with siliceous matter, as Von Buch observed, in Lancerote, the walls of a volcanic crater formed in 1731 to be traversed by an open rent in which hot vapours had deposited hydrate of silica, the incrustation nearly extending to the middle.* Such a vein may then be filled with clay or sand, and afterwards reopened, the new rent dividing the argillaceous deposit, and allowing a quantity of rubbish to fall down. Various metals and spars may then be precipitated from aqueous solutions among the interstices of this heterogeneous mass.

That such changes have repeatedly occurred, is demonstrated by occasional cross-veins, implying the oblique fracture of previously formed chemical and mechanical deposits. Thus, for example, M. Fournet, in his description of some mines in Auvergne worked under his superintendence, observes, that the granite of that country was first penetrated by veins of granite, and then dislocated, so that open rents crossed both the granite and the granitic veins. Into such openings, quartz, accompanied by sulphurets of iron and arsenical pyrites, was introduced. Another convulsion then burst open the rocks along the old line of fracture, and the first set of deposits were cracked and often shattered, so that the new rent was filled, not only with angular fragments of the adjoining rocks, but with pieces of the older veinstones. Polished and striated surfaces on the sides or in the contents of the vein, also attest the reality of these movements. A new period of repose then ensued, during which various sulphurets were introduced, together with hornstone quartz, by which angular fragments of the older quartz before mentioned were cemented into a breccia. This period was followed by other dilatations of the same veins, and other sets of mineral deposits, until, at last, pebbles of the basaltic lavas of Auvergne, derived from superficial alluviums, probably of Miocene or older Pliocene date, were swept into the veins. I have not space to enumerate all the changes minutely detailed by M. Fournet, but they are valuable, both to the miner and geologist, as showing how the supposed signs of violent catastrophes may be the monuments, not of one paroxysmal shock, but of reiterated movements.

Such repeated enlargement and reopening of veins might have been anticipated, if we adopt the theory of fissures, and reflect how few of them have ever been sealed up entirely, and that a country with fissures only partially filled must naturally offer much feebler resistance along the old lines of fracture than any where else. It is quite otherwise in the case of dikes, where each opening has been the receptacle of one continuous and homogeneous mass of melted matter, the consolidation of which has taken place under considerable pressure. Trappean dikes can rarely fail to strengthen the rocks at the points where before they were weakest; and if the upheaving force is again exerted in the same direction, the crust of the earth will give way anywhere rather than at the precise points where the first rents were produced.

* Principles, ch. xxvii 8th ed. p. 422.