

to be really a causal connection, and the coincidence not fortuitous. So far no satisfactory explanation has as yet been offered for their appearance. The release of gases from the earth has been suggested, electric ignition through friction, however nothing has been proven.

Sound was heard at most places where our earthquake was felt, but not at the most distant place, Pembroke, 100 miles. Sound is produced by waves of condensation and rarefaction in the air. The lower limit of audibility requires at least 30 vibrations per second. These vibrations in case of earthquakes must come from the elastic vibrations in the rocky medium of the earth along the ray of the impulse. As the rate of propagation in air is very much less than in rock there will be refraction at the surface, with the result that the direction of the sound waves will be nearly vertical, as pointed out by Professor Knott. Areas overlain with a thick bed of alluvium will naturally be less affected by the phenomenon of sound than those with rock close to the surface, on account of absorption in the former case. This absorption takes place too in deep-seated quakes by the viscosity of the rocky material, so that a wide-spread quake of small intensity, as obtained with the quake of April 28, combined with the fact that it was accompanied by sound would again point to a hypocentre of no great depth, a conclusion we had already arrived at for other reasons. In general, the description of the sound was low-rumbling, the rolling of distant thunder, or of a heavy vehicle, indicating vibrations of low frequency. Evidence of sound of an explosive character was only obtained at Iroquois and Morrisburg, which as stated above are near the epicentre, and consequently suffer less by absorption of the original energy.

Although we know that audible sound requires a frequency of the air-waves of at least 30 per second, yet such frequency or period we can not measure on the seismogram as the period of the earth particles which create the vibrations in the air, remembering that a millimetre on the seismogram represents four seconds. It is desired to point out that the explanation of the phenomenon of sound in connection with earthquakes is inferred, but is not deduced from or correlated with actual instrumental or seismograph records. Sounds emanating from the earth have been noted in different parts of the world, not only in connection with earthquakes, but otherwise also, and the phenomenon goes under different names in different countries, such as *Mistpoeffers* in the Netherlands; *Guns of Barisal* in India; *Rombo*, *Marina* and *Balza* in Italy; *Bramido* in Mexico, and so on. Their complete explanation has not yet been found.

Beneficial effects of earthquakes are seldom noted so that the case cited by Professor Schmidt of the quake of Nov. 16, 1911, may well be given. On the