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The intakes of the Tonawandas and Lockport, further out in the stream, are very much better placed than the Niagara Falls intake. The sewage-polluted water is known to



Fig. 4.

"hug the shore," as shown in analyses made by Dr. Bissell, city bacteriologist of Buffalo, N.Y., in 1904, and by Mr. Theodore Horton in 1907. At Buckhorn Island a sample of water showed a bacterial count of 800 per cubic centimeter; 300 yards from the United States shore the count was 860 per cubic centimeter; 100 yards from the shore the count was 10,000, and directly offshore there were too many to count.

It may be readily seen in what condition, bacteriologically, the water of Niagara River reaches Lake Ontario. A report from the laboratories of the Ontario Government show a continuance of B. coli in samples forwarded from Niagara-onthe-Lake, Ont., although, unfortunately, no systematic examination has been undertaken. It would prove of interest to obtain figures showing counts made at Buffalo and Niagara Falls, N.Y., simultaneously with counts made at Niagara-on-the-Lake, Ont., and frame an opinion as to what extent the oxidation and aeration of the falls affected the two municipalities below, and at which season this churning of the liquid reached its maximum and minimum influence on organic life.

A reference to Fig 2 will demonstrate the fact that the currents of Lake Erie as a body are uniform in the direction of their flow, from west to east; however, in the case of Lake Ontario there is a decided swirl in the western portion of the waters which does not appear to flow any definite course. Some years ago a series of experiments were carried out in the vicinity of Toronto, Ont., to ascertain the course of lake currents at that point. Ten floats were launched from Victoria Park, to the western part of Toronto Island; these were not surface floats but were carried by the current at depths varying from 16 to 30 feet. Fig. 3 is a chart showing the direction taken by the various floats; the course of float 9, which may be seen to cut the four launched from a point opposite Leslie Street, was nearer the surface than the average of those taking a south-westerly course; the depth of float 9 was 20 feet; that of float 1, 20

feet; float 3, 30 feet; float 4, 25 feet; float 5, 25 feet; and float 6, 30 feet. The depth of float 2, which was launched near the spot of No. 9, but which travelled toward the beach, was 16 feet. From these experiments it was clearly proved that the general direction of the currents is parallel to the coast line from Victoria Park to the western extremity of the island. North-east, east, and south-east winds as a general rule produce currents flowing south-west, while south, south-west and west winds give north-easterly currents, and north and north-west winds give rise to variable currents.

Instances of currents are known in the vicinity of Niagara-on-the-Lake; fishermen have often made mention of their nets out in deep water during the prevalence of strong easterly winds, would be strongly clogged with sea weed on the western parts, showing an undercurrent from the west.

Contamination from sewage around Toronto may be safely stated to depend on the wind; easterly winds forcing the matter in Toronto Bay out the western gap and westerly winds reversing the process. An authority, who has made a considerable research into this question, found, under certain conditions, that a sample taken off Humber Bay could be duplicated off Scarborough twenty-four hours later; the reverse was found to act similarly, so that under average conditions the lowest counts of B. coli and bacteria generally have been found off the Island, the location of the present intake.



Fig. 5.

The typhoid fever death rate in Toronto is represented in Fig. 4, the figures on the left being deaths caused by this disease per one hundred thousand inhabitants. It is in that period after 1890 that serious consideration to the water and sewage problems has been given. This assumed the form of a tunnelled shaft under the bay and other engineering works of considerable magnitude.

The means and methods adopted in the research of these currents in the vicinity of Toronto consisted of a number of floats or drags made to the design of Fig. 5. These consist of two cross brackets of wood covered with linen, a rope of from twenty to sixty feet attached, and a tin float surmounted by a flag and numbered.