

tradition between the earliest and the latest discoveries in acoustics? And the answer must be, that these intermediate modes of vibration are complex in their nature, and difficult to produce; and that those which were formerly believed to be the only possible vibrating conditions, are so eminent above all the rest by their features, their simplicity, and their facility, that we may still, for common purposes, consider them as a class apart; although for the sake of reaching a general theorem, we may associate them with the general mass of cases of molecular vibrations. And thus we have no exception here, as we can have none in any case, to our maxim, that what formed part of the early discoveries of science, forms part of its latest systems.

We have thus surveyed the progress of the science of sound up to recent times, with respect both to the discovery of laws of phenomena, and the reduction of these to their mechanical causes. The former branch of the science has necessarily been inductively pursued; and therefore has been more peculiarly the subject of our attention. And this consideration will explain why we have not dwelt more upon the deductive labors of the great analysts who have treated of this problem.

To those who are acquainted with the high and deserved fame which the labors of D'Alembert, Euler, Lagrange, and others, upon this subject, enjoy among mathematicians, it may seem as if we had not given them their due prominence in our sketch. But it is to be recollected here, as we have already observed in the case of hydrodynamics, that even when the general principles are uncontested, mere mathematical deductions from them do not belong to the history of physical science, except when they point out laws which are intermediate between the general principle and the individual facts, and which observation may confirm.

The business of constructing any science may be figured as the task of forming a road on which our reason can travel through a certain province of the external world. We have to throw a bridge which may lead from the chambers of our own thoughts, from our speculative principles, to the distant shore of material facts. But in all cases the abyss is too wide to be crossed, except we can find some intermediate points on which the piers of our structure may rest. Mere facts, without connexion or law, are only the rude stones hewn from the opposite bank, of which our arches may, at some time, be built. But mere hypothetical mathematical calculations are only plans of projected structures; and those plans which exhibit only one vast