

waves. A very good ocular demonstration of the effect that may be produced by impact of bodies can be shown by standing a row of dominoes on ends within a short distance of each other and then causing the end one to fall against its neighbor. The result will be the downfall of the whole row. It is by a series of blows similar to this that vibration is carried along by the atoms of a body, whether that body be gaseous, liquid or solid.

It may also be observed that if two stones are thrown into the water, two different series of concentric wave circles will be caused; and it will be further seen that these areas may encroach upon each other without destroying the wave form. The same phenomenon exists also in the case of sound waves passing in the air, so that the same space of air may be occupied by any number of sounds passing in different directions without destroying one another.

A sound, therefore, produced as all sounds are by the vibration of bodies, passes on the atoms of successive layers of the transmitting medium until it reaches the ear, and is there admitted to the auditory nerve. It must not be supposed, however, that this transmission is instantaneous. On the contrary, the velocity of sound, when compared with others known to physics, is extremely slow. In ordinary air the speed at which sound travels was estimated simply by firing a cannon at one point and observing the interval between the flash of the powder and the perception of the sound. Estimated in this way, the velocity of sound was found to be 330 metres, or about 1,100 feet, per second. Of course in liquids and solids it is greater: indeed in some metals it is even twenty times as swift as in air. But with the same medium the velocity of sound is nearly uniform, with the exception that the velocity increases slightly with the intensity of the sound. A rather ludicrous incident illustrating this peculiarity, and dependent upon the different velocities of sound and light,—which latter travels at the rate of 190,000 miles in a second,—was observed in the Arctic regions by members of an expedition. A cannon was fired at a distance of about a mile from the vessel. Those on board saw the flash instantaneously. Some four seconds later the report of the cannon was heard, and the sound of that report had died away when the command "Fire!" came to their ears. The absurdity of the phenomenon was apparent to all and caused great mirth, coupled with no little wonder, among those who knew not the explanation.

However, in this essay, it will be sufficient to state that under normal conditions the velocity of sound in air is uniform at 330 metres per second. And this velocity is the same for different musical notes, as was shown by playing a tune on a flute at the