

ture on a small scale, which is common in the solid ice of the glacier. The planes of these *ribbons* are, for the most part, at right angles to the crevasses, near the sides of the glacier, while, near its central line, they *dip* towards the upper part of the glacier. This structure appears to arise from the difference of velocities of contiguous moving filaments of the icy mass, as the crevasses themselves arise from the tension of larger portions. Mr. Forbes has, in successive publications, removed the objections which have been urged against this theory. In the last of them, a Memoir in the *Phil. Trans.*, 1846, (*Illustrations of the Viscous Theory of Glacier Motion*,) he very naturally expresses astonishment at the opposition which has been made to the theory on the ground of the rigidity of small pieces of ice. He has himself shown that the ice of glaciers has a plastic flexibility, by marking forty-five points in a transverse straight line upon the Mer de Glace, and observing them for several days. The straight line in that time not only became oblique to the side, but also became visibly curved.

Both Mr. Forbes and other philosophers have made it in the highest degree probable that glaciers have existed in many places in which they now exist no longer, and have exercised great powers in transporting large blocks of rock, furrowing and polishing the rocks along which they slide, and leaving lines and masses of detritus or *moraine* which they had carried along with them or pushed before them. It cannot be doubted that extinct glaciers have produced some of the effects which the geologist has to endeavor to explain. But this part of the machinery of nature has been worked by some theorists into an exaggerated form, in which it cannot, as I conceive, have any place in an account of Geological Dynamics which aims at being permanent.

The great problem of the diffusion of drift and erratic blocks from their parent rocks to great distances, has driven geologists to the consideration of other hypothetical machinery by which the effects may be accounted for: especially the great *northern drift* and *boulders*,—the rocks from the Scandinavian chain which cover the north of Europe on a vast area, having a length of 2000 and breadth of from 400 to 800 miles. The diffusion of these blocks has been accounted for by supposing them to be imbedded in icebergs, detached from the shore, and floated into oceanic spaces, where they have grounded and been deposited by the melting of the ice. And this mode of action may to some extent be safely admitted into geological speculation. For it is a matter of fact, that our navigators in arctic and antarctic regions have