

acuteness and graveness of notes is produced;" and in this, after noting generally the difference of sounds, and the causes of difference (which he states to be the force of the striking body, the physical constitution of the body struck, and other causes), he comes to the conclusion, that "the things which produce acuteness in sounds, are a greater density and a smaller size; the things which produce graveness, are a greater rarity and a bulkier form." He afterwards explains this so as to include a considerable portion of truth. Thus he says, "That in strings, and in pipes, other things remaining the same, those which are stopped at the smaller distance from the bridge give the most acute note; and in pipes, those notes which come through holes nearest to the mouth-hole are most acute." He even attempts a further generalization, and says that the greater acuteness arises, in fact, from the body being more tense; and that thus "hardness may counteract the effect of greater density, as we see that brass produces a more acute sound than lead." But this author's notions of tension, since they were applied so generally as to include both the tension of a string, and the tension of a piece of solid brass, must necessarily have been very vague. And he seems to have been destitute of any knowledge of the precise nature of the motion or impulse by which sound is produced; and, of course, still more ignorant of the mechanical principles by which these motions are explained. The notion of *vibrations* of the parts of sounding bodies, does not appear to have been dwelt upon as an essential circumstance; though in some cases, as in sounding strings, the fact is very obvious. And the notion of vibrations of the air does not at all appear in ancient writers, except so far as it may be conceived to be implied in the comparison of aërial and watery waves, which we have quoted from Vitruvius. It is, however, very unlikely that, even in the case of water, the motions of the particles were distinctly conceived, for such conception is far from obvious.

The attempts to apprehend distinctly, and to explain mechanically, the phenomena of sound, gave rise to a series of Problems, of which we must now give a brief history. The questions which more peculiarly constitute the Science of Acoustics, are the questions concerning those motions or affections of the air by which it is the medium of hearing. But the motions of sounding bodies have both so much connexion with those of the medium, and so much resemblance to them, that we shall include in our survey researches on that subject also.