

substances will be extracted by this process when passed into the river as sewage, because sewage waters need thorough shaking and mixing with fresh water before they both can be incorporated and the purifying influence of fresh water have a telling effect on the sewage. This fact has caused the British Government Board of Health to say that they know no river of sufficient length to thoroughly oxidize sewage fluids so as to be safe to use for domestic purposes.

Dr. Frankland assures us that dangerous microbes that cause epidemic diseases are held in suspension by the waters and do not settle down with the dead organic matters termed the heavy solids, to the bottom of the rivers or reservoirs. Dr. Thresh has proved by tests and close investigation that the poisonous germs cast off by diseased persons have been still alive and dangerous after traveling in river water for 108 miles at a speed of one mile an hour, though the germ-carrying sewage had become well clarified and clear. He also beats out Dr. Frankland's statement that the disease breeding germs are held in solution in water after the sewage is cleaned and the sediment is separated. Several noted biologists hold the opinion that when river water is specifically infected with germs ejected from persons or animals suffering from epidemic diseases they cannot afterwards be sufficiently purified to be safe for use for drinking purposes for a long period after contamination, however far they are carried with the stream.

The effect of the sun's rays upon water containing organisms is beneficial. Professor Buchner proved this by placing gelatine plates closely sown with live typhoid bacilla in water, at various depths, for a period of over four hours and exposed to the rays of the sun, when he found that all the plates that had been placed less than five feet deep were sterilized; this proves that the sun can do purifying work to a depth of five feet in clean water. Dr. Thresh and others state that typhoid ejecta loses its virulence within fifteen days, but in that space of time it may travel and convey the disease to persons 400 miles from the place from which it started.

I stated and showed clearly in my first article on water supplies that people may get accustomed to swallow contaminated water with impunity without ever being seriously and violently affected, but the act runs down the bodily system and makes life less enjoyable and shorter than if pure water was always used. This statement was proved in a very remarkable manner at the town of Newark, England. For many years that town took its water supply from the river Trent, and to be sure to have it palatable they filtered it, but the death rate for a rural, healthy district like Newark was high, and it was decided to secure the town's supply from deep wells, and abolish the use of river water. The waterworks system was totally changed in August, 1893, and proved to have a surprising beneficial effect. I herewith give the number of typhoid fever cases of that town for six years, which was supplied by Dr. Wills and published by Dr. Thresh in his reports (page 224). Newark on Trent has a population of 14,500:

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1890	1	4	1	2	3	3	3	1	1	6	20	3	53
1891	25	17	8	5	5	0	12	7	14	12	15	5	125
1892	1	1	0	5	1	3	5	12	12	7	12	10	69
1893	16	16	4	5	4	5	5	8	5	4	4	2	78
1894*	1	0	0	0	0	0	0	2	1	2	3	1	10
1895	1	0	0	0	0	1	0	0	1	1	3	0	7

*The new water supply

This table of figures speaks for itself and proves the advantages derived from a pure water supply. It is not always the best policy to extend intake pipes too far into

the rivers, because the river may prove to be of better quality near the shore, and it is not hard to judge by the eye where good palatable water locates. For example I may state that this week I was over a part of the St. Lawrence River in a boat; on leaving the beach I sailed for several hundred feet over a beautiful bay of clear, bright, good water, resting on a clean stony bed, which could be easily seen at a depth of about nine feet, and appeared totally free from vegetable growth until nearing the main body of the river stream where the water turned a yellowish green and could not be seen through nearly so well. As this bay had a clean bed and was shallow for a good distance out, the water it contained would easily get aeration and have the full benefit of the sun's rays, moreover, the water coming from the surface of the main stream would be partly aerated and oxidized before it overflows sideways into the bay. This bay is really a self-cleansing reservoir kept clean at the bottom by slow circulation of the surface water of the river moving towards the beach and returning back to the main body of the river. That part of the river that is really the fringe or edge of the main stream is not of so good water, or so well sterilized as the water in the bay, moreover, it is the part of the river stream that carries the sewage from the towns situated higher up the river banks, for no sooner does sewage leave the mouth of the discharge pipe of the drain, than it makes a bee line straight down the stream and seldom passes to the main current in the centre of the stream.

In summing up the subject we may say that it is absolutely necessary to supply the public with water that is free from excrements and urine, also, any bodies or material that are in a state of decomposition or putrefaction, but I cannot admire such judgment as the citizens of Bradford, England, showed three years since when they compelled the waterworks committee to run to waste over 50,000,000 gallons of good water out of Chellow Dean reservoir because a person had drowned himself in it. The body was removed long before decomposition set in, therefore the immersion was harmless.

LAKE LEVELS.

Referring to our remarks in last issue on the subject of St. Lawrence levels, the Engineering News, New York, says: "Our contemporary is needlessly alarmed." The fact remains, however, that the situation is serious and that the outflow at Chicago by the canal will injure Canadian shipping enormously. The United States interests on the Upper Lakes may be protected by a dam on the Niagara River as recommended some time ago by the commission, and by a new Erie Canal as resolved on by Gov. Roosevelt's commission in the past few days, but these measures will not help the St. Lawrence Canals, they will make their maintenance a matter of purely Canadian interest, and it is necessary that public opinion should be educated on this important question. The Montreal Witness has an editorial under the head "Stolen Waters," recently, which takes a commendable position on this subject. The Engineering News in discussing the question refers to the capacity of the canal as "300,000 cu. ft. per second." This passing through a canal having a section 161 x 22 ft. would move at the rate of a mile a minute and the total flow per annum would equal the area of Lake Erie with a depth of say 35½ inches. Taking our contemporary's own figures we need not be alarmed about the St. Lawrence levels, as there would be no St. Lawrence under those circumstances.