

have been the means of keeping before the minds of natural philosophers the question how these actions are mechanically communicated, a problem which lay outside of the astronomical view of the phenomena. To Faraday himself the analogy between the phenomena of these actions meant also a real physical relation or even identity, a supposition which he followed up with unwearying patience and all the experimental resources of his inventive mind, till he succeeded in showing by experiment that magnets in the neighbourhood of transparent substances which have a polarising effect on rays of light possessed the property of altering the direction in which the polarised rays show their laterality. Faraday's conception of "lines of force" filling all space and explaining electric and magnetic action, radiation, and possibly also gravitation, was elaborated during the years 1830 to 1850. An opinion then prevailed that his discoveries stood in opposition to the views elaborated and experimentally verified by Continental philosophers. The first who showed the analogy and threw out a hint how the two views could be brought into harmony was William Thomson (Lord Kelvin). As early as 1842,¹ when scarcely eighteen

46.
Develop-
ment of the
conception
by Lord
Kelvin.

¹ "On the uniform motion of Heat in homogeneous solid bodies, and its connexion with the mathematical theory of Electricity," 'Cambridge Mathematical Journal,' February 1842. The following note is attached to the reprint in the 'Philosophical Magazine' of 1854: "The general conclusions established show that the laws of distribution of electric or magnetic force in any case whatever must be identical with the laws of distribution of the lines of motion of

heat in certain perfectly defined circumstances. With developments and applications contained in a subsequent paper (1845), they constitute a full theory of the characteristics of lines of force, which have been so admirably investigated experimentally by Faraday, and complete the analogy with the theory of the conduction of heat, of which such terms as 'conducting power of lines of force' ('Exp. Res.,' Nos. 2797-2802) involve the idea."