

THE Sanitary Review

SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND
WATER PURIFICATION

STERILIZATION OF WATER BY CHLORINE AND OZONE.

In the issue of August 4th, we gave the paper read before the Royal Sanitary Institute by Prof. G. Sims Woodhead. The current issue of the Surveyor of London, Eng., gives, in part, the discussion on the paper.

Discussion of Dr. Sims Woodhead's Paper.

Mr. Haycock said that chlorine must obviously be cheaper than ozone for water treatment, but he urged that while an overdose of chlorine would be obnoxious, an overdose of ozone would not be harmful; further, as ozone was practically insoluble, an overdose in the water would be practically impossible. The whole of the water supply of Paris was now to be sterilized with ozone as the result of the ozonizing work already done there. The Marne water was turbid and like sewage, but when filtered and ozonized it was clear and pure.

Dr. Thresh drew attention to some larger works than those at Cambridge, where he, working with Messrs. Candy, had been sterilizing river water by a process similar to the chlorine treatment at Cambridge with satisfactory results. The quantity treated was 200,000 gallons a day, but, unfortunately, he was not at liberty to give the name of the place. The coli were entirely eliminated from this water. He was of opinion that the amount of chlorine added to the water should be in excess of what was actually required to destroy the coli, and that the excess should be neutralized. The use of bisulphite of soda was difficult for this purpose, however. Chlorine was present in many good drinking waters, so that it was clear that the addition of a very small amount of chlorine to the water did not alter its condition in any unusual manner. The process of chlorine sterilization was so simple, and the plant was not impressive as in the case of ozone, and, consequently, it was difficult to make people believe in it.

Mr. Ferguson was of opinion that chlorine present in water after treatment might give trouble owing to its action on the organic matter and on certain salts present in the water. He considered it possible that poisonous substances might thereby be formed. With the ozone treatment, though the cost were greater, there would be no such risk.

Another speaker considered that sterilization might lead to carelessness in the protection of gathering grounds and of water supplies generally. It should only be regarded as an additional safeguard and not as superseding any process of protection at present considered necessary.

Dr. Bushnell Anningson (medical officer of health, county of Cambridge), considered that chlorine treatment was better than filtration or storage for final purification as far as final results were concerned, but there were other points to be considered. It was difficult to see how the accurate dosing, without which the process would be useless, could always be guaranteed. He disliked the idea of trusting the matter to unskilled labor as had been suggested. He quoted from an article which appeared in a special issue of the Surveyor, dealing with water supply in the year 1909. The statement was to the effect that if sterilization were adopted much public money spent on

obtaining water from great distances might be saved. Thus it appeared that if sterilization had been adopted Manchester and Birmingham would not have obtained their supplies from Wales, but would have used water of worse quality nearer at hand. This he considered would have been a very undesirable result of sterilization. However, he considered that in treating supplies from the chalk, or for emergencies, sterilization would be useful.

Dr. Rideal, who was not present, contributed the following remarks, which were read by his son: The subject of the sterilization of water supplies by means of chlorine or ozone is one of serious interest at the present time, seeing that there has been a tendency in recent years to make the coli test more and more severe as an index of purity or suitability of a water for drinking purposes. It is difficult to see what limit the modern bacteriologist should fix so as to be satisfied in this respect. Dr. Houston in his valuable evidence before the Belfast Health Commissioners has shown that many public supplies in England contain coli in 1 c.e., but adds that he is attempting in the case of the London supply to purify the Thames and the Lea waters to an absence of coli in 100 c.e. The last contribution to the Royal Sanitary Institution as given in Prof. McWeeney's remarks in Dublin last week (if he has been correctly reported), fixes his standard to be "coli absent from 10 c.e." in well waters, and "coli to be absent from 1 c.e." in upland waters. It would seem, therefore, that it must be the duty of the water authorities to ensure the absence of B. coli from the water supply as far as possible, and there can be no doubt that, if by such a standard is meant the absence of coli from several hundred c.e.'s of the water, such a result can only be economically attained by sterilizing processes after the ordinary methods of filtration. Alternative methods, such as pre-filtration, followed by sand or mechanical filters, with or without coagulants, only ensure a percentage removal of the coli organisms present, and as the best filters cannot be expected to give more than, say, 95 per cent. reduction, it follows that, dealing with raw water, containing a large number of organisms, even pre-filtration or long sedimentation will not reduce the organisms to such an extent as to enable a final filtration process to bring the number of coli organisms to such a low figure as the one which is now looked upon as safe for potable waters. The sterilization processes, on the other hand, have the advantage of being far more economical and requiring comparatively small initial works, and can be relied upon for removing the whole of the coli organisms present. Another very important advantage of the chemical sterilizing process is, that when they are used we have a chemical test which enables one to judge as to the germicidal effects, and I have found repeatedly that when chlorine or ozone has remained in excess in the water supply for a short time, one can be certain that the coli organisms present have been destroyed. As to the quantity of chemicals required for sterilization. My experiments in Paris on the Marne water showed that after sand filtration the water contained a varying number of bacteria—28 to 320 per c.e. (with a frequency of coli organisms of 1 in 100 c.e. to 1 in 40 c.e.) Ozone, in the proportion of 0.6 parts