

able to generalize this proposition, and to assert that in any combination of rods, strings, and laminae, at right angles to each other, the longitudinal and transverse vibrations affect respectively the rods in the one and other direction,¹⁶ so that when the horizontal rods, for example, vibrate in the one way, the vertical rods vibrate in the other.

This law was thus expressed in terms of that classification of vibrations of which we have spoken. Yet we easily see that we may express it in a more general manner, without referring to that classification, by saying, that vibrations are communicated so as always to be parallel to their original direction. And by following it out in this shape by means of experiment, M. Savart was led, a short time afterwards, to deny that there is any essential distinction in these different kinds of vibration. "We are thus led," he says¹⁰ in 1822, "to consider *normal* [transverse] vibrations as only one circumstance in a more general motion common to all bodies, analogous to *tangential* [longitudinal and rotatory] vibrations; that is, as produced by small *molecular oscillations*, and differently modified according to the direction which it affects, relatively to the dimensions of the vibrating body."

These "inductions," as he properly calls them, are supported by a great mass of ingenious experiments; and may be considered as well established, when they are limited to molecular oscillations, employing this phrase in the sense in which it is understood in the above statement; and also when they are confined to bodies in which the play of elasticity is not interrupted by parts more rigid than the rest, as the sound-post of a violin.¹⁷ And before I quit the subject, I may notice a consequence which M. Savart has deduced from his views, and which, at first sight, appears to overturn most of the earlier doctrines respecting vibrating bodies. It was formerly held that tense strings and elastic rods could vibrate only in a determinate series of modes of division, with no intermediate steps. But M. Savart maintains,¹⁸ on the contrary, that they produce sounds which are gradually transformed into one another, by indefinite intermediate degrees. The reader may naturally ask, what is the solution of this apparent con-

¹⁶ *An. Chim.* p. 152.

¹⁰ *Ib.* t. xxv. p. 33.

¹⁷ For the suggestion of the necessity of this limitation I am indebted to Mr. Willis.

¹⁸ *An. Chim.* 1826, t. xxxii. p. 384.