

down the serpent's throat, emerged slowly in all his glory from the opposite side.

If science gains as much in knowledge by the observations made by the different eclipse parties as the wily Brahmins have gained by this late eclipse in money, then a great deal of knowledge will have been gained about all those mysterious phenomena by which Father Sol is still surrounded; for every village in India, as far as the country was affected by the eclipse, paid willing contributions to the Brahmins, that these holy men might use all their influence (by prayers, fastings, and offerings) with their deities in order to induce them to come to the rescue of the sun in the hour of his great danger and need; and I hear that the Brahmins hereabouts had an abundant harvest in money from the poor villagers, to whom they preached months before the great danger impending over the sun; and as these poor people are not yet bold enough to doubt a single word of these heaven-born Brahmins, they contributed to the best of their abilities to the Brahmins, in whose hands, as they believe, rests not only the fate of men but of the whole universe, as the Brahmins are the connecting links between men and the deities ruling this and other worlds. An event like the eclipse shows how much importance is to be attached to all the reports and writings about the great progress in enlightenment of the people of India. Knowledge does not reform their manners; many well-informed and educated natives performed all the superstitious ceremonies connected with the eclipse, with just as much zeal as the ignorant ryot, and many of those who talk to us Europeans about the folly of all the old superstitions, went back again, and performed their rites in the manner of their forefathers, fearing, that if they did not do so, Father Sol might be lost for good, and that we might have to end our remaining days in the constant gloom of starlight.

I have already mentioned that, as far as my observations go, I observed that the shape or form of the corona or glory which surrounded the eclipsed sun underwent changes in form even during the short space of two minutes; but you will easily see that an observer with no other means than an ordinary good telescope, his naked eye, and a photographic camera, was quite incompetent to draw any conclusion; suffice it therefore to say that the changes in the shape of the corona during totality can but be compared to the slow transformation of forms in a dissolving-view apparatus, or perhaps more correctly to the changes of form and shape we observe in isolated thin clouds. I will not express more of my opinion on the nature of the corona than that I believe it consists or partakes of the nature of shining, illuminated ether, perhaps somewhat of the same nature as the aurora borealis; why I think so will appear below.

About eight or ten seconds before totality ended, the moon appeared as if it had made a jerk (stumbled against something), and that jerk was accompanied by a tremendous flickering movement and momentary brightening up of the corona. This momentary phenomenon (for all passed in less or not more than one second) I am unable to describe more clearly, and I cannot compare it to anything except to those flickering movements and brightenings up observable in the aurora borealis. I spent one entire night during the winter of 1845 in watching a grand aurora borealis in North Germany, but had nearly forgotten all about it, but the above appearance in the corona towards the close of totality reminded me so forcibly of it that I hold that something similar is connected with the corona. I was watching the eclipse with a strong magnifier in the camera obscura, and three gentlemen near me used telescopes, and we all observed the same—I in the camera, and they with their telescopes—and the flickering caused us all to express some surprise, such as "Look! look!"

In the evening I had some conversation on the eclipse in general with the telegraph master, a very scientific gentleman, who, without my saying anything about the matter, told me that he observed such a phenomenon.

I think this is about all I can say, as the play and changes of colours which were visible are quite beyond my sphere; I can only say I saw them, but I do not remember their order and succession, nor changes.

In conclusion I must once more repeat that what I say must be taken for what it may be worth. I merely speak of the appearances without accounting, or being able to account, for them; and this will not be surprising when those who spend their lives in these studies can often only offer conjectures as to the real nature of these matters.

Ootacamund, Dec. 22, 1871

J. BOESINGER

Natural Science at Oxford

THE regulations relating to Natural Science at Oxford, reprinted in a recent number of NATURE,* will have considerable interest for those who follow the progress of such studies at the Universities.

The Natural Science Schools is one of the five "Final Schools." There are examinations which take place at the end of the University course; in any one or more of them it is open to candidates to seek for honours. Hitherto the Natural Science School has offered a threefold division of its subjects, namely, Biology, Physics, and Chemistry. A candidate was allowed to select any of these three divisions, and was expected to show, in the first place, a general acquaintance with the subject matter; and in the second, a detailed knowledge of some particular branch of it. The selection of the "special subject" was left entirely to the candidate, but the liberty of choice (in theory a most valuable one) was frequently altogether abused. The object was, apparently, in many cases, to turn the tables on the examiners, and by selecting matters likely to be out of the way of their reading, to make the examination almost fictitious. It is to remedy this that the new Board of Studies has laid down the scope of the general and special knowledge which will be required from candidates for the future.

The regulations at present published relate only to Biology. I venture to think that they by no means form such a philosophically-arranged course as might have been expected.

The first paragraph states the nature of the *general* knowledge which will be demanded. This is defined to consist of General and Comparative Anatomy, Human and Comparative Physiology and Physiological Chemistry, and the general philosophy of the subject. The books recommended are the best commentary on the meaning attached to these headings. The list certainly does not err from defect of copiousness, yet it is noticeable that although it contains all the common zoological text books, it does not include any distinctively botanical book whatever. I do not mean to say that some of the authors named in it do not touch on Botany, but this is so far accidental that they apparently owe their position on the list to their bearing on zoological matters. It appears to me therefore that the only conclusion which can be arrived at from the regulations is that by Biology is not intended General Biology, but only Biology from a zoological standpoint. This is, I think, to be regretted. A general acquaintance with the principal forms of vegetable life ought to form part of a comprehensive biological course, and should be required even of those who intend to devote their strength to the study of the animal economy alone.

The fifth paragraph appears to admit of Botany being taken up to a certain extent as an alternative subject, but this does not remedy its practical absence from the general scheme. I can see nothing in the regulations to preclude a candidate taking high honours in "Biology" who shall, for example, be quite ignorant of the anatomical differences between a cycad and a palm, or shall be quite unable to indicate any points of agreement between a mushroom and a mould. Any one in this predicament might perhaps excuse himself as a zoologist, but he can hardly be allowed to claim the whole of Biology as his province.

W. T. THISELTON DYER

Auroral Statistics

HAVING had already to answer many questions and calm some fears touching the recent brilliant aurora, and its prototype in October 1870, "when the Franco-German war was raging," I beg to send you some condensed statistical returns of auroral phenomena during the last eleven years, prepared and printed before the recent manifestation, and to be published in a few days, but as a part of a ponderous volume not likely to be generally accessible, viz., vol. xiii. of the "Edinburgh Astronomical Observations."

In that book I have endeavoured, amongst other subjects of professional duty, to exhibit the final mean results of nearly 7,025,000 meteorological observations of all kinds, by 55 observers of the Scottish Meteorological Society, spread over the country at as many stations; and, after a preliminary process of compression into 32 numerical tables, the quintessence of the whole appears on a single page, whereof the 28th line gives a numerical expression for each month of the year; combining the

* See NATURE, No. 118, p. 270.

number of times that aurora was visible with the extent of country over which it was observed, and the numbers stand thus:—

January	...	...	29.7
February	...	...	42.5
March	...	...	35.0
April	...	...	27.5
May	...	...	4.8
June	...	...	0.0
July	...	...	0.5
August	...	...	12.6
September	...	...	36.0
October	...	...	49.4
November	...	...	32.4
December	...	...	28.8

It will thus be seen that October and February are precisely the two months when brilliant auroras are most likely to be seen; and that of these two maxima of the annual cycle October has rather the advantage.

The lightning return, prepared on the same principle, is not uninteresting to be compared against the aurora; for, though both in its aerial altitude and actual numerical returns, lightning may be the very opposite of aurora, yet it exhibits a tendency to a similar double maximum in the course of the year; and not a few of the lightning storms of that second, or winter maximum, are locomotive "meteors," travelling from S.W. to N.E., and having undoubtedly a very wide-spread earth-influence and physical signification. The actual numbers are these:—

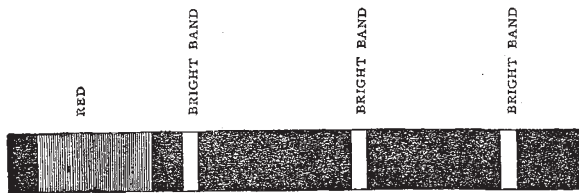
January	...	...	24.0
February	...	...	14.4
March	...	...	7.0
April	...	...	15.4
May	...	...	37.4
June	...	...	48.0
July	...	...	53.2
August	...	...	38.4
September	...	...	22.4
October	...	...	20.8
November	...	...	15.0
December	...	...	15.0

C. PIAZZI SMYTH

15, Royal Terrace, Edinburgh, Feb. 10

The Aurora of February 4

I WILL not attempt to describe the wonderfully gorgeous display of aurora which I witnessed on Sunday night, February 4. I merely wish to mention a circumstance connected with it which may have some interest. I was watching for the zodiacal light at about 5.30, and, having perceived faint traces of it, I presently saw some peculiar red clouds a little above it; from their rapid change of form I soon became aware that this was the light of an aurora. From that time, and from that spot, it spread rapidly; a bright white arch extending high overhead from W. to E., while a segment of blue sky stretched low down in the



S.E. in the magnetic meridian, the space between being filled with brilliant colours. Shortly after this a radiating point became very striking, not in the zenith, but at one-third the distance from the Pleiades to Capella; and then the folds of gorgeous light-red, white, and faint green, interspersed with dark shading, spread from it, like a canopy, down on all sides except in the N.W. I never witnessed or read of such a display in these latitudes. With one of Browning's small star spectroscopes the spectrum consisted of a small portion of brilliant red, then a bright band rather close to it, and then two others beyond; the two latter

being rather nearer together than the first and second; that at the more refrangible end being the faintest, and that near the red the strongest. I enclose a sketch showing the spectrum, the slit being wide open.

The maximum display was between 6.45 and 7 P.M.; at 7.15 it was fading rapidly. Clouds covered the sky at 7.30, and some smart electric showers fell; still I could see that the display was going on; and at 11 P.M., in spite of dense clouds, the light was sufficient to enable me to read large print.

HENRY COOPER KEY

Stretton Rectory, Hereford, Feb. 6

ON Sunday evening 4th inst., a beautiful display of aurora was observed here (lat. 51° 26' 0" N., long. 0° 20' 53" W.). My attention was first directed to it at 6h. 4m. (G.M.T.) at which time there was a fiery glow over a considerable portion of the southern sky, much resembling the reflection of a distant conflagration. Shortly after, an almost complete auroral arch, of faint orange red light, similar to that at first observed, was noticed, extending from E., above and partly embracing δ, ε, and ζ Orionis, to W., its altitude (by estimation) at the centre being about 40°, and its extent something like 120°. For a short time this glow was most intense in S.S.E. at a great altitude, but the display attained its greatest intensity about 6h. 15m., when a number of rays or streamers of whitish blue and orange red light appeared as if radiating from a point near δ, α, and κ Persei. At 6h. 20m. nothing was observed but a widely diffused fiery glow, which must have continued more or less during the whole evening, as it was again observed by me at 8h. 25m.

JOHN JAMES HALL

Fulwell, near Twickenham

THERE was a fine display of the above phenomenon here on Sunday night, February 4. At five o'clock a muddy undefined redness made its appearance in the N.E. and W., especially in the former, which continued for some time without any very marked change. Towards half-past six the redness became more concentrated, gradually brightened, and finally became of a most intense brilliancy—indeed, so much so that it fairly baffles description, the landscape and the countenances of those standing near being visibly tinged. Streamers soon began to form, and shoot gradually upwards from the horizon in all directions from N.E. by S. to W., some intensely red, some very white, while others were of a greenish hue. The red and white being very brilliant, were finely intermingled, especially in a N.E. direction, while a muddy green prevailed chiefly in the S., and a reddish tinge in the W. By seven o'clock that rare phenomenon, a corona, was formed overhead, assuming a variety of shapes. The most curious part of the display (as far as my experience goes) was the entire absence up to this time of any streamers or coloured haze in a W. by N. to N.E. direction, the sky being cloudless, perfectly clear, and the stars shining with their usual brightness. On the formation of the corona a sheet of fan-shaped sea-green haze shot from it in a N. direction, spreading rapidly as it advanced, but did not proceed for more than 20°, when it suddenly disappeared. The streamers were remarkably steady throughout and straight, unlike those during the display of November 10 of last year, which were wave-like, rapid, and flickering. By half-past seven the entire sky had assumed a greenish tinge, with a reddish glow in some places, and a few resplendent beams of white light from the E. chiefly. At a quarter to eight red streamers became visible in a N. direction, at a considerable elevation, resting on a greenish haze, itself emanating from a very indistinctly white arch spread across the N. At nine the sky was still tinged, and a streamer here and there visible, but by ten the display was over, as clouds had obscured the heavens. Although the red colours were so intense and deep, the stars could be distinctly seen through them, and when the streamers suddenly changed to white, &c., it was possible to see the time on a watch, though the night under ordinary circumstances would have been dark. A common dipping needle which marked 56° at noon changed to 45° before the aurora became visible. Barometer corrected and reduced, 29.748. Temperature, 37° at the time. Solar radiator during the day, 77°. A few shooting stars darted across the heavens in a south from east direction, mainly during the aurora. A wet night afterwards set in.

THOMAS FAWCETT

Blencowe School, Cumberland, Feb. 5