

Paper on the Mysteries of Ether.

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WE speak of the "Mysteries" of Ether and indeed there is nothing which is so mysterious and baffling to the scientist in its intrinsic nature as Ether in the whole realm of God's creation. It embodies the energies of motion. Matter itself is potentially existent in it. It alone is the medium of universal intercourse. By it alone can cosmical influences be exercised. It is invisible, and yet it is the vehicle of light. It is intangible, and yet it is the fount of solidity. It is non-phenomenal, and yet it is the ground and source of all phenomena. It is elastic, and yet its elasticity appears to produce no effect whatever upon the velocity of light. It is exceedingly dense, and yet it in no wise impedes motion, nor does it arrest, nor scatter light. The nature and properties of Ether had not been seriously inquired into, until the discovery of the "undulatory theory of light" forced it upon the attention of Science. The offices it performs are exceedingly various and well-nigh contradictory. Thus it must be not only the transmitting medium of the force of gravity, binding with steel links the various attracting bodies throughout the Universe, but it must also be the transmitting medium of electricity. And as Hertz has proved that the undulatory disturbance of electricity is of the same kind as that of light, it is also obviously the transmitting medium of light. Ether is then a real unity in itself, possessing at the same time almost infinitely complex functions. In view of a popular misapprehension, we must add here that Ether has absolutely no kinship with air. It is by no means a refined kind of atmosphere. The properties of Ether and air are essentially different. Whilst air is compressible, Ether is absolutely incompressible. Whilst air transmits vibrations longitudinally, Ether transmits them laterally. Again the mysterious fact is revealed, that whilst Ether is ideally incompressible it yet yields to torsional stresses. Until lately Ether was categorised as a "solid," but the electro-magnetic theory has finally disposed of this fallacy. It is now provisionally regarded as a "perfect fluid." Ether is coming to be looked upon as the store-house of every form of energy and matter. Or rather, electricity, energy, and matter are only different forms of Ether, which is the sole real "World-stuff" as Metaphysics would say. Larmor attempts to solve the difficulty of Ether being both ideally incompressible and yet elastic,

by conjecturing that it is "A structure of tangled or interlaced vortex filaments which might resist deformation by forming a stable configuration." In any case Ether can be no mere simple structureless fluid, if it is to perform all its infinitely complex functions. We have said that Ether yields to distortional strains. These distortions are called "electrons," from which material atoms are formed. They are not small bodies, as they used to be thought, exerting energy upon neighbouring bodies of like kind, but are probably structures in the Ether, surrounded by atmospheres as it were of ethereal strain. Thus electricity is on this hypothesis, positive or negative according to the direction of the strain. Professor Thomson has said—"All mass is mass of the Ether, all momentum, momentum of the Ether, and all kinetic energy, is kinetic energy of the Ether; and this being so, the density of Ether must be immensely greater than that of any known substance."

Ether is the seat of all processes in nature. A concrete reality belongs to Ether alone, for it alone is unchanging. "Matter" supervenes when the ideally small or rigid electrons fail to "fit together" and the misfit may be propagated endlessly, without any transference of the particles themselves, after the manner of a tidal wave. It can be mathematically calculated that the diameter of the atoms is only the seven hundred thousand millionth part of the wave length of violet light, and their possible displacement is only the four hundred thousand millionth part of their diameters. This atomic displacement is probably the sole cause of the elasticity of Ether and indeed of matter generally. Ether is calculated to be ten thousand times more dense than water, having a pressure of over three quarters of a million tons to the square inch, and the coefficient of its transverse elasticity gives a velocity of transmission incomparably greater than that of light. The theory of atomic Ether as now held seems sadly to upset many time-worn and dignified doctrines of science. For example, the doctrine of the "conservation of energy" is overthrown if positive and negative electrons can annihilate one another. For they exist in pairs, so that their simultaneous presence would appear to have this effect. Hence there would be conservation neither of mass nor energy. In many other directions too, has science sustained from this mysterious Ether of late years very unpleasant and disconcerting shocks.