

Letters to the Editor.

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Diffraction of Cathode Rays by a Thin Film.

If a fine beam of homogeneous cathode rays is sent nearly normally through a thin celluloid film (of the order 3×10^{-6} cm. thick) and then received on a photographic plate 10 cm. away and parallel to the film, we find that the central spot formed by the undeflected rays is surrounded by rings, recalling in appearance the haloes formed by mist round the sun. A photograph so obtained is reproduced (Fig. 1). If the density of the plate is measured by a photometer at a number of points along a radius, and the intensity of the rays at these points found by using the characteristic blackening curve of the plate (see *Phil. Mag.*, vol. 1, p. 963, 1926), the rings appear as humps on the intensity-distance curves. In this way rings can be

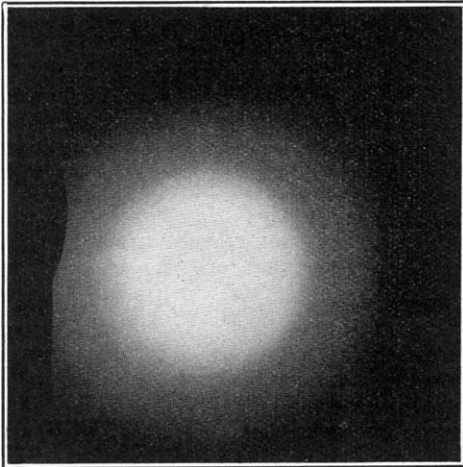


FIG. 1.

detected which may not be obvious to direct inspection. With rays of about 13,000 volts two rings have been found inside the obvious one. Traces have been found of a fourth ring in other photographs, but not more than three have been found on any one exposure. This is probably due to the limited range of intensity within which photometric measurements are feasible.

The size of the rings decreases with increasing energy of the rays, the radius of any given ring being roughly inversely proportional to the velocity, but as the rings are rather wide the measurements so far made are not very accurate. The energy of the rays, as measured by their electrostatic deflexion, varied from 3900 volts to 16,500 volts. The rings are sharpest at the higher energies and were indistinguishable at about 2500 volts. In one photograph the radii of the rings were approximately 3, 5, and 6.7 mm. for an energy of 13,800 volts.

It is natural to regard this phenomenon as allied to the effect found by Dymond (*NATURE*, Sept. 4, 1926, p. 336) for the scattering of electrons in helium, though the angles are of course much smaller than he found. This would be due partly to the greater speed of the rays giving them a smaller wave-length.

Using the formula $\lambda = h/mv$ the wave-length in the above-quoted case would be $\lambda = 1.0 \times 10^{-9}$ cm. It is quite possible that there are other rings inside or outside those observed at present, and no opinion is advanced as to whether the diffracting systems are atoms or molecules. The disappearance of the rays at low speeds is probably due to the increased total amount of scattering which occurs. In all, about fifteen plates have been taken showing the effect, including some using a slit, instead of a pin hole, to limit the beam of rays. It is hoped to make further experiments with rays of greater energy and to obtain more accurate measurements of the size of the rings.

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May 24.

British Settlement in the Dominions Overseas.

HAVING read the interesting criticism in *NATURE* of May 14 of the annual report of the Oversea Settlement Committee, may I, as a member of that Committee, be permitted to make certain comments?

It is claimed that the report fails adequately to cover the field of activity of the Oversea Settlement Department, and that no mention is made of many of the various factors that bear more or less directly on the question of the settlement of our people in the Dominions.

The answer to this stricture is twofold. In the first place some of our earlier reports cover a wide range; but in a time of transition like the present there would be great difficulty—in fact danger—in attempting to forecast, for example, the economic results from different types of farming. Secondly, our reports are intended primarily for Parliamentary use, and are not intended for purposes of propaganda or to furnish information to would-be settlers. The latter functions properly belong to the handbooks on the various Dominions and Colonies which are prepared and issued free to inquirers by the Department. These handbooks which, it may be said, are compiled with the utmost care and are revised twice yearly, contain much of that information we are charged with omitting from our report, where its inclusion would be quite impracticable, if only on the grounds of bulk and expense.

The O.S.C. has no widespread policy of propaganda, for the simple reason that, without it, there are more migrants willing to leave our shores than the Dominions can at present absorb.

This point should be clearly understood—the volume of migration from Great Britain is governed by the absorbing power of the Dominions.

In regard to this power of absorption, I would point out that the article in *NATURE* overlooks the fact that New Zealand, per head of her population and *pro rata* for her area, places far more settlers than any other Dominion.

One reason for the small numbers who migrate to South Africa is that more capital is required there than is the case in the other Dominions. There are other reasons as well that it is inexpedient to discuss.

One very important point raised in the criticism is that of the suitability of previously inexperienced men for settlement upon the land. We can say quite definitely that, given the right conditions of settlement, inexperienced men can and do succeed well. The Group Settlements of Rochester and Shepperton in Victoria, Australia, are convincing proof. Started in 1910, with the settlers drawn almost entirely from our great cities, these are to-day well-developed and flourishing communities. But this form of settlement,