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THE ETHER OF SPACE.

The Ether of Space. By Sir Oliver Lodge, F.R.S.
Pp. xvi + 156. (London: Harper and Bros., 1909.)
Price 2s. 6d. net.

THIS book is a contribution to what the publishers describe as a "Library of Living Thought." In appealing to Sir Oliver Lodge for a book on the ether they could count on getting something which could certainly be called "thought," in the most exalted sense of the word, and would as certainly be alive. But, notwithstanding the many picturesque images with which the theme is illustrated, we must confess that we have found the book as a whole somewhat unsatisfactory. This is perhaps due to a certain indefiniteness of aim; some sections would seem to be addressed to the cultivated *dilettante*, and dwell at great length on very elementary matters, whilst others can hardly be appreciated except by the expert who is already conversant with the more abstruse parts of electrical and optical theory. Thus the primary notions of aberration are expounded very fully, whilst the theories of Michelson's experiments and of Fresnel's law of wave-velocity in a moving substance are treated with tantalising brevity. Again, the mechanical and optical details of the author's own experiments with the "ether machine" are given with a minuteness which in a work on the present scale rather tends to distract attention from the main point.

The ether has in its not very lengthy history undergone many transformations. The unsatisfactory elastic-solid medium of the last century, with its abundant provision for the explanation of non-existent phenomena, has at length gone, to the general relief. But the newer ether which is gradually being evolved in its place, with its ability to exercise force, and, at the same time, its utter indifference to forces exerted on itself, appears somewhat shadowy and mysterious. When the conceptions are resolved into their elements we are left with little more than what the mathematicians call a "vector-field." It might seem, indeed, that the physicist had only to take one step more, and hand over the whole medium, as a pure abstraction, to the mathematician, who, for his part, is disposed to welcome the gift with enthusiasm as affording, after a few improvements, an unexpected outlet for the theory of groups. His one regret is that he did not (as he confesses he ought to have done) invent the whole thing for himself.

Sir Oliver Lodge, like Lorentz, comes to the brink, but he will not take the plunge. The most interesting parts of this book are those in which he explains the lengths to which he is prepared to go in the effort to retain a mechanical basis for phenomena. He admits, indeed, that ordinary matter is an imposture, but he clings resolutely to something very real and very substantial in the background. He reproduces his recent arguments to show that if the inertia of the atoms of ordinary matter is merely the manifestation of that of a surrounding medium, the density which it is necessary to attribute to the

latter is something like 10^{12} that of water. This seems at first sight like a nightmare, but it is in no sense incredible. Waiving details which can have no great influence on the result, it is, indeed, from the author's point of view, mathematically incontestable. He goes on to speculate on the origin of the forces which this medium can exert. Assuming a kinetic theory of force as the only one ultimately acceptable, he sums up his conclusions in a sort of anthem:—

"Every cubic millimetre of the universal ether of space must possess the equivalent of a thousand tons, and every part of it must be squirming internally with the velocity of light."

It will be seen that the book is in substance a re-statement of the author's most recent speculations, in which, of course, he stands by no means alone. If it somehow fails to do full justice to these, and if in some respects the original papers in the *Philosophical Magazine* and elsewhere will probably be found by many to be really easier reading, the auspices under which it is brought out are no doubt partly accountable. The general reader, even if he is disposed to take most things on trust, and does not adopt the critical attitude which the author would himself welcome, will at all events learn to understand the admiration which the scientific world feels for the genius and unflagging spirit with which a most difficult as well as stupendous theme is repeatedly essayed.

H. L.

NEW METHODS OF WEATHER FORECASTING.

Nouvelle Méthode de Préviation du Temps. By Gabriel Guilbert. Pp. xxxviii + 343. (Paris: Gauthier-Villars, 1909.)

MONSIEUR GABRIEL GUILBERT, the winner of the prize offered in 1905 by the Société belge d'Astronomie, de Météorologie et de Physique du Globe, for the most successful short-period forecasts of weather, has published in book-form a detailed exposition of the principles underlying his method. He introduces two new principles into the art of weather forecasting, which, so far as we are aware, have not been stated explicitly by any other writer on this subject. First, he invites us to compare the force of the wind at the surface as observed at the various stations contributing to our daily weather reports with the barometric gradient at sea-level. If in any region the observed wind forces are markedly in excess of the normal for the prevailing gradient, a surge of high pressure in the direction of the gradient may be looked for, and *vice versa*. His definition of the word "normal" is entirely conventional. It is based on comparisons made by Clement Ley, Sprung, Köppen, and others, and is that the number expressing the wind force on the Beaufort scale shall be twice that expressing the gradient in millimetres of mercury per degree (111 km.). It follows from this general principle that a depression which is surrounded on all sides by winds in excess of the normal will fill up, whereas a depression surrounded by winds in defect will grow deeper. If the defect is great, a depression of small intensity will develop into a violent storm

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