

## LETTERS TO THE EDITOR.

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**The Effect of Light on Long Ether Waves.**

THE curious and important observation made by Mr. Marconi on the basis of experience in long-distance wireless telegraphy exhibits a strange kind of interference between ether waves of very different lengths. The extremely short waves which ionise air interfere with the easy transmission of the long waves which are originated by alternating electric currents, and may conceivably have something to do with the optical opacity of dry haze.

Since many scientific men besides physicists read NATURE, it may be permissible to explain that this is an entirely different effect from the purely localised bands of interference which accompany the superposition of wave motions, and are a matter of simple geometry. In this phenomenon of interference bands there is no destruction, only redistribution, of energy; and there is nothing akin to opacity, whether of the absorbent or the reflective kind. It is, moreover, purely an affair of the ether. Whereas opacity is always an effect brought about by the presence of matter in the path of ether waves, the ions or electrons which are liberated from matter by exceedingly short waves raise a barrier or act as a reflector to extremely long ones. Thus the phenomenon depends on the interaction between free ether and electrified particles immersed in it.

A study of the details of this phenomenon cannot fail to be instructive, and the Radio-telegraphic Committee of the British Association had made preparation for getting facts recorded during the solar eclipse of August, 1914. The war prevented anything being done, but now, as Prof. Fleming—the father of the committee—suggests in NATURE of January 23, another opportunity presents itself in the eclipse of the afternoon of May 29, when the line of totality passes across the South Atlantic from South America to Africa, crossing Ceara, in Brazil, and Princes Island, in the Gulf of Guinea. The astronomers going from this country will have their hands full, but a special group of wireless experts might accompany the expedition if funds were available. It seems probable that assistance might be rendered more readily by the United States than by this country. Prof. Eccles, the secretary of the British Association Wireless Committee, is still too engaged at present with Admiralty work to superintend operations, but the Astronomer Royal has informed him that Dr. Bauer, the head of the Carnegie Institution of Washington, has already made plans for observations on magnetism and atmospheric electricity, and may be planning to take charge of radio-telegraphic observations also. Several months ago Prof. Eccles sent to Dr. Bauer the documents prepared for recording wireless phenomena on the occasion of the previous solar eclipse in 1914, and is again communicating with him. And thus we trust that Prof. Fleming's admirable suggestion will be carried out.

OLIVER J. LODGE,

Chairman of the British Association

February 4. Radio-telegraphic Committee.

**The Aggregate Recoil of Radio-active Substances Emitting  $\alpha$ -Rays.**

THE November (1918) issue of the *Philosophical Magazine* has just reached us, and I have read with great interest the results of some remarkable experi-

ments by Mr. S. Ratner "On Some Properties of the Active Deposit of Radium." The paper in question deals with the spontaneous transference of active matter from the surface of a plate covered with the active deposit of radium to other objects placed near it.

This effect has been repeatedly observed by workers in radio-activity, and has been attributed (1) to a slight volatility of the active deposit at ordinary temperatures, or (2) to the recoil of a compact cluster of atoms of the active matter when one of the atoms contained in it disintegrates with ejection of an  $\alpha$ -particle. To this latter phenomenon I recently gave the name of "aggregate recoil."

Mr. Ratner deals with both possibilities, and arrives at the conclusion that neither of them satisfies the requirements of his results. He states that his experiments "have failed to disclose the nature of the phenomenon."

During the last four years I have been engaged at intervals on experiments of a similar kind, performed with the object of explaining the almost inevitable and unavoidable contamination with polonium of electroscopes and ionisation vessels used in experiments with this substance. In 1915 I made mention of this phenomenon in a paper published in the *Communications* of this institute (No. 80), and suggested the possibility mentioned under (2) above in explanation of it, although I had, unfortunately, overlooked the fact that Makower and Russ had made the same suggestion in 1910 until I read Mr. Ratner's paper yesterday.

My subsequent experiments with polonium, done for the most part in the summer of 1917, lend strong support to the idea of aggregate recoil as the cause of this "wandering" of the active matter. Inasmuch as I obtained quite appreciable effects with polonium, my results disagree with those of Mr. Ratner; in fact, I have not a single observation which is not adequately explicable in this manner. In No. 113 of the *Communications* of this institute, which was published in July, 1918, I discussed this phenomenon, and examined the part played by the disintegration of the active foil ("spluttering") due to the bombardment of  $\alpha$ -particles. It was found that, in general, much less than 1 per cent. of the total effect is due to the latter cause. A further paper on aggregate recoil is at present in the press, and the work is still in progress.

As I am returning home in the course of a few weeks, I hope before long to publish the results of these experiments in the *Philosophical Magazine*, as well as others of a similar nature done last summer with the active deposit of radium. I beg to mention, however, that, in the light of my own work, I am of the opinion that almost all, if not all, of Mr. Ratner's results are in harmony with the recoil of aggregates of atoms of active matter, as originally suggested by Makower and Russ in explanation of the phenomenon in question.

Like Mr. Ratner, I regard the so-called  $\beta$ -recoil of radium-C from radium-B as a theoretical possibility, which it will be impossible to realise in practice. My reasons for the latter conclusion are contained in my July publication. Dr. Lise Meitner, to whom I mentioned my results last summer, informed me that she no longer believes in the practicability of achieving a transference of active matter by  $\beta$ -recoil. She agreed that the idea of aggregate recoil in the manner above suggested is much more in harmony with the experimental results, and she informed me that Prof. Hahn and herself had never been able to obtain pure radium-C by the postulated  $\beta$ -recoil method.

Before closing this letter, I should like to make