

a space of about ten minutes the aurora appeared to be fading, but at about 10^h 40^m a bright streamer, 5° or 6° broad at its base, rose upwards from the "pointers" to above the Polar star, while the whole northern half of the sky was again covered with fainter streamers. Waves of light flashed rapidly along the principal beam, from its base to near the zenith in about one second, and at the same time drifted upwards over the other parts of the aurora in extremely vivid and rapid succession. The progress of the disturbance continued the same, and was watched for about ten minutes, during which time occasional bright streamers rose and faded, and all the beams of the aurora were equally lighted up by the flitting waves. The motion of the latter appeared to be in parallel lines rising upwards from the N.N.E. horizon, and where in that direction the bases, or brightest parts, of the streamers were arranged in a continuous succession of altitudes from near the horizon to the zenith, the waves appeared to be propagated in the most regular and unbroken manner. Tall streamers at a considerable distance east or west of the magnetic north were lighted up very rapidly from their bases to their summits, as if directly confronted throughout their whole lengths by the advancing waves. At about 10^h 45^m, the cloud-like apex of the aurora was somewhat nearer to γ than to β Andromedæ, and it was lighted up like the occasional tall streamers in the east and west, by almost momentary flashes of pale, phosphorescent light. The impressions of a luminous vapour, like that which floats over phosphorus, of the *ignis fatuus*, or of the disturbed surface of a phosphorescent sea, blown by the wind, were most vividly suggested by the flickering changes of brightness in portions of the auroral cloud overhead. At 10^h 50^m the disturbance ceased, and the streamers gradually resumed their steadiness, some appearing soon afterwards in the south-west, from between θ Pegasi and α Aquarii to α Pegasi; and others, in the south-east, across Aries and Taurus. The auroral apex was faintly visible, at this time, near γ Andromedæ. At about 11^h, a third disturbance among the auroral beams occurred for a few minutes overhead. A slightly curved arch 2° or 3° broad, extending towards the east and west about 20° on each of the apex, and lance-like streamers in the east and west, which, together with the arch, were in their ordinary state invisible, were repeatedly lighted up suddenly and very brightly, and were immediately again extinguished; the light sometimes appearing in the beams and sometimes in the arch, as if it were banded to and fro between them. The streamers in the north were at this time very faint, and those in the south-east and south-west were almost entirely hidden by clouds, which a rising wind now drove across them from the south. From 11^h 8^m to 11^h 10^m a rapid succession of horizontal waves and wavelets of light rose in parallel lines above the N.N.E. horizon, drifting, apparently, overhead towards the south. As they appeared to catch the beams, and the arch which still remained extended across the apex towards the east and west, these were suddenly lighted up, and immediately again extinguished, as before; the flickering and dancing effect of the light which they produced resembling that reflected on the clouds in the south from distant iron-smelting furnaces upon the opposite bank of the Clyde. A repetition of the flashing lights, which, I presume, must have been those described by ancient writers as *capra saltantes*, and by mariners familiar with displays of the aurora in high latitudes as "merry-dancers," occurred again among the beams overhead between 11^h 12^m and 11^h 14^m. Soon after this, thick clouds came over from the south, and the sky very shortly afterwards became overcast.

The beams of this aurora were uniformly white, without any trace of colour. But the farthest east and western beams of a bright aurora seen here from 8^h to 11^h on the evening of Thursday last, the 20th inst., were of a rich crimson red, and one tall streamer of that aurora, reaching nearly to the zenith, exactly in the north, was tinged with crimson at the top. A south-west wind, accompanied by rain, succeeded that aurora on the following day. Last night a south-west gale sprang up, and there was a considerable fall of rain here this afternoon. I heard no crackling sounds during the brightest flashing of this aurora; but such sounds might very possibly be produced in Arctic regions by the cracking of ice, which great pressure, or a change of temperature in a gale of wind, would be not unlikely to occasion as a concomitant of the aurora, if, as was recently suggested by the late Admiral Fitzroy, auroral displays in these latitudes accompany, and are pretty certain indications of the existence of, very stormy weather at a distance.

A. S. HERSCHTEL

Andersonian University, Glasgow, Oct. 26

A WONDERFULLY fine auroral display took place last night, very far exceeding in extent and brilliancy that of the 24th ult., as seen from this place. It began to show itself soon after sundown, attained its maximum about 8 o'clock, and had not wholly disappeared at 11. At about 8 o'clock more than half the visible heavens was one sea of colour, the general ground greenish, yellow, and pale rose, with extensive shoals of deep rose in the east and west, and from the north; streaming upwards to and beyond the zenith, tongues and brushes of rosy red so deep that the sky between looked black. The spectroscopic, a direct-vision one, showed four lines in the rosy portion and one in the greenish; one strong red line near the C, one strong pale yellow line near the D, one paler near the F, and one still paler beyond, with a faint continuous spectrum from about the D to beyond the F. The C line was very conspicuous and the brightest of the whole, intermediate in position and colour to the red of the lithium and the calcium, with both of which I am familiar; plainly there were two spectra superposed, for while the red portions of the aurora showed the four lines with a faint continuous spectrum, the greenish showed only one, near the D on a faint ground. Of course, no numerical accuracy was attainable with so simple an instrument, only the judgment of the eye; but the conviction was very strong that the rosy hue was owing to hydrogen, possibly resulting from decomposition by electrical discharges of the excessively attenuated watery vapour existing in the higher regions of the earth's atmosphere, which Tyndall has shown to be capable of producing the blue colour of the sky, and by the consequent loss of which the blackness of space was discernible.

T. F.

St. Mary Church, Torquay, Oct. 25

SHORTLY after sunset this evening an ill-defined auroral arch was seen in the north. At about 7 45 patches of rose-coloured light were visible about the constellations Auriga, Ursa Minor, Ursa Major, &c., and at about 8 o'clock brilliant crimson rays shot up to the zenith, and the sky seemed one vast mass of fire. The auroral light was visible as far south as Cetus and Aquarius. The crimson tint passed from time to time into a greyish light.

When the most brilliant portions were examined with the spectroscopic, two bright lines were visible, one a greenish-grey line situated about the middle of the spectrum, and the other a red line looking very much like the C hydrogen line.

London, Oct. 24

W. B. GIBBS

DURING the recent brilliant auroral displays (Oct. 24th and 25th), I observed four bright lines in the spectrum of the crimson beams of the corona.

1. A broad and well defined red band near C.

2. A bright white band near D (? the same as Angström's line with wave-length = 5567). I have frequently seen this line even during very faint displays; on the 25th it was visible in every part of the sky.

3. A faint and rather nebulous line, roughly estimated to be near F.

4. A very faint line about half way between 2 and 3.

The red band was absent from the spectrum of the white rays of the aurora, but the other lines were seen.

Bedford, Oct. 29

THOS. G. ELGER

ON the night of the 25th a most gorgeous aurora borealis was visible at North Shields. I first observed it about 6 P.M., when it formed a splendid boreal crown, of which the centre was about 25° south-east of the zenith. Rays of brilliant crimson converged to it from all directions, especially from N.E., S., and S.W. To the north the light was more of the ordinary colour. They appeared to rise from an irregular circle, extending round the whole horizon, and slightly arched in the N.W. Below this was the usual dusky cloud. When the rays, or rather sheets, of crimson were at their brightest, they were streaked with yellowish light. At times the centre of convergence was dark, at others it was occupied by luminous clouds of twisted forms, reminding me of those of some of the nebulae. The rays seemed to have a slow motion towards the south.

About eight o'clock the crown gradually faded, and the light of the centre flickered with a tremulous motion. At 8.15 an arch shot across the sky from N.E. to S.W., passing just north of the pole star. It slowly drifted south, and at 8.30 was in the zenith. At 10 the boreal crown had reappeared, but was of the ordinary yellowish colour.

The spectrum of the red rays contained a brilliant red line,