

velocity of the earth-wave, and its variation with the nature of the material through which it is propagated. Mr. Mallet found that the shock produced by the explosion of gunpowder travelled at the rate per second of 825 feet in sand; 1088 feet in schists, slates, and quartzites; 1306 feet in friable granite; and 1664 feet in solid granite. General Abbot, by observing the effects of the explosion of dynamite and gunpowder, found the velocity of transmission of the shock to vary from 1240 to 8800 feet per second, and to be greatest where the shock is most violent.¹⁷² Observations of the time at which an earthquake has successively visited the different places on its track have shown similar variations in the rate of movement. Thus in the Calabrian earthquake of 1857, the wave of shock varied from 658 to 989 feet per second, the mean rate being 789 feet. The earthquake at Viège in 1855 was estimated to have travelled northward toward Strasburg at the rate of 2861 feet per second, and southward toward Turin at a rate of 1398 feet, or less than half the northern speed. The earthquake of 7th October, 1874, in northern Italy, travelled at rates varying from 273 to 874 feet per second. That of 12th March, 1873, showed a velocity per second of 2734 feet between Ragusa and Venice; 4101 feet from Spoleto to Venice; 601 feet from Perugia to Orvieto; 1640 feet from Perugia to Ancona; and 1640 (or 2188) feet from Perugia to Rome. The rate of the central European earthquake of 1872 was estimated to have been 2433 feet, that of Herzogenrath, June 24, 1877, 1555 feet, that of an earthquake at Travancore, in Southern Hin-

¹⁷² Amer. Journ. Sci. xv. (1878). Prof. J. Milne, experimenting in Japan, has likewise ascertained that a close relation exists between the initial violence of the shock and the velocity of propagation, and that there is a progressive diminution in speed as the wave of shock travels outward from the centre of disturbance. "Earthquakes," p. 65.