The Flash-spectrum.

GENTLEMEN,—

If I may be permitted to make a few further remarks in reference to Mr. Fowler's interesting communication in your last number, I should like to say that my own results are in substantial agreement with those of Mr. Mitchell in the tables of selected lines which Mr. Fowler gives.

These show clearly the tendency of certain enhanced lines to appear as strong lines in the flash-spectrum, and I may admit further that a considerable number of the stronger enhanced lines of both iron and titanium coincide with abnormally strong lines of single origin in the flash. This is proved by a comparison of the intensities estimated by four different observers from the results obtained at the eclipses of 1898, 1900, and 1901.

It is possible I may have under-estimated the importance of these coincidences, which are doubtless of great interest and significance *per se*. However, the question at issue is whether or not

* It is interesting to remember that this is the town of the last Gold Medallist of the Royal Astronomical Society.

there is such a fundamental difference between flash- and Fraunhofer spectra as to lead us to abandon the view that the flash-layer is the seat of the Fraunhofer absorption-lines.

If an extended comparison is made over a long range of spectrum of the intensities of isolated lines of single origin it is found that for each element there is a close general correspondence with the intensities of the dark lines. The agreement is by no means exact in detail, since the enhanced lines in many cases produce abnormal intensities. I give as an example a table showing the results I have obtained with the titanium lines between λ 3500 and λ 5000.

Titanium Lines in Sun and Flash, λ 3500 to λ 5000.

All lines in Rowland's table assigned to Ti only excepting those which are obscured in the flash by strong hydrogen lines.

Intensity in ⊙.	No. of lines in ⊙.	No. of lines in flash.	Average intensity of flash-lines.
1	38	0	0
2	27	4	10 *
3	27	9	8
4	19	13	16
5	7	7	21
6 and over	5	5	48

* The average intensity of the four flash-lines is increased by two enhanced lines at λλ 3505·06 and 3520·40; omitting these, the average is 1.

It is from this general correspondence of intensity that I have been led to conclude that the flash really represents a portion of the absorbing stratum, viz., the upper more diffused region.

The lower region immediately in contact with the photosphere may give emission-spectra in which the enhanced lines are less prominent; and although this stratum is not able appreciably to impress the photographic plate at eclipses, it may yet have a very considerable absorptive effect, perhaps as much or more than the much deeper upper region. It appears to me, however, that there is no ground for abandoning the view that the *whole depth* of the flash-layer is effective in producing the absorption-lines; and in the case of the hydrogen and calcium lines the whole depth of the chromosphere itself is effective. This is indicated by the narrow absorption-lines at the centres of H and K, which agree exactly in width and absolute intensity with the corresponding bright lines of the chromosphere.

Yours faithfully,

J. EVERSHED.

Kenley, Surrey,
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