Bakewell estimated the annual cutting backward of the falls to be about one yard a year, but Prof. James Hall[243] and Sir Charles Lyell[244] thought that one foot a year was a more probable amount. They showed that beds containing recent shells and mastodon teeth occurred in the banks above the gorge, at the whirlpool, three miles below the falls, and also on Goat Island above the falls, indicating that in the Champlain epoch the waters of Lake Erie extended up over the gorge and present falls, and that since that period a large portion of the gorge had been excavated. They found also at the whirlpool an ancient pre-glacial channel, which, having been filled with drift in glacial times, had forced the river to cut a new channel through the rock since that period.

There are here, therefore, data for calculating the close of the glacial epoch. If the whole gorge has been cut out since that epoch, at the rate of one foot per year, thirty-five thousand years would be required. It has been, however, more than once suggested that a portion of the gorge is pre-glacial. Prof. Dana[245] supposed about one mile of it to be pre-glacial, but Mr. Belt[246] after a personal investigation concludes that the gorge above the whirlpool was excavated nearly up to the present position of the falls in pre-glacial times. After giving the evidences upon which he founds his opinion, he says:[247] "If the conclusion at which I have arrived is correct, that the gorge from the whirlpool to the falls is pre-glacial, and that the present river has only cut through the softer beds between Queenstown and the whirlpool, and above the latter point merely cleared out the pre-glacial gorge in the harder rocks, twenty thousand years or even less is amply sufficient for the work done, and the occurrence of the glacial epoch, as so measured, will be brought within the shorter

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[243] Geology of New York, vol. iv, p. 383, et seq.

[244] Travels in North America, 1841–'2, vol. i, p. 22, et seq. See, also, Proc. Geol. Society of London, vol. ii, p. 77, vol. iii, p. 595, vol. iv, p. 19.

[245] Manual of Geology, p. 590.

[246] Quarterly Journal of Science, April, 1875, p. 135.

[247] *L. c.*, p. 154.