

that clay makes a part of till, and sometimes interlaminating beds; and that half-decomposed rock-flour, fitted to make loess, should have been contributed so abundantly to the Mississippi and its tributaries.

The smaller traveled stones were sometimes ground smooth on several sides, and thus faceted, so as to resemble human flint implements. Shaler mentions the frequent occurrence of such faceted stones on Nantucket, and W. P. Blake has found many over Mill Rock, near New Haven, Conn.

The process of *decomposition* went forward rapidly because the stones were in a moist place, and the needed air penetrated all glaciers. Moreover, through the carbonic acid present in the ice, as it is present in all rain or snow, decomposition of other kinds went forward, and especially that of *changing the finely powdered feldspar to clay* (page 129). The microscopic vegetation not uncommon in glacier ice, including that of Greenland, may, through its decay, have afforded additional carbonic acid, and also organic acids for the work of decomposition.

There is little of this clay made in the region of the Alps, but it was almost universal when the continental ice flowed over regions where crystalline rocks were to be had; and the distribution of clay in great beds over glaciated areas, as well as in the boulder clay, is thus accounted for.

The invading ice in its first movement trod down the forests and carried off the broken trunks; and some trunks and stumps and eddy-like gatherings of leaves in the till or boulder clay of Ohio, Indiana, Illinois, and other states west may have thus been gathered. The accumulation of soil and the growth of forests over the debris that accumulates on the melting margin of a glacier, as on the St. Elias glacier (page 239), illustrates a common process of the Ice age.

2. *Transportation.*—In the work of transportation both ice and water were concerned. Melting, through the warmer season, and copious rains supplied the water. The glaciers of the Alps and Greenland teach that superglacial lakes and streams may thus have been made, which contributed water to sub-glacial rivers.

The distance of transportation by the glacier varied from 10 miles or less to 500; and more examples of distant travel would exist if stones did not wear out. Native copper has the advantage of stone, and some of its masses made a journey of at least 450 miles, as stated on page 952.

The direction of travel is sometimes indicated by the occurrence of long trains of stones leading off from the ledge or peak which afforded them. A hill of hard quartzose chloritic rocks on the borders of Lebanon and Canaan, in Rensselaer County, N.Y., was the parent source of the "Richmond" train of large stones that crosses the Taconic Range into Massachusetts, and is continued on over Richmond and Lenox into Tyringham (S. Reid, 1842, E. Hitchcock, 1844, E. R. Benton, 1878).

Some of the transported boulders exceed 1000 tons in weight. The "Churchill Rock" at Nottingham, N.H., described by C. H. Hitchcock, is 62, 40, and 40 feet in its diameters, and is estimated to weigh about 6000 tons.