

contend for the volcanic origin of these rocks, always ascribe them to sub-marine volcanoes, acting while the ocean still covered the surface of our present continents, or at least the districts in which they are found.

(d) *Modes of arrangement and connexion with the rocks among which they occur.* The trap rocks which are found within the limits occupied by the coal-measures and subjacent limestone, occur under three distinct modes of position, of which two appear to indicate an origin distinct from that of the strata with which they are geographically associated: while the third seems to countenance the opposite inference of their contemporaneous formation. These modes of position are, I. As overlying masses resting unconformably on the subjacent strata. This appears to be the position of the trap rocks at Clee Hill and at Dudley. II. As dykes irregularly intersecting and traversing the strata; of these, numerous examples are found in Northumberland and Durham, and one remarkable instance will be described in Staffordshire. III. As beds conformably interstratified and regularly alternating with the other strata. The Great Whinsill of Northumberland, and the toadstone strata of Derbyshire, illustrate this case. It does not appear that there are any circumstances in the stratification and arrangement of such beds of trap, which decidedly differ from the appearances presented by the neighbouring strata. It has indeed been asserted that they are subject to much greater and more rapid alterations in thickness; and this certainly appears in some instances at least, to be the case. But this character seems scarcely sufficient to afford foundation for inferring a distinct origin. It has also been said that the metalliferous veins traversing the other strata, are themselves cut off by these, which must therefore be of subsequent formation. But although such is often the fact, yet the exceptions which occur require this argument to be modified, though not perhaps entirely withdrawn; and it must also be remembered, that metalliferous veins are subject to similar contractions, in traversing many other strata; expanding for instance in those of limestone, and shrinking in those of shale which alternate with them.

Between the trap rocks, however, occurring in these three so different positions, no mineralogical or external features of distinction have been shewn to exist; but the same varieties seem to occur indiscriminately in each; so that the indications of their belonging to different formations, afforded by a diversity of position, are balanced by opposite probabilities resulting from identity of character.

We ought not to close this article, without noticing some