

to find relief by rising into mountain ridges. With this effort the elevatory movements ceased. They were followed either by a stationary period, or more usually by a renewal of the gradual depression, until eventually relief was again obtained by upheaval, sometimes along new lines, but often on those which had previously been used. The intricate crumpling and gigantic inversions of a great mountain-chain naturally suggest that the movements which caused these disturbances of the strata were sudden and violent. And this inference may often, if not generally, be correct. It is not so easy, however, to demonstrate that a disturbance was rapid as to prove that it must have been slow. That some uplifts resulting in the rise of important mountain ranges have been almost insensibly brought about, can be shown from the operation of rivers in the regions affected. Thus the rise of the Uinta Mountains has been so quiet that the Green River, which flowed across the site of the range, has not been deflected, but has actually been able to deepen its cañon as fast as the mountains have been pushed upward.¹⁰ The Pliocene accumulations along the southern flanks of the Himalayas show that the rivers still run in the same lines as they occupied before the last gigantic upheaval of the chain (p. 1672).¹¹ A similar conclusion has been drawn from the river-valleys in the Elburz Mountains, Persia.¹²

2. Terrestrial Features due to Volcanic Action.—The two types of volcanic eruptions described

¹⁰ Powell's "Geology of the Uinta Mountains," in the Reports of U. S. Geographical and Geological Survey, Rocky Mountain Region, 1876. The same conclusion is drawn by Gilbert from the structure of the Wahsatch Mountains. See his admirable essay on "Land Sculpture," in his "Geology of the Henry Mountains," published in the same series of Reports, 1877.

¹¹ Medlicott and Blandford, "Geology of India," p. 570.

¹² E. Tietze, *Jahrb. Geol. Reichsanst.* xxviii. 1878, p. 581.