

by one of the most brilliant and splendid phenomenon that can be imagined." He had expected to see round the dark moon, which now completely concealed the sun, nothing beyond something analogous to what he had seen at Jedburgh in 1836, viz., a narrow, circular band or riband of light, of no great brilliancy or extent. But he had not sufficiently estimated the effect of the still remaining light which emanated from the narrow, luminous ring of the annular eclipse at Jedburgh, in obliterating phenomena which, but for this residuary light, might have displayed themselves with far greater intensity. The unexpected phenomenon which had excited the applause in the streets of Pavia, and which the more calm astronomer confesses electrified himself in his solitude above, was nothing less than the sudden outburst of a *crown of light* surrounding the dark orb of the moon. Its breadth extended fully to that of one-half of the moon's diameter; the colour of the light was neither pearly, nor yellow, nor red, but of a pure white, and seemed divided into rays. In some respects it seemed inimitable by any artificial contrivance, but it bore some resemblance to the "Auricle" or "Glory," which in pictures is placed round the heads of the saints. We can fully appreciate the expression of Mr. Baily's surprise, that so obvious, sudden, and magnificent a phenomenon had not been adequately described in any previous account of a total solar eclipse.

But this sudden outburst of a luminous corona round the dark orb of the moon was not the only unexpected phenomenon which the astronomer saw, or at all events now noticed, for the first time.† From the dark body of the moon, or it might be from the now obscure photosphere of the sun behind it, there darted forth into the corona three luminous protuberances, or tongues, as it were, of coloured flame; their colour was red, tinged with purple, or peach blossom, or perhaps more nearly resembling that celestial tint which sometimes reposes impatiently upon the snowy tops of the Alps at sunset.

These mysterious tongues of coloured flame extended into the corona through a space estimated at about one-twentieth of the moon's diameter; hence, if they belong to the sun they must have had one dimension of at least from thirty to fifty thousand miles! If they belong to the moon this magnitude would be reduced to perhaps eighty, or it may be, a hundred miles; we speak purposely in a loose approximation. We shall see in the sequel that modern astronomy has settled *where* they are, but not *what* they are. yet we are not without a reasonable hope that through observations made during a total eclipse, which will occur in less than thirteen months hence, perseverance, and science in her rapid progress, will disclose to us something definite regarding the natural history of even those unearthly fires so mystic and so remote. But of this also we shall speak much more definitely in the sequel. At present we shall only add that the light from the corona was sufficiently intense to render a candle, which Mr. Baily had lighted for the purpose of reading his chronometer, unnecessary. And now for how long does the reader imagine was the continuance of these wonderful revelations? In the brief space of two minutes and a half, they had come and they had gone; suddenly they came, and as suddenly they vanished—vanished from the sight "like an exhalation," or a vision in a dream—but not from memory.

While Mr. Baily was thus engaged in making these observations at his room in the University of Pavia, the present Astronomer Royal, Professor Airy, was similarly occupied on the summit of the Superga. The Superga is the culminating point of an insulated knot of hills, rising some 800 feet above the valley of the Po, situated about five miles from Turin, and commanding a most lovely and extensive view over the plains of Piedmont. Mr. Airy appears to have selected it among other reasons, under the hope that he might catch a glimpse of the rapid *flight of the shadow of the eclipse* over a widely extended and visible track of country. In this he was disappointed, for the day was gloomy, and it requires a bright and unclouded sky to see the mighty rush of that unearthly shadow spreading from height to height, or sweeping over the level fields, at the rate of some thirty miles per minute, up to the very feet of the observer, and then wrapping him and all things round him in a sudden and startling gloom.

Upon the Superga were many spectators; but the Professor—thanks to the good feeling of his neighbours—was not like his great predecessor, Cotes, at Cambridge, "oppressed with overmuch company." At Mr. Airy's station, the darkness both before and during the totality seemed to have considerably exceeded that experienced by Mr. Baily at Pavia, indeed the amount of darkness during an eclipse appears to be modified to a great extent by the meteorological circumstances of the atmosphere at the time. About two minutes before the commencement of the totality, the candle which stood lighted at Mr. Airy's side seemed to burn with an unnatural brilliancy. "A large cloud over our heads, whose appearance had not been particularly remarked, became, if possible, blacker than pitch, and seemed to be descending rapidly, its aspect became terribly menacing, and I could almost imagine it appeared animated." such is the description given in Mr. Airy's own words. He adds,—"Of all the appearances during the eclipse,

there was none which has dwelt more powerfully upon my imagination than the sight of that terrible cloud."*

Mr. Airy saw nothing whatever of the "beads," though, at Pavia, Mr. Baily, as we have seen, had observed them the second time; but then it must be borne in mind that in the neighbourhood of the Superga the sky was clouded; so much so, that at Turin, only five miles away, Professor Plana lost the available sight of totality altogether, and, strange to say, owing mainly to that very cloud, of which the Astronomer-Royal has given so graphic a description. Mr. Airy observed the same three coloured protuberances already described, but although the "corona" was very distinctly visible, still, on account, probably, of the murkiness of the atmosphere round the sun, it contracted its visible breadth into about one-eighth of the diameter of the moon. We ought, however, to add, that the three coloured protuberances, or flames, were distinctly visible to the unassisted eye of Mr. Airy's companion, *after his attention had been formally called to their existence.* The darkness was so considerable, that the indications of the chronometer could be read only with great difficulty.

Akin to the appearance of the proximity of the dark cloud overhead, was the remarkable aspect of the black moon in front of the corona. It seemed to hang, as it were, in mid-air, and even to approach the eye of the spectator within a few hundred yards? To this remarkable phenomenon we shall have to refer again, in our description of what occurred at Gijuli. Before, however, we conclude our account of Mr. Airy's observations, it may be well to add, that the same sort of tumultuous applause which occurred with Mr. Baily at Pavia, was repeated also on the Superga. As soon as the sun was completely hidden, there commenced among the spectators at the hill, first a low murmur, and then a loud expression of general delight.

Such are the phenomena observed by these two experienced and distinguished astronomers. In due time the reader will have an opportunity of comparing them with what was observed in Spain during the most unexceptionable circumstances of the totality of 1860, and so far we apprehend that the terms in which we have spoken of the awful and majestic character of the appearance disclosed in a Total Solar Eclipse have not been exaggerated or over-charged.

Upon the return of the Astronomer Royal and Mr. Baily to London, it was natural that a very lively interest should be excited among men of science, and indeed among intelligent persons in general, by the remarkable, not to say striking nature of the phenomena which they had described. The re-observation of the bead-like appearance by Mr. Baily, their non-observation by the Astronomer Royal, the unexpected dimensions and brightness of the corona, and beyond all, the record of the coloured flames or prominences, became the subject of animated discussion among learned men. Notwithstanding the philosophy of Comte, at that time coming into fashion, that men act wisely and usefully when they confine their attention solely to what they see, and how and when they see it, it came from an irrepressible impulse of the mind, setting at nought and confuting this hard philosophy, that intelligent men began, and could not help beginning, to speculate earnestly and widely upon the causes of these strange and newly observed phenomena. Does the beautiful light of the corona arise from the reflection of the sun's light by a transparent atmosphere surrounding the sun's photosphere? If so, how enormous must be its extent, seeing the light has been traced to a distance from the sun exceeding the half of its own diameter! And then, what are these mysterious coloured prominence like tongues of fire? Are they really flames? Are they solid? Are they enormous masses of solar cloud floating in the lower portions of a solar atmosphere, and illuminated and coloured like terrestrial clouds at sunset? Or is it possible that they are appendages of the moon? And lastly, what are these luminous bead-like entities into which the last thread of solar light breaks up, just when the black moon is completing its obscuration of the sun? Are they the strugglings of the last of the sun's rays through interstices between some line of lunar mountains on the moon's edge? Are they entities at all, or is it possible that the telescope is at fault? These and other like questions formed, for many months, the staple of discussion not alone among astronomers, but they deeply interested other intelligent men who took pleasure in advancing or in watching the advance of physical knowledge.

With such knowledge as philosophers possessed in 1842, it was not then possible to give a definite and certain reply to many, or perhaps even to any of these questions; but then the discussion of them served to indicate the proper form of future observations; and as competent men quietly mused upon the strange sights which had been seen in Italy and at Jedburgh, the practical questions and cross-questions which it would probably be most advantageous to put to the sun and to the moon, on the occasion of the next total eclipse, began gradually to take a philosophical and definite form. And not only so, but there arose also another collateral advantage: the minds of practical observers became more intently set upon scrutinizing the body of the uneclipsed sun itself, the ultimate result in our day being an accession to our knowledge far beyond what in 1842 entered into the conceptions or the hopes of men. And should the reader desire to know what these accessions to our physical knowledge are, he will find many of them detailed lucidly

* Transactions of the Astronomical Society. 1842.

† In Motte's Abridgment of the Philosophical Transactions, vol. i., page 268, the curious reader may find that Captain Stannyan, at Berne, in 1706, observed "a blood-red streak of light, in the corona, and that Halley anticipated the observation of something like "Baily's beads" in the next total eclipse of 1715. See pages 272, 273, of Motte's Abridgment.