



New Theory of the Aether. By T. F. F. See.

(First Paper.)

1. The Medium of the Aether is necessary for conveying Physical Action across Space.

A superfine medium associated with the stars and with the light of day, known as the Aether (*Αἰθήρ*), has been universally recognized since the time of *Homer* (*Iliad*, XV.20, and XVI.365). During the last three centuries the greatest natural philosophers and mathematicians, from *Huyghens*, *Newton*, and *Euler* to *Maxwell*, *Lord Kelvin* and *Poincaré*, have regarded this aetherial medium as a necessary condition for the action of physical forces across space. In his *Mécanique Céleste* 4.541, 1896, *Tisserand* expresses the general opinion thus:

»Les théories les plus récentes de la physique donnent lieu de croire que les attractions des corps célestes ne peuvent se transmettre à distance que par l'intermédiaire d'un milieu, sans doute l'éther. Mais on ne connaît rien encore sur ce mode de transmission. Il paraît probable que le même milieu sert de véhicule à des actions électriques ou électromagnétiques«.

Notwithstanding the very secure foundation for a valid theory of the aether erected by the labors of the most eminent geometers and natural philosophers since the age of *Newton*, a strange tendency has arisen within recent years, for abandoning the aether as an unnecessary hypothesis. Whether this reactionary tendency is based upon adequate grasp of the geometrical and physical considerations involved may be doubted by the more experienced natural philosophers of today. At any rate we leave this to the judgement of those investigators who follow the argument here developed.

In their treatise on Magnetism and Electricity, London, 1912, *Brooks* and *Poyser*, who were inspired by the electronic theories emanating from Cambridge, express themselves thus:

»In this book, we have implicitly assumed the existence of a medium, which is the seat of the phenomena denoted by the terms electric and magnetic lines of force. It may, however, be mentioned that at the present moment the various questions associated with the ether give rise to problems of great complexity and difficulty. The experimental knowledge acquired during the last twenty years, taken in conjunction with recently acquired knowledge regarding the 'electron' and the constitution of matter, leads to apparently irreconcilable results, and the real nature of the ether — if it exists at all in the old sense of the word — must be regarded as absolutely unknown. For instance, if the ether is incompressible, as it is usually assumed to be, we are driven, by one line of argument, to the conclusion that it is 2000 million times denser ¹⁾ than lead and possesses enormous energy of internal motion. On the other hand, if it is compressible, it may be much rarer than the rarest gas. There

is no intrinsic difficulty in either view, but at present no method is known by which we may hope to discriminate between them. The whole subject of the ether is in that state of uncertainty and apparent confusion, which in other branches of science has usually preceded some great advance in knowledge«.

Such an attitude as the above, by physicists of recognized authoritative connections, is confusing enough; but an even more bewildering doctrine has been put forth by *Einstein*, and quite widely adopted in England, though it generally is rejected in America. The english observers of the total solar eclipse of May 29, 1919, found some evidences of a deflection of the light of stars by the field of the sun, but it was by no means conclusive, and the weakness of the whole Theory of Relativity was impressively pointed out by *Dr. Silberstein*, (*Observatory*, November 1919, p. 396-7), who showed that *Einstein's* theory will not account for the refinement of moving perihelia, and would even permit a planet or comet to move in a straight line, under the gravitative action of the sun. In view of these facts *Dr. Silberstein* justly says that the *Einstein* theory stands or falls by the *Evershed* and *St John* spectral observations, which are ample, yet do not confirm the theory.

In an interview at Chicago, Dec. 19, 1919, Professor *A. A. Michelson*, the eminent authority on light, openly rejects *Einstein's* theory, because it does away with the idea of light traveling by means of vibrations in the aether which is supposed to fill all space. »*Einstein* thinks there is no such thing as aether«, remarked *Michelson*. »He does not attempt to account for the transmission of light, but holds that the aether should be thrown overboard«.

In view of the confusion of thought introduced by the electronists, on the one hand, and by the *Einstein* pure mathematicians, on the other, — both extremes leading to ideas not appropriate to the facts, which *Dr. Whewell*, *History of the Inductive Sciences*, 1847, 1.81, showed was the cause of the failure of the physical sciences among the greeks — it seems highly important to enter upon an account of certain unpublished researches on the aether made by the present writer during the past six years, omitting so far as possible the results already available in volume I of the *Electrodynamic Wave-Theory of Physical Forces*, Boston, London and Paris, 1917.

And first we shall show that the aether is necessary for holding the planets in their orbits, from the established law of the centrifugal force. This centrifugal motion must be counteracted, otherwise a planet can not be made to curve the path at every point and thus revolve in a Keplerian ellipse with the sun in the focus.

¹⁾ In a future paper a conclusive criterion will be given for rejecting this claim of a large density for the aether.