

LETTERS TO THE EDITOR.

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The Quadrantid Meteors, 1902.

ON the night of January 3 some fine meteors were observed here. It is doubtful, however, if any of them were directly connected with the radiant that has given this early January shower its name. Possibly the first meteor observed shortly before ten o'clock may have issued from the neighbourhood of Boötes, as it shot upwards from the direction of the Great Bear with a brilliancy sufficient to attract attention in a lighted thoroughfare, from where, however, its starting point could not be clearly ascertained. During a watch kept under more favourable conditions for observation, between 10.30 and 11.30 G.M.T., four or five shooting stars were observed, the brightest of which scarcely equalled a second magnitude star, its path extending from Gemini to the east of Ursa Major. The others were seen flashing to the east of the latter constellation with no well-defined centre of radiation. It should have been stated that in a ten minutes' watch between 10 and 10.30 a stationary meteor more brilliant than a first magnitude star appeared for about half a second midway between the Quadrantid radiant and Ursa Major. This was the only meteor seen that may perhaps be regarded as conformable to the radiant proper, though almost exclusive attention was given to that part of the sky. Though occasionally a look out was kept from 12 to 1 a.m., no shooting stars were seen, but in an unbroken watch from 1.15 to 1.45 a.m. a brilliant bolide was observed at 1.40 gliding down evidently from the neighbourhood of Gemini towards the Great Bear, and throwing off several fragments near the end of its path. It was the brightest meteor seen during the night. The night of the 3rd was very fine here, though a few clouds interfered somewhat with observation between 10 and 10.30.

Similar atmospheric conditions obtained in the first half of the night of the 4th, and an early watch for Quadrantids was maintained between 10 o'clock and midnight. Six or seven meteors were observed during this period. The first seen at 10 p.m. shot down through Orion at a great rate from some point considerably higher up, the exact whereabouts of which could not be known, as the meteor was only accidentally glimpsed. It must have been of a magnitude equal to Sirius. Another meteor (second magnitude) passed from a little below Gemini to Ursa Major at 10.45, and yet another from the same radiant centre to Leo at 11.45, the latter being of more than first magnitude brightness. This upper radiant must have been at the least fairly active, as the above meteors were only accidentally seen, persistent observation being maintained towards Boötes, which, however, as yet met with scant success, only a few meteors having been noticed, all below the second magnitude with the exception of one in the form of a brilliant flash, which shot straight from the direction of Boötes, but made its first appearance considerably to the east of that constellation, its course being parallel to the horizon. No definite centre of divergence could be assigned to the rest.

During a subsequent watch held between 12.45 and 1.15 there seemed to be a period of meteoric quiescence, but when the outlook was resumed at 1.30 a distinct change had evidently taken place in the interval. Bright meteors were shooting steadily from the last two stars in the tail of Ursa Major. The radiant seemed very accurately defined there at a point midway between the stars in question and very slightly to the east. From 1.30 to 1.45 five meteors issued from this centre ranging between the second and third magnitudes. During the same time also three second magnitude shooting stars came down towards Ursa Major, evidently from the upper radiant, whose activity had drawn attention to it earlier in the night, and which was now in active cooperation with the radiant centre lower down. Further observations, however, could not be obtained as regards the progress of the display, as light clouds at 1.45 a.m. began to obscure the sky, obliterating all but the brightest stars, which continued to shine dimly for a while, during which an occasional flash of a meteor was seen; but eventually the heavens became a starless blank, and the watch had to be abandoned. Whether, therefore, the radiant proper of this shower developed any symptoms of activity as the night wore

on and the time of the expected maximum drew near could not be ascertained here. In view, however, of the sudden appearance of the radiant in the tail stars of Ursa Major, this may not have been improbable, the more especially as there are reasons for believing that the maximum of the shower may have occurred one or two hours later than that fixed at 3.30.

It may be observed that the multiple character of the radiant of the meteors of January 2 was particularly noticeable in 1872 (British Association Report, "Luminous Meteors," 1872), when radiant centres roughly corresponding with those on the present occasion furnished more than 50 per cent. of the meteoric shower observed in that year.

DUBLIN.

JOHN R. HENRY.

Sir Walter Raleigh and Evolution.

I HAVE recently come across a passage in Sir Walter Raleigh's "History of the World" which seems to me sufficiently remarkable for the author to deserve a notable place among those early naturalists who anticipated in some measure the modern views on evolution. In the historical sketch at the beginning of the "Origin of Species" Darwin quotes Buffon, who was born a century and a half later than Raleigh, as "the first author who in modern times has treated the subject in a scientific spirit"; but although, scientifically, Raleigh cannot be compared with Buffon, the fact of his having penned at such an early date the words I am about to quote possesses some interest. The passage I refer to is to be found in the 1621 edition (part i., book i., chap. vii., § 9, p. 94). Speaking of the days of the Flood, he says: "But it is manifest, and undoubtedly true, that many of the *Species*, which now seeme differing, and of severall kinds, were not then in *rerum natura*. For those Beasts which are of mixt natures, eyther they were not in that age, or else it was not needfull to preserve them, seeing they might be generated againe by others: as the Mules, the *Hyena's*, and the like; the one begotten by Asses and Mares, the other by Foxes and Wolves. And whereas by discovering of strange Lands, wherein there are found divers Beasts and Birds differing in colour or stature from those of these Northerne parts; it may be supposed by a superficial consideration, that all those which weare red and pyed Skinned, or Feathers, are differing from those that are lesse painted, and were plaine russet or blacke; they are much mistaken that so thinke. And for my owne opinion, I find no difference, but onely in magnitude, betwene the Cat of *Europe*, and the Owncce of *India*; and even those Dogges which are become wilde in *Hispaniola*, with which the *Spaniards* used to devour the naked *Indians*, are now changed to Wolves, and begin to destroy the breed of their Cattell, and doe also oftentimes teare asunder their owne Children. The common Crow and Rooke of *India* is full of red feathers in the drownd and low Islands of *Caribana*; and the Black-bird and Thrush hath his feathers mixt with blacke and carnation, in the North parts of *Virginia*. The Dog-fish of *England* is the Sharke of the South Ocean: For if colour or magnitude made a difference of *Species*, then were the *Negro's*, which wee call the Blacke Mores, *non animalia rationalia*, not Men, but some kind of strange Beasts: and so the Giants of the South *America* should be of another kind, than the people of this part of the World. We also see it dayly, that the natures of Fruits are changed by transplantation, some to better, some to worse, especially with the change of Clymate. Crabs may be made good Fruit by often grafting, and the best Melons will change in a yeere or two to common Cowcumbers, by being set in a barren Soyle."

AGNES ROBERTSON.

The Old Hall, Newnham College, Cambridge, January 13.

The Teaching of Mathematics.

PROBABLY every experienced teacher of mathematics qualified by a sufficiently thorough acquaintance with the relations of his subject to the physical sciences and practices will have some sympathy with the document which appeared under this heading in your last issue (p. 258). I do not desire to discuss the changes it suggests, I merely wish to describe as a contrast to that or any other rational scheme the work that year by year the public purse pays some of us to attempt. Protests against South Kensington teaching and the South Kensington scheme of work are frequent, but I do not remember seeing any detailed criticism of any part of the course. Here is the work that I and hundreds more teach yearly in what is known as the second stage of mathematics.