

During the long-continued trembling of the ground in the Piedmontese valleys of Pelis and Clusson, the greatest changes in the electric tension of the atmosphere were observed while the sky was cloudless. The intensity of the hollow noise which generally accompanies an earthquake does not increase in the same degree as the force of the oscillations. I have ascertained with certainty that the great shock of the earthquake of Riobamba (4th Feb., 1797)—one of the most fearful phenomena recorded in the physical history of our planet—was not accompanied by any noise whatever. The tremendous noise (*el gran ruido*) which was heard below the soil of the cities of Quito and Ibarra, but not at Tacunga and Hambato, nearer the center of the motion, occurred between eighteen and twenty minutes *after* the actual catastrophe. In the celebrated earthquake of Lima and Callao (28th of October, 1746), a noise resembling a subterranean thunder-clap was heard at Truxillo a quarter of an hour after the shock, and unaccompanied by any trembling of the ground. In like manner, long after the great earthquake in New Granada, on the 16th of November, 1827, described by Boussingault, subterranean detonations were heard in the whole valley of Cauca during twenty or thirty seconds, unattended by motion. The nature of the noise varies also very much, being either rolling, or rustling, or clanking like chains when moved, or like near thunder, as, for instance, in the city of Quito; or, lastly, clear and ringing, as if obsidian or some other vitrified masses were struck in subterranean cavities. As solid bodies are excellent conductors of sound, which is propagated in burned clay, for instance, ten or twelve times quicker than in the air, the subterranean noise may be heard at a great distance from the place where it has originated. In Caraccas, in the grassy plains of Calabozo, and on the banks of the Rio Apure, which falls into the Orinoco, a tremendously loud noise, resembling thunder, was heard, unaccompanied by an earthquake, over a district of land 9200 square miles in extent, on the 30th of April, 1812, while at a distance of 632 miles to the northeast, the volcano of St. Vincent, in the small Antilles, poured forth a copious stream of lava. With respect to distance, this was as if an eruption of Vesuvius had been heard in the north of France. In the year 1744, on the great eruption of the volcano of Cotopaxi, subterranean noises, resembling the discharge of cannon, were heard in Honda, on the Magdalena River. The crater of Cotopaxi lies not only 18,000 feet higher than Honda, but these two points are separated by the co-