

subjected. Thus, while the latter obey, in common with the planets, the laws of gravitation, they frequently present to us, in their apparent changes of volume, form and general character, phenomena, the explanation of which has hitherto baffled the ingenuity of astronomers. One of the most curious of these phenomena has been recently observed in Biela's comet. This comet has a period of about six years and a half, and has been observed a considerable number of times on its periodical return to the neighbourhood of the sun. It appeared in November, 1845, and in the following January, the phenomenon alluded to was observed for the first time. The comet had become divided into two distinct parts with separate nuclei. Sometimes the one and sometimes the other appeared the brighter, till their final disappearance. The elements of the orbits of the twin comets were calculated by Professor Plantamour, from observations made at Geneva in 1845-6, assuming them to be uninfluenced by each other's attractions. The correctness of these elements could be determined only on the next return of the comet, which took place in the autumn of last year, one of the nuclei having been first seen by Signor Secchi at Rome, on the 25th of August, and the other on the 15th of September. The subsequent observations made upon them show that the elements of the orbits, as previously calculated from the Geneva observations, were far from exact. A complete discussion of all the observations which have been made on these comets during their last and previous appearances, is now in progress by Professor Hubbard, of the Washington Observatory. The distance between the two nuclei was much increased on their last appearance. Judging from the apparent absence of all influence and sympathy between these bodies, it would seem that their physical divorcement, though without known precedent, is final and complete.

Stellar Astronomy continues to manifest a vigour and activity worthy of the lofty interest which attaches to it. Bessel had made a survey of all stars to those of the ninth magnitude inclusive, in a zone lying between  $45^{\circ}$  of north, and  $15^{\circ}$  of south declination. Argelander has extended this zone from  $80^{\circ}$  of north, to  $31^{\circ}$  of south declination. It comprises more than 100,000 stars. Last year was published also the long expected work of M. F. G. W. Struve, containing a catalogue of stars observed by him at Dorpat, in the years 1822-43. They are principally double and multiple stars, which had been previously micrometrically observed by the same distinguished astronomer. Their number amounts to 2874; the epoch of reduction is 1830. The introduction contains the discussion of various important points in stellar astronomy.

Notices have been brought before us from time to time of the nebulae observed through Lord Rosse's telescope. This noble instrument, so unrivalled for observations of this kind, continues to be applied to the same purpose, and to add yearly to our knowledge of the remotest regions of space into which the eye of man has been able to penetrate. Almost every new observation appears to confirm the fact of that curious tendency to a spiral arrangement in these nebulous masses of which mention has so frequently been made. To those persons, however, who have neither seen the objects themselves, nor careful drawings of them, a mere verbal description must convey very indistinct conceptions of the spiral forms which they assume. I have, therefore had the drawings made which are suspended in the room for your inspection. They will convey to you at once an idea of the spiral forms alluded to. I am indebted to the kindness of Lord Rosse for the use of the original drawings,—and for these large and accurate copies of them, to our excellent Secretary, Mr. Phillips, who, with his usual activity in the cause of the Association, has had them prepared for the purpose of this evening. Most of them are representations of nebulae which have been very recently observed.

Two pairs of these are respectively drawings of the same objects; the larger one of each pair representing the nebula as seen through the large telescope, the other as seen through a smaller one of Lord Rosse's, of only three feet aperture. You will observe how little resemblance there is between them, except in the external boundary, and how entirely the characteristic details of the larger drawings are lost in the smaller ones; and if I had exhibited to you drawings of some others of these nebulae, as seen by previous observers with inferior telescopic power, it would have been still more obvious to you how necessary are telescopes with large and perfectly ground mirrors for the development of the real character of these astonishing and enigmatical aggregations of stars.

It is for this reason that it has been thought desirable to have the nebulae of the southern hemisphere examined with higher telescopic power than has hitherto been brought to bear upon them. You are aware with what a noble devotion to science Sir J. Herschel spent several years at the Cape of Good Hope, in the examination of the southern heavens; but his telescopic power was limited to that of a reflector of  $18\frac{1}{2}$  inches aperture. It is now proposed to send out to some convenient station in the southern hemisphere a reflecting telescope, with a mirror of four feet aperture. Mr. Grubb, of Dublin, has undertaken to construct such an instrument, (should the plan proposed be adopted,) under the general superintendance of Lord Rosse, Dr. Robinson, Mr. Lassell, and one or two other gentlemen. The general construction of the instrument, and the best mode of mounting it, have been decided on with careful deliberation, after consulting all the best authorities on the subject.

These important preliminaries being agreed upon, and an estimate of the whole expense of the instrument having been made by Mr. Grubb, the deputation appointed proceeded to wait on Lord Aberdeen, to ascertain whether the Government were willing to bear the expense which the plan proposed would involve. His Lordship expressed himself, without hesitation, as favourable to the undertaking; but said that, since it involved a grant of money, it would be necessary to consult the Chancellor of the Exchequer, who, supposing him to take a favourable view of the subject, would probably bring it before the House of Commons among the estimates of the ensuing year. With this answer, the deputation could not be otherwise than perfectly satisfied, nor could they fail also to be gratified by the perfect courtesy with which they were received. Judging from all we know respecting Mr. Gladstone's enlightened views on subjects of this nature, and the favourable manner in which the House of Commons has always received propositions for the advancement of science, we have, I think, every reason to hope that my successor in this chair may have the satisfaction of announcing to you another example of the liberality of the Government in their acceptance of the plan proposed to them. In such case, the result, I doubt not, will afford a new proof that the Association is doing effectively what it professes to do as an association for the advancement of science.

The refinement of modern methods of astronomical observation has become so great, that astronomers appear very generally to think that a higher degree of refinement in the calculations of physical astronomy than has yet been attained is becoming necessary. Mr. Adams has been engaged in some researches of this kind. He has corrected an error in Burchardt's value of the moon's parallax; and he has also determined to a nearer approximation than that obtained by Laplace the secular variation in the moon's mean motion. The former investigation is published in an appendix to the Nautical Almanac for 1856; the latter has been very recently presented to the Royal Society.

Before I quit this subject, I may state, that an American 'Ephemeris and Nautical Almanac for 1855' has been published this