

LETTERS TO THE EDITOR.

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The Quadrantids, 1903—A Coincidence.

A FRIEND of an astronomical turn of mind called a few evenings ago and related to me the following:—

"At 5 p.m. on the first Saturday in January, i.e. January 3, I was on a hill outside Bangor, Co. Down, looking westwards, when a large bright meteor, magnitude = Jupiter, appeared above the south-western horizon, and rose slowly and perpendicularly until it attained an altitude of about 30 degrees: duration, two or three seconds: no sound or explosion, but a fine sight in the strong moon or twilight."

Observers will notice the agreement of the date of this meteor with that of the Quadrantids, and one is tempted to ask if it could be a member of that system, drawn out of its course, or was it an ordinary slow, direct-motion, fireball from the west? My informant says, judging from the position of Jupiter and the moon at the time, that its path lay in the ecliptic.

I may remark in connection with this subject that on or about the date of maximum of some of the larger showers, I have frequently noticed, and sometimes had reported to me, the observances of slow, irregular meteors which, although obviously connected in some way with the shower under observation, were yet quite unrecognizable as to the radiant; and I came to the conclusion that they were meteors which had been trapped or captured at former returns, and were then members of those sun-earth systems referred to by M. Schulhof in his papers "Sur les Étoiles Filantes" (*Bull. Astron.*, March–September, 1894, pp. 64, 65).

The question may not have hitherto received the attention it deserves, but I leave it to those more competent to judge. The outside planets control their cometary systems and swarms. Why not the earth on a smaller scale?

My own observations of the shower this year were not at all satisfactory, and were briefly as follows:—

January 2.—12–1 a.m., Quadrantids nil.
January 3.—Overcast.
January 4.—2.30–3 a.m., Quadrantids 15.

The display was evidently closing when I took up my watch. I, however, placed the hourly rate as high as sixty for the short time it lasted. Several of the meteors were fine, bright, steel-like flashes, straight from the radiant through the zenith, in marked contrast to others, which were of a much slower and sporadic-like character.

W. H. MILLIGAN.

26 Cooke Street, Belfast, March 23.

THE phenomenon referred to in his letter, by Mr. Milligan, that the principal star-showers of the year are in general accompanied simultaneously, or nearly so, by a somewhat more than ordinary abundance of shooting-stars from centres not very far distant from that of the principal display, has long been observed, and has indeed received an elaborate amount of attentive study, as a pretty clearly distinguishable character of several of those showers; but it can hardly be said that observations of those dispersed contemporaneous meteor-flights have yet been made with such satisfactory exactness as either to assign them all to real centres, or to say with certainty how many of them are stragglers from the main and from the neighbouring shower-sources. In the present imperfection of our knowledge of the phenomenon's real features, no recourse, it may be feared, can yet be had with any prospect of successful issues to hypothetically ventured explanations of these, either closely grouped together, or else, by perturbative attractions, erratically scattered and deflected contemporaneous meteor-systems.

The Quadrantid shower appears to have reached its maximum this year in the evening and night of January 3; for in watches of about two hours towards midnight on that date, rather rapid hourly rates of appearance of the Quadrantids were noted both by Mr. T. H. Astbury, at

Wallingford, and by Mr. A. King, at Leicester, some of the meteors recorded being very bright ones;¹ and this date of its greatest brightness was thus confirmed by the considerable intensity of the shower observed at a later hour on the same night by Mr. Milligan in Belfast. Much clouded sky, and rain prevailed on that night at Slough, but in a clear interval of about 1 hour, between 12h. 35m. and 13h. 50m., nine meteors were mapped, of which four or five diverged from Quadrans. During a watch of nearly 5 hours on the preceding night of January 2–3, from 12h. 10m. to 17h. 5m., with continually clear sky,² thirty-four meteors were mapped and three or four more were seen, appearing at a steady rate of seven or eight per hour. Of the mapped meteors five were Quadrantids, three of them equal to or brighter than first magnitude stars; all seen in the last 1½ hours, and none in the first 3¼ hours of the watch, denoting apparently a distinct beginning of the shower at about 3h. 30m. a.m. on the morning of January 3.

The radiant-point of four Quadrantid tracks was well marked at $235^{\circ}+54^{\circ}$; but with five more on January 3, all from about $225^{\circ}+49^{\circ}$, the mean of the nine paths was at $220^{\circ}+52^{\circ}$. At 16h. 38m. on January 2, a Sirius-like brief white flash was quite stationary for half a second, at $228^{\circ}+59^{\circ}$. A mean place of the radiant-point at $228\frac{1}{2}^{\circ}+52\frac{1}{2}^{\circ}$ was also obtained by Mr. W. E. Besley, at Clapham, from six Quadrantid tracks among seventeen to twenty meteors mapped and glimpsed in a watch, with clear sky from 11h. to 13h. 20m., on the night of January 3. Evident signs of radiation by three or four meteors from each point were also noted here from $180^{\circ}+55^{\circ}$ (δ Ursæ Majorids, II.) $258^{\circ}+44^{\circ}$ (β Draconids), and $235^{\circ}+36^{\circ}$ (θ Coronids), round the Caput-Böotid, or Quadrantid radiant-region, and notably also from one more distant source (ϵ Craterids), at about $160^{\circ}-8^{\circ}$ (five meteors), and from a weaker one at about $210^{\circ}+6^{\circ}$, Mons-Mœnalids or (15) Böotids.

The large meteor described by Mr. Milligan as having been seen at Bangor, Co. Down, at 5h. p.m. on January 3, shooting upwards in the S.W. nearly along the path of the ecliptic, or from some radiant-point near β Aquarii in the sunset vicinity, was indeed, as early evening fireballs sometimes are, directed from an exceptionally far western quarter. But as its radiant-source was at least 100° off from that of the Quadrantids, then near the N.W. horizon, it could only, surely, be in a course of countless ages that we might suppose it to have become so widely divergent in its route from the star-shower's path-direction, since this would need many times repeated, always like-acting close approaches to the earth, with the only small deflecting actions in each of them which the earth by its attraction would be able to exert on the direction of its motion.

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Observatory House, Slough, March 28.

Analogue to the Action of Radium.

Is not the generation of radiant energy by radium analogue to the humming of telegraph wires and poles? In each case the emission of energy is a response to surrounding disturbances which elicit no response from bodies in general. The disturbances from which the energy is drawn are irregular movements, of the air in the one case, and of

¹ From Mr. King's description in the *English Mechanic* of February 6, 1903 (vol. lxxvi. p. 544), of his view of 8. to 10 Quadrantids seen and mapped in 45m. of cloudless, only slightly hazy sky, after 9h. (none having appeared in the previous hour, from 8h. to 9h., of equally clear watch), their rate of appearance then, allowing for haze, and for time spent in registration, was about 17 to 23 per hour, and they were "coming as frequently as the Perseids in the early hours of their maximum dates." The eight mapped flights (of which one was as bright as Sirius, and five were equal to or brighter than second magnitude stars) showed a radiant-point at $228^{\circ}+52^{\circ}$. Mr. Astbury saw 19 Quadrantids during a watch of 1h. 45m. between 6h. and 7h. 30m. The thirteen mapped paths gave "two good centres, one at $231^{\circ}+54^{\circ}$ (5 Quadrantids) and a second at $225^{\circ}+53^{\circ}$ (5 Quadrantids)." The three remaining "fell near, but not on, these centres."

² Three or four flashes of lightning were noticed on that night, as also happened on that date in the bright return of the Quadrantid shower in 1900. In the clear watch of 5½ hours kept at Slough on the latter night, considerably more meteors (35 together) than the 28 observed well centred paths from Quadrans, appeared to diverge from the following five positions, which, with the δ Ursid centre seen this year, were distributed round the January shower's radiant region near the Huntsman's head pretty closely, and pretty evenly in all directions, thus:— $216^{\circ}+34^{\circ}$ (ρ Böotids, 8 meteors), $243^{\circ}+29^{\circ}$ (ξ Coronids, 8 meteors), $257^{\circ}+44^{\circ}$ (β Draconids, 7 meteors), $260^{\circ}+65^{\circ}$ (ζ Draconids, 7 meteors), and $242^{\circ}+75^{\circ}$ (γ Ursæ Minorids, 5 meteors).