

the beautiful forms of many shells covered with spines, prove that they could not have been drifted from a distance, or deposited in an agitated ocean.

I have never been able to comprehend, why any peculiar difficulties should be supposed to attend the enquiries respecting the origin of calcareous or magnesian earths; or of the carbon and sulphur occurring in rocks, in the state of carbonic or sulphuric acids. It would be equally proper to institute an enquiry into the origin of siliceous or aluminous. I hold the earth itself, and its ancient atmosphere, to have been the great chemical laboratories, in which all the solid and fluid parts of the surface were originally prepared and formed. This opinion I stated at some length in Chap. XVI. of the second edition of this work in 1815, and also in the third Edition, in a chapter on the agency of subterranean fire in the formation of rocks, and on igneous and aqueous eruptions of earthy matter. It has been too much the fashion to consider all the secondary strata as mechanical depositions; but the siliceous strata in the Paris basin, the layers of flint in chalk, and the beds of chert or hornstone in transition limestone, are certainly as much original formations as granite itself.

In referring to the vast magnitude of ancient volcanoes, I have stated that they had doubtless an important office to perform in nature: and can it be unreasonable to believe, that the earth itself is the great laboratory and storehouse, where the materials that form its surface were prepared, and from which they were thrown out upon the surface in an igneous, aqueous, or gaseous state, either as melted lava, or in aqueous solution, or in mechanical admixture with water in the form of mud, or in the comminuted state of powder or sand? Inflammable and more volatile substances may have been emitted in a gaseous state, and become concrete on the surface.

These primeval eruptions, judging from the size of the ancient fissures and craters, may have been sufficient to cover a large portion of the globe. Nor can it be deemed improbable, that still larger and more ancient craters have been entirely covered by succeeding eruptions. In proportion as the formation of the surface advanced, these eruptions might decline, and be, more and more, limited in their operation.

It is not necessary to suppose, that these subterranean eruptions consisted only of lava in a state of fusion. The largest active volcanoes at present existing, throw out the different earths intermixed with water in the form of mud. Nor should we limit the eruptions of earthy matter in solution or suspension, to volcanic craters: the vast fissures or rents which intersect the different rocks, may have served for the passage of siliceous solutions to the surface. We know no instances in nature of siliceous earth being held in aqueous solution, except in the waters of hot or boiling springs; and hence it seems reasonable to infer, that many siliceous rocks and veins have