

of the North of England, is engaged in founding at Newcastle-upon-Tyne.

The Executive Committee fully recognises the importance of Biology. The professorial chair, which was called at the public meeting that of Geology and Mineralogy, will be called, according to a subsequent decision of the committee, the Chair of Geology, Biology, and Mineralogy. It is true that this designation leaves it uncertain whether Biology is co-ordinated with Geology, and has its claim to be a distinct science allowed, or is subordinated and intended to be treated only as a component part of Geology. In the former case, it may be said, the Chair will be too capacious for one man to fill; in the latter, the rights of biology are but inadequately acknowledged.

The answer to this is, that the programme of teaching is necessarily, at the present stage of affairs, initiatory. It will, no doubt, when the work of the Institution has commenced, and the scale of operations which everything seems to foreshadow has been in some measure realised, receive such expansions and modifications as are suitable to the relative value of the sciences, and the actual wants of the students.

J. WAITE

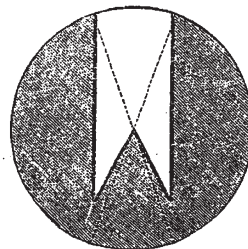
University College, Durham, April 17

### The Aurora Borealis

A VERY bright display of aurora was visible here last night, illuminating the greater part of the heavens at intervals with a fitful light. At 9h. 45m., when I first noticed it, broad cirrus-like brushes of white light stretched in parallel bands across the zenith, from below Corona in the north-east, across Cor Caroli, nearly overhead, to about the altitude, and 15° or 20° south of Venus, then shining dimly through clouds in the western sky. My view of the aurora was afterwards confined to an east window; but from a short examination of a clear part of the sky towards south-west, it appeared to be almost as bright, at first, in the opposite direction as in the quarter between north and east, where I had, from that time onwards, an uninterrupted view of its progress. The streamers were white, and irregular in form, rising from no distinct arch, or definite base in any quarter, but they occasionally met and formed a bright corona overhead. A rose-tint pervaded some of them, in the north-east, at 10h. 30m., and presented itself in different parts of the sky until about 11h., when the phenomenon faded, and a faint glow only remained visible in the north. At about 11h. 40m., while streamers reappeared, forming a bright corona overhead, whose arcs and beams appeared to grow more densely luminous until 12h. 15m. It then showed a well-defined central nucleus, with rays of great brightness proceeding from it, about three-sevenths of the distance from  $\eta$  Ursæ Majoris to Arcturus, white streamers rising to meet it all round, with the appearance of a cupola or dome. While I watched some of the brighter stars through its dense light-cloud, it rapidly assumed a vivid fiery red colour, and a similar bright appearance breaking out at the same moment at the base of a north-east streamer, the fiery glow reflected among the clouds in that direction perfectly resembled a distant conflagration. A wide expanse of brilliant orange and crimson-red light soon joined these two regions of greatest intensity together in one splendid blaze of ruddy colours. This brilliant outburst faded away at 12h. 25m., the streamers disappearing, until 12h. 40m., when they again met overhead, and formed a corona with a sharply-defined nucleus, about 3° west of the star  $\gamma$  Böotis. The light of the white streamers flickered considerably, as if waves of varying brightness were driven rapidly over the whole phenomenon by the wind. Until after two o'clock, when the moon rose, and their light was weakened although not extinguished, a constant succession of bright streamers occupied the north-east sky between the horizon and the zenith; towards these I directed the slit of a Browning's Student's Spectroscope, in order to determine, if possible, the position of some of the auroral lines. A single greenish line only was so faintly visible in the spectroscope that all attempts to view it simultaneously with the cross-wires of the instrument proved unsuccessful. A simple form of pointer, substituted for the use of the wires in the dark field of the telescope enabled me, however, to identify its position with considerable accuracy.

A circular card, of the figure shown in the sketch, was slipped into the forward end of the eye-piece until it reached the diaphragm upon which the cross wires are stretched. It was so disposed that the angular pointer in the middle of the card exactly filled up the lower angle of the cross-wires; and its sharp

point coincides almost exactly with the place of their intersection. In a field of view almost dark it was possible to see the summit of the card-pointer with considerable distinctness; and if a great and imposing phenomenon may be compared with an object so diminutive, the appearance of its dark peak, surmounted by the narrow, flickering line of light, resembled in the dim field of view the cone of a volcano, projecting in a thin



jet from its apex frequent eruptions of varying height and brightness. By obtaining a reading of the soda-line seen in the flame of a salted spirit lamp, and referred to the pointer in the same manner, I obtained as a result of three observations of the auroral line, differing less than two minutes on the graduated position-circle of the spectroscope, a place in the spectrum twenty-four minutes more refrangible than Fraunhofer's line D. Many observations of the dark lines of the solar spectrum, compared with their positions in Kirchhoff's maps, having assured me that a minute of arc on this spectroscope corresponds between Fraunhofer's lines D and  $\delta$ , with 10.44 divisions of Kirchhoff's scale, the resulting difference of refrangibility between the green auroral line and Fraunhofer's line D is 250.6 divisions of Kirchhoff's scale; and its absolute position, assuming for that of D to be 1005 Kirchhoff, was within 10 or 20 units on either side of a place at about Kirchhoff 1255. A bright line in the spectrum of the aurora was observed by M. O. Struve at Pulkowa, in April 1868, whose position he ascertained to be within 10 or 15 units of the scale at Kirchhoff 1259, a place apparently identical with that of the bright line which was principally visible in last night's aurora. The faint and uncertain brightness of its appearance, while confining my attention principally to its observation, prevented me from searching in other parts of the spectrum for accompanying bright lines. Within a space of about 400 Kirchhoff on each side of that which was recorded, I could, however, perceive no traces of any co-existing lines. The position of the bright lines which are most conspicuous in different auroras is, perhaps, a subject of interesting inquiry in connection with the yet unascertained laws which govern their appearance, and with the varying characters and peculiarities of their phases. A remarkable circumstance connected with the appearance of the single line observed on this occasion, was the flickering and frequent changes with which it rose and fell in brightness, apparently even more rapidly than the swiftly travelling waves, or pulsations of light, that repeatedly passed over the streamers, near the northern horizon, towards which the spectroscope was directed.

A. S. HERSHEL

Andersonian University, Glasgow, April 10

THERE was a brilliant display of aurora borealis visible from this place on Sunday the 9th inst. I first noticed it about 10.45 P.M.; there was then a considerable luminosity in the N.W. with a magnificent red glow and streamers springing from the W. extending to within 20° of the eastern horizon, also radiation from other parts in the N. and N.W., but less brilliant. At about 10.55 P.M., a bright streamer made its appearance near the zenith crossing the red at right angles, and standing out clearly upon it. The aurora had nearly faded away at 11.10. When it was at its brightest through a direct-vision spectroscope with the slit rather wide and directed to the N.W., where there was scarcely any colour, the red and green bands usually seen under such circumstances were clearly defined, more particularly the red band. I then directed the spectroscope to the W., at a part where the red light was most intense, to my surprise the red band was scarcely to be discerned, and looked blurred, and spread out