

A VIEW of the magnificent aurora of Feb. 4 was much interrupted here by great masses of cloud, which frequently drifted over large tracts of the illuminated sky, and towards 8 o'clock collected and descended in a general downpour of rain. Nevertheless enough of it was seen to produce a very striking impression. It began to tinge the southern sky at a considerable altitude so early in the evening that I thought it must have been the reflection of a crimson sunset; nor was I undeceived till I had been to the other side of the house, where I found the western horizon glowing with amber light, in which was no trace of the expected ruddiness. Red continued throughout to be the prevailing hue, chiefly in great diffused masses, but occasionally broken up into filaments and streamers; there was, however, no absence of sheets and columns of the more usual pale green light. The clouds, chiefly heavy cumuli, assumed a strange aspect; sometimes, when opposite to the crimson illumination, reflecting a dull and sombre red, at others, when projected in front of it and enlightened from the other side by the twilight, or the green aurora, standing out in lurid and ghastly contrast. At one period the northern part of the sky, up to a great altitude, though clear and studded with stars, appeared at first sight almost like a black cloud from its contrast to the greenish white sheet which bordered it abruptly at a considerable height on the west; this again passing into crimson masses in the south, and sending out a whitish stream to meet another from the east, and form, probably, for a few moments, a complete bright ring, somewhat south of the zenith, of which, however, only one half could be seen from the post of observation. The light was so intense that even after it had been a good deal obscured by cloud, a large print might have been read without much difficulty. A miniature spectroscope (one of Browning's) brought out some interesting features. The usual yellowish green auroral line was distinct everywhere, and could be perceived even when the instrument was directed to masses of dense cloud; and as was observed by Birmingham on a former occasion, could be made out in the reflection from any suitable terrestrial object; white paper for example exhibited it very obviously. As shown in the brighter greenish patches in the sky, it remained visible even when the slit was so much contracted that the sodium band of a common fire would have been thinned down almost to its smallest breadth before extinction. Such a diminution of light, however, was fatal to the rest of the spectrum, which was a very remarkable one. With a wider slit a crimson band, bearing a fair amount of contraction, was perceptible in the brighter patches of that hue, with a dark interval between it and the principal green band. On the opposite side of that green band, beyond a second similar dark space, was a considerable extent of greenish or bluish light, quite decided, but so feeble as to leave it undecided whether it was of uniform brightness, or (as I suspected) compounded of contiguous bands; beyond this again was another dark space, leading on to a faintly luminous band, too dim to show colour, but which must have taken its place somewhere in the blue. This band, and the darkness adjacent to it on the less refrangible side, were each about as broad as the intensely vivid yellowish green stripe. Could the light have borne sufficient reduction, we should certainly have had three narrow bright bands in the red, green, and blue, the two latter being wide apart, with either a faint separate continuous spectrum, through part of the interval, or possibly several feeble lines, which the widening of the slit fused into one lengthened area.

The peculiarity, first noted I believe by Otto Struve, was very obvious, that even where the naked eye recognised the strongest and fullest crimson without a trace of green, the greenish yellow band in the spectroscope far exceeded, perhaps three or four times, the red line in visibility. This display was distinguished from almost all that I can recollect to have witnessed through many years, by its very feeble development in all the northern portion of the sky.

Hardwick Vicarage, Hay

T. W. WEBB

WILL you kindly permit me to correct an error which crept into my letter of last Monday on the aurora. The words "western" and "north-eastern" in the 14th line should have read respectively "eastern" and "north-western." Allow me also to call attention to the present condition of Jupiter. On Thursday evening last the equatorial ochre-tinted belt was lighter in colour than I have seen it of late years, but much and distinctly mottled with light and dark clouding, two dark hanging spots on the upper edge, with adjoining elliptical bright patches,

being conspicuous, while the lower dark madder-brown edge was very unequal, being swollen and thick about one-third to the right from the centre, and thinning off towards each end. The dark belt above the equatorial zone had two knots or thickenings of considerable size upon it, and the whole series of belts presented ragged and dentated edges, and, to use the apt phrase of a lady who saw them, had a "mountainous" look.

On occasional glimpses I more than suspected a general mottling of the whole surface of the planet, which, moreover, presented a dull appearance, the dark and light belts and spaces not being, as I thought, so well contrasted as usual. The poles were coloured as in ordinary, the upper one warm and ochreish, the lower slate grey. The instrument used was Browning's 8 $\frac{1}{2}$  reflector, full aperture, with inserting achromatic eye-piece 306. A transit of a satellite and its shadow added to the general effect.

Guildown, Guildford, Feb. 10

J. R. CAPRON

ON Sunday, the 4th of February, at 10 P.M., I observed the central point of the "corona" of the aurora visible that evening to be situated between  $\epsilon$ , 64 and 65 Geminorum, in R.A. 7h. 20m. and N. decl. 28°. Our latitude is N. 50° 50' 55", and longitude E. 0° 32' 50".

The "corona" drifted away very slowly towards the E. against a slight E. wind blowing at the time.

Perhaps some of your contributors can calculate the aurora's height from the earth from the above notes, and let us know the result through your journal.

J. E. H. P.

St. Leonard's, Sussex, Feb. 12

NOT wishing to trouble you with a long description of the aurora observed by so many on the evening of the 4th, I will confine myself to a few remarks. The spectrum of the brighter portions, viewed through a five-prism direct instrument, consisted generally of the four lines mentioned by Captain Maclear; but when the spectroscope was turned towards the brightest of the curved streamers forming that splendid red and pink star, which so suddenly burst forth at 7 $\frac{1}{2}$  25, some degrees south of the zenith, the relative intensity of the lines was completely changed, the red line becoming more strongly marked even than the green.

The fact that the green line can always be detected, even where the unassisted eye fails to notice any trace of auroral light, might suggest the advisability of a daily observation with a small hand spectroscope for those who are desirous of forming a complete list of all auroral phenomena. Magnetic disturbances are a sure guide in the case of grand manifestations of aurora; but might not a very slight aurora be observable without the magnets being sensibly affected?

On the evening of the 4th the magnetic storm commenced about 2 P.M., and was at its height from 4 to 9, though the magnets were not steady again until after sunrise the next morning.

S. J. PERRY

Stonyhurst Observatory

I WRITE a very short account of the great aurora of February 4, as seen by me in the south-east of France, between Chambéry and Macon. It may be of some interest, as a brilliant aurora is very unusual in those latitudes, and this was quite comparable in brilliancy to the auroras of October 1870, and November 1871, which I witnessed in Scotland. The sunset was very clear and bright, but as the sunlight gradually faded, light fleecy clouds appeared in different parts of the sky, with the ruddy tints characteristic of the Northern Lights. As it became darker the redness increased in intensity and extent, overspreading a large portion of the sky, especially towards the zenith, and was streaked with bands of greenish white light. On the eastern horizon a well-defined arch of this pale green light was visible for some time, while underneath the arch the sky was so black that but for a large star shining in the centre of the blackness, I should have supposed that the darkness was due to a heavy cloud. There were, in fact, no true clouds at the time in the sky, and the large stars were everywhere visible amid the shifting masses of nebulous light, which at one instant seemed to be the ruddy reflection of a great fire, and at another to be lighted up by the rays of a full moon. Long streamers of red and green light seemed to shoot up towards the zenith from almost every point of the horizon at various times; but singularly enough there appeared to be fewer displays of this sort in the north than in any other quarter of the heavens. Being, however, in a railway carriage in motion,