

"HYPOTHESIS," OR "ASSUMPTION?"

Professor De Volson Wood's discussion of the properties of the luminiferous æther is so important and valuable, that I am glad to welcome his defence. on p. 226 of the current volume of this JOURNAL, against my charge on p. 129, even though it proceeds upon a mis-interpretation of the real point at issue between us. "The charge of overlooking Herschel's hypothesis," which I did *not* make, is a very different thing from the charge of "overlooking the precaution which Herschel had taken to define his hypothesis," which I *did* make. "The *assumption* that the density of the æther was the same as that of the air at sea-level," which Prof. Wood alleges against Herschel is very different from the "hypothesis that an amount of our ætherial medium equal *in quantity of matter* to that which is contained in a cubic inch of air were enclosed in a cube of an inch in the side," which Herschel uses as the basis of a conditional estimate of ætherial elasticity.

Prof. Wood considers the statement that he proceeds precisely according to Herschel's methods and obtains results which are substantially the same as Herschel's, "questionable as to the correctness of the facts."

Herschel's reasoning, as well as Prof. Wood's, is based upon the relations of wave-velocity to elasticity and density, which are expressed by the formula $v^2 \propto e \div d$. Representing the velocities of sound and of light by v_1 and v_2 , respectively, Herschel's fundamental equations were,

$$v_1 = \sqrt{gh} = 916 \text{ feet.}$$

$$v_2 = 186,000 \text{ miles.}$$

$$e_1 \div d_1 : e_2 \div d_2 :: v_1^2 : v_2^2 :: 1 : 1,148,000,000,000.$$

Prof. Wood says that "in a pound of the æther there is 100,000,000,000 times the kinetic energy of a pound of air." The discrepancy arises from his inadvertently omitting one cipher and making a rougher approximation than Herschel. The difference of approximation causes a similar slight discrepancy between the two estimates of the ratio when allowance is made for the thermodynamic acceleration of the velocity of sound, Wood's result being 8×10^{11} nearly, while Herschel's is 811,801,000,000; the methods of calculation being the same.

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