

period ; it might be protruded, laterally, between them. That such lateral protrusions have actually taken place in some instances, is proved by Dr. MacCulloch's observations on the coast of Scotland, where trap may be seen forming beds between strata of sandstone, then suddenly cutting through the upper strata and forming other beds above. See Plate III. fig. 3. where strata of sandstone are intersected, vertically, by a dyke of basalt, and laterally by nearly horizontal beds of the same basalt. Professor Sedgwick has bestowed much labor in investigating the true position of the Great Whinstone Sill, and its relations to the different strata in its vicinity, and has given a very luminous and satisfactory description of the remarkable phenomena which it presents, proving unanswerably the igneous origin of this rock.

It would be doing great injustice to this valuable paper, to attempt an abridgment of the detail of interesting facts and arguments which it contains : I shall briefly recapitulate some of the observations. The whin sill is not a regular bed interposed between the same strata in different parts of its range, but it cuts through or overlies very different strata. It has had an extraordinary effect in converting beds of shale, on which it lies, into a porous slag ; and where the whin sill comes in contact with limestone, the limestone is converted into a dull white granular and crystalline mass. (Query Dolomite?)

This conversion takes place not only in the subjacent limestone, but sometimes on the limestone which covers the whin sill,—a fact deserving particular attention, as it indicates that the whin sill was protruded between the beds of limestone, otherwise it could scarcely have produced any chemical or mechanical change on the upper bed of limestone. In some parts, beds of limestone are seen bent upwards and imbedded in the whin sill.

Indeed Professor Sedgwick thinks it probable, that the whin sill was produced by a lateral injection of volcanic matter, in a state of igneous fusion.

The beds of trap or toadstone, imbedded in the mountain limestone of Derbyshire, were supposed by Mr. Whitehurst to have been protruded or driven, in a melted state, between the strata : this opinion was founded chiefly on the supposed fact, that the metallic veins, which cut through the limestone, 1. 2. 3. do not pass into the toadstone, (see Plate IV. fig. 5.) and were therefore supposed to have been broken through when the latter beds were protruded. It has, however, since been discovered, that the veins do often pass into the toadstone, though they seldom bear ore in this rock ; hence the conclusion of Mr. Whitehurst was deprived of its main support. Subsequently, Mr. Farey, in his survey of Derbyshire, misled by an attachment to theory, described the beds of toadstone as regular strata, preserving their thickness and continuity through the Peak of Derbyshire. This is by no means the case ; the beds of toadstone are extremely variable in their thickness and order of succession, and the