## APPENDIS PART II.

enters the shadow at a., but not suddenly, because, like the moon, it has a considerable diameter seen from the planet; so that the time elapsing from the first perceptible loss of light to its total extinction will be that which it occupies in describing about Jupiter an angle equal to its apparent diameter as seen from the centre of the planet, or rather somewhat more, by reason of the penumbra; and the same remark applies to its emergence at b. Now, owing to the difference of telescopes and of eves, it is not possible to assign the precise moment of incipient observation, or of total extinction at  $a_{i}$ , or that of the first glimpse of light falling on the satellite at b., of the complete recovery of its light. The observation of an eclipse, then, in which only the immersion, or only the emersion, is seen, is incomplete, and inadequate to afford any precise information, theoretical or practical. But, if both the immersion and emersion can be observed with the same telescope and by the same person, the interval of the times will give the duration, and their mean the exact middle of the eclipse, when the satellite is in the line S.J.X., i.e., the true moment of its opposition to the sun. Such observations, and such only, are of use for determining the periods and other particulars of the motions of the satellites, and for the calculation of terrestrial longitudes. The intervals of the eclipses, it will be observed, give the synodic periods of the satellites' revolution; from which their siderial periods must be concluded by the method in art. 415."

(539) "It is evident, from a mere inspection of our figure, that the eclipses take place to the west of the planet, when the earth is situated to the west of the line SJ, *i.e.*, before the opposition of Jupiter; and to the east, when in the other half of its orbit, or after the opposition. When the earth approaches the opposition, the visual line becomes more and more nearly coincident with the direction of the shadow, and the apparent place where the eclipses happen will be continually nearer and nearer to the body of the planet. When the earth comes to  $F_{c.}$ 

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