air as an elastic body, he showed the effect of an impulse on any portion of it to consist in a condensation of the air immediately adjacent in the direction of the impulse, which then, re-acting by its spring, drives back the portion which had advanced to its original place, and at the same time urges forward the portion before it, in the direction of the impulse, so that every particle alternately advances and retreats. But, in pursuing this idea into its details, Newton fell into some errors which were pointed out by Cramer, though their origin was not traced, nor the reasoning corrected, till the subject was resumed by Lagrange and Euler: nor is this any impeachment of the penetration of our immortal countryman. The mathematical theory of the propagation of sound, and of vibratory and undulatory motions in general, is one of the utmost intricacy; and, in spite of every exertion on the part of the most expert geometers, continues to this day to give continual occasion for fresh researches; while phenomena are constantly presenting themselves, which show how far we are from being able to deduce all the particulars, even of cases comparatively simple, by any direct reasoning from first principles.

(271.) Whenever an impulse of any kind is conveyed by the air, to our ears, it produces the impression of sound; but when such an impulse is regularly and uniformly repeated in extremely rapid succession, it gives us that of a musical note, the pitch of the note depending on the rapidity of the succession (see art. 153.). The sense of harmony, too, depends on the periodical recurrence of coincident impulses on the ear, and affords, perhaps, the only instance of a sensation for whose pleasing impression a distinct and intelligible reason can be assigned.

(272.) Acoustics, then, or the science of sound, is a very considerable branch of physics, and one which has been cultivated from the earliest ages. Even Pythagoras and Aristotle were not ignorant of the general mode of its transmission through the air, and of the nature of harmony: but as a branch of science, independant of its delightful application in the art of music, it could be