

successive phases of glacial action in Switzerland, to which I shall presently advert.

*Contorted Strata of Glacial Drift south of Ivrea.*

At Mazzé near Caluso (see map, p. 306), the southern extremity of this great moraine has recently been cut through in making a tunnel for the railway which runs from Turin to Ivrea. In the fine section thus exposed Signor Gastaldi and I had an opportunity of observing the internal structure of the glacial formation. In close juxtaposition to a great mass of till with striated boulders, we saw stratified beds of alternating gravel, sand, and loam, which were so sharply bent that many of them had been twice pierced through in the same vertical cutting. Whether they had been thus folded by the mechanical power of an advancing glacier, which had pushed before it a heap of stratified matter, as the glacier of Zermatt has been sometimes known to shove forward blocks of stone through the walls of houses, or whether the melting of masses of ice, once interstratified with sand and gravel, had given rise to flexures, in the manner before suggested, pp. 138 and 220; it is at least satisfactory to have detected this new proof of a close connection between ice-action and contorted stratification, such as has been described as so common in the Norfolk cliffs, p. 222, and which is also very often seen in Scotland and North America, where stratified gravel overlies till. I have little doubt that if the marine pliocene strata, which underlie a great part of the moraine below Ivrea, were exposed to view in a vertical section, those fundamental strata would be found not to participate in the least degree in the plications of the sands and gravels of the overlying glacial drift.

To return to the marks of glaciation: in the moraine at Mazzé, there are many large blocks of protogene, and large