

XVIII. *Observation of the great Eclipse of the Sun of Sept. 5, 1793. By John Jerome Schroeter, Esq. Communicated by George Best, Esq. F. R. S.*

Read May 15, 1794.

ALTHOUGH the weather, owing to temporary clouds and flying showers, have at times been somewhat unfavourable, it was yet upon the whole sufficiently clear to admit of a good observation, to which the superiority of my instruments was not a little conducive.

Having prepared my hand telescope, being a 7-foot reflector, with a power magnifying 50 times with great distinctness, and with a field that took in more than the disk of the sun, I watched attentively for the first contact, but was prevented by some intervening clouds: the first glimpse, however, I had was immediately after the immersion, which took place at the north-west edge of the sun; and it was as yet so very trifling, that had it not been for the excellence of my instruments I should hardly have perceived it; and I am well assured that the first contact did not take place above 4 seconds before this instant of time. This observation was, according to true time, (corrected by 9 equal altitudes on the 4th and 6th) on the 5th Sept. at $10^{\text{h}} 26' 59''$, 3; so that the first contact must have been at $10^{\text{h}} 26' 55''$. The distance of the cusps I could not observe.

The end of the eclipse was, on the other hand, observed with

much more accuracy; for although the sun was at this time frequently covered by clouds of different densities, yet by means of a variety of glasses, which I applied occasionally to the eyeglass of my telescope, I was enabled to see distinctly the decreasing obscuration, which during the 3 last seconds was scarcely perceptible, although certainly still existing, the orb of the sun not being perfectly complete till after the expiration of the last-mentioned interval, which ended at $1^{\text{h}} 32' 54''$ true time. All these observations were made with the abovementioned 7-foot telescope, made by professor SCHRADER, magnifying 50 times.

During the intermediate period of the eclipse, the atmosphere being tolerably serene, I was enabled by the excellence of this telescope, and a large 13-foot reflector, to make a very interesting observation, which led to some important inferences.

1. All my telescopes, even the 3-foot achromatic, applied to my quadrant, shewed the globular body of the moon like a dusky grey orb floating before the sun, its faint light becoming somewhat brighter towards the rim.

2. Both myself, and several other persons who were then with me, perceived soon after the beginning of the eclipse three high ridges of mountains on the south-east border of the moon projecting sensibly into the disk of the sun; one of them appearing to be a long and considerable mountainous range, and the two others to the westward being more in the shape of prominent points. This was seen with the 7-foot reflector magnifying only 50 times, but this very distinctly: I applied a power of 160, together with the projection machine, and found that the two last-mentioned points were from 24 to 28 seconds asunder; that the long eastern range was somewhat

more distant from the nearest of the former, and that all of them projected, if not 4, at least 3 seconds beyond the rim of the moon ; so that their height from the said rim could not be less than three-quarters of a German mile. It occurred to me that these probably were parts of the very high mountainous region *Doerfel* (*v. Selen. Fragm. Tab. IV.*) ; I delineated them, and compared them with my charts, and found that, though according to the present libration of the moon their projection ought not to be precisely as here represented, the coincidence was yet sufficiently striking.

Soon after, when the south-western limb of the moon had advanced a little further on the disk of the sun, I discovered on this part another equally prominent mountainous range, which I also measured and delineated. It consisted of a ridge one minute and from 30 to 40 seconds, and therefore not less than 23 or 24 geographical miles, in length ; and four insulated mountains to the westward, all projecting from 2 to 3 seconds beyond the rim of the moon ; these I had little doubt must be parts of the very lofty mountainous region *Leibnitz*, which a particular libration now presented in such a projection to our sight.

About noon, the eclipse being then at its greatest obscuration, I ventured to direct my excellent 13-foot reflector to the dim light of the sun ; and now the dark orb of the moon, and its lofty mountainous rim to the southward, appeared with such uncommon, and in a manner palpable distinctness, that the impression of it can never be effaced from my imagination. I at the same time distinguished between these high ridges, other less ones, which however were equally well defined, but which I had not perceived with the 7-foot reflector ; and

the contrast between several lofty ridges, and the smooth almost regular rim of the moon to the westward, was here sufficiently striking.

3. Not having for several days before, and likewise on the very day of the eclipse, noticed any spots on the disk of the sun, three small ones only excepted, which were perceived on the 29th of August; and it appearing very remarkable to me that, with this particular modification of the atmosphere of the sun, none of its blazing spots should be perceptible; I confess I was not a little surprised on viewing the sun's disk with my large reflector, to find that no, either dark or blazing, spots appeared on the luminous part, but that the whole visible disk was in a manner marbled, or covered over with whitish, more or less faint, nebulosities; as I had indeed seen it some years ago with my 7-feet *HERSCHELIAN* telescope, but by far not in so striking a degree. I at the same time discovered, westward towards the rim of the sun, a very small but distinct blackish spot, which other observers with inferior telescopes may well not have noticed, since I myself could not see it with my 7-feet *SCHRADERIAN* reflector. Some other observations I have made I shall reserve for the present.

Lilienthal,
Sept. 8, 1793.