

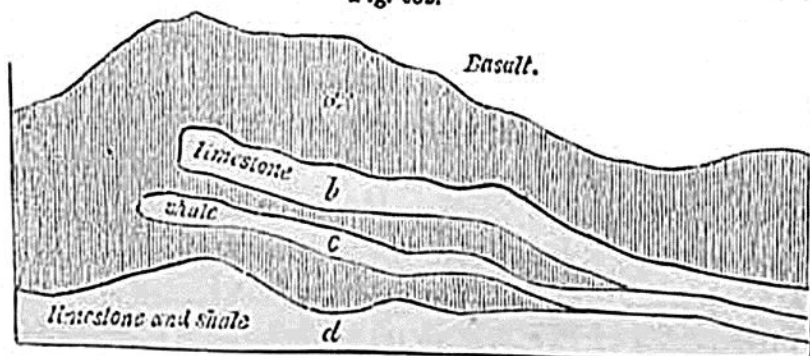
a variety of cases, shale being turned into flinty slate or jasper, limestone into crystalline marble, sandstone into quartz, coal into coke, and the fossil remains of all such strata wholly and in part obliterated, it is by no means uncommon to meet with the same rocks, even in the same districts, absolutely unchanged in the proximity of volcanic dikes.

This great inequality in the effects of the igneous rocks may often arise from an original difference in their temperature, and in that of the entangled gases, such as is ascertained to prevail in different lavas, or in the same lava near its source and at a distance from it. The power also of the invaded rocks to conduct heat may vary, according to their composition, structure, and the fractures which they may have experienced, and perhaps, also, according to the quantity of water (so capable of being heated) which they contain. It must happen in some cases that the component materials are mixed in such proportions as prepare them readily to enter into chemical union, and form new minerals; while in other cases the mass may be more homogeneous, or the proportions less adapted for such union.

We must also take into consideration, that one fissure may be simply filled with lava, which may begin to cool from the first; whereas in other cases the fissure may give passage to a current of melted matter, which may ascend for days or months, feeding streams which are overflowing the country above, or are ejected in the shape of scorïæ from some crater. If the walls of a rent, moreover, are heated by hot vapor before the lava rises, as we know may happen on the flanks of a volcano, the additional caloric supplied by the dike and its gases will act more powerfully.

Intrusion of trap between strata.—In proof of the mechanical force which the fluid trap has sometimes exerted on the rocks into which it has intruded itself, I may refer to the Whin-Sill, where a mass of basalt, from 60 to 80 feet in height, represented by *a*, fig. 632, is in part

Fig. 632.



Trap interposed between displaced beds of limestone and shale, at White Force, High Teesdale, Durham. (Sedgwick.*)

wedged in between the rocks of limestone, *b*, and shale, *c*, which have been separated from the great mass of limestone and shale, *d*, with which they were united.

* Camb. Trans. vol. ii. p. 180.