have to trust an imperfect memory or else search laboriously through original memoirs.

Leeds, August 2.

NORMAN R. CAMPBELL.

Perseid Meteoric Shower, 1910.

THE only night really good for witnessing the Perseid shower near its maximum this year was August 10, when the clear state of the sky afforded every facility for securing observations.

I began watching at 9h. p.m., and up to 11h. 45m. p.m. there were fifty-two meteors, so that the hourly rate was nearly twenty, of which about three-fourths were Perseids. The finest specimen appeared at 10h. 6m.; it had a long and slowish flight from $328^{\circ}+37^{\circ}$ to $301^{\circ}+8^{\circ}$, and left a bright streak just above the small stars of Delphinus for fifteen seconds. The meteor itself was much more luminous than Venus, and was also observed by Mr. T. K. Jenkins at Nantyglo. From a comparison of the recorded paths, I find the height 75 to 48 miles over Wiltshire, and the end point near Blandford, Dorset.

The velocity was decidedly slower than that of the ordinary Perseid, its observed speed being 27 miles per second.

I saw brilliant Perseids also at 11.34 and 11.46, the former shortening towards α Andromedæ and the latter just under Polaris, and at 11.34½ there was a beautiful slow-moving Draconid falling from $303\frac{1}{2}^{\circ}+33^{\circ}$ to $311^{\circ}+19\frac{1}{2}^{\circ}$. Its pear-shaped nucleus threw off a tail of yellow sparks as it sailed down the sky.

I think the display of August 10 was better than it was last year, and gave promise of a pretty abundant shower on August 11 and 12, but I cannot speak as to its actual character, the firmament being cloudy on those dates at Bristol.

There were a few breaks in the clouds on August 12, and I happened to notice a fine meteor at 11h. 49m. shooting upwards from $355^{\circ}+40^{\circ}$ to $338\frac{1}{2}^{\circ}+50^{\circ}$. It was as bright as Jupiter at least, and left a train, but it quickly disappeared. The meteor was not a Perseid, but apparently belonged to a shower with radiant lying eastwards of α Andromedæ, or at $9^{\circ}+27^{\circ}$. The meteor was also seen by Mr. G. Powell at Aberdare, and I find its height 89 to 53 miles. It was nearly over Bath at end point. Velocity 40 miles per second, and certainly more rapid than the Perseid alluded to above, though it should have been the swifter of the pair.

Several observers have written me describing the Perseid shower as fairly rich on August 10, though the maximum was not due until the morning of, or night following, August 12. Some large meteors were also recorded on August 5, which was a very clear night, and the Perseid display was in pretty strong evidence even at that early date.

W. F. DENNING.

Brilliant Meteor of July 31.

AN exceedingly beautiful meteor, one of the finest I have seen, was observed from this vessel, while at sea, on the night of July 31. The time of observation was 10h. om. ship's apparent time, or 13h. om. G.M.T., the position of the ship at the time of observation being latitude $43^{\circ}34'$ N., longitude $43^{\circ}37'$ W. The duration of the flight was between fifteen and twenty seconds, and the meteor was much more brilliant than Venus. It pursued an almost horizontal course, about 8° above the horizon, passing below the constellations Ursa Major, Perseus, and Aries, in all traversing an arc of about 135° .

At first the meteor appeared as a brilliant steel-blue ball, with a short tail of the same colour. It disappeared at a point about 90° from its first position, reappearing almost immediately, and exploding and dividing into three or four parts, with a luminous tail some 3° in length, and of a vivid red and blue colour. Its motion was slow, and it conveyed to all who witnessed it, officers and passengers alike, the impression of being at no great distance from the ship when it exploded.

The night was very fine; and the chief officer, who was

on the bridge at the time, reports that when it disappeared it left a small black cloud in the sky. At the time of seeing this meteor we were in wireless communication with the U.S.N. *Texas*, and it is hoped that other observations may be forthcoming from other vessels at sea.

A. L. CORTIE.

On Board S.S. *Cymric*, August 3.

ON COLOUR VISION AT THE ENDS OF THE SPECTRUM.

IT is half a century since Maxwell¹ investigated the chromatic relations of the spectral colours and exhibited the results on Newton's diagram. The curve "forms two sides of a triangle with doubtful fragments of the third side. Now, if three colours in Newton's diagram lie in a straight line, the middle one is a compound of the two others. Hence all the colours of the spectrum may be compounded of those which lie at the angles of this triangle. These correspond to the following—scarlet, wave-length (in Fraunhofer's measure), 2328; green, wave-length, 1914; blue, wave-length, 1717. All the other colours of the spectrum may be produced by combinations of these; and since all natural colours are compounded of the colours of the spectrum, they may be compounded of these three primary colours. I [Maxwell] have strong reason to believe that these are the three primary colours corresponding to three modes of sensation in the organ of vision, on which the whole system of colour, as seen by the normal eye, depends."

Later observations, such as those of König and Dieterici,² have in the main confirmed Maxwell's conclusions. The green corner is indeed more rounded off than he supposed. It is with regard to the "doubtful fragments of the third side" that I have something to say. According to Maxwell's results with both of his observers the extreme red deviates from the less extreme by a tendency towards blue. Neither my friends³ nor I can perceive anything of this. When the extreme and the less extreme red are seen in juxtaposition in the colour-box, no difference whatever can be perceived after the brightnesses are adjusted to equality. I have not any precise measurements of wave-length, but the extreme red passed a cobalt glass while the less extreme was stopped. Observations at the ends of the spectrum are more difficult than elsewhere. Owing to deficiency of illumination at these parts there is more danger of false light finding access. To get satisfactory results I found it desirable to supplement the action of the prisms by placing red glass over the slits. It is probable that Maxwell was misled by some defect of this sort, since the differences he found would appear to lie outside the errors of observation. The German observers, it should be added, also found the colour constant at the red end.

At the other extreme the tendency of the violet towards red is, to my vision, not in the least doubtful. Some remarks made a few years ago by Dr. Burch, who speaks of violet in terms which I could not possibly use, were the occasion of a more particular examination. Although, so far as I remembered, I had never made the trial, I was confident that I should be able to match violet approximately with blue *plus* red, and full blue with violet *plus* green. And it seemed further that this must be the general estimation, as there is no widely spread protest against describing the upper extreme of the spectrum as "violet"—a name which would be quite inappropriate in the absence of an approach towards red.

¹ Phil. Trans., 1860.

² Helmholtz, "Phys. Optik," 2nd edition, p. 340.

³ Mr. Gerald Balfour included.