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JOURNAL OF
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NOTE ON THE RECESSION OF NIAGARA FALLS.

The question of the rate of the recession of the Falls of Niagara has been the subject of much inquiry, since Lyell estimated that "the cutting of the present gorge terminating at the heights towards Lake Ontario had taken 35,000 years."

Volume xix of the Victoria Institute's Transactions (p. 90) contains a summary of the Report of the New York Commission, and diagrams therefrom; from this Report it had been estimated that the cutting had taken only 10,000 years.—Through the kindness of one of the Institute's Members, Mr. Warren Upham, the Assistant U.S. Government Geologist, the following particulars are given as to where the results of most other surveys are recorded.

"The early report, by Prof. James Hall, in 1842, is in *The Natural History of New York, Geology*, Part IV, pp. 402-403.

"In 1875 a second survey was made by the United States Army Engineers.

"The next survey was made in 1886 by Mr. R. S. Woodward, of the United States Geological Survey, and his work was published in New York in *Science*, vol. viii, p. 205.

"Still more recent surveys have been made,* of which a more important one is summarised in *Science*, vol. xviii, p. 216, 1891.

"Mr. John Bogart, State Engineer of New York, has sent in a report concerning the recession of Niagara Falls. In 1842 Professor James Hall made an accurate survey, and a comparison of his results with those in 1890, made in a bulletin of the American Geographical Society, shows that the annual recession at the American Fall has been 7·68 inches, and at the Canadian or Horseshoe Fall, 2 feet 2·16 inches. During this period the crest line of the American Fall has sunk from 1,080 to 1,060 feet, and that of the Canadian has risen from 2,260 to 3,010 feet. The area of rock which has been carried away during those forty-eight years is 32,900 square feet at the American Fall, and 275,400 square feet at the Canadian Fall.

"In 1889 Mr. G. K. Gilbert, of the United States Geological

* The reports of these may probably be obtained by addressing *The State Engineer of New York*, at Albany, N. Y., U.S.A.

Survey, Washington, D.C., discussed the 'History of Niagara River,' in a long and very valuable paper, with maps, originally published in the *Sixth Annual Report of the Commissioners of the State Reservation at Niagara for the year 1889*, pp. 61-84. This same paper is republished in one of the *Annual Reports of the Smithsonian Institution for the year 1891*. Mr. Gilbert finds the maximum rate of retreat of the apex of the Horseshoe Fall (the re-entrant angle where erosion is most rapid) to be 'between four feet and six feet per annum.' [Mr. Bogart's figure may be taken as the average for the whole line of the Horseshoe.] Arguing that 'the rate of retreat of the central portion of the Horseshoe is the rate at which the gorge grows longer,' Mr. Gilbert concludes that probably '7,000 years were needed to excavate the six miles of gorge from Queens-town Heights.' But various considerations qualify this estimate, some of these tending to shorten and others to extend it. These are discussed by him in the paper mentioned.

"See also a report of Mr. Woodward's work and discussion by Mr. Gilbert, in *Proc. Am. Assoc. Adv. of Sci.*, vol. xxxv, for 1886, pp. 222-3."
