Letters to the Editor.

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Observations of the Total Eclipse of the Sun at Alor Star, Kedah, on May 9.

THE observations attempted by British observers at the total eclipse of the sun on May 9 were almost completely spoilt by cloud. At Alor Star in Kedah, the sky was covered throughout the day of the eclipse by high cloud through which the sun could generally be dimly seen. The prearranged programme was carried out, but the stars in the sun's neighbourhood did not show on the plates and the spectroscopic observations also failed.

Better success was obtained with the 6-inch lens of 45 feet focus which was used at Giggleswick, and the loan of which was extended by Mr. Worthington

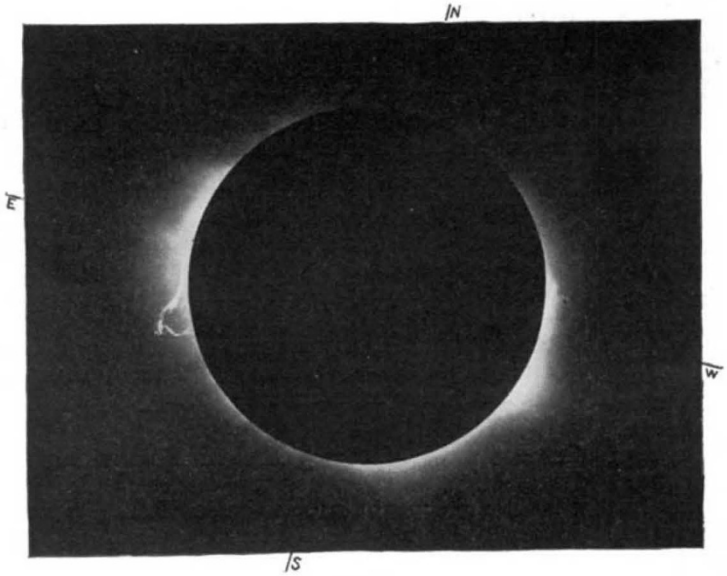

FIG. 1.

to this eclipse. The series of exposures from 3^s to 20^s were intended to show the prominences and the form of the inner corona. Although the longest exposure does not show more extension than was expected to be obtained from the shortest in a good sky, and although the longer exposures show a good deal of scattered light within the dark circle of the moon, the five plates give excellent pictures of the brighter details. The definition was excellent, such as it often is through cloud, and all the five plates show the same irregularities in the moon's limb. The reproduction (Fig. 1) is from the plate exposed from 200^s to 210^s after the beginning of totality. The filamentous prominence on the east limb is 180,000 miles long and 120,000 miles high—one of the largest ever photographed, though much inferior to that of 1919, especially in brilliance. The photographs taken near the beginning and end of totality show considerable differences in the structure of this prominence. On the western limb a beautiful coronal arch, besides much other detail, can be seen. The observers noted a considerable amount of red on this side of the eclipsed sun before the end of totality, but they did not see the large prominence on the eastern limb.

Small scale photographs were also secured through red filters. Those on kryptocyanine plates show the form of the corona best. The corona is of intermediate form and shows considerable difference from that generally obtained at sunspot maximum. On the panchromatic plates, also exposed through a red filter, the coronal extension is confused with the scattered light.

Photographic reproductions on paper 12 in. by 15 in., similar to those made from the photograph taken at Giggleswick, can be obtained from Mr. F. Jeffries, Royal Observatory, Greenwich, price 2*s*. 6*d*. each.

J. JACKSON.

Royal Observatory,
Greenwich, S.E.10, July 6.

A Possible Origin of Faint Fraunhofer Lines.

THERE are about 20,000 lines in the Fraunhofer spectrum of the sun (excluding the infra-red part), of which only about 6000 have been correctly identified with the lines of known elements, and with the lines of certain band spectra (cyanogen, Swan, etc.). The origin of the others is still wrapped in mystery. Possibly a large number may be found to coincide with the fainter lines of complicated spectra of elements like iron, nickel, etc., particularly with those belonging to higher Rydberg sequences. For some time past we have been thinking of a third possibility of the origin of these lines, namely, whether a large number may not be ascribed to the combined effect of Raman scattering and ordinary absorption. For example, molecules which are responsible for the emission of the cyanogen and Swan bands are strongly present in the sun, and when a beam of light falls on them from the photosphere, this light may be supposed to be modified by Raman scattering to the frequency $\nu - \nu'$, where ν' is some frequency corresponding to a strong vibration-rotation frequency of the CN-molecule. If $\nu - \nu'$ happens now to coincide with the H or the K frequency, the modified light will be absorbed by the high level Ca^+-atoms, and we shall get an absorption line in the place of the original frequency ν.

Taking the strong vibrational-rotational frequencies of the CN-molecule (particularly those which are expected to be strong at the solar temperature), I have calculated the lines which, after being modified by Raman scattering, are absorbed by the Ca^+-atoms. I have obtained lines which agree very closely with Fraunhofer lines of intensity $(-3, -2, -1)$ for both H- and K-lines. Some calculated lines coincide with the recorded faint lines of other elements. But even leaving these aside, the evidence obtained is strongly in favour of the view presented in this note. If we calculate the lines modified by such molecules as H_2, which are known not to occur in the solar spectrum, the coincidences are found to be either entirely lacking or rather poor.

Of course, in the circumstances, it is impossible to get absolute confirmation of the view, but probably a plausible case has been made out that Raman scattering may be responsible for the origin of a large number of faint Fraunhofer lines. If the view be correct, it will afford us a method for calculating the total number