The intimate connection of the phenomena which we have considered is still hidden in obscurity. Elastic fluids are doubtlessly the cause of the slight and perfectly harmless trembling of the earth's surface, which has often continued several days (as in 1816, at Scaccia, in Sicily, before the volcanic elevation of the island of Julia), as well as of the terrific explosions accompanied by loud noise. The focus of this destructive agent, the seat of the moving force, lies far below the earth's surface; but we know as little of the extent of this depth as we know of the chemical nature of these vapors that are so highly compressed. At the edges of two craters, Vesuvius, and the towering rock which projects beyond the great abyss of Pichincha, near Quito, I have felt periodic and very regular shocks of earthquakes, on each occasion from 20 to 30 seconds before the burning scoriæ or gases were erupted. The intensity of the shocks was increased in proportion to the time intervening between them, and, consequently, to the length of time in which the vapors were accumulating. This simple fact, which has been attested by the evidence of so many travelers, furnishes us with a general solution of the phenomenon, in showing that active volcanoes are to be considered as safety-valves for the immediate neighborhood. The danger of earthquakes increases when the openings of the volcano are closed, and deprived of free communication with the atmosphere; but the destruction of Lisbon, of Caraccas, of Lima, of Cashmir in 1554,* and of so many cities of Calabria, Syria, and Asia Minor, shows us, on the whole, that the force of the shock is not the greatest in the neighborhood of active volcanoes.

As the impeded activity of the volcano acts upon the shocks of the earth's surface, so do the latter react on the volcanic phenomena. Openings of fissures favor the rising of cones of eruption, and the processes which take place in these cones, by forming a free communication with the atmosphere. A column of smoke, which had been observed to rise for months together from the volcano of Pasto, in South America, suddenly disappeared, when, on the 4th of February, 1797, the province of Quito, situated at a distance of 192 miles to the south, suffered from the great earthquake of Riobamba. After the earth had continued to tremble for some time throughout the whole of Syria, in the Cyclades, and in Eubœa, the shocks suddenly ceased on the eruption of a stream of hot mud

* On the frequency of earthquakes in Cashmir, see Troyer's German translation of the ancient *Radjataringini*, vol. ii., p. 297, and Carl v. Hügel, *Reisen*, bd. ii., s. 184.