

rays which succeed in being refracted or bent round through our atmosphere (the amount of bending of the light extending to a maximum of about 70' in the lowest strata of the atmosphere). Into this inner circle, in this case about 2525 miles in diameter at the distance of the moon, no rays of light can stray except those which are scattered by our atmosphere as a sun-illuminated envelope. It is now very evident that the position of the dark patch bordered by the line (*b-c*) and lying partly over the western half of the moon, with respect to the earth's shadow, is very anomalous. If the line (*bc*) had been curved concentrically to the centre of the shadow, it would have been less surprising. The only way in which it can be accounted for is by supposing the earth's atmosphere to have been very opaque about the regions of the earth within the Arctic circle, allowing very little light, if any, to be refracted, and, tracing southwards that meridian along which the moon would be setting at the time, the atmosphere getting clearer and clearer, first in the upper strata and then in the lowest as we go southwards, until the equator is nearly reached. At 10.50 the moon would be illuminated by solar rays refracted by the earth's atmosphere and tangential to the earth's surface along the meridian 105° east of Greenwich (or thereabouts), which passes through Irkutsk (in Siberia), Mongolia, Tonquin, and Siam, along which line the inhabitants would see the moon going down veiled in its mysterious obscurity. It would be interesting to know whether any observers noticed, at about the middle of the eclipse, any contrast between the inner and darker shadow, in which the moon would be largely immersed, and the outer regions of the shadow which are illuminated dimly by both refracted and scattered light. The unusual darkness of this eclipse, surprising, as it must have done, all spectators, must be taken as a strong indication of great opacity in our atmosphere. Another noticeable feature was the unsymmetrical appearance of the illuminated crescent at 10.50, when the northern cusp (*b*) exhibited a bluish-white, shading off gradually from the brilliant white to the obscurity of the shadow, while the other cusp seemed quite sharp and distinct. Observing the eclipse both with the naked eye and through a 4½" equatorial, neither my fellow observers nor myself noticed any other indication of a blue fringe than that appearing just at *b*, which seemed to me therefore to be a real appearance, and not a subjective effect of contrast, as there was not complementary copper colour anywhere on the moon sufficiently strong to suggest the blue, and if there had been I ought to have noticed the blue fringe all along the edge of the shadow bordering on the crescent, but it appeared to me of a neutral grey.

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### The Red Light round the Sun—The Sun Blue or Green at Setting

I CAN confirm Mr. Backhouse's and Mr. E. D. Archibald's impression about the colour now and for some time past seen round the sun; that it first appeared about November last and has been more or less visible ever since. The colour was then, and still is, sometimes rose, sometimes amber or buff. It is best observed, when the sun on bright days is behind a cloud, round that cloud, in the place where, at other times, broken beams of shadow, thrown out from the cloud like a row of irregular palings and deepening the blue of the sky, are to be seen. Towards sunset it becomes glaring, and white and sallow in hue. Something of a circular shape may then perhaps be made out in it, but it does not seem to me that it ought to be called a halo. A halo, as I understand, is a ring, or at least a round space inclosed by a ring. This appearance has no ring round it. Also in a halo (I have seen numbers) it is the ring that is coloured—either throughout, or at four places where the ends of the four arms of a cross would rest upon it; and the inclosed field is uncoloured or coloured like the rest of the sky: here there is an uninclosed but singularly-coloured field.

But whether we call the appearance a halo or not is perhaps only a question of terms: to call it a corona, as Mr. Leslie does, is another, and, as it seems to me, a hazardous thing, because it would imply that what we are looking at is an appendage of the sun's own (and that too at a time when it is strongly doubted if the sun has a corona of any sort of all), instead of what is much easier to suppose, a terrestrial or atmospheric effect. If there is going on, as Mr. Leslie thinks, an "increase of sun power," this ought to be both felt and measured by exact instruments, not by the untrustworthy impressions of the eye. Now Prof. Piazzi-Smyth says that sunlight, as tested by the spectroscope, is weaker, not stronger, since the

phenomena of last winter began. To set down variations in light and heat to changes in the sun when they may be explained by changes in our atmosphere, is like preferring the Ptolemaic to the Copernican system.

It is, however, right and important to distinguish phenomena really new from old ones first observed under new circumstances which make people unusually observant. A sun seen as green or blue for hours together is a phenomenon only witnessed after the late Krakatoa eruptions (barring some rare reports of like appearances after like outbreaks, and under other exceptional conditions); but a sun which turns green or blue just at setting is, I believe, an old and, we may say, ordinary one, little remarked till lately. I have a note of witnessing it, with other persons of a company, in North Wales on June 23, 1877, the sunset being very clear and bright. It is, possibly, an optical effect only, due to a reaction (from the red or yellow sunset light, to its complementary colour) taking place in the overstrained eye at the moment when the light is suddenly cut off, either by the sun's disappearance or by his entering a much thicker belt of vapour, which, foreshortened as the vapour is close to the horizon, may happen almost instantaneously. And this is confirmed by a kindred phenomenon of sunset. If a very clear, unclouded sun is then gazed at, it often appears not convex, but hollow; swimming—like looking down into a boiling pot or a swinging pail, or into a bowl of quicksilver shaken; and of a lustrous but indistinct blue. The sky about it appears to swell up all round into a lip or brim, and this brim is coloured pink. The colour of the light will at that time be (though the eye becomes deadened to it) between red and yellow. Now it may be noticed that when a candle-flame is looked at through coloured glass, though everything else behind the glass is strongly stained with the colour, the flame is often nearly white: I suppose the light direct from the sun's disk not only to master the red and yellow of the vapour medium, but even, to the eye, to take on something of the complementary blue.

Even since writing the above I have witnessed, though slightly, the phenomenon of a blue setting. The sunset was bright this evening, the sun of a ruddy gold, which colour it kept till nothing was left of it but a star-like spot; then this spot turned, for the twinkling of an eye, a leaden or watery blue, and vanished.

There followed a glow as bright almost as those of last year. Between 6.15 and 6.30 (Dublin time) it was intense: bronzy near the earth; above like peach, or of the bluish colour on ripe hazels. It drew away southwards. It would seem as if the volcanic "wrack" had become a satellite to the earth, like Saturn's rings, and was subject to phases, of which we are now witnessing a vivid one.

G. M. H.

Dublin, October 19

### The Volcanic Dust (?) Phenomena

THE changeableness of the wisps of this dust (?) is surprising. On the 19th inst., near sunset, they were conspicuously visible in all parts of the great corona round the sun, being definite in form—narrow, and about 5° long; it was the first time I had seen them since (I believe) May 18, when they were only just perceptible. During the intervening period the film or portion of the atmosphere on which the universal sky phenomena have appeared has been perfectly uniform in texture. On the 20th inst. they were again conspicuous about sunset, extending faintly even beyond the great corona; they appeared horizontal in the north-west. They were more or less visible about the same time on the 23rd and 26th, on which latter date they could be distinguished faintly in the semicircle opposite the sun at 7.30 a.m. and 4.8 p.m.

It would be interesting to know how far the changes in their visibility are simultaneous over large districts: it appears that they are not universal, for Mr. R. Leslie (*NATURE*, October 16, p. 583) describes them as distinct though very small in the early part of July this year, at which period I never perceived a trace of them in Switzerland. I take the "cloud forms" Mr. Leslie describes to have been the same I am alluding to, though the colour seems to have then been too faint to be perceptible at Southampton. I cannot attempt to explain how the glare round the sun was visible to him in 1882 or earlier, when the red part of what seems to be the same phenomenon did not appear till so long after.

Observations on the motion of the wisps would be very useful in showing the movements of the upper currents of the atmosphere. I have made a few, but they are not very satisfactory.