

THE RELATION OF CHOLERA TO THE LONDON WATER SUPPLY.

By LOUIS C. PARKES, M.D., D.P.H., Medical Officer of Health for Chelsea, etc.

IN view of the almost certain recrudescence of cholera in Europe during 1893, and the importation of the disease into this country on a considerably more extended scale than we have been subjected to during the past autumn, a recapitulation of the most striking facts connected with London's former visitations of cholera and their bearing upon the quality of the contemporaneous metropolitan water supply may not be out of place—more especially if taken in conjunction with some of the recent scientific evidence offered to the Royal Commission on Water Supply now sitting.

In the year 1832, when Asiatic cholera first attacked London, the water supply of the population was largely derived from shallow wells in the superficial gravel beds, these wells being in all probability considerably polluted with human waste matters. But water was also supplied by water companies from the Thames—the intakes being situated at various places between Kew and London Bridge—and also from the tidal portion of the Lee. There can be little doubt that at this time, when London was almost an undrained city, but little of the town's sewage reaching the river, except, perhaps, by percolation out of cesspools, the water of the tidal portion of the Thames was, as compared with the present day, pure and clean—clean enough at any rate for salmon to pass through on their way to the upper reaches.

The death-rate from cholera per 1,000 of the metropolitan population in 1832 was 3·14.

The next epidemic was in 1849, when the death-rate was 6·18 per 1,000, nearly double the rate of 1832. At this period much more water relatively was taken from the Thames than the Lee for consumption, but the tidal portions of the Thames and of the Lee also were now subject to considerably more pollution, owing to the more general introduction of water-closets, the drainage of houses, and the construction of sewers which were laid with a course more or less direct to the banks of the Thames, there to discharge their contents. The pollution of the Thames water was no doubt greatest in the heart of the City—between Waterloo and London Bridges—where the filth of a large proportion of the population would be discharged; and it is interesting to note that whilst in the district supplied by the Grand Junction Company taking water from the river at Kew, the death-rate from cholera was only 0·8 per 1,000, and in the district supplied by the West Middlesex Company taking water from the river at Hammersmith, the death-rate was 1·7 per 1,000; in the district supplied with water from Chelsea reach the death-rate was 4·7 per 1,000, and attained the enormous

figure of 16·3 per 1,000 in the parishes supplied with water drawn from the much polluted portion of the river between Battersea and Waterloo Bridge.

The epidemic of 1854 found London still largely supplied with a polluted water, but certain improvements had taken place in the interval between 1849 and 1854. The East London Company, supplying an enormous poor population, had moved its intake three miles higher up the river Lee, and the New River Company had taken steps to prevent sewage finding its way into the Lee, which formerly affected its pumping station at Tottenham; but most important of all, the Lambeth Company had changed the source of its supply from the polluted tidal river at Hungerford Bridge to Thames Ditton, where the river is beyond tidal influence and uncontaminable by London sewage.

The death-rate from cholera in London in 1854 was 4·29 per 1,000, a decrease of nearly 2 per 1,000 as compared with 1849. But this diminution was by no means general or equally shared by the different water-supplied metropolitan districts. The large districts supplied with New River and East London water had a decreased mortality as compared with 1849, but the districts supplied with water from the West Middlesex, Grand Junction, Chelsea, and Southwark Companies, suffered from an increased cholera mortality as compared with 1849. These four latter companies took water from the river from the same spots as in 1849, but the quality was even worse in 1854 than in 1849, owing to the larger amount of sewage reaching the river by the metropolitan sewers. We can understand what was the actual quality of this water, when it is stated that fragments of the muscular fibre of food—which could only be derived from human excrement—were found to exist in samples of the Southwark Company's water.

The most interesting records, however, are those relating to the competing supplies of the Lambeth and Southwark Companies in the South London District. Over a very considerable area the mains of both companies had been laid side by side in the streets, with the result that whilst some houses were supplied with water from one company, other houses took water from the other, and so complex and unsystematic was the intermingling that great difficulty was experienced by the registrars in discovering the supply in many cholera-stricken houses. As has before been stated, the Lambeth Company during the cholera year supplied a pure, uncontaminated water, whilst the Southwark Company supplied the very reverse, and the broad result of this great experiment in human vulnerability to water-carried poisons is the fact that, whilst there were 11·3 deaths per 1,000 houses supplied by the Lambeth Company, there were 57·1 deaths per 1,000 houses supplied by the Southwark Company.

In 1866—the next year of cholera visitation—various metropolitan improvements had been effected. The water companies had moved their intakes above all tidal influences in the Thames, and the completion of the main drainage intercepting sewers with their discharging outlets at Barking and Crossness had rid the tidal Thames above bridges of the gross sewage pollutions of a former period. The cholera of 1866 in London was most severely felt, was, in fact, practically limited to an East London district, which in July was supplied with water from the Old Ford reservoir of the East London company. There can be little doubt that the water in this reservoir was obtained from the river Lee, which was in close proximity to it, by soakage through a bed of porous gravel forming the bed of the reservoir. The Lee itself at this time was receiving the sewage of Stratford and West Ham, which was washed up and down stream by the ebb and flow of the tide twice daily between and in close proximity to the open and storage reservoirs of the water company. The river had also at this time received the evacuations of two cases of cholera occurring at Bromley by means of a sewer opening into the Lee at Bow Bridge, half-a-mile below the Old Ford reservoirs.

The London cholera death-rate in 1866 was 1·8 per 1,000, but as already stated, North, South, and West London were but little affected as compared with East London.

The above quoted facts are tolerably suggestive of the intimacy of the relation subsisting between cholera epidemics in London and water supply. The question with which we are all concerned now is “What improvements have been effected in the quality of the water supply since cholera last visited London in 1866?”

The water supply is practically from the same sources now as it was then; that is to say, from the Thames and Lee above the reach of the tides. Now, on the one hand, it cannot be denied that probably much less crude sewage finds its way into the parent or main streams now than formerly, owing to the necessity towns now lie under of purifying their sewage in some way before discharge into the river. On the other hand, towns situated on the affluents of the main stream more than three miles above their junction with the latter, either have not been under any obligation to treat their sewage before discharge, or have failed to do so, and as a result of increase of population and establishment of new manufacturing processes, more waste refuse is now discharged than formerly into these affluent waters. Again, the traffic on the river is very much larger than 25 years ago, especially the pleasure traffic, and the population residing in house-boats moored to the banks of the Thames in June, July, and August, is a standing menace to the health of London water drinkers.

On the whole we are justified in concluding that

the quality of the Thames water as it flows to the water companies' intakes is not superior to what it was 25 years ago, and from the point of view of cholera dissemination is subject to greater risks of accidental specific pollution owing to the greater mobility of the population, and the extended facilities for pleasure travel to and from the Thames upper reaches.

Another point of much importance is the adequacy of the existing arrangements of the water companies for the storage and filtration of the river water. Arrangements for storage and filtration, which were sufficient for the needs of London in 1866, when the population was 2,804,000, are certainly not sufficient for the London of to-day with its population of four and a-quarter millions, yet it is doubtful if the companies works have been extended in anything like the proportion which is necessary considering the growth in the numbers of their customers. The storage capacity of the Thames water companies for unfiltered water is now notably deficient, and is constantly the subject of unfavourable comment by the official water examiner, Dr. Frankland. Deficiency of storage means that the water companies are at times obliged to take in a turbid and polluted water from the river when in flood, a water which it is impossible to purify by sand filtration, so as to render it fit for dietetic use.

The storage capacities for unfiltered water of the various companies are given as follows by the official water examiner (Report for August, 1892).

Chelsea Water Company.....	14·2 days supply
East London Water Company	13·7 " "
Grand Junction Water Company ...	3·5 " "
Lambeth Water Company.....	6·5 " "
New River Company	5·1 " "
Southwark and Vauxhall Water Co.	2·5 " "
West Middlesex Water Company ...	7·0 " "

With reference to this table it is right to mention that the supply of the New River Company is taken from deep wells and from the upper reaches of the river Lee, which are little, if at all, affected by floods, whilst the Grand Junction and Southwark and Vauxhall Companies are now able to pump water from gravel beds adjoining the Thames, which practically considerably increases their capacity for the storage of unfiltered water.

Any excessive rainfall which causes the Thames to be in a flooded, and its water in a turbid condition, for longer than a week, is a source of considerable embarrassment to some of the Thames water companies. Floods in the Thames valley are most usual in autumn and winter, but are not unknown during wet summers. Should the summer of 1893 prove a wet one, like the summers of 1888 and 1879, and should there be—as we have now too much reason to expect—an importation of cholera into this country on a scale far in excess of any cholera year since 1866, then the almost certain failure of some, at least, of the London water companies to deliver

day by day an adequately filtered water will cause a repetition of those experiments on water drinking London, whose teachings in the past have been urged by every sanitarian for the last twenty-five years, but of which the practical application is so little advanced that it is not yet out of the Royal Commission stage of immaturity.

The situation for 1893 may be summed up as follows: The sole protection afforded to a large proportion of the metropolitan population against the consumption of a possibly cholera-polluted water is sand filtration as practised by the water companies, and such is the weakness of this defence that it cannot withstand a week's rain and its following flood.

QUERY COLUMN.

1. A medical man is called in to see a child who is suffering from scarlet fever and diphtheria. Can he notify each disease on a distinct form, and charge a fee for each?

Answer.—We believe not. If the child, when first seen, was suffering from scarlet fever only, which was duly notified, and the child afterwards developed diphtheria, this also could be notified.

2. We have several travelling caravans in our rural district. They are much overcrowded, although certain members of the family sleep in filthy little tents. Can anything be done to abate this overcrowding?

Answer.—Chambers, in his "The Law Relating to Public Health," says: "It does not appear that a caravan or gipsy waggon used for sleeping purposes can be deemed a 'house' under Sec. 91, Public Health Act, 1875, or that any means exist for dealing with the overcrowding which prevails in these vehicles." By Sec. 9 (1) of the Housing of the Working Classes Act, 1885, however, vans are distinctly included within Sec. 91 of the Public Health Act, 1875, and there would be no difficulty in proceeding against their occupiers for overcrowding.

3. Having adopted the Infectious Disease Notification Act, should the following case have been notified: "Puerperal septicæmia, three days"?

Answer.—We presume this is from the copy of the death certificate. The case should certainly have been notified as "puerperal fever."

4. I am asked by the County Council to send to their medical officer a monthly return of the number of cases of infectious disease which have come to my knowledge. Can I claim any fee for this?

Answer.—No fee can be claimed. If the medical officer of health does not receive adequate remuneration for his services, he can ask his authority for increased remuneration, pointing out that his duties are increasing. As in nearly all cases half the salary of a medical officer of health is paid by the County Council, it would have to pay half the advance, although such increase does not require the sanction of the County Authority.

THE SMOKE NUISANCE IN MANUFACTURING DISTRICTS.

(Concluded from page 92.)

WE closed our last contribution with the remark that ample boiler room is the one thing indispensable under all circumstances for burning bituminous coal smokelessly, and that while a comparatively clean chimney-top can be shown with hand firing where the work done by the boiler is light, the fireman intelligent and painstaking, and some automatic method of air admission in use, a perfectly smokeless chimney can usually only be seen where a good mechanical stoker of the coking class is at work. Mr. Herbert Fletcher summed up the present knowledge on this subject at a recent Local Government inquiry at Bolton in these words: "There is now no difficulty in adopting mechanical appliances for the consumption of black smoke at every works in Bolton. But it is not necessary to adopt mechanical means. The nuisance might be prevented by simple hand-firing under certain conditions—increased care, increased labour; that is, the attendant must not have so much to do, and in that case the manufacturer had to pay far more than by the use of mechanical appliances. A stoker costing £100 would save its cost in three years in the use of coal of a lower price. The twelve-hour observations which had been recently taken of some of the principal chimneys of the town pointed to the fact that the smoke nuisance could be practically suppressed. They could have the atmosphere in manufacturing towns as clear every day of the week as it is during a holiday." In actual working, the difficulties of smoke abatement in hand-fired boilers are very great, and it is seldom that a decent chimney can be seen under any circumstances with hand-firing.

For all practical purposes the difficulties connected with smokeless firing by machine may be said to be now at an end. But not so the greater difficulty—the application of force to offenders, who pollute the atmosphere of the towns, to compel them to make use of the methods of smoke abatement which modern experiments have placed at their disposal. Mr. H. Fletcher has for the last three years made a brave attempt to accomplish the necessary reform by educating the public mind and calling upon electors at the municipal polling booths to support only candidates pledged to atmospheric purification. He has invited to his works and to his house thousands of electors from various towns, many engineers, steam users, and others likely to take an interest in this question.

A large number of sanitary authorities with their officers of health have visited his collieries at Darcy Lever, and after inspecting his smokeless chimneys, and promising a strenuous crusade against smoke offenders when they returned to their own districts have gone home and—done nothing. Nothing, indeed, could be reasonably