

instantaneously produced by tremendous cataclysms or even by downright supernatural means or miracles. The idea still lingers among men not familiar with geological matters that some stupendous topographical results have been effected in the twinkling of an eye by the "finger of God"—the expression cited by Prof. Branner. But all geologists now realize that the sculptured relief of the mountains and valleys, even where most astounding, even the gorge of the Niagara or the cañon of the Colorado, has been accomplished in the lapse of thousands of years by the same agents, chiefly rain and streams of water, that we see still in action about us.

It is plain that the geological indications given by the surface topography must have great value of a practical kind, and aid very much towards ascertaining both the general subterranean structure and the smaller details of either theoretical interest or economical importance. If coal or iron ore or other valuable mineral is known to occupy a particular geological horizon, a certain layer in a series of rock beds, such a series, for example, as we have in these Punjab illustrations, the place of outcrop of that horizon or layer, with the useful mineral, may in many cases be recognized merely by means of a careful study of the topography, and often the general structure, whether that of a basin or of a saddle, may be perceived; even though the surface of the ground may be so covered with loose earth and broken stone as to conceal the dips and precise character of the solid rock beds below.

The Punjab illustrations of the influence of the geological structure on the topography are interesting from their showing so clearly the small basins and saddles, with frequently very steep dips, but occasionally gentle ones, and with the repeated alternation of rather thin harder and softer rock beds, partly buried under level-bedded, soft, alluvium-like beds, in a region where the rock beds are in the main very strongly compressed and sharply folded and often broken and crushed together. The map is a striking example of the excellent geological results of faithful topographical work by surveyors who were no doubt quite unconscious of its having any significance for geology.