

has been the work of the last hundred and fifty years resembles precisely in depth, width, and character, the rest of the gorge which extends seven miles below, it is most natural to infer, that the entire ravine has been hollowed out in the same manner, by the recession of the cataract.

It must at least be conceded, that the river supplies an adequate cause for executing the whole task thus assigned to it, provided we grant sufficient time for its completion. As this part of the country was a wilderness, till near the end of the last century, we can obtain no accurate data for estimating the exact rate at which the cataract has been receding. Mr. Bakewell, son of the eminent geologist of that name, who visited the Niagara in 1829, made the first attempt to calculate from the observations of one who had lived forty years at the Falls, and who had been the first settler there, that the cataract had during that period gone back about a yard annually. But after the most careful inquiries which I was able to make, during my visit to the spot in 1841-2, I came to the conclusion that the average of one foot a year would be a much more probable conjecture. In that case, it would have required thirty-five thousand years for the retreat of the Falls, from the escarpment of Queenstown to their present site. It seems by no means improbable that such a result would be no exaggeration of the truth, although we cannot assume that the retrograde movement has been uniform. An examination of the geological structure of the district, as laid open in the ravine, shows that at every step in the process of excavation, the height of the precipice, the hardness of the materials at its base, and the quantity of fallen matter to be removed, must have varied. At some points it may have receded much faster than at present, but in general its progress was probably slower, because the cataract, when it began to recede, must have had nearly twice its present height.

From observations made by me in 1841, when I had the advantage of being accompanied by Mr. Hall, State geologist of New York, and in 1842, when I re-examined the Niagara district, I obtained geological evidence of the former existence of an old river-bed, which, I have no doubt, indicates the original channel through which the waters once flowed from the Falls to Queenstown, at the height of nearly three hundred feet above the bottom of the present gorge.* The geological monuments alluded to, consist of patches of sand and gravel, forty feet thick, containing fluviatile shells of the genera *Unio*, *Cyclas*, *Melania*, &c., such as now inhabit the waters of the Niagara above the Falls. The identity of the fossil species with the recent, is unquestionable, and these freshwater deposits occur at the edge of

* The reader will find in my *Travels in North America*, vol. i. ch. 2. a coloured geological map and section of the Niagara district, also a bird's-eye view of the Falls and adjacent country, coloured geologically, of which the first idea was suggested by the excellent original sketch given by Mr. Bakewell. I have referred

more fully to these and to Mr. Hall's Report on the Geology of New York, as well as to the earlier writings of Hennenpin and Kalm in the same work, and have speculated on the origin of the escarpment over which the Falls may have been originally precipitated.