

AN OLD DRAWING OF A MAMMOTH¹

AS an addendum to the historical review of the mammoth discoveries in Siberia and the traditions to which they have given rise, which I have rendered in the "Voyage of the *Vega*," I have the pleasure of presenting a curious drawing of the animal, discovered among the Benzelian MSS. in the Linköping library. My attention was directed to the original by the president, Herr Hans Forssell, who, in his memoir of Erik Benzelius the younger, has given an account of the proceedings which it occasioned in the Upsala Scientific Society.²

The drawing bears the following inscription:—

"The length of this animal, called Behemot, is 50 Russian ells; the height is not known, but a rib being 5 arsin long, it may be estimated. The greatest diameter of the horn is half of an arsin, the length slightly above four; the tusks like a square brick; the foreleg from the shoulder to the knee $1\frac{1}{4}$ arsin long, and at the narrowest

part a quarter in diameter. The hole in which the marrow lies is so big that a fist may be inserted, otherwise the legs bear no proportion to the body, being rather short. The heathens living by the River Obi state that they have seen them floating in this river as big as a 'struus,' *i.e.* a vessel which the Russians use. This animal lives in the earth, and dies as soon as it comes into the air."

On the reverse of the drawing we read:—

"This drawing and description is given by Baron Kagg, who has just returned from captivity in Russia and Siberia,¹ 1722, in Decembri."

This drawing was exhibited by Benzelius at the meeting of the Upsala Scientific Society, December 14, 1722. The statement referring thereto in the *Journal* of the Society is as follows:—

"Herr Benzelius exhibited a good drawing of an animal, transmitted by Baron Kagg, who has just returned from captivity in Russia and Siberia, which the



Siberiaks call Mehemoth or Mammont, which has caused many to believe that it was identical with Behemoth of Job. Herr Prof. Rudbeck and Dr. Martin maintained that it was a sea animal, moreover as Herr Kagg stated that it was found at the River Obi. To this was added that Capt. Lundius had said that its bones were mostly found in the earth by the river. With regard to the animal being drawn with claws, Prof. Rudbeck pointed out that as yet no animal *cornigerum* had been found also to be *unguiculatum*, without being *palmipes* or having skin between the toes like geese, &c. It was decided to write to Herr Kagg, requesting some information about the figure, and asking how he had obtained it, so that it might be ascertained whether it was reliable. There is a

description about this Mehemoth in Capt. Müller's account of the Ostiaks."²

At a later meeting, January 11, 1723, Dr. Martin stated that he had carefully examined works of zoology, whether there existed any sea animal like that shown at the last conference, but had found nothing like it, although the head—excepting the horns—and probably also the feet and the tail, were like those of the hippopotamus of the River Nile. At the same meeting Benzelius announced that Lieut.-Col. Schönström had promised to forward a whole tusk of this remarkable animal.

On later occasions too the animal was discussed by the Society. Thus on January 18, 1723, a letter was read from the learned linguist, Sparfvenfelt, wherein he explains the derivation of the words Behemoth and

¹ Major L. Kagg was taken prisoner at the River Dnieper in 1709, and brought to Tobolsk, whence he returned in 1722.

² J. B. Müller's "Leben und Gewohnheiten der Ostiaken unter dem Polo Arctico wohnende," &c. Berlin, 1720.

¹ Published in *Ymer* (Journal of the Swedish Anthropological and Geographical Society), 1884, Parts 7 and 8. (Translation communicated by the Author.)

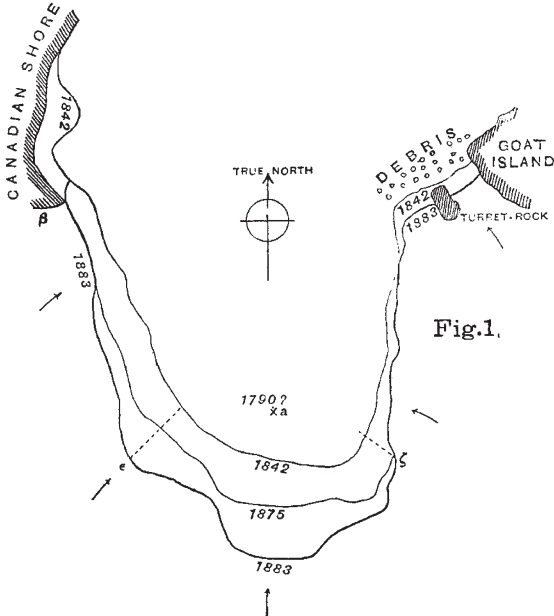
² "Svenska Akademiens handlingar" (*Proceedings of the Swedish Academy*), Part 58. Stockholm, 1883, p. 315.

Mammoth; on February 15 a letter was read from Benzelius, stating that Kagg had received the drawing from a Capt. Tabbert, and that he could give no information as to its correctness. Again, on October 3, Benzelius exhibited a large bone, almost petrified, which was the jaw of a Mammoth, or as it was called Behemoth, received from Tobolsk in Siberia, through Capt. Clodt von Jürgensburg, and, on November 22, Benzelius exhibited "part of the tusk of a Behemoth, which was exactly like ivory." Finally, Benzelius communicated with the Russian Chief of Mines, Tatischew, who, in a letter dated May 12, 1725, had given long and important information of the history of the mammoth. This letter is printed in "Acta Literaria Sueciæ" (vol. ii. p. 36, 1725).

A. E. NORDENSKIÖLD

NIAGARA FALLS: THE RATE AT WHICH THEY RECEDE SOUTHWARDS

THE diagrams are from the map issued by the New York Commission for the establishing a State reservation at the Falls, based on surveys made in August and September, 1883, by Thomas Evershed, under direction of Silas Seymour, State Engineer and Surveyor. The scale of the diagrams is one half that of



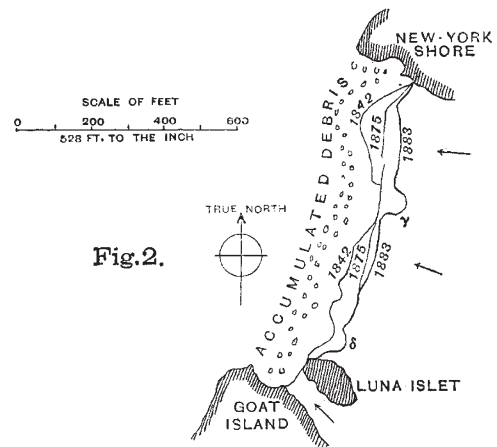
the map, which is on a scale of four chains to the inch. To have given all on one diagram with the intervening Goat Island would take up nearly an entire page of NATURE, and if the scale were smaller it would fail to show clearly the distinctive features of the changes in progress. Fig. 1 shows the Canadian or Horse-Shoe Fall, Fig. 2 the Eastern or so-called "American" Fall—a misnomer too deeply rooted in usage to be now supplanted by some more fitting name.

The rate at which the Falls are receding has been a matter of interest to geologists for over fifty years, but the results so far reached have been conflicting and inconclusive. The manner in which the Falls work backward, undermining their brink, is so well known from Lyell's clear description, that I shall not repeat it.

In 1830, Bakewell, on the basis of such information as he could gather from old inhabitants and from his own observations, concluded that during the previous forty years the Falls had receded at the rate of three feet per annum.

Lyell, from such materials as he could obtain during his own visit in 1841 and 1842, estimated the annual retrograde motion at only a foot. It is sufficient to recite such discordant results arrived at by two careful investigators to show how imperfect were the materials at their disposal, nor will any one who has been on the spot wonder at their differing so greatly. It would be possible to roughly compute the southward movement of the innermost recess of the Canadian Fall by referring its position from time to time to some fixed points on the adjoining shore, but any conclusive determination of the movement of the entire Fall could not be obtained in this way. The map referred to gives the outline of the Falls as determined by three surveys: the New York Geological Survey of 1842, the U.S. Lake Survey of 1875, and Evershed's Survey of 1883. The contours of the brink as established by these enable us to measure the total movement.

I divide the contour from β to Goat Island into thirty-three sections, disregarding for obvious reasons the overflow north of β, on the Canadian shore. From β to ε are eleven sections, from ε to ζ are twelve sections, from ζ to Goat Island are ten sections. It is obvious that much the greater work has been done between β and ζ, and that the innermost recess has kept in the same relative position.



The means of the measurements on the sections, along perpendiculars from the contour at the date of each survey, measured on a tracing of the published map, give the following results for the Canadian Fall:—

	33 years ending in 1875 ft.	8 years ending in 1883 ft.	41 years ending in 1883 ft.
Mean aggregate recession along contour of 2000 feet, from β to Goat Island =	80	—	114
Mean aggregate recession along contour of 1200 feet, β to ζ =	—	60	—
Mean annual rate of regression along the whole contour where a visible change was effected =	2½	7½	2¾
Total maximum regression at the innermost recess =	118	135	253
Annual rate of maximum regression =	3½	16½	6¼

The "American" Fall, measured in ten sections, gave a total mean recession of 37½ feet in the 41 years ending in 1883, which is at the rate of about 10 inches per annum.

I do not know that I have seen any estimate attempted of the relative volumes of water passing over the two falls. From such imperfect data as I have, referring to depth and swiftness, I should think that the rate of erosion for each fall gave some approximation to the