

slow upheaval of the land along the borders of the Icy Sea is now constantly taking place, similar to that experienced in part of Sweden. In the same manner, then, as the shores of the Gulf of Bothnia are extended, not only by the influx of sediment brought down by rivers, but also by the elevation and consequent drying up of the bed of the sea, so a like combination of causes may, in modern times, have been extending the low tract of land where marine shells and fossil bones occur in Siberia.* Such a change in the physical geography of that region, implying a constant augmentation in the quantity of arctic land, would, according to principles to be explained in the next chapter, tend to increase the severity of the winters. We may conclude, therefore, that, before the land reached so far to the north, the temperature of the Siberian winter and summer was more nearly equalized; and a greater degree of winter's cold may, even more than a general diminution of the mean annual temperature, have finally contributed to the extermination of the mammoth and its contemporaries.

On referring to the map (p. 81.), the reader will see how all the great rivers of Siberia flow at present from south to north, from temperate to arctic regions, and they are all liable, like the Mackenzie, in North America, to remarkable floods, in consequence of flowing in this direction. For they are filled with running water in their upper or southern course when completely frozen over for several hundred miles near their mouths, where they remain blocked up by ice for six months in every year. The descending waters, therefore, finding no open channel, rush over the ice, often changing their direction, and sweeping along forests and prodigious quantities of soil and gravel mixed with ice. Now the rivers of Siberia are among the largest in the world, the Yenesei having a course of 2500, the Lena of 2000 miles; so that we may easily conceive that the bodies of animals which fall into their waters may be transported to vast distances towards the Arctic Sea, and, before arriving there, may be stranded upon and often frozen into thick ice. Afterwards, when the ice breaks up, they may be floated still farther towards the ocean, until at length they become buried in fluvial and submarine deposits near the mouths of rivers.

Humboldt remarks that near the mouths of the Lena a considerable thickness of frozen soil may be found at all seasons at the depth of a few feet; so that if a carcass be once imbedded in mud and ice in such a region and in such a climate, its putrefaction may be arrested for indefinite ages.† According to Prof. Von Baer of St. Petersburg, the ground is now frozen permanently to the depth of 400 feet, at the town of Yakutzk, on the western bank of the Lena, in lat 62° N., 600 miles distant from the polar sea. Mr. Hedenstrom informs

* Since the above passage was first printed in a former edition, June 1835, it has been shown by the observations of Sir R. Murchison, M. de Verneuil, and Count Keyserling, and more recently by M. Middendorf (see above, p. 83.), that

the Lowland of Siberia has actually been extended, since the *existing species* of shells inhabited the northern seas.

† Humboldt, *Fragmens Asiaticques*, tom. ii. p. 393.