Original and Selected Papers.

NOTES ON SOME CANADIAN WATERS.

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On a trip this summer round Georgian Bay and Lake Superior, the writer collected specimens of water from both, when at a great distance from land. The result of an examination into their purity may not be without interest, but as it was not convenient to carry any large quantity, and as they are so remarkably pure that to make a complete analysis would require the evaporation of several gallons, attention was paid merely to the total solid contents and the freedom from organic matters.

In the water of Superior no trace of sulphates, or chlorides, could be detected; but the portion to which nitrate of silver had been added, exhibited an almost imperceptible browning, after exposure, showing the presence of a very minute trace of organic matter. Oxalate of ammonia produced a turbidity after a considerable time, and the oxalate of lime was not deposited at the end of a week. No precipitate was formed on boiling 4,000 grains. On evaporating a weighed quantity, 1,000 grains, it was found that a residue remained of 0.0154 grains, equal to 1.08 grains in a gallon of 70,000 grains.

The residue, when heated, scarcely changed color at all, and the loss was inappreciable. It was found to be essentially carbonate of lime, which, as is well known, is soluble in about 10,000 parts of water, while 10,000 of the water examined contained only 0,154 of a grain.

The water from Georgian Bay contained rather more solid contents, viz: 2.48 grains in a gallon; but in sulphates, or chlorides; it contained, however, a little more organic matter than the Superior water. The residue was again carbonate of lime, and was not deposited on boiling, as 10,000 of the water would contain only 0.354.

Lake water is almost always purer than rain water, but that of Lake Superior is quite remarkable. The writer knows of none that can compare with it, except that of Loka, in Sweden, which is said to contain only one-twentieth of a grain in a gallon. Lakes, in primitive formations, are, usually, very pure: some in Scotland contain 4 to 5 grains; some lakes contain a considerable quantity of earthy matter—the Geneva water contains 10.5 in a gallon.

An examination was then made of the Ontario Lake water, taken from a point south of the light-house: several analyses were made and the mean gave the following numbers:

In a gallon 7.814 grains of impurity, of which 5.369 is essentially carbonate of lime, and 2.443 organic matter. No precipitate is formed in boiling, but the water is not quite so clear, after some concentration, as the quantity of carbonate is nearly as much as it can hold in solution, and it soon begins to precipitate. No chlorides or sulphates could be detected. The great difference between Ontario and Superior is very noticeable

Water taken from the middle of the bay was then examined, and the mean of several analyses gave, in one gallon, 9.656 total residue, of which 5.502 is mineral, and 4.154 organic. It will be noticed that the quantity of the latter is largely increased, but otherwise, the water is very pure. In a second paper the writer proposes to give an account of some experiments on the waters of other lakes, and on specimens taken from various parts of the Toronto Bay, and from the Water Works, and to compare the water supplied to Toronto with that used in some English towns.

ON HYPOPHOSHOROUS ACID AND THE HYPOPHOSPHITES.

BY E. B. SHUTTLEWORTH.

As the discussion appointed for this evening is in regard to the so-called syrups of the hypoposphites, the writer has prepared a few notes on hypophosphorous acid and its salts, trusting that in thus suggesting a groundwork for discussion, he will in no wise interfere with or anticipate the subject on hand.

Nearly half a century has elapsed since the discovery of hypophosphorous acid by Dulong, but it was not until ten or twelve years ago that the hypophosphites can be said to have occupied a place in medicine. Their introduction is to be attributed to Dr. Churchill, who suggested their employment as a source for the supply of phosphorus in tuberculosis and other diseases. "The proximate cause," says Dr. C., "or at all events, an essential condition of tubercular diathesis, is the decrease in the system of the phosphorus which it contains in an oxygenizable state, and that the specific remedy of the disease consists in the use of a preparation of phosphorus, uniting the two conditions of being in such a state that it may be directly assimilated, and, at the same time, at the lowest possible degree of oxidation." These conditions are said to be fulfilled by the hypophosphites, which "seem to possess, in the highest degree, all the therapeutical properties formerly attributed, by different observers, to phosphorous itself, without any of the danger which attends the use of that substance, and which has caused it to be almost forgotten as a medicinal agent." Whether Dr. Churchill's idea in regard to the cause of consumption, or the decrease of nerve power, be correct or not, is not the province of the pharmaceutist to determine. We may say, however, that the assumption has been questioned and denied by many eminent medical authorities. It has been affirmed that, in those diseases in which the hypophosphites have been recommended, phosphorus already exists in greater quantity in the system than when in health. However this may be, one thing is certain, that the use of these salts has been attended with the most satisfactory results, and that few remedies enjoy greater popularity, although, up to the present time, neither the British nor United States Pharmacopœias contain any official mention of them.

Hypophosphorous acid may be represented by the formula H_3PO_2. It is monobasic, that is, it is only capable of exchanging one of its atoms of hydrogen for an equivalent quantity of metal. Its salts will therefore have the formula MPH_2O_2. The concentrated acid is described as a thick, viscid, uncrystallizable liquid, having a strong acid taste and reaction. It may be obtained by decomposition of one of its salts by an equivalent quantity of any acid which forms an insoluble combination with the base present, Thus, (1) the lead salt may be decomposed by sulphuretted hydrogen—sulphydric acid; (2) or the barium salt with an equivalent quantity of sulphuric acid; (3) or the lime salt by the proper proportion of oxalic acid. The latter method will be found easiest of execution, inasmuch as no previous determination of the strength of the acid will be required, as would be necessary if a liquid acid were used. The following formula is given by Prof. Proctor:*

Hypophosphite of lime	480 grains.
Oxalic acid	350 "
Distilled water	9 fluid oz.

Dissolve the hypophosphite in six ounces of water, and the acid in the remainder, by the aid of heat; mix the solutions; filter; make up the measure to ten fluid ounces and finally evaporate to 8½ fluid ounces. The solution contains about ten per cent. of the acid, and cannot be kept any length of time if exposed to the air, as it gradually takes up oxygen, and becomes converted into a mixture of phosphorous and phosphoric acids.

The salts of hypophosphorous acid may be obtained, directly by neutralization by bases; or by boiling phophorus in solutions of the alkalies. The hypophosphites, as

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*Amer. Jour. Pharm., 1858, p. 118.