per million, ensured the absence of coli from all samples of ozonized water tested, giving in my case a total of 1,580 c.c., with a maximum of 280 c.c. in the test. With chlorine I have found that 1 part in two millions, practically the same amount, will also bring about the same result. One of the most interesting cases is that of Shrewsbury, where, at my suggestion, chlorine, in the form of "chloros," is at present being added to the River Severn water in the above quantity after it has passed through Bell's mechanical filters, using alumino-ferri as a coagulant. Dr. Orr, the medical officer of health, there, tells me that he has failed to find coli in the water after treatment, although he made daily tests, using as much as 500 c.c. of the treated water for examination. Over a million gallons of water is treated daily for the Shrewsbury supply in that way. Since June, 1909, I have also been applying "chloros" in the proportion of 1 to 2 parts av. chl. per 1,000,000 to 100,000 gallons daily of drinking water for a town in the North of England; the liquid is made practically sterile, coli is absent from 75 to 85 c.c., and there is no effect on the taste. But a larger installation of this kind is at Jersey City, in America, where about 40,000,000 gallons a day of the Rockaway River water has been treated with chloride of lime since the beginning of 1909. The writer is of opinion that the electrolytic processes are to be preferred to the use of either chloride of lime or "chloros" in solution, as in all cases the electrolytic processes are most economical, especially when power is available as is the case in most towns. Electrolytic preparations from salt as wanted has the great merit that the disinfecting liquid is then fresh and of full strength, whereas hydrochlorite solutions are unstable;

Advocates of sterilization must not be downhearted from the adverse report recently published on the Lindsay ozone purification plant by the Provincial Board of Health, Ontario, as it is evident that there were engineering defects in this installation which fully accounted for the absence of any marked sterilizing effect, as it is important that the air should be dried before ozonizing, and the mixing with the water must be thorough.

Mr. H. C. H. Shenton said that he was surprised to hear of the suggestion of the employment of unskilled labor for testing work. As an engineer, he could say that waterworks were generally in charge of a very highly trained manager, who could not possibly be called an unskilled person. He had to look after works, plant and machinery, requiring the greatest skill and care, and he therefore considered that he might be entrusted with the simple work involved in treating and testing the water in the chlorine process with safety, but this was in no sense unskilled labor. With regard to the Lindsay report, it appeared that the Board of Health of Ontario had sent two chemists to report upon the Lindsay water sterilization. They found that the water after treatment did not differ materially from the raw water, and, moreover, that something was wrong with the ozone plant, whereby the ozone produced was not mixed with the water. Under the circumstances, it was surprising that they should have thought it worth while to make daily analyses for three months. The report condemning the whole installation if read superficially was calculated to produce a false impression-viz., that sterilization by means of ozone was a failure, whereas the Lindsay plant was evidently

Place. Harrisburg, Pennsylvania Hartford, Connecticut Jersey City, New Jersey	Date of commencement. July, 1909 January, 1909	Million gallons treated daily.	Parts per million. Average chlorine added. -39 I.0 0.2	Percentage products of bacteria. 99.7 over 99.5	B. Coli in treated water. Not found Only once in 455 tests
Minneapolis, Minneapolis	February, 1910	20	1.1 at first, to be reduced		·····
Montreal, Canada Nashville, Tennessee Quincey, Illinois Toronto, Canada	January, 1910 August, 1909 April, 1909 March, 1910	40 14 35	0.35 0.45 1.1 to 0.45 0.11	98.4 99.7 to 98.3 77	No Coli Absent in 16 tests

saved. It might be as well to point out that free chlorine is not evolved in the process, the action being due not to chlorine, but to hypochlorous acid liberated by the carbonic acid present in the air and water. I can agree with Prof. Sims Woodhead that there is no action on metals. In the case of ozone no raw material is required, but as salt is naturally present in all waters, and as after sterilization the sodium hypochlorite reverts again to sodium chloride, it cannot be urged that the addition of common salt is of the nature of a foreign ingredient. In comparing the costs of chlorine and ozone it must not be forgotten that 8 grains of available oxygen as ozone is equivalent to 35.5 grains of available chlorine, so that the quantity of chlorine theoretically required to do the same work as ozone must be in this ratio. It would appear, therefore, from my experiments at Shrewsbury and at Hornsea, and also of the results of the inquiry here at Cambridge, that these waters are purer, as far as organic matter is concerned, than the filtered Marne water at Paris. I believe that further experience of these two sterilizing agents will show very little difference economically between the two in actual costs of running. One thing, however, is certain, that whatever the actual working costs are they must be much less than the large expense involved in the alternative methods of filtration and sedimentation which have been advocated by some experts with a view to obtaining this high bacterial purification. It may be interesting to summarize the results obtained by the use of chlorine in American and Canadian cities from the details given in the Surveyor of June 10, 1910.

the cost of transport of carboys, which is a serious item, is also not working properly or out of order, and was not a proper saved. It might be as well to point out that free chlorine is not evolved in the process, the action being due not to chlorine, could report usefully.

Dr. Sims Woodhead, in replying to the discussion, instanced the case of Maidstone, where the contamination which lead to a very serious epidemic took place at a point where it could not possibly have been expected. If at that time the water had been sterilized many lives would have been saved. The proposed new source for the supply of Cambridge was just as likely to be contaminated as the Maidstone scource. The possibility of contamination to wells in the chalk, even to new wells, always existed, and should be guarded against. With regard to leaving the dosing and testing to unskilled labor, he did not suggest that such a thing should be done, but he pointed out that the work of dosing and testing was so simple at Cambridge that it could be looked after even by unskilled labor. He considered that an exceedingly soft water was no more desirable that an exceedingly hard water, and that was his answer to those who suggested that it would have been well to combine a softening process with the chlorine treatment. The exact action of the ultra-violet rays was unknown. All that was known up to the present was that coli were destroyed by the action of the rays, but he hoped to be able to discover something further shortly.

SEWAGE FUNGUS AND PURIFICATION.*

Where the mineralization of organic matter in sewage has occurred by land treatment the nitrates and nitrites are use