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Dr. McNally. The radiation of importance lies in the wavelength range 912–1216A.

Dr. Seaton. In this spectral region, the radiation from hot stars is probably strongly absorbed by the Lyman lines.

The President. Does this explain the rocket observations?

Dr. Seaton. No. The rocket observations are made at longer wavelengths.

The President. We thank Dr. McNally for his paper. This is the first time he has addressed the Society except for reading the results of the Ballot! We look forward to hearing more papers from him in the future. The meeting is adjourned until 1962 September 6 in Belfast.

THE INFLUENCE OF SUPERFLARES ON THE *Hα* STRIATION PATTERN

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Ellison and his colleagues[1, 2, 3] have recently drawn attention to a new phenomenon associated with major flares. The *Hα* striation pattern in the immediate vicinity of the active region is seen to be mysteriously obscured near at times flare maximum. Some of the flares studied at Dunsink, which show the phenomenon of striation obscuration, produced showers of cosmic-ray particles of high energy. An examination of seventeen Class 3 flares, on Sacramento Peak flare patrol films by Smith and Booton[4], shows that only the flare of 1960 May 6, which produced moderate polar cap absorption, demonstrated the obscuration of the *Hα* striation. It is thus a phenomenon associated with great flares, and needs for its detection pictures of high quality taken under good seeing conditions.

Two of the most important flares observed during this century are those which occurred on 1926 February 22 and 1956 February 23. Both flares have spectroheliograms of good image scale (33″/mm). The 1926 flare has a fine series of spectroheliograms covering a time interval of nearly seven hours. All the spectroheliograms were obtained with a slit width of 0·3 A, under extremely good conditions of seeing. These have been described earlier by Royds[5]. The first *Hα* plate of the day was obtained at $2^h\,33^m$ U.T. The flare is noticeable as a thin ribbon in emission on this plate. The second spectroheliogram obtained five minutes later shows the flare to have brightened appreciably. We therefore assume that the flare must have commenced at $2^h\,30^m$. The flare has a maximum area on the spectroheliogram obtained at $3^h\,34^m$. It seems likely that the flare maximum occurred within fifteen minutes of this epoch. The last plate of the day was obtained at $9^h\,36^m$ wherein traces of the flare with considerably reduced intensity could still be seen.

At the start of the observations there was clearly a very well developed striation pattern overlying the active region, with almost radial symmetry. The striae can be followed to distances greater than 10^5 km from the inner boundary of the pattern. At $3^h\,6^m$ the striae in the direction of "a" had commenced to be indistinct; this indistinctness may have reached a maximum sometime between $3^h\,34^m$ and $4^h\,54^m$. Thereafter conditions were rapidly restored to normal, and the striae could be seen with the usual contrast on

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the last plates of the day. The pattern in the direction of "b" had a slower rate of fading, the maximum of indistinctness in this direction being seen on the spectroheliogram at $4^h\,54^m$. Fig. 1 indicates the progress of the flare, the inner boundary of the striation pattern and the location of the dark filaments in the vicinity of the flare. The zone of obscuration of the striation pattern diminishes in size after $4^h\,54^m$. Many of the details of this pattern are restored soon after. The spectroheliograms obtained on the morning of February 23 indicated a striation pattern which was to a large extent identical to the pre-flare pattern of the previous day.

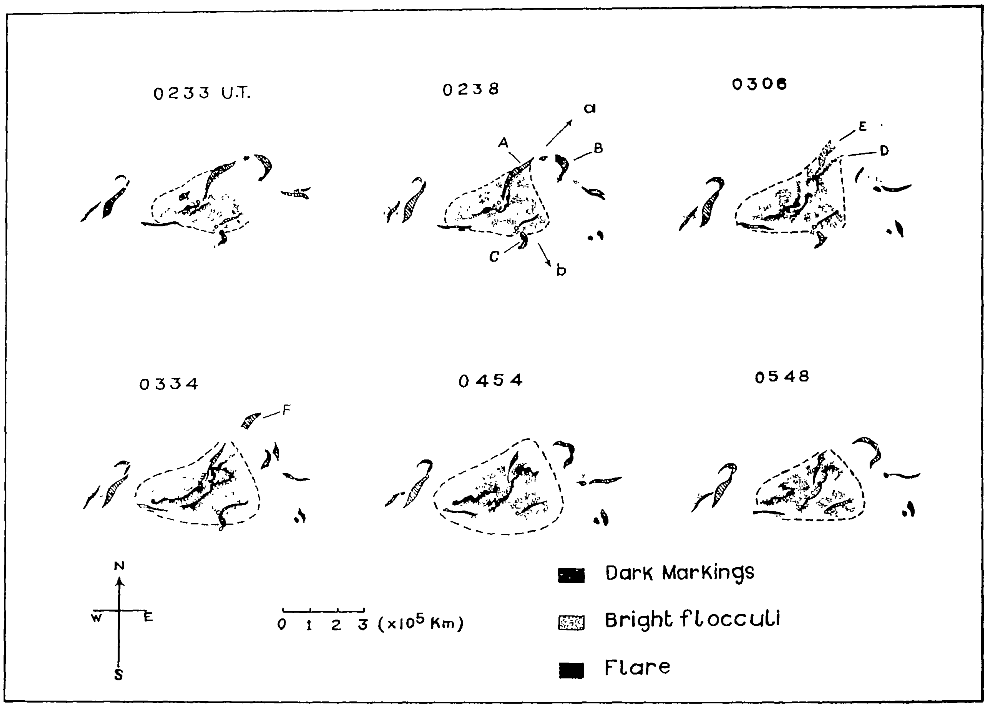

FIG. 1
The flare of 1926 February 22.

Three cases of filament activation have been observed during the progress of the flare. The filament "A", which partly enclosed the region where one of the bright ribbons of the flare occurred subsequently, was activated in the early stages of the flare, becoming invisible at $3^h\,6^m$. A spectroheliogram, taken four minutes later with the second slit of the instrument 0·5 A off the *Hα* line to the red, shows the filament moving away from the active region. By $3^h\,34^m$ it began to reappear. Filament "B" experienced activation around $2^h\,38^m$. Except for the southernmost tip it is virtually invisible at $3^h\,6^m$. At $3^h\,10^m$ it was seen as two separate features in the off-*Hα* spectroheliogram, one stationary and the other moving away from the parent filament. These two features become visible on the *Hα* spectroheliogram obtained at $3^h\,34^m$. An interval of eighty minutes exists between this plate and the subsequent one, during which time the filament resumed its pre-flare shape.

The third activated filament "C" became invisible at $3^h\,34^m$ and did not reappear until the next day.

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An active high speed bright surge "D" was in progress at $3^h\,6^m$ in the direction of filament "B" and was presumably responsible for its activation. This surge was still visible at $3^h\,34^m$, but with decreased intensity. A diffuse bright cloud "E" is seen at $3^h\,6^m$ travelling radially away from the spot. This forms an expanded dark cloud "F" as seen on the spectroheliogram of $3^h\,34^m$.

Two explanations of the obscuration of striation details seem plausible. The first offered by Ellison relates the obscuration of the striation pattern with a possible partial destruction by the flare of the chromospheric magnetic field. On the other hand Smith and Booton have shown a close relationship between striation obscuration and associated surge occurrences during the flare of 1960 May 6. Attractive as the hypothesis of the destruction of the magnetic field is, we should adopt it only when it becomes definite that the disappearance is not due to the opacity of the ejected material. The flare of 1926 February 22 has surges accompanying the flare. Furthermore, an analysis of calcium spectroheliograms carried out by Bappu and Punetha[6] has shown that the calcium plage structure remains virtually unaffected throughout the flare event as such, and no changes in the magnetic field larger than 20 gauss seem possible. We therefore believe that the flare of 1926 February 22 provides evidence in favour of the concept of obscuration of the striation pattern by absorption caused by flare-ejected material, rather than by possible changes in the magnetic configuration at the chromospheric level.

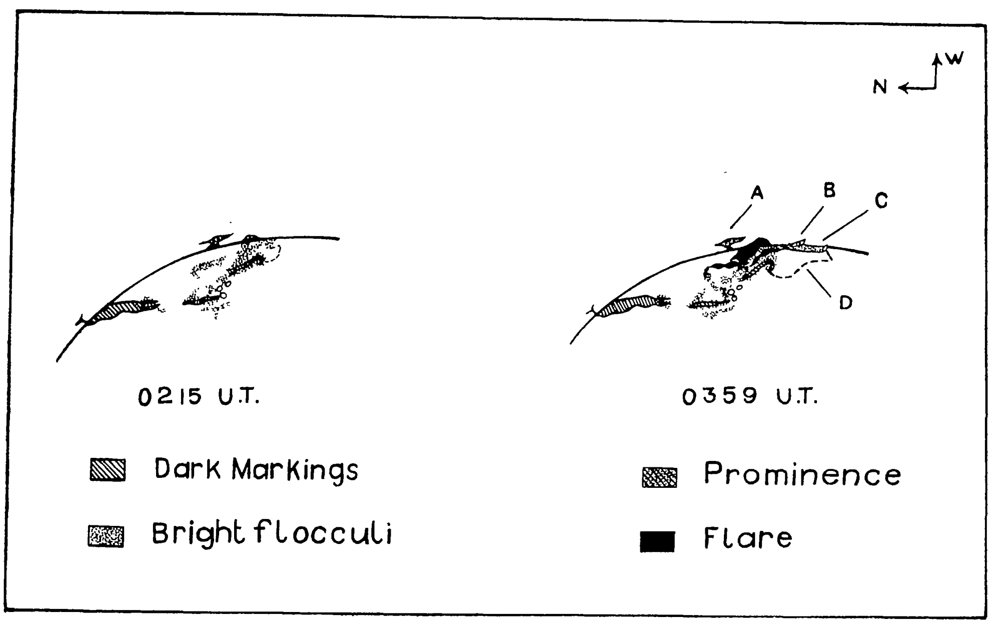

FIG. 2
The flare of 1956 February 23.

The flare of 1956 February 23 is extremely well known for its terrestrial effects, and normally would be a very ideal flare for studying the phenomenon reported by Ellison. However, two aspects of this flare prevent the possibility of any detailed study. Firstly, only one spectroheliogram exists of this important event and secondly, it is so close to the limb that the

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striation pattern would normally be invisible. The flare spectroheliogram was taken at $3^h 59^m$, seventeen minutes after the maximum epoch observed by Notuki, Hatanaka and Unno[7]. The pre-flare spectroheliograms were obtained at $2^h 10^m$ and $2^h 15^m$. Fig. 2 shows schematically the changes of chromospheric structure caused by the flare. A prominence "A" at the limb remains unaffected by the flare. The Tokyo astronomers have observed a large surge in the flare region just before the flare maximum. The Kodaikanal spectroheliogram shows a small surge "B" at $3^h 59^m$. Close to this surge is a luminous filament "C" which lies projected against the disk. This luminous filament forms the western boundary of the dark region "D", which has expanded in size considerably at the time of the flare. Both the luminous filament and the expanded dark area are the result of the flare and hence the flare of 1956 February 23 also seems to confirm the idea that the obscuration of surface details is caused by flare ejected material.

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