

“A faint continuous spectrum, without any traces of dark lines in it, was also visible, evidently due to the corona. Its light, tested by a tourmaline applied next to the eye, proved to be very strongly polarized in a plane passing through the centre of the sun. I am not sure, however, but that this polarization, as suggested by Prof. Pickering, may have been produced by the successive refractions through the prisms. This explanation at once removes the difficulty otherwise arising from the absence of dark lines.”

I have first to do with the continuous spectrum, deduced from Professor Pickering's observations.

I think in such a method of observation, even if the corona were terrestrial and gave a dark line spectrum, the lines visible with such a dim light would in great part be obliterated by the corresponding bright lines given out by the long arc of chromosphere visible, to say nothing of the prominences, in which it would be strange if C, D, E, *b*, F, and many other lines were not reversed. This suggestion, I think, is strengthened by the statement that two bright lines were seen “near C” and “near E;” should we not rather read (for the “near” shows that we are only dealing with approximations) C and F, which is exactly what we might expect.

But even this is not all that may be hazarded on the subject of the continuous spectrum, which was also seen by Professor Young under different conditions.

Assuming the corona to be an atmospheric effect merely, as I have before asserted it to be, it seems to me that its spectrum should be continuous, or nearly so; for is it not as much due to the light of the prominences as to the light of the photosphere, which, it may be said roughly, are complementary to each other?

With regard to the aurora theory, I gather from Professor Young's note that, if not already withdrawn, he is anxious to wait till the next eclipse for further facts. I consider that the fact that I often see the line at 1474, and often do not, is fatal to it, as it should be constantly visible on the proposed hypothesis. The observation of iron-vapour, as I hold it to be at this elevation, is of extreme value, coupled with its simple spectrum, *seen during an eclipse*, as it entirely confirms my observations made at a lower level in the case not only of iron but of magnesium.

February 3, 1870.

Lieut.-General Sir EDWARD SABINE, K.C.B., President, in  
the Chair.

Among the Presents received was a Thermometer, presented by Mr. Augustus De Morgan, which had been made in Florence in the seventeenth century. It was one of a collection discovered in the Museo Fisico of

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Florence in 1829, which had belonged to the Accademia del Cimento, and corresponds with the small thermometer used for determining atmospheric temperatures, of which a figure and description are given in the Memoirs of the Academy.

The following communications were read :—

- I. “ Note on an Extension of the Comparison of Magnetic Disturbances with Magnetic Effects inferred from observed Terrestrial Galvanic Currents ; and Discussion of the Magnetic Effects inferred from Galvanic Currents on days of tranquil magnetism.”  
By GEORGE BIDDELL AIRY, Astronomer Royal. Received December 22, 1869.

(Abstract.)

The author, after referring to his paper in the Philosophical Transactions for 1868 on the comparison of Magnetic Disturbances inferred from Galvanic Currents recorded by the Self-registering Galvanometers of the Royal Observatory of Greenwich with the Magnetic Disturbances registered by the Magnetometers, on 17 days, states that he had now undertaken the examination of the whole of the Galvanic Currents recorded during the establishment of the Croydon and Dartford wires (from 1865 April 1 to 1867 October 24). The days of observation were divided into three groups,—No. 1 containing days of considerable magnetic disturbance, and therein including not only the 17 days above mentioned, but also 36 additional days, No. 2 containing days of moderate disturbance, of which no further use was made, and No. 3 containing the days of tranquil magnetism.

The comparisons of the additional 36 disturbed days were made in the same manner as those of the preceding 17 days, and the inferences were the same. The results were shown in the same manner, by comparison of curves, which were exhibited to the Society. The points most worthy of notice are, that the general agreement of the strong irregularities, Galvanic and Magnetic, is very close, that the galvanic irregularities usually precede the magnetic, in time, and that the northerly magnetic force appears to be increased. The author remarks that no records appeared open to doubt as regards instrumental error, except those of western declination ; and to remove this he had compared the Greenwich Curves with the Kew Curves, and had found them absolutely identical.

The author then proceeds with the discussion of the Galvanic Current-Curves on days of tranquil magnetism, not by way of comparison with the magnetic curves, but for independent examination of the galvanic laws. The method was explained of measuring the ordinates and connecting the measures into expressions for magnetic action, at every hour, and group-

ing the measures at the same nominal hour by months, and taking their monthly means for each hour. As these exhibited sensible discordance, they were smoothed by taking the means of adjacent numbers, taking the means of the adjacent numbers of the new series, and so on, repeating the operation six times. The author explains the theory of this process, and the way in which it tends to degrade the periodical terms of higher orders. He then explains an easy method of resolving the numbers so smoothed into periodical terms recurring once in the day, twice in the day, thrice in the day, &c., and applies the method to the numbers for every month.

When these quantities (which from month to month are perfectly independent) are brought together in tables, they present such an agreement, with gradual change accompanying the change of seasons, as leaves no doubt on their representation of a real law of the diurnal changes of the galvanic currents. They also show the existence of a constant turn towards the north (which explains the apparent increase of force to the north observed in the results for days of great disturbance), and a still larger force towards the west (which also is well marked on the days of great disturbance). No light is obtained on the origin of these terms, but they appear to be probably pure galvanic accidents, depending on the nature of the earth-connexions.

The author then exhibits in curves the diurnal inequalities of magnetism which the galvanic currents must produce. The form generally consists of two parallel lobes, making with the magnetic meridian an angle of nearly  $60^\circ$  from the north towards the west. The greatest east-and-west difference of ordinates, in the month of April, is 0.00044 of Total Horizontal Magnetic Force; it corresponds, in the hours to which those ordinates relate, nearly with the Ordinary Diurnal Inequality. But it is much smaller than the ordinary diurnal inequality, and the daily law of the galvano-magnetic inequality differs greatly from that of diurnal inequality. For the greater part, therefore, of diurnal inequality the cause is yet to be found.

- II. "Monthly Magnetic Determinations, from December 1866 to May 1869 inclusive, made at the University of Coimbra." By Professor J. A. DE SOUZA, Director of the Observatory. Communicated by BALFOUR STEWART, F.R.S. Received December 16, 1869.

[NOTE.—These observations form the continuation of a series the results of which were communicated to the Royal Society on May 8, 1867, by the President. In both series the same instruments were used, and the method of observation was the same in both.—B. S.]