

FURTHER DETAILS OF THE RECENT METEORIC SHOWER

WE have received the following further communications having reference to the recent meteoric shower. The first is an extract from a letter by Prof. Herschel:—

“Some light on the real extent and form of the radiant region will, I feel sure, be thrown as time brings fresh additions to the already great stock of information about its apparent place and features from so many observers, and from such widely distant quarters; and the knowledge so gained would be of inestimable value in clearing up the difficulties that surround the general question of the unsettled radiation of many meteor showers; from knowing the origin of this stream we might learn how far sporadic shooting stars may be derived from special showers of well-determined radiant points and of regularly foreseen returns. I have just received from Professors Newton and Heis in America and Germany long printed reports on their observations, which contain, I have no doubt, interesting details and speculations; but I have not yet perused them sufficiently to gather any particular idea of their contents. Capt. Tupman also wrote to me to-day, pointing out what had struck me, that the comet found by Mr. Pogson does not agree well with the contemporaneous place of the meteor-cloud through which the earth is supposed to have passed, unless its considerable distance from that place is really a proof of the extraordinary deflection of its path by the earth in its passage near it, which will make it most interesting to inquire what will become of the new comet in future. Two observations, which seem to be all that Mr. Pogson could obtain, are unfortunately not enough to determine its new orbit, and its ‘periodic time’ will therefore give us no hint as to its probable return. Capt. Tupman even suggests (to account for its ‘unconformable motion’ between the first and second observation), that perhaps comet I. of the pair was seen by Mr. Pogson in his first, and comet II. of the belated Biela’s couple in his second night’s observations. The comet, if it is really Biela’s, was, in that case at least, two months behind its time, or as Capt. Tupman says, *twelve weeks*, and it must have been ‘loitering’ somewhere on its path. Prof. Grant, who wrote to me to-day, says that he will send me in a few days the list of tracks of the meteors which he mapped during the shower at Glasgow, and I have no doubt that this contribution will be a very valuable addition to my ‘working charts’ of these strange legions.

“I see that I have made a mistake in my list of ‘radiant-points,’ (No. 30 reading thus — ‘A.D.P., Newcastle-on-Tyne,’ &c. ‘close to if not coincident with Mirach (γ Andromedæ).’ This is a mistake, as Mirach is not γ , but β Andromedæ, and this radiant-point is therefore altogether misplaced in the list. I should like A.D.P.’s observations to be left out altogether and the observation of Mr. Van de Stadt substituted for it, thus—

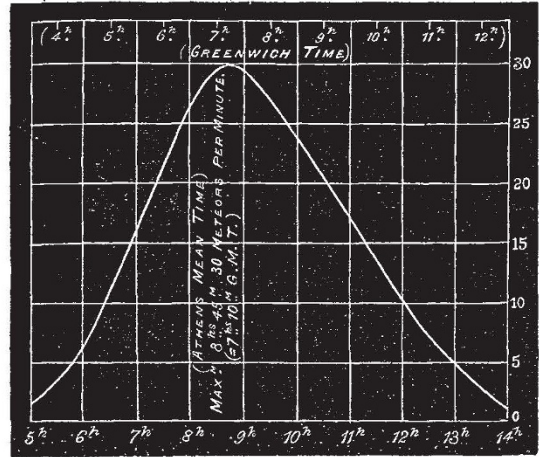
No.	Observer	Place	h. m.	R.A. N.D.	Position
30	H. van de Stadt	Arnhem (Holland)	6.30 to 8.45	29—41°	Andromeda

“The numbers in M. Denza’s observations (immediately preceding it) should be changed to R.A. 29°, Decl. 41°; the R.A. and declination of the star γ Andromedæ, which I have only just now ascertained exactly.

“Prof. Heis publishes (in the Münster *Wochenschrift für Astronomie*, &c., of December 11, 18, and 25) twelve descriptions of the shower by observers at Göttingen, Dantzig, Lichtenberg, Cornorn (Hungary), Athens, &c. Those at Göttingen by Mr. Heidorn and Prof. Klinkerfues and at Athens by Dr. Schmidt are the most interesting. Prof. Klinkerfues relates that after determining the place of the radiant-point with the greatest precision at R.A. 26°, N. Decl. 37° from the projected courses of 80 meteors carefully mapped, and calculating from them the parabolic elements of the meteor-stream (which he gives with the radiant-point), in the usual way, he then *only accidentally* recognised its resemblance to, and evident identity with Biela while telegraphing a short note and transmitting a full account of the Göttingen observations to Dr. Heis. No wonder that at such an unexpected discovery he should have been immediately prompted to send to some observer of the southern hemisphere

his famous telegram, ‘*Biela touched earth, &c.*, look for it near θ Centauri!’

“Schmidt, at Athens, watched the shower for 9 hours uninterrupted, from 5h. 30m. to 14h. 30m., and gives a complete curve of frequency for the whole time (in numbers for the ‘four practised and two unpractised observers,’ who undertook the counting) reduced to hourly numbers for a position of the radiant-point in the zenith at intervals of successive hours. On this figure I have merely altered the scale so as to exhibit his



Curve of average frequency of Shooting Stars per minute seen by four practised observers at Athens, Nov. 27, 1872. J. F. SCHMIDT [In Athens mean time, 1h. 35m. fast on G.M.T.]

result in numbers per minute, instead of numbers per hour during the whole time. His more complete account of the shower was sent to the *Astronomische Nachrichten*, and he fixed the place of the radiant-point at R. A. 22° 5, N. Decl. 42° 5.”

The following has been forwarded to us by Prof. H. A. Newton:—

“Dr. Weiss, of Vienna, who first pointed out in 1868* the probable connection between Biela’s comet and the meteors seen December 6, 1798, by Brandes, and December 6, 1838, by Mr. Herrick, gives the radiant for meteors following the path of that comet as R.A. 23° 4’, N. Decl. 43° 0’. I assigned a point 3° from γ Andromedæ as the centre of the radiant of the meteors, or about R.A. 25° 3’, N. Decl. 43° 3’. The longitude of the node of Biela’s comet was in 1852, according to Hubbard, 245° 51’, and the comet would pass about a million of miles from the earth’s orbit, between it and the sun. We passed that place of the node early Wednesday evening, November 27. There can hardly be a doubt, therefore, that these meteors were once fragments, or companions, of that comet.

“Any theory that shall explain the formation of the present grouping of meteoroids must account for the magnitude and shape of the radiant areas. If the members of a group have nearly the same orbit, the radiant should be a point. But the area of the radiant, November 24–27, was at least 8° long. This implies that the orbits differ considerably, either—(a) in their inclinations to the ecliptic; (b) in their major axes; (c) in the longitude of perihelion; or, in two or three of these elements combined.

“The shower ended abruptly on Wednesday evening, and in the clear evenings that followed nothing special was to be seen. Similarly marked limits are not uncommon in other showers. The orbits must then either be approximately in a plane or there must be a common node in the ecliptic, where the earth meets them. Such a node would point unequivocally to the earth as the body that originally scattered the comet.

“If, as seems more probable, the orbits, however, lie nearly in one plane, either the major axes, or the longitudes of the perihelia, must differ widely. Neither of these conditions could be

* Sitzungsberichte, vol. Ixii.

satisfied, so far as I can see, by a group formed from the dispersion of a comet by Jupiter, or other large planet. If the fragments of the comet leave the neighbourhood of Jupiter, they should after each revolution return nearly to the same point in space. But a radiant area 8° or 10° long, on the night of November 27, implies a distribution of the aphelia over 10° or 12° of longitude, or a similarly large difference of major axes. Such orbits can hardly have a common point at a great distance from the sun. Moreover, a scattering accomplished in a short time upon a body moving in an orbit inclined several degrees to the ecliptic should, it would seem, be incompatible with a grouping at the earth's node.

"Again, suppose that a disrupted body or agglomeration has been once changed into a stream by the differential action of gravitation in the manner shown so beautifully by Schiaparelli. If the perturbing forces exerted by any planet or planets, whether temporary or long continued, should produce such differences of major axes, or longitudes of perihelia, by differential action, the total action would, undoubtedly, entirely scatter the group at the earth's nodes.

"In fact, instead of regarding the meteors as a stream, we ought rather to look upon the group as coming together near the perihelion—or near the node—and then scattering widely, to reassemble, perhaps, after a complete revolution in the orbit.

"A resisting medium cannot account for the observed effect, for this does not change the longitude of the perihelion of the orbit.

"It seems to me, therefore, that the periodic meteors cannot have been brought into the solar system as a stream, but that the forces which have scattered the comets are those acting near the perihelia of their orbits. As a probable corollary, we may infer that whatever force divided Biela's comet into its two principal parts was one acting near the perihelion.

"If we consider the orbits of the meteors of November 14, the preceding discussion is simplified. That shower is sharply limited, being in its greatest intensity only one or two hours long. Its recurrence at regular intervals of one third of a century, for nearly a thousand years, precludes great differences of the major axes of the individual orbits, and the secular procession of the node of the group, as a group, equally forbids great differences of inclinations of the orbits.

"The size of the radiant is therefore due almost exclusively to the difference of the longitude of the perihelia. This difference for that group cannot be less than 15° .

"In conclusion I would say that we have no evidence, as yet, that any radiant of meteors is so small as is apparently required by the supposition of the distinguished Italian astronomer, that the meteors were drawn as a stream into the solar system from the stellar spaces. With Prof. Weiss and others, I am inclined to consider them all to have been once connected with periodic comets. The scattering took place apparently at or near the perihelion."

THE NATIONAL HERBARIA

THE following memorial has been transmitted to the First Lord of the Treasury on the above subject:—

"To the Right Hon. W. E. Gladstone, First Lord of the Treasury.

"SIR,—The undersigned persons engaged in the pursuit of botany, or in instruction therein, desire to call your serious attention to a subject that deeply concerns the progress of Natural Science, and that of those branches of agriculture, horticulture, forestry, and manufactures that largely depend on botanical research.

"The First Commissioner of Works, in a Memorandum presented to Parliament before the close of last session, clearly raised the question whether it is desirable to transfer to the branch of the British Museum about to be constructed at South Kensington the Scientific Collections and Library now existing at Kew, and further stated that, pending the decision on that subject, he considers it his duty to take care that no new expense shall be incurred at Kew which will embarrass the Ministers of the Crown or the House of Commons in arriving at a decision.

"The Lords of the Treasury, in their Minute of the 24th July, decline to refer to that portion of the above-mentioned Memorandum, and no statement on that subject has since been made by any Minister of the Crown which shows whether it has received the attention of the Government.

"Being strongly of opinion that the proposed measure would be highly detrimental to the progress of science, and injurious to all those interests that depend upon it, we beg to urge upon you that the subject is not one merely of departmental interest, and that it would not be unfitting your position, as First Minister of the Crown, to give your consideration to the following reasons which we beg to urge in opposition to the proposed measure:—

"1. That it appears to us that it is absolutely necessary that a great Botanical Garden like that at Kew, which is confessedly far the most important in the world, should be in close connection with as perfect an Herbarium and Botanical Library as possible, and that these conditions are now fulfilled as far as circumstances and the present state of science will admit.

"2. That such a combination of living and dead specimens is requisite for the complete study of plants, as regards their technical, physiological, and economic characters; and that the removal of the Herbarium would be a retrograde step in a scientific point of view.

"3. That the records of the Colonial and India Offices will show of what immense importance the establishment at Kew has been to the welfare of the entire British Empire, and that weighty questions are constantly submitted to the Director which require immediate attention, and which could not, in many cases, be satisfactorily answered without reference to the Library or Herbarium.

"4. That every facility for the investigation of the intimate structure and general habits of plants, and the study of them in every point of view which can reasonably be considered within the scope of pure Botany, is afforded by the Herbarium and Museum of Botany in connection with the Garden, and that it would be easy to point out important labours in that direction which have been instituted at Kew, while the systematic treatment has always regarded the more minute characters as well as those which are superficial.

"5. It has been remarked, indeed, that important works, such as the 'Hortus Kewensis,' have been prepared without the aid of an Herbarium at Kew. We would, however, remark that the statement is not correct, as there was an Herbarium, which was dispersed before Sir W. Hooker became Director; and the conditions of Natural Science are at the present time so completely altered that it is impossible to institute any fair comparison, the number of known species being enormously increased since the date of the publication in question.

"6. That the Museums of Structural and Economic Botany, which owe their existence and importance to the late Sir W. Hooker, are often found of great value in the decision of critical points in the study of species, and that the severance of them from the Herbarium and Library would be a serious loss.

"7. That in the principal Botanic Gardens on the Continent, where effective work is done, there is in every case a large herbarium connected with them.

"8. That, in the interest of Botanical Science, we think it highly desirable that, besides the collections now existing at Kew, an Herbarium, or collection of dried plants, as complete as possible, should be maintained in connection with the Natural History Museum which it is proposed to place at South Kensington, and that the two Herbaria should be in intimate relation with each other.

"9. That from the delicate and perishable nature of its contents, and the necessity of referring to numerous specimens, an Herbarium cannot be made use of by many persons at the same time; and while it is desirable that students should have ready means of access at the National Museum in London to collections which may enable them to identify the plants of any particular country, it is still more essential that the authors of important works in Botanical Science should be enabled, as at present, to pursue their labours at Kew without interruption from casual visitors.

"10. That an Herbarium is the least costly of all collections of Natural History, and that which requires the least amount of space for its proper maintenance, in proportion to the number of objects which it contains.

"11. That the arrangements of the Herbarium at Kew are so perfect, and the facilities for study so great, that it is resorted to from all parts of the world; and it would therefore be unwise to make a change which in the result is almost certain to be detrimental, and which, we are assured, would be especially distasteful to the leading foreign botanists.

"M. J. Berkeley, F.L.S., Botanical Director to the Royal