

begun to fall, it is still running up river. At low water the converse happens, that is, the level at Indiantown keeps falling nearly until the part below the rapids has been filled up to the level above the rapids. It seems, however, not a little remarkable that the delay is so exactly the same for high water and low water. This account must be admitted to be very imperfect, as I had very little time for exact observations, except as regards the time of high water and low water at Indiantown.

XIII.—TIDAL CURRENTS.

In the preceding I have not paid any attention to the currents which form so important a part of tidal phenomena. The subject is one of great complexity in such a river as the St. John. Two remarks may however be made.

First it is rather a common mistake to suppose that there must exist a flow of saltish water as far up the river as tides can be detected. Two grounds are sometimes advanced for this view. The first is that a tide means a flow of water and there must be a flow of water as far up as there is a tide. This statement is true, but the deduction is unsound; for a tide, whether in a river or on the ocean, is a wave, and a wave may pass on for thousands of miles while the water at any place only makes short excursions, going forwards as the crest of the wave passes by, and backward as the trough passes. No one would claim that the water at the mouth of the Bay of Fundy travels the whole way to the head with the tide, for if so a vessel could float that distance in one tide. The second ground sometimes advanced is that there must, by the principles of hydrostatics, be salt water as far up stream as the point at which the bed of the river is on a level with the mean level of salt water at the mouth of the river; and that hence up to the head of the tides there will be an undercurrent of salt water up and an overcurrent of fresh water down. But it is impossible that two such layers should co-exist for a hundred miles without mixing. Again in many rivers such as the Amazon, La Plata, and Forth it is known that the tides extend a long distance further up than the point at which the level of the