

to the situation and time (allowing for the difference between the meridians of Dublin and Hornsey), it being nearly half an hour past ten at Dublin when eleven here, makes it very probable, that it was one and the same meteor; which, if so, is a proof, that its height in the atmosphere must be very considerable. I am,

S I R,

Your obliged humble servant,

William Hirst.

XCH. *A Letter from Monsieur Clairaut, Member of the Royal Academy of Sciences at Paris, and F. R. S. to Thomas Birch, D. D. Secret. R. S. containing a Comparison between the Notions of M. de Courtyron and Mr. Melvil, concerning the Difference of Refrangibility of the Rays of Light.*

Read July 4,
1754.

AS I was perusing the last volume of the Philosophical Transactions, I fell upon a memoir of Mr. Melvil, the subject of which having been handled in a book, that I presented some time ago to the Royal Society, from a friend of mine, and written upon a matter, which I had

had formerly studied myself, I first examined whether any notice had been taken of the things common to both of the works, and to what degree the two authors agreed together.

The book I speak of is a treatise of optics, composed by Mr. le Marquis de Courtivron, of the French Academy of Sciences. It was published in 1752, and presented the same year to the Royal Society and consequently has the anteriority of date with regard to Mr. Melvil's paper, which was read only the 8th of March of 1753. But I am far from imagining that he would have neglected citing Mr. de Courtivron, if he had had any notice of his book.

As I do not doubt but the Royal Society would have ordered some mention of Mr. de Courtivron upon the same subject, if an account, sufficiently circumstantiated, of his book had been read before that illustrious body, I hope a short exposition of the question will not be amiss.

Both of these gentlemen thought of accounting for the difference of refrangibility, by the difference of velocity in the rays of light; which, if it really agreed with the observations, would give a great simplicity to the theory of refraction, as reducing it under the same laws as the theory of gravity: whereas in the hypothesis, wherein the particles of light are endowed with tendencies different from one another, one is obliged to multiply the properties of matter.

Messieurs de Courtivron and Melvil went so far the same way, as to examine, whether the immersions and emersions of Jupiter's satellites could not

afford the means of distinguishing the difference of velocities between the rays of several colours.

In fact, if, according to that hypothesis, the red rays were swifter than the others, it possibly might happen, that the satellite would appear of a reddish colour in the beginning of the emerſion; I mean before the full time required for the whole tranſmiſſion of light from the ſatellite to us.

As to the examination of the number of ſeconds between the propagation of the red and violet rays, the two authors differ widely; and I cannot help aſſerting, that Mr. de Courtivron's calculations are more ſurely grounded than the other's.

Mr. Melvil ſuppoſes, that the difference of velocity between two ſorts of rays muſt be very near the difference of their ſines of refraction, where their ſines of incidence are the ſame. From whence he concludes, that, as the ſine of refraction of the red rays is about $\frac{1}{77}$ greater than the ſine of refraction of the violet ones, the velocity of the firſt rays muſt alſo exceed the velocity of the ſecond by about $\frac{1}{77}$.

He indeed gives thoſe proportions as only being nearly the ſame; for, ſays he farther, to know exactly the ratio of the velocities from the ſines of refraction, the following problem ſhould be reſolved, which he propoſes to the learned :

“ If two bodies fall, in equal angles of incidence,
 “ on a ſpace terminated by parallel planes, in which
 “ any power acts perpendicularly to the planes (ac-
 “ cording to the hypotheſis in prop. 94. lib. 1. of
 “ the *Principia*), the ratio of the ſines of the emer-
 “ gence to the common ſine of incidence, and con-
 ſequently

“ frequently to one another, being given, to determine the proportion of their velocities at the time of their incidence on the first plane.”

But as the investigation of the curve described by the rays of light, in any hypothesis of attractive power, has been published long ago (at least by me in 1738), and by such a method, as leads to the solution of Mr. Melvil’s problem, I do not doubt but if he had seen that method, he would have resolved the problem, which he proposes, and perceived what a considerable difference there is between the proportion of the velocities, and that of the sines of refraction.

Mr. de Courtivron, who has made use of my solution, is arrived at the following result :

If p denotes the ratio of the sines of incidence to the sine of refraction for one of the colours, and q the same ratio for any other, $\frac{1}{\sqrt{1-pp}}$ to $\frac{1}{\sqrt{1-qq}}$ will express the ratio, which the velocity of the first rays bears to the velocity of the others.

Now, in order to make use of such a theorem, if p and q are made equal to $\frac{77}{80}$ and $\frac{78}{80}$, which are the proportions between the sines of incidence and refraction for the red and violet rays, the ratio of the velocities sought will come out in even numbers, that of 45 to 44, which differs entirely from Mr. Melvil’s.

Thus, if Mr. Short’s observations have led him to conclude, from Mr. Melvil’s principles, that the difference of refrangibility cannot be caused by the difference of velocities (when the motion of light is performed in the manner of a projectile), how surer

may not his assertion be after Mr. de Courtivron's calculation, since they give a difference of time considerably greater?

I am, with the greatest regard,
Reverend Sir,

Hampton-Court
in Middlesex.
June 30, 1754.

Your most humble
and obedient servant,

Clairaut.

XCIII. A Letter to the Right Honourable the Earl of Macclesfield, President of the Royal Society, concerning some new electrical Experiments, by John Canton, M.A. and F. R. S.

My Lord,

Read Nov. 14,
1754. **A**S electricity, since the discovery of it in the clouds and atmosphere, is become an interesting subject to mankind; your lordship will not be displeas'd with any new experiments or observations, that lead to a farther acquaintance with its nature and properties.

The refinous and vitreous electricity of Mr. Du Fay, which arose from his observing bodies of the one class to attract, what those of the other would repel, when each were excited by attrition; received no light till the publication of the second part of Mr. Franklin's experiments; wherein it appears, that the one