A series of simple calculations will show that in accordance with the foregoing data, 5.303,022 lbs of water pass Grenville, on the Ottawa, in one second of time. This immense mass of liquid carries with it 131.515 lbs of Carbonate of Lime or chalk; 36.9 lbs of Carbonate of Magnesia; 109.21lbs of Silica, or flint; 8.484 lbs of Chloride of Potassium; 6.47 lbs of Sulphate of Potassa; 9.969 lbs of Glaubers' Salts; and 21.742 lbs. of Carbonate of Soda; in all 324¼ lbs nearly, of mineral substances every second of time, or more than five million tons in a year. By the same process we arrive at the curious and instructive result, that the St. Lawrence is the bearer of more than one hundred and forty-three million tons per annum to that great depository, the sea. Suppose this operation to continue for many thousands, and even hundreds of thousands of years, it can be easily understood how, by this slow but sure process, deep lake basins and river valleys are dissolved away and conveyed to the ocean, to form new rocks over its floor, and afford building materials for the countless millions of animals and vegetables which people its depths. A very considerable quantity of the materials thus carried away, would be deposited as soon as they reached salt water, in consequence of the large quantity of substances already in a state of solution in sea water; water possessing the curious property of relinquishing a certain proportion of minerals already in solution upon the addition of a fresh supply of a different substance. Thus, if water is saturated with common salt, that is to say contains as much common salt as it can hold in solution, and a portion of magnesia be added, the water will relinquish a definite quantity of salt, and take up a little magnesia; if now some potash be added, a small proportion of salt and a small quantity of the dissolved magnesia will be precipitated, and a corresponding quantity of potash dissolved; so also with regard to each new soluble mineral introduced, the water will always make room as it were for a certain proportion by relinquishing a little of each of the other minerals dissolved. Hence when the waters of the St. Lawrence mingle with the salt ocean, a part of their constituents will remain dissolved, and a part be precipitated, together with small quantities of the other compounds held in a state of solution by sea water. By this process, independently of animal or vegetable organisms, and the deposition of mechanically suspended matter, the floor of the ocean is gradually being covered with fine mud, which in process of time will become consolidated, entombing within it the remains of those marine animals and plants which derive the materials for the construction of their shells, shields, and the hard parts of their tissue from the dissolved constituents of sea water. In the foregoing remarks no reference has been made to the organic matter contained in the waters of the Ottawa and St. Lawrence. In those of the former river the amount is considerable, and gives a perceptible pale amber yellow colour to it; those of the latter are clear and transparent, containing but a small proportion of organic matter either in suspension or solution.

Mr. Hunt thus compares the waters of the Ottawa and the St. Lawrence.*

"The comparison of the water of these two rivers shows the following differences:—The water of the Ottawa, containing but little more than one-third as much solid matter as the St. Lawrence, is impregnated with a much larger portion of organic matter derived from the decomposition of vegetable remains, and a large amount of alkalies uncombined with chlorine or sulphuric acid. Of the alkalies determined as chlorids, the chlorid of potassium in the Ottawa water forms 32 per cent. and that of the St. Lawrence only 16 per cent., while in the former the silica equals 34 per cent., and in the latter 23 per cent. of the mineral matters. The Ottawa drains a region of crystalline rocks, and receives from these by far the greater part of its waters; hence the salts of potash liberated by the decomposition of these rocks are in large proportion. The extensive vegetable decomposition, evidenced by the organic matters dissolved in the water, will also have contributed a portion of potash. It will be recollected that the proportions of potash salts in the chlorids of sea-water and saline waters generally, does not equal more than two or three per cent. As to the St. Lawrence, although the basin of Lake Superior in which the river takes its origin is surrounded by ancient sandstones, and by crystalline rocks, it afterwards flows through lakes whose basins are composed of palæozoic strata which abound in limestones rich in gypsum and salt, and these rocks have given the waters of this river that predominance of soda, chlorine and sulphuric acid which distinguishes it from the Ottawa. It is an interesting geographical feature of these two rivers that they each pass through a series of great lakes, in which the waters are enabled to deposit their suspended impurities, and thus are rendered remarkably clear and transparent.

The presence of large amounts of silica in river waters is a fact only recently established, by the analysis by H. Ste. Claire Deville of the rivers of France.† The silica of waters had generally been entirely or in great part overlooked, or had, as he suggests, from the mode of analysis adopted, been confounded with gypsum. The importance in an agricultural point of view of such an amount of dissolved silica, where river waters serve for the irrigation of the soil, is very great, and geologically it is not less significant, as it marks a decomposition of the silicious rocks by the action of water holding in solution carbonic acid, and the organic acids arising from the decay of vegetable matter. These acids combining with the bases of the native silicates, liberate the silica in a soluble form. In fact silica is never wanting in natural waters, whether neutral or alkaline, although proportionately much greater in those surface waters which are but slightly charged with mineral ingredients. The alumina, whose

* Geological Survey of Canada, 1853.

† *Annales de Chimie et de Physique*, 1848. vol. xxiii., p. 32.