



XXXIV. Intelligence and miscellaneous articles

N. Hesehus

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sive volumes may supply an adequate record of the progress of British Geology, which is an important element in the studies of geologists all over the world. To local workers and country Societies it will be of great service, readily giving them a wide view of the science, and bringing their publications to the knowledge of the general body of geologists.

XXXIV. *Intelligence and Miscellaneous Articles.*

ON THE REFRACTION OF SOUND, AND ITS VELOCITY IN POROUS SUBSTANCES PERMEABLE TO SOUND. BY N. HESEHUS.

THE author gives the name of bodies *permeable* to sound to porous bodies such as wadding, eiderdown, sponge-shavings, &c., which are reputed to be bad conductors of sound, which they transmit more or less freely by their pores filled with air. Experiments on the propagation of sound in this class of bodies present great interest in consequence of the analogy with the propagation of light in transparent media, and of electrical vibrations in dielectrics.

As the velocity of sound in the interstices of a porous body is less than in air, it is to be expected that by means of these bodies we could bring about the refraction of sound. A hemisphere, 25 centim. in diameter, of metal gauze filled with ebonite shavings, and closed by a plane sheet of the same gauze, behaved like a plano-convex lens in reference to the sounds of a Galton's whistle. The experiment may even be repeated in a lecture provided we use a Gore's sensitive flame to observe the strengthening and enfeeblement of the sound. The well-known formula of lenses enables us to calculate the refractive index of, and therefore the velocity of sound in, the material of the lens as a function of its principal focal distance and its radius of curvature. The velocity, thus determined, decreases when the density of the substance of the lens is increased by placing more shavings in the same envelope. The velocity v may be calculated by the following empirical formula,

$$v = 343(1 - \delta)^{0.222\delta - 5},$$

in which 343 (metres) is the velocity of sound in air at 18° C., δ the quotient of the mass of the shavings filling the lens by the mass of a lens of the same dimensions of solid ebonite, so that $1 - \delta$ expresses the quotient of the volume of air contained in the pores by the volume of the lens.

The value of the wave-length of the sound employed varied in the experiments of the author between 24 millim. and 60 millim., and that of δ between 0.0356 and 0.1441; the velocities calculated by the formula of lenses from these data being comprised between 261 metres and 146 metres.—*Journal de Physique*, Dec. 1891 from *Société Physico-Chimique Russe*.