The removal of these gullies and the provision of "shoots" has been done here and there throughout the town, but, with exceptions due to special circumstances, it has been done universally throughout the south-east registration district.

Cleansing and Diarrhoea.—I venture, therefore, to suggest that the information conveyed in the preceding paragraphs points somewhat in the direction of showing that if still greater attention were paid to cleansing, a diminution in the somewhat high diarrhoea death-rate prevailing in Leeds might be expected for two reasons :

First, it has been shown that last year, when something of this kind was attempted, the autumn rate fell below the average of the preceding ten years, while in twenty-four of the twenty-seven other towns whose records are available the rate rose. In three towns only of the twenty-seven did it fall. Only one of these towns, Blackburn, had a lower autumn death-rate last year than that of Leeds ; but if, instead of restricting attention to the third quarter, we had taken the whole year, it would have been found that the diarrhoea rate in Blackburn for the whole year 1899 was greater than that of Leeds. May there not have been a causal connection between the special cleansing last year in Leeds and the circumstance that the increase in the death-rate, as compared with that of the preceding decade, in 89 per cent. of the large towns last year did not extend to Leeds, although it did to other Yorkshire towns suffering less severely from the high temperature ?

Second, the apparent response in the death-rate in the south-east registration district to the special efforts made in that district in 1893, 1894, and 1899, suggests also a causal connection, and strengthens the position.

PLAGUE.—By order of the Local Government Board dated 19th September last this disease has been added to the schedule for notification. Medical Officers of Health are also required to report cases to the Board as soon as they become acquainted with them.