

gossal mountain chain of Quito, Pasto, and Popayan, no less than by numerous valleys and clefts, and they are 436 miles apart. The sound was certainly not propagated through the air, but through the earth, and at a great depth. During the violent earthquake of New Granada, in February, 1835, subterranean thunder was heard simultaneously at Popayan, Bogota, Santa Marta, and Caraccas (where it continued for seven hours without any movement of the ground), in Haiti, Jamaica, and on the Lake of Nicaragua.

These phenomena of sound, when unattended by any perceptible shocks, produce a peculiarly deep impression even on persons who have lived in countries where the earth has been frequently exposed to shocks. A striking and unparalleled instance of uninterrupted subterranean noise, unaccompanied by any trace of an earthquake, is the phenomenon known in the Mexican elevated plateaux by the name of the "roaring and the subterranean thunder" (*bramidos y truenos subterranos*) of Guanaxuato.* This celebrated and rich mountain city lies far removed from any active volcano. The noise began about midnight on the 9th of January, 1784, and continued for a month. I have been enabled to give a circumstantial

* On the *bramidos* of Guanaxuato, see my *Essai Polit. sur la Nouv. Espagne*, t. i., p. 303. The subterranean noise, unaccompanied by any appreciable shock, in the deep mines and on the surface (the town of Guanaxuato lies 6830 feet above the level of the sea), was not heard in the neighboring elevated plains, but only in the mountainous parts of the Sierra, from the Cuesta de los Aguilares, near Marfil, to the north of Santa Rosa. There were individual parts of the Sierra 24–28 miles northwest of Guanaxuato, to the other side of Chichimequillo, near the boiling spring of San José de Comangillas, to which the waves of sound did not extend. Extremely stringent measures were adopted by the magistrates of the large mountain towns on the 14th of January, 1784, when the terror produced by these subterranean thunders was at its height. "The flight of a wealthy family shall be punished with a fine of 1000 piasters, and that of a poor family with two months' imprisonment. The militia shall bring back the fugitives." One of the most remarkable points about the whole affair is the opinion which the magistrates (*el cabildo*) cherished of their own superior knowledge. In one of their *proclamas*, I find the expression, "The magistrates, in their wisdom (*en su sabiduria*), will at once know when there is actual danger, and will give orders for flight; for the present, let processions be instituted." The terror excited by the tremor gave rise to a famine, since it prevented the importation of corn from the table-lands, where it abounded. The ancients were also aware that noises sometimes existed without earthquakes.—Aristot., *Meteor.*, ii., p. 802; Plin., ii., 80. The singular noise that was heard from March, 1822, to September, 1824, in the Dalmatian island Meleda (sixteen miles from Ragusa), and on which Partsch has thrown much light, was occasionally accompanied by shocks.