as 1831 conceived this peculiar condition of matter to be equivalent to a state of strain, could be represented by the mechanical analogy of the strains existing in an elastic solid. He had distinguished three distinct forms of this elastic strain, and had identified these three forms severally with electrostatic, magnetic, and galvanic forces. He had not given a physical explanation of the origin of these forces, but had merely used the "mathematical analogies of the two problems (the electrical and the elastic) to assist the imagination in the study of both."[1] Maxwell now took a further step and proceeded to give a physical or mechanical description of the nature of this state of stress, of the electrotonic state of matter. With this object in view he conceives of a medium which is capable of exerting force on material bodies by being itself strained, and exhibiting the

"suggests the idea that there may be a problem in the theory of elastic solids corresponding to every problem connected with the distribution of electricity on conductors, or with the forces of attraction and repulsion exercised by electrified bodies. The clue to a similar representation of magnetic and galvanic forces is afforded by Mr Faraday's recent discovery of the affection, with reference to polarised light, of transparent solids subjected to magnetic or electro-magnetic forces."

[1] Quoted from Maxwell's paper "On Physical Lines of Force," in the 'Philos. Mag.' 1861 (see 'Coll. Papers,' vol. i. p. 453), in which Maxwell applies Rankine's conception of molecular vortices to the representation of magnetic phenomena. He refers to his earlier paper (1855) on (geometrical) "lines of force" in which he had "shown the geometrical significance of the electrotonic state," and had used "mechanical illustrations to assist the imagination, but not to account for the phenomena." "I now," he says, "propose to examine magnetic phenomena from a mechanical point of view, and to determine what tensions in, or motions of, a medium are capable of producing the mechanical phenomena observed. If by the same hypothesis we can connect the phenomena of magnetic attraction with electro-magnetic phenomena, and with those of induced currents, we shall have found a theory which, if not true, can only be proved to be erroneous by experiments which will greatly enlarge our knowledge of this part of physics" (ibid., p. 452).