

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Magnetic Storm and Aurora, December 16-17.

THE following details of a noteworthy magnetic storm and aurora, which occurred on December 16-17, are communicated by permission of the Director of the Meteorological Office.

C. CHREE.

Kew Observatory, Richmond.

ON the magnetic traces at Kew Observatory, Richmond, Surrey, there were indications of disturbance shortly after 8h. on December 16, but no striking movements until after 14h. (2 p.m.). Activity was greatest between 16h. and midnight of December 16, but some considerable movements appeared after midnight, and the disturbance did not die down until after 4h. on December 17. The range of declination (D) was about 34', the ranges of horizontal force (H) and vertical force (V) being respectively about 400 γ and 250 γ . The needle reached its extreme westerly position about 14h. 40m., and its extreme easterly position just after 21h. Its largest continuous movement was a swing of 23' to the west, occupying about thirty-five minutes, and ending just after 22h. The highest and lowest values of H occurred about 17h. and 21h. 15m. respectively; between these hours there was a general tendency to fall. A very rapid movement in H ended just before 21h. 15m., the element falling 215 γ in less than ten minutes. Between the end of this movement and 2h. 25m. on December 17, H rose almost 350 γ .

From 14h. 30m. until after 21h. on December 16 the D trace showed, superposed on a gradual drift to the east, a series of oscillations with a mean period of about twenty-two minutes. The H trace also showed a series of oscillations between 15h. and 18h., and the oscillations in the two elements were roughly in phase, increase in H going with westerly movement of the needle. The changes in V were of a normal kind, the value of the element being raised between 15h. and 22h. on December 16, and depressed in the early hours of December 17. The V trace was almost free from short-period oscillations, and these were also less conspicuous in the D and H traces than is usual with so large a disturbance.

The following particulars are reported from Eskdalemuir Observatory, Dumfriesshire, where the magnetographs record the north (N), west (W), and vertical (V) components of the magnetic force:—

Time of commencement 8h. 17m. G.M.T. on
December 16.

	h. m.	Range
Maximum of N	at 17 23	638 γ
Minimum "	" 21 27	
Maximum of W	" 17 16	587 γ
Minimum "	" 21 14	
Maximum of V between	17 20	>579 γ
and	17 35	
Minimum "	at 21 18	

These ranges, it will be noticed, especially that in V, are much larger than those recorded at Kew Observatory.

After the occurrence of the minimum values about 21h. 20m., the Eskdalemuir curves showed a recovery to about their normal positions; but just before 2h. on December 17 another disturbance was recorded, causing an increase in W and fall in N and V, the changes

of force being approximately in N-150 γ , in W+80 γ , in V-260 γ .

Observations of aurora on December 16 have been reported from many stations in Scotland and Ireland. At Eskdalemuir aurora was first noticed at 20 $\frac{1}{2}$ h., when it appeared as a glow to W.N.W. At 21h. an arc extended from about N.W. to about N.E., with green streamers extending towards the zenith. At 21h. 10m. the arc had disappeared, but the whole northern half of the sky up to the zenith was glowing brightly. At 21 $\frac{1}{2}$ h. the glow was less extensive. It was noticed at this time that the streamers radiated to a point about 10° from the zenith towards the south (*i.e.* the radiant point had an elevation of about 80°, an azimuth of about 180°). The streamers were not thin and sharply defined, as is usually the case, but vaguely defined patches of light which glowed brightly. At 21 $\frac{1}{2}$ h. the principal glow was to the W. and W.S.W., but it was also plain to the N.W., N., and N.E. The natural inference was that the centre of the arc of the horizon from which the disturbance proceeded had changed azimuth from N (nearly) to W (nearly) between 21 $\frac{1}{2}$ h. and 21 $\frac{3}{4}$ h., but the radiant point of the streamers did not change appreciably in position. A slight glow was still visible in the N.E. at 23h.

At Aberdeen Observatory, Mr. Clarke, the observer, reported a fine auroral display on December 16. From 16h. 45m. to 21h. it was of a comparatively stable character. Until 18h. there was a single curtain-arc, with crimson, yellow, and green colouring. Between 18h. and 21h. there were several similar arcs, coloured from yellowish-green to bluish-white. After 21h. the type altered, streamers appearing all over the sky, accompanied by a corona. This second auroral phase would seem to have synchronised with the very rapid fall of magnetic horizontal force at Richmond.

At Rothesay, according to the observer, Mr. J. Davidson, the aurora was very fine indeed. Along with extra long streamers were waves of red and white light, the whole centring overhead and forming an immense "dome" (corona), where both streamers and waves of light centred. The red waves came mostly from N.W. and N.E.

At Fort Augustus the "dome" was in the zenith at 21h. 15m. The most southerly station from which observations have been received at present is Seskin, near Waterford, where the aurora was "moderately bright" at 21h., and "faint" at 22h. The observer, Mr. Ernest Grubb, writes:—"The aurora on Sunday was much brighter at Mount Mellick, fifty-seven miles north of here, and very much brighter at Belfast, 174 miles north of here."

At Southport "a very fine display of streamers" was seen early on December 17, between 2 $\frac{1}{2}$ h. and 2 $\frac{3}{4}$ h., and therefore corresponded with the second magnetic disturbance at Eskdalemuir.

SOURCES OF POTASH.

AS is well known, the world's supply of potash during the last three years has been greatly curtailed owing to the present isolation of Germany, and compounds of potassium have, consequently, greatly increased in price. This, of course, has acted adversely on the interests of agriculture, of medicine, and of numberless processes in the arts which are more or less dependent upon the use of potash compounds. Up to within comparatively recent times such potash as the world needed was obtained from sea-water, either directly, or indirectly through the medium of sea-