

en masses and fragments into distant countries. The formation of valleys constitutes an important subject of geological research: it will be reserved for a subsequent part of the volume; but it may be useful to state to the geological student, that all stratified mountains are only parts of extended strata, with which they were once united.

This will be more distinctly understood, by consulting Plate IV. fig. 1., which is intended to represent the general rise of the strata from Sheffield in Yorkshire to Castleton in Derbyshire, intersected by the valley through which the river Derwent flows.

The town of Sheffield, fig. 1., is built over coal strata, which rise towards the west, and disappear in that direction about five miles from Sheffield (2). Here, the under rock makes its appearance (3), which is a bed of coarse gritstone, more than one hundred and twenty yards in thickness, forming the summits of all the mountains as you advance to the vale of Derwent (4). The grit-rock rests upon a thicker bed, of a different kind, composed chiefly of slaty sandstone, represented (5). On the western side of the valley, the grit-rock (3) exists only as a cap or covering on Whin-Hill, a lofty mountain, marked (6). Two miles farther west, the grit-rock disappears, and the slaty sandstone, which is the base of Whin-Hill, forms the summit of the celebrated Mam Tor, or the Shivering Mountain. The mountain limestone (7) here makes its appearance as the base of Mam Tor, and, farther west, the same limestone forms entire mountains. The difference observable in the rocks east and west of the Derwent, is owing to the general rise of the strata in the latter direction.

It is here obvious, that Whin-Hill, though it appears an isolated mountain, is only a portion of the thick beds of gritstone, and slaty sandstone, on the other side of the valley.

It deserves notice, that isolated caps, like that on the top of Whin Hill, fig. 1., (6.) often occur where we can trace no similar rocks in the vicinity: they are, sometimes, the only remaining relics of a stratum that has been destroyed, and removed by some of the great catastrophes that have changed the surface of the globe.

When valleys take the same direction as that of a range of mountains, they are called *longitudinal valleys*; when they cut through a range of mountains, they are called *transversal valleys*: in the latter case, the strata on each side of the valley are generally the same.

The small valleys which open into a larger valley, nearly at right angles to it, are called *lateral valleys*. In some rare instances, a valley is formed by the bending of the strata, which make a trough as represented Plate I. Fig. 2. c.

When considerable tracts of the upper strata are wanting, as between A, B, Plate I. Fig. 2., it is supposed that the lower strata have been laid bare, by some convulsion that has torn off and carried away