

XXXI. *A Letter from the Prince de Croy to the Earl of Morton, President of the R. S. containing the Observations of the Eclipses of the Sun of the 16th of August 1765, and of the 5th of August 1766, made at Calais, together with some Remarks on the first of these Eclipses: Translated from the French, by Mathew Maty, M. D. Sec. R. S.*

Calais, August 9, 1766.

My Lord,

Read Nov. 27, 1766. I Have the honour to send your lordship, according to your desire, the curious observation, which I made of the eclipse of last year; and likewise inclose with it the observation we just now have been making, and which, though less curious, (because this part of the moon has neither pits nor mountains), confirms the former with regard to the height of the cusps, or that small elevation which is seen against the sun's cusps. I do not send the figure of the latter, because it is nearly the same thing, excepting that it was, as you know, towards the lower part of the sun. I think I have seen enough to conclude, that the atmosphere of the moon extends to at least double the height of the highest mountains

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in it, and that it has some dry cavities, which sink below the disk. These two remarks, having been thought curious by Mr. Le Monier, and Mr. Cassiny, I have taken the liberty to communicate them to you; and have the honour to be,

My Lord,

Your Lordship's

most obedient humble Servant,

Le Prince de Croy.

Observation of the Eclipse of the Sun, of the 16th of August 1765, at Calais, near the Steeple, in the same Place, where the central and annular Eclipse was observed.

Beginning	-	-	-	3 ^h	50'	46''*
End	-	-	-	5	8	17 $\frac{1}{2}$
The duration, of which I am very certain	1	17	31 $\frac{1}{2}$			
The greatest magnitude was of 2 ^{dig.} 50 ^{min.}						

The points of ingress and egress are marked as they appeared to us in the three refracting telescopes, two of which had very nice micrometers, and in the large

* This might have happened 1" sooner, viz. at 45'', on account of the uncertainty of the ingress. I, however, think the former determination just, because I, at that instant, was pointing with the great refractor towards the spot, where the moon entered, and I was struck with the suddenness of the ingress of the penumbra.

refractor.

refractor. These, as well as the size of the cusps and the number of digits, were verified by Mr. de Fourcroy, chief engineer, who was so good as to assist us, and by Mr. Mouron, who assisted Mr. Blondeau in the observation of the annular eclipse.

There appeared hardly any sign of an atmosphere, except against the cusps of the sun, which seemed something bigger at the two sides, which touched the moon. There is no indication of one any where else, unless that the disk seems not so well defined at the ingress and egress. These two remarks would induce me to believe there is a small atmosphere; and this is the subject of a separate memoir.

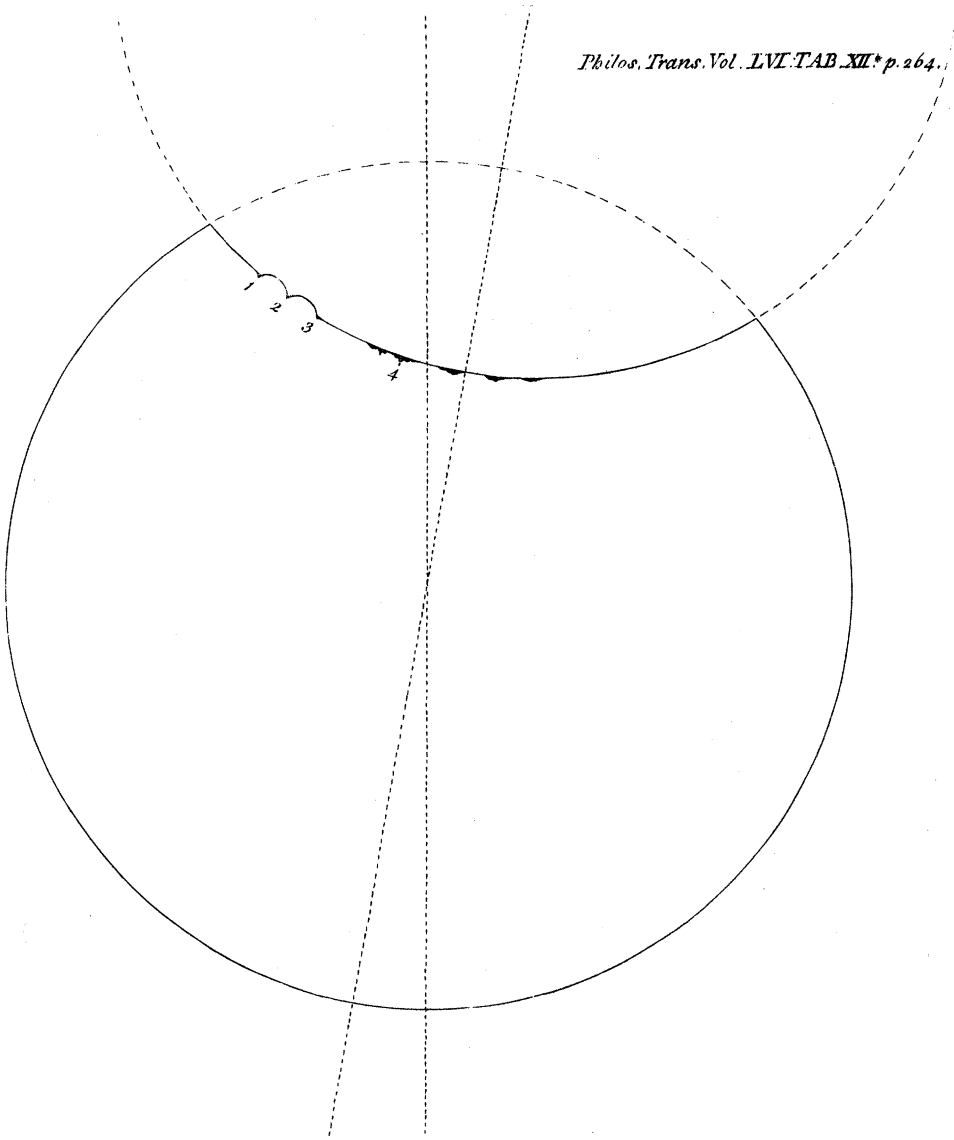
I saw very distinctly with the reflector of 4 feet 3 inches (which answers a common telescope of 70 or 80 feet) and with the acromatic telescope, several mountains, and particularly five, which I have delineated (see TAB. XII), besides some inequalities. I always saw them in their fixed places, whatever motion was given to the telescope.

N^o 1. Emerged from the sun's left limb or

cusps at	-	-	-	-	4 ^h	32'	6''
2.	-	-	-	-	4	35	18
3.	-	-	-	-	4	38	6

These seemed to have their summits at about an equal distance from one another.

The mountain N^o. 4. which was the highest and well defined, made its exit at 4^h 45' 0''; it was accompanied with a smaller but well defined one a little on the left. On the right hand several inequalities remained; but the right limb of the moon had none, and was smooth and perfectly well defined.



We all four very well saw these mountains, and we certify their existence. The three first seemed to have hollows between them, which penetrate a little into the moon; all the rest projected out of the disc.

The clock was verified by the meridian the six following days. The whole is referred to the meridian and point of Calais; and it appears that the time marked for the new moon of that day requires a rectification. Signed,

Prince de Croy, De Fourcroy, chief Engineer,
Garnier, Engineer: Mouron.

Remarks on the Eclipse of the 16th of August 1765 at Calais, with regard to the Atmosphere, and the Mountains seen in profile.

The Atmosphere.

Upon mature consideration, I think the moon's atmosphere perceptible, see Fig. 1. 1. Because the two small elevations, which I constantly saw of the sun's limb, towards the cusps, is easily distinguished in the large telescope, through which the other parts appeared very exactly defined. It is true that the sun appears equally bright at the place of this small elevation, but the atmosphere cannot affect its brightness, and can only somewhat raise the rays, which pervade or slide over a denser medium.

2. Because this elevation is gradual, rising higher towards the moon, according to the degree of the density of its atmosphere.

3. Because this elevation of the sun against the cusps seemed to me a little higher than the mountain N^o. 4. which jetted out the most on a side view.

4. Because the penumbra, which I observed at the ingress and egress, and which certainly is much less defined than towards the middle, is very probably occasioned by the mixture of the rays, which are refracted in passing through the lunar atmosphere. This appears to me more likely than that it should be caused by the inflexion of the light, from the globe of the moon; because such inflected light sliding upon the globe ought rather to lessen its dark limb; whereas, on the contrary, the penumbra, which was sufficiently thick, served, as we all observed, to enlarge that limb.

That the telescope was clear, appeared from the spots of the sun appearing exactly defined. A parcel of these was seen somewhat below the middle on the right, and above it on the left.

The Mountains.

The most surprising circumstance to me, as I observed to the gentlemen present, and made a sketch of, after half an hour's continual attention, was that of the mountains seen in profile, and perfectly well defined; N^o. 4. in particular with the small elevation on the left, had several inequalities and protuberances, which I have drawn exactly enough, though with a pencil not sufficiently sharp; I could have been more correct as to particulars, had I had a drawing pen*.

* Mr. Short told me in the month of July 1766, in London, that he had had a side view of these mountains with his telescopes of 8 and 12 feet.

The three summits of N^o. 1, 2, and 3, were very distinct, and especially the hollows between them, surprising on account of their depth, for they made cavities within the circle of the disc. I am no longer astonished at the luminous points, which are seen starting from the crescent; but I wonder that no notice should hitherto have been taken of these mountains seen sideways in the eclipses of the sun: a four feet telescope well fixed is necessary to observe them distinctly. Large refracting telescopes cannot serve for that purpose, as it is difficult to prevent intirely their shaking. Happily we had none of them; the air was clear, the wind to the north, and I often made the eclipse move from the top to the bottom of the field of the telescope, in order to see whether any spots in the glass did occasion this phænomenon. But the indentings were still the same, and equally well defined; and when their place was known, they were likewise seen through the other telescopes. It is only by sight that I have marked the place and distances of these mountains, as the great telescope had no wires; but, to remedy this inconveniency, I exactly observed the instant of the egress of the four chief eminences, whence their position might be ascertained: it may be, this side of the moon is one of the least mountainous parts.

In delineating the mountain, N^o. 4, whose figure was so exactly defined, I thought of the atmosphere; but no trace of that is seen in that case. This, however, in my opinion, does not afford a sufficient reason for den, ing it, because the atmosphere, in that position,

must be, on all sides, pervaded by the solar rays, which must render it invisible to our sight. It is therefore only against the cusps, and that at the ingress and egress, that this atmosphere is to be searched for, with very large instruments, and sufficiently well fixed.

Prince de Croy.

N. B. I am inclined to believe, that there is no water in the moon, for the two cavities, which penetrated within the disk continued concave to the bottom, whereas if there had been there any water, the bottom ought to have been convex. The mountains in the moon must be very high and hollow; and that is the reason of their white circle. If ever Tycho could be seen edge ways, it would make a beautiful appearance.

XXXII. *Observation of the Eclipse of the Sun the 5th of August 1766, near the Courgain at Calais.*

Read Nov. 27,	B EGINNING	-	5 ^h 39 ^m 9 ^f
1766.	End	- - -	7 19 13

The sun did not set in the sea till about 14 minutes after the end of the eclipse; that is, at least 10 minutes later than the almanac makes it to do at Paris. His lower limb touched the sea at 7^h 23^m in thick vapours, which made me prefer the setting of this lower limb rather than the centre. It is easy to conclude the difference, which should result from the different situations of Paris and Calais.

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