sity exists, a molecular or corpuscular theory answering quite as well for that as for the others, and without nearly the inconsistency involved in the generally accepted idea of sound waves? We possess not a particle of proof of the existence of this "luminiferous ether," and yet the belief in its all-pervading nature is very extensive. True, a great many now accept the molecular theory of light, and at their head is the name of Sir Isaac Newton, the discoverer, but a large portion of intelligent people still cling to the firmly-rooted hypothesis of undulations. Strange that when it occurred to Newton that light consisted of something more than the mere waves of this "etherial medium pervading space," he did not see his way out of those inconsistencies into which the study of sound lead him, by adopting a like theory for it, and one which meets all difficulties. If he had not allowed himself to be worried—almost distracted—by the continued attacks of the small scientific fry, instead of abandoning the first theory, he would, no doubt, have proceeded to the development of the second.

We ask again, "What is sound?" Something, most certainly, must cause the sensation which we call sound. What is it? The two theories that have been advanced, set side by side, are these. The 2,500 years old one we place first—it states that sound consists of air-waves, generated by the sounding instrument, which cause the tympanum of the ear to vibrate, and that thus musical notes and other sounds are carried to the brain. The hypothesis we have undertaken to support would define sound to be a *finely attenuated substance*, generated by the vibratory motion of whatever instrument produces it, which is radiated from the sound-producing body by an unknown law of diffusion. Now, our opponents need not think that because we said "unknown law of diffusion" they have got a handle with which to shake our hypothesis, for—as far as our knowledge goes—it has never yet been scientifically explained why liquids of different densities tend to mix or project their particles through each other in opposition to the law of gravity, or why grains of odor shoot through the still atmosphere at considerable velocity, or by what law magnetic atoms stream ceaselessly from the ends of a magnet. Why may there not be an "unknown law of diffusion" to govern the spreading of sound, as well as odour, magnetism or electricity?

The first question which occurs to us is, can air-waves travel as fast as sound is known to do? In the article on "Hurricane," in Appleton's American Cyclopædia, it is stated that "from the observed destructive force of some gusts, it has been maintained that a velocity of ten miles a minute must have been momentarily attained; but such computations are not very satisfactory. The highest hurricane winds that have ever been actually observed have, on the British coast, attained a velocity of 130 miles per hour." Now, sound is known to travel at the rate of 1,120 feet a second—in round numbers, 700 miles an hour—*nearly six times as fast*. Fancy a man whistling: according to this undulatory theory, he sends off from his mouth air-waves which travel nearly six times faster than the highest and swiftest winds! The disparity between the *possible* velocity of air and the *known* velocity of sound, gives scope for an endless amount of ingenuity to reconcile. Now, let us develop our argument somewhat. It was thought that sound travels through bodies in relation to their density and elasticity. On this basis Newton discovered an "inconsistency." His calculations of the relative density and elasticity of air made the velocity at which sound should travel in the air—on the wave hypothesis—to be about *five-sixths* of the observed rate at which it travels, *i. e.*, that sound travels one-sixth faster than air-waves can do, *not taking into account the resistance offered by the atmosphere*. Inconsistency number one, which, on Professor Huxley's authority, should be equal to "five hundred."

Ah, now, the worthy friend with whom we have been suppositiously talking, full of the scientific education of our schools and colleges—we well remember how, in our youth, we swallowed it all ourselves comes with the honored name of Laplace to the rescue. But, perhaps, Professor Tyndall can explain it for us best. When he wants his hearers to grasp the idea of sound, he says - we chose one description out of many "figure clearly to yourselves a harp-string vibrating to and fro, it advances and causes the particles of air in front of it to crowd together, thus *producing a condensation of the air*. It retreats, and the air particles behind it separate more widely, thus producing a rarefaction of the air. . . . In this way the air *through which the sound of the* string is propagated, is moulded into a regular sequence of condensations and rarefactions, which travel with a velocity of about 1,100 feet a second." —(Quoted from *Prob. of Human Life*, p. 79.) Now we are given Laplace's idea. It is well known that sound travels faster in a warm atmosphere than in a cold, and the French acoustician ingeniously suggested that the pressing of the air together, or, "condensation," caused by a vibrating string or fork, generates sufficient *heat* to make up this deficiency of "one-sixth" in the velocity of sound. According to this, then "air-waves" travel faster when the atmosphere is warm than when cold; therefore, a hot wind must travel faster than a cold one, and our North American "blizzards" be far behind the cyclones of equatorial regions. Perhaps they are, but we very much doubt it as a universal fact. At any rate, we come across this inconsistency, a high wind travels faster than a low one—therefore, if the wave theory be correct, a loud sound shall travel faster than a weak one; but universal observation tells us that the velocity of sound is always the same. Is there any way out of this difficulty? A canary is at this moment whistling in a room below ours, and at some distance away from where we sit, is this little bird actually able, with its tiny throat, to set the air vibrating and send it off in waves, with a velocity nearly six times as great as the fiercest tornado, not only all through a large house, but even through doors and floors, around corners and back again, in a way that wind was never known to travel? In this connection, consider the great weight of air and amount the bird would have to shake. But what of these "condensations and rarefactions" which generate "heat" enough to add one-sixth to the velocity of sound? It is the air being quickly pressed together—forming "condensations"—which generates this additional "heat," we are told.—Now, to our unscientific mind, it would seem as if the associated "rarefactions" should counteract the effect of the "condensations," and retard the sound pulse by generating as much *cold* as the latter does *heat*. We leave this difficulty just where it is for want of time, and space, and proceed.

One grand mistake acousticians seem to make in estimating these "condensations and rarefactions" of air-waves is in leaving entirely out of account the great *mobility* of the air. To be sure, air-waves are incidental to sound and accompany it, but can no more be called the cause than the rebound of a cannon or the kick of a