opment of large quantities of pure aqueous vapor; subsequently, when the volcano becomes a solfatara, by aqueous vapors mixed with sulphureted hydrogen and carbonic acid gases; and, finally, when it is completely cooled, by exhalations of carbonic acid alone. There is a remarkable class of igneous mountains which do not eject lava, but merely devastating streams of hot water,* impregnated with burning sulphur and rocks reduced to a state of dust (as, for instance, the Galungung in Java); but whether these mountains present a normal condition, or only a certain transitory modification of the volcanic process, must remain undecided until they are visited by geologists possessed of a knowledge of chemistry in its present condition.

I have endeavored in the above remarks to furnish a general description of volcanoes—comprising one of the most important sections of the history of terrestrial activity—and I have based my statements partly on my own observations, but more in their general bearing on the results yielded by the labors of my old friend, Leopold von Buch, the greatest geognosist of our own age, and the first who recognized the intimate connection of volcanic phenomena, and their mutual dependence upon one another, considered with reference to their relations in space.

Volcanic action, or the reaction of the interior of a planet on its external crust and surface, was long regarded only as an isolated phenomenon, and was considered solely with respect to the disturbing action of the subterranean force; and it is only in recent times that—greatly to the advantage of geognostical views based on physical analogies—volcanic forces have been regarded as *forming new rocks, and transforming those that already existed.* We here arrive at the point to which I have already alluded, at which a well-grounded study of the activity of volcanoes, whether igneous or merely such as emit gaseous exhalations, leads us, on the one hand, to the mineralogical branch of geognosy (the science of the texture and the succession of terrestrial strata), and, on the other, to the science of geographical forms and outlines—the configuration of continents and insular groups elevated above the level

* Compare Reinwardt and Hoffmann, in Poggendorf's *Annalen*, bd. xii., s. 607; Leop. von Buch, *Descr. des Iles Canaries*, p. 424–426. The eruptions of argillaceous mud at Carguairazo, when that volcano was destroyed in 1698, the Lodazales of Igualata, and the Moya of Pelileo—all on the table-land of Quito—are volcanic phenomena of a similar nature.