

relate in a satisfactory manner. And, as we have already said, it is certainly not worthy of the luxurious paper and excellent print lavished upon it in the translation. In short, *le jeu ne vaut pas la chandelle*. Messrs. Labouchere and Jesse might have spent their time and money in many other ways, to the greater advantage of natural history and of their own pockets.

*Notes on River Basins.* By Robert A. Williams. (London: Longmans and Co., 1872.)

THE river basins to which this little book refers are those of Great Britain and Ireland, and the notes are published, the author says, in the hope that they may be found useful to pupil-teachers. They are intended to form a supplement to the usual text-books of school geography. The rivers of England are given first, then those of Scotland and Ireland, each system being preceded by a general sketch of the course of the water-shed (or "water-parting," as Mr. Williams prefers to call it) of the country to which it belongs, and followed by a section on the canals. The author commences at one end of each country, takes the rivers in their order round the coast, names the drainage basin and source, describes the course and mouth, takes up and describes each tributary and affluent as it occurs, names and gives the measurements of any lakes which may be in the way, mentions the most remarkable features, and ends by giving the length of the main river and the area of its basin. So far as we have tested it the information seems in the main accurate, and the list of rivers and tributaries is remarkably full. Mr. Williams mentions the fall of the Rumbling Bridge on the Devon, a tributary of the Forth, but takes no notice of the equally high and equally grand fall of the same name on the Bran, a tributary of the Tay. It is surely very unusual to spell Dunkeld "Dunkield." The book will be useful to all who wish to have the main details concerning British rivers and canals carefully and clearly arranged in a handy form.

#### LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.]

##### The late Meteoric Shower

WE have had here, and I presume you also have had in England, quite a fine display of shooting stars from the fragments or companions of Biela's comet.

On Sunday evening, Nov. 24, they were coming about as fast as in the thickest parts of the August sprinkles—that is, forty or fifty to the hour, for a single observer. Three-fourths of them radiated from  $\gamma$  Andromedæ and vicinity.

On Monday morning there was no special abundance, but the radiant was then quite low in the north-west.

Monday evening they were coming with about half the frequency of the previous evening. Half of those seen came from the Andromeda radiant.

Tuesday evening the sky was overcast, but Wednesday evening there was so great a display as to attract the attention of multitudes. Our party of from two to six persons counted 1,000 in a part of the first hour—that is, from 6h. 38m. to 7h. 34m., and in the next hour and a quarter we counted 750. The display was rapidly diminishing. Before midnight it was essentially over, and, so far as I know, has not re-appeared.

The flights were slower than those of the Nov. 14 period, and generally faint. The radiant was carefully observed on Wednesday evening by Prof. Twining and myself, and we argued that the centre was in the line from the Pleiades to  $\gamma$  Andromedæ produced, and was about  $3^\circ$  beyond that star. It was much longer in right ascension than in declination, and was not less than  $8^\circ$  long. The star  $\gamma$  was within the radiant area, for flights in the several directions from the radiant would, if produced backward, pass sometimes on one side and sometimes the other of that star.

The character of this display, and the previously observed divi-

sion of the comet into two parts, will, I doubt not, incline astronomers to the opinion of Dr. Weiss and others, who think that the shooting stars are products of the disintegration of comets already moving in closed orbits, rather than to the opinion of Prof. Schiaparelli that they are drawn from the stellar spaces into long parabolic currents. The latter hypothesis presents difficulties which I cannot explain.

Yale College, Dec. 2

H. A. NEWTON

If the following translation of a letter I have received from Father Denza, Director of the Royal Observatory at Montcalieri, in Piedmont, will be of interest, it is at your service.

R. P. GREG

"Dear Sir,—A great shower of luminous meteors has just been witnessed throughout this country, and has no doubt been seen elsewhere. As soon as it became dusk falling stars were observed to fall continuously until midnight, and had it not then become cloudy no doubt they would have been seen until a still later hour. About 33,400 meteors were here counted by four observers. Even this number does not adequately represent the probable actual numbers. About 8 P.M. (when in some parts of the sky there seemed a real rain of fire) it was difficult to keep count, especially of those meteors appearing near the zenith; and at one time our four observers counted on the average 400 meteors every minute and a half. All the wonderful and beautiful appearances reminded us of the November shower. The meteors appeared of various colours; some left brilliant streaks; fireballs were frequent, some with an apparent diameter nearly equal to the moon's; some here and there breaking up in a thousand ways, as into a luminous cloud, or opening up into bundles of rays of singular shapes. From time to time some of these nebulous trains or appearances pursued their courses; or now vanishing or halting, only again to reappear. One of these, which appeared at 6h. 35m. between Perseus and Auriga, remained visible until 6.56, or 21m. after its first becoming visible. In short the general aspect of the phenomenon was that of a cosmic cloud which, encountering our atmosphere, appears and then melts away. The position of the *radiant*, which was accurately determined, was almost close to  $\gamma$  Andromedæ, and the epoch of the appearance induces one to suppose that the meteoric stream which we have just been traversing, and which in fact has been more or less seen every year, though with much less intensity might be the same which was seen by Brande, December 7, 1798, and again noticed on the same day in 1830 by the Abbé Raillard; in 1838 by Herrick and Flangerges; later again in 1847 by Prof. Heis, of Münster; and in 1867 was recognised by Signor Zerlioli at Bergamo. At the present time its point of contact with the earth's orbit must have taken place on November 27-28. Now it results from sufficiently probable calculations, that this meteor stream marks the orbit of the so much celebrated comet of Biela, the appearance or passage of which we have been expecting in the month of October of the present year, and for which astronomers are on the look-out. Most probably the large meteoric stream or cloud which produced this remarkable shower of falling stars last evening belongs to a part of this comet; so much the more likely when we consider that only yesterday the earth passed through one of the two nodes of this comet's orbit.

"A fine rose aurora was visible last evening from 6 to 8 P.M., adding to the beauty of the entire phenomenon.

"Yours respectfully,

"DENZA

"Montcalieri Observatory, Nov. 28, 1872

"P.S.—The shower was seen by many other Italian observers and astronomers—by Gasparis at Naples, who noted two meteors per second; Prof. Eugenio at Matera with three assistants counted 38,153 meteors between 6 and 12 o'clock; at Messina the number was too great to count; at Mandori Prof. Bruno and three assistants counted 30,881 meteors between 6h. 18m. and 14h. 15m.; at Ancona were counted 5,000 meteors per hour. The maximum appearance generally at all these stations was about 8 P.M., and the radiant was found to be not far from  $\gamma$  Andromedæ."

WHILE going to the Naval Observatory on the evening of November 27, I noticed many shooting-stars, and made the following observations:—From 6h. 25m. to 6h. 43m., Washington mean time, I counted one hundred meteors; and from 7h. 40m.