

In Canada, many of our towns and cities are at present favored with water from what are, generally speaking, good sources, while others have natural advantages which slightly offset the risks from suspicious sources and they are not anxious, at present, to incur the cost of filters. With increased demand for water and increased risks of pollution, with a denser population, we will take our water from less wholesome sources and must consider the problems of water purification. We draw water from lakes and rivers that are, for the most part, above suspicion, but dead animals and the excreta of man and the higher animals are possibilities to be thought of in connection with water supply contamination. Typhoid fever is generally associated with water pollution. Spring epidemics are common, owing to the harmful bacteria from surface waters during times of melting snow and heavy rains. Wherever the drinking-water has been sterilized by ozone, the falling-off in mortality from typhoid fever has been most marked.

Ozone is particularly the enemy of harmful bacteria. Its action on bacteria is purely chemical, the bacteria being reduced to the simpler metals or elements. Color, due to humus substances, and the very unpleasant odors and the taste in water, due to vegetable decay, readily yield to ozone, and, in the water sterilising plant in Philadelphia, the effect of ozone in turbidity is easily seen, as the muddy-looking water passes through a glass tower and is instantly cleared on meeting the gas.

In the ozone process of water sterilisation, the water, if containing much matter in suspension, is first passed through rough or rapid filter beds to remove the grosser matter. The water so strained is raised to the top of towers, about sixteen feet high, and it either trickles down through layers of large pebbles or, is broken up into spray by baffle-plates; or, other device to ensure thorough mixing with the ascending gas forced in near the bottom of the tower. The gas is usually supplied in excess of ordinary requirements to meet the possibility of an excess of bacteria or oxidisable matter, and the excess of gas passing out to the open air is an indication of the purity, or otherwise, of the raw water.

Small ozonisers, guaranteed to sterilise sixty gallons of very impure water per hour, have been in considerable demand and the author recently had opportunity of seeing a very successful "Otto" ozoniser of this type. Over one thousand "Otto" small household ozonisers are in use in Paris alone, and there the system is considered indispensable. Recent tests of this apparatus in London were very satisfactory. Samples of London Main water, having an average of 870 organisms per cubic centimeter, were perfectly sterile after treatment. And water, infected with *Bacillus Coli*, and showing 5,400 organisms per c.c., was also readily sterilised. In this type of ozoniser, a small box, containing a transformer and plates, is placed above the water tap and a small pipe is carried down to a point just below the water valve. Opening the water valve automatically switches on the current to the transformer and the water in passing through the valve sucks down ozonised air through the small pipe, and intimate contact between the gas and water is in future assured by means of a swirling or mixing chamber which is part of the tap casting. The water drawn off smells strongly ozone, but, the gas passes off almost instantly and the water is then absolutely tasteless, that is, it retains its natural taste. The cost of treatment is nominal; the current required being about the same as for a 16 c.p. lamp.

We hear much, though not enough, of "Death From The Cup," an apt title to emphasize the danger of drinking from the public school or fountain cup. Common sense, without statistics, brings home to us the need of a remedy for existing conditions in schools and other places where the drinking cup transmits from mouth to mouth the most loathsome diseases.

Considerable attention has been given to this in the United States and it is impossible to over-estimate the good already done by those intrusted with the work of investigation and prevention. Dr. Forbes, of Rochester, reported, that an epidemic of diphtheria, bringing suffering to twenty-four persons, was traced to a common drinking cup which

all had used. Virulent diphtheria germs were found in nearly five per cent. of a large number of apparently healthy school children in Philadelphia.

Dr. Davidson, of Lafayette College, found on a cup, which had been in use only nine days in a school, over twenty thousand human cells, or bits of dead skin. Between the cells, were thousands of germs, and every square inch of glass had on its surface at least one hundred thousand bacteria. We cannot afford to ignore the warning given by the above figures, and we might look at the matter in this way, that if we are not humane enough to protect others, we should at least be selfish enough to protect ourselves.

The small ozonisers, already spoken of, afford an excellent remedy, for, besides sterilising the water from the mains, the ozone present, either in solution or in excess, as free gas, effectively sterilizes the drink glass. The simplicity and economy of the process almost mark its apparent power as a bactericide, for we are accustomed to fighting disease with more costly and cumbersome methods. There is now no doubt as to the commercial success of the sterilisation of water by ozone. In America, we have a very successful plant at Philadelphia (Vosmaer process) treating about one million gallons per day of very polluted Schuylk River water at a cost of from three to seven dollars per million gallons. The water is rough filtered. The figures cover all charges, as interest, depreciation, salaries, etc. These figures compare favorably with the cost of eight dollars per million gallons obtained from good sand-filtering plants and the estimated cost of ten dollars per million gallons for the sand filters at Pittsburg. And, the relative sizes of the plants is striking. The Philadelphia plant takes up but a small space in the heart of the city, while the Pittsburg plant covers an area of 170 acres and is distant about eight miles.

Vosmaer plants are in operation near Amsterdam, treating 5,000 to 8,000 gallons per hour of surface water of poor quality.

The Otto & Marmier-Abraham processes exploited by the General Ozone Company, of Paris, etc., have met with considerable success on the continent of Europe. The system has been officially recognized by the French Government, and has carried off all honours wherever exhibited since first obtaining the Grand Prize at Paris in 1900. Plants treating from 100,000 to 5,000,000 gallons daily have been installed by the company at Paris, Nice, Dinard, Indret, Chartres, St. Servain, Chantenay, Avranches, Cosne, Sulina, and many others are now in the course of erection.

Effort is now being made to apply the Otto process in the treatment of sewage in conjunction with "Dibden" Slate Beds. "The sewage is poured over a series of plates which are laid one on top of the other with a 2-inch space between them. The sewage is then allowed to remain stagnant for two hours, when it is drawn off slowly, the sludge being left behind on the slates and being exposed to the air. Here it is immediately attacked by numberless animalcula. The filter is allowed to remain empty for about one hour, when it is gradually filled again. The sludge deposits, while it is allowed to remain for two hours, when the bed is again emptied. The result is that the whole of the organic matter in the sewage is digested by the worms and other living creatures and converted into humus. Periodically this humus is washed off (escapes). It has absolutely no smell whatever. This new departure is of the greatest value, permitting sewage schemes to be carried out much closer to houses than was formerly possible." The slate bed takes the place of the septic tank and produces sludge which is quite inodorous. The effluent from the beds is treated by ozone, the treatment removing the last trace of the oxidisable matter and killing off all bacteria.

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WINNIPEG.—Tenders addressed to the chairman, Board of Control, for supply of ten ton macadam roller for the Street Commissioner's Department, will be received at the office of the undersigned up to 11 a.m. on Monday, March 1st, 1909. Delivery called for 1st May, 1909. M. Peterson, secretary, Board of Control office.