was struck upwards from below with such force as to unship and split up the main-mast.

(50.) Evidences of a similar sudden and upward explosive action are of frequent occurrence among the extinct volcanos of Auvergne and the Vivarais, where in many instances the perforation of the granitic beds which form the basis or substratum of the whole country appears to have been effected at a single blow, accompanied with little evidence of disturbance of the surrounding rocks—much in the same way as a bullet will pass through a pane of glass without starring or shattering it. In such cases it would seem as if water in a liquid state had suddenly been let in through a fissure upon a most intensely heated and molten mass beneath, producing a violent but local explosion, so instantaneous as to break its way through the overlying rocks, without allowing time for them to bend or crumple, and so displace the surrounding masses.

(51.) The same kind of upward bounding movement took place at Riobamba in Quito in the great earthquake of February 4, 1797, which was connected with an eruption of the volcano of Tunguragua. That earthquake extended in its greatest intensity over an oval space of 120 miles from south to north, and 60 from east to west, within which space every town and village was levelled with the ground; but the total extent of surface shaken was upwards of 500 miles in one direction (from Puna to Popayan), and 400 in the other. Quero, Riobamba, and several other towns, were buried under fallen mountains, and in a very few minutes