Researches relating to the Great Lakes.—Spencer. 121

before the upper lakes were turned into the Niagara drainage, for a long time seemed undeterminable, until the features of Foster's flats were used for measuring the amount of work performed in that early episode. This standard has since been confirmed by other phenomena not yet published; and from a different standpoint the distance of the early recession has been agreed to by Prof. Gilbert, who now considers the age of the falls far greater than that formerly suggested by his paper in 1886. From all the available data up to 1894, the writer computed the age of Niagara falls at 32,000 years.* Of the various episodes, that of the cataract passing the narrows of the whirlpool rapids still seems the most difficult of explanation; but the writer has recently found that the narrows record a second reduction in the amount of fall in the river, before the present descent was established, thus retarding the recession along this section of the gorge, and increasing in part the time compensation for the reduced amount of work performed. However, further discoveries are necessary to fully explain the phenomenon of the narrows. It now seems probable that the error in determining the time required for the recession of the falls through the section of the whirlpool rapids would not affect. the computation of the whole age of the river by more than a few per cent.

No less important than the determination of the age of the river was that of the date when the waters of the Algonquin basin (Huron, Michigan and Superior) were first turned into the Niagara drainage, owing to the warping of the land, with the greatest rise occurring along an axis trending N. 28° E.† The date of the diversion of the waters of the upper lakes from the Ottawa to the Niagara valley has been computed by the writer at 7,200 years. This result was obtained from the mean of three distinct methods of computation, varying from 6,500 to 7,800 years.‡ Mr. F. B. Taylor's more recent estimate gives the range of from 5,000 to 10,000 years.

Niagara as a time piece would be incomplete without indi-

* Duration of Niagara Falls. Am. Jour. Sci., vol. XLVIII, 1894. pp. 455-472.

[†]This direction occurs east of Georgian bay, while at the end of lake Ontario the direction of rise is N. 25° E. See papers by the writer cited before.

\$See Duration of Niagara Falls, cited before.

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