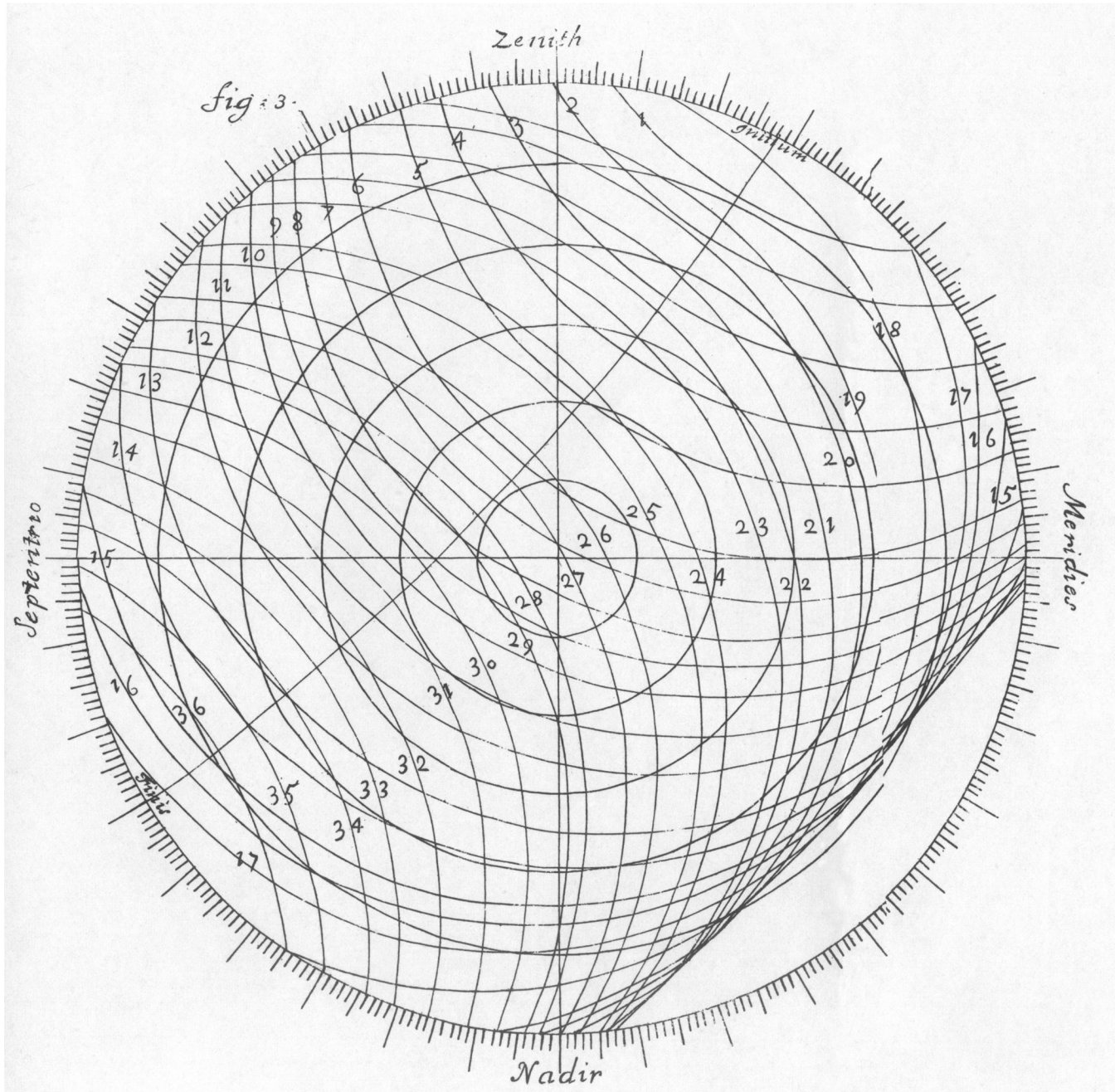
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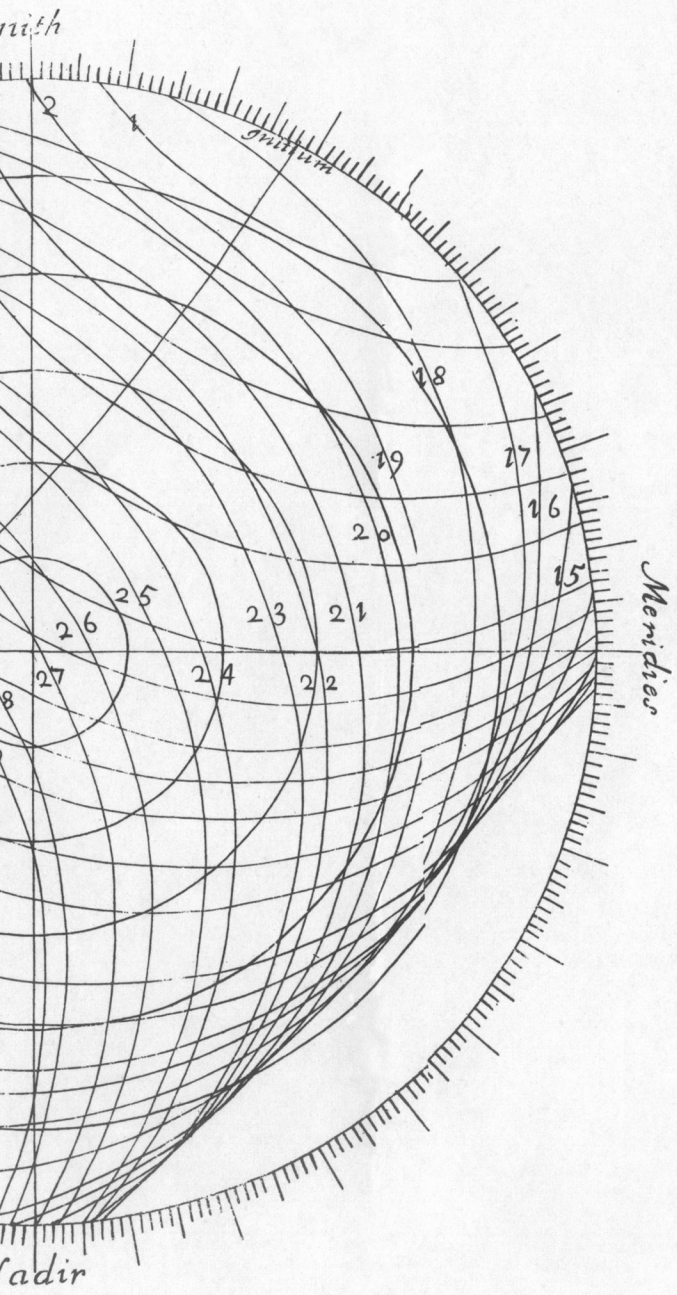
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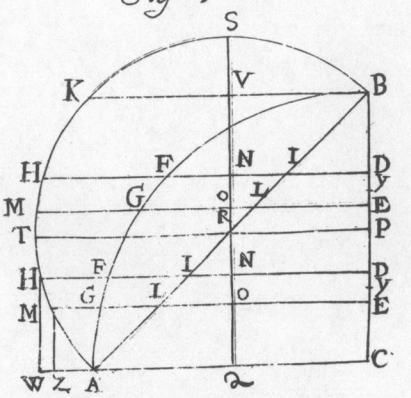
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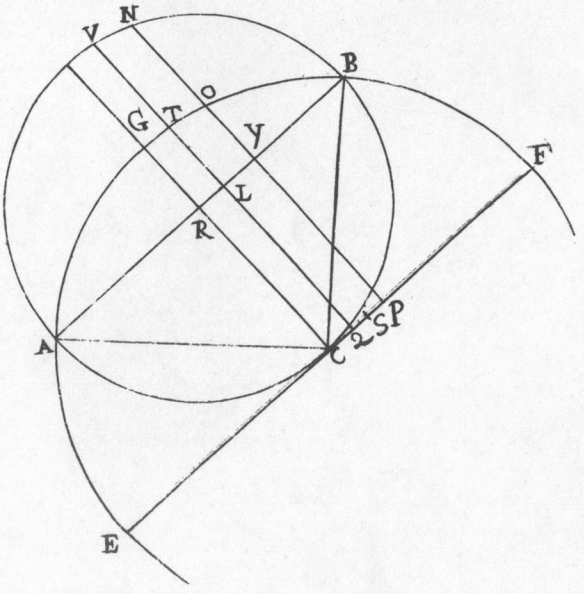
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## II. *A Letter ſent to the Publiſher of theſe Tranſactions, concerning an abſtract of ſome obſervations made of the Eclipſe of the Sun,* September 13. 1699.

*SIR,*

ASTrological predictions about the Eclipſe of the Sun, *Sept.* 13. 1699. having raiſed the expectations of the Curious, and the event having ſo little anſwered them, that many (eſpecially about *London*, where the air was thick and foggy all the time of the Eclipſe) did doubt whether there were any Eclipſe or not on that day. And ſo few of the Obſervations made in other parts of *England* having been ſince publiſhed, made me hope that Mr *Worzelbaur*'s Obſervations and Deſcription of it, printed by himſelf at *Nurenberg*, would be grateful to the Well-wiſhers to Aſtronomy. Wherefore (not being able to procure his Book here in *England*) I have tranſlated an Abſtract thereof which I found in the *Leipſick Acta Eruditorum* of *December* 1699, and have here ſent it you to be printed in your next Tranſactions, if you think fit: It may poſſibly excite ſome of thoſe that obſerved it carefully here, to ſend you theirs, to be likewiſe communicated to the publick in ſome of your next Tranſactions.

*The Eclipſe of the Sun on the* 13*th of* September, 1699. *obſerved at* Nurenberg *by* John Philip Worzelbaur. *Printed at* Nurenberg *by the Sons of* Joh. Andr. Enter, *in* 2 *large Sheets in Fol. and an half Sheet Plate.*

AMongſt divers Obſervations communicated to us of the late Remarkable Eclipſe of the Sun, we

have thought fit (friendly Reader) to give an Abſtract of that which was made by the celebrated Mr *Wurzelbaur*, and elegantly delineated, and printed (See Fig. 3.) with Remarks and proper Tables, ſhewing the order, quantities and times of the progreſs thereof. Specifying alſo the Equinoctials of the preſent year moſt exactly obſerved; which kind of Obſervations 'tis the Intereſt of the preſent Aſtronomers to be ſtudious of, and well verſed in, ſince by the Common Conſent of the Proteſtants of the Empire, the *Julian* Calender hitherto uſed by them is abrogated, and proper means are to be maturely ſought, and conſulted how the Yearly Tables of the times may be made to agree moſt exactly and perpetually with the motions of the Celeſtial Luminaries, upon which depends the whole ſtreſs of this Difficult Enquiry.

To the Picture of the Eclipſe, exactly copied from that of the Author, we have added a Table, ſhewing the order and quantities of the ſeveral phaſes or appearances, and the times of each of them, obſerved by a Pendulum Clock, and compared with the times ſhewn by an exact Horizontal Dial, denoting every ſingle minute, and with the altitudes of the Sun, diligently taken, and exactly agreeing. So that any who have need to examine the Obſervations of the Eclipſe made by others, may ſafely rely on the certainty of this.

A Table, ſhewing

| *The Order of the Phaſes.* | *The Quantities Eclipſed.* | | *The times by a Pendulum Clock.* | | |
|---|---|---|---|---|---|
| Numb. | Dig. | Min. | H. | M. | S. |
| Initium | — | — | VIII. | 57 | 14 |
| 1 | 0 | 52 | IX. | 3 | 26 |
| 2 | 1 | 32 | | 8 | 23 |
| 3 | 2 | 28 | | 14 | 14 |
| 4 | 3 | 19 | | 19 | 40 |
| 5 | 4 | 8 | | 24 | 57 |
| 6 | 5 | 15 | | 31 | 57 |
| 7 | 5 | 50 | | 35 | 2 |
| 8 | 6 | 26 | | 38 | 43 |
| 9 | 6 | 53 | | 40 | 36 |
| 10 | 7 | 20 | | 43 | 47 |
| 11 | 7 | 56 | | 50 | 39 |
| 12 | 8 | 30 | | 55 | 9 |
| 13 | 9 | 23 | X. | 1 | 44 |
| 14 | 9 | 53 | | 5 | 46 |
| 15 | 10 | 24 | | 10 | 34 |
| 16 | 10 | 38 | | 14 | 37 |
| 17 | 10 | 45 | | 17 | 54 |
| 18 | 10 | 45 | | 22 | 29 |
| 19 | 10 | 12 | | 27 | 31 |
| 20 | 9 | 49 | | 30 | 10 |
| 21 | 9 | 21 | X. | 33 | 11 |
| 22 | 8 | 52 | | 35 | 53 |
| 23 | 8 | 30 | | 38 | 46 |
| 24 | 7 | 38 | | 42 | 12 |
| 25 | 7 | 14 | | 46 | 7 |
| 26 | 6 | 33 | | 49 | 42 |
| 27 | 6 | 6 | | 53 | 22 |
| 28 | 5 | 27 | | 56 | 37 |
| 29 | 5 | 9 | XI. | 0 | 0 |
| 30 | 4 | 33 | | 4 | 24 |
| 31 | 3 | 57 | | 8 | 16 |
| 32 | 3 | 13 | | 13 | 3 |
| 33 | 2 | 41 | | 18 | 3 |
| 34 | 2 | 11 | | 21 | 37 |
| 35 | 1 | 32 | | 25 | 38 |
| 36 | 1 | 2 | | 28 | 27 |
| Finis | 0 | 0 | | 33 | 56 |

Moreover, the Author took notice, that from the eighth to the twelfth phaſis, the opaque limb of the Moon on the South ſide, was a little rough, but about the Northern horn to near a fourth part of the Segment, it was more ſmooth: But when the horns of the Eclipſe were almoſt parallel to the Horizon, before and after the 15th phaſis the extremity of the Gibbous Limb of the Moon looking downward, was ſomewhat inlightned, and of a kind of Saffron colour; but though the Sky was free from Clouds, yet no Stars were viſible. Nor was even *Venus* itſelf viſible in the open air, unleſs by ſome more ſharp-ſighted than ordinary. The Author takes notice alſo, that of many round plates, cut out of thick paper of divers magnitudes, differing from one another, five ſeconds, about the firſt phaſis, and after none agreed to the Limb of the Moon but that which was cut to a Radius or Semi-diameter of 15'. 30". (taking the Radius or Semi-diameter of that of the Sun to be 16'. 04".) and that gradually to be ſo ſwell'd or augmented, that larger plates were neceſſary to be made uſe of; and that about the 36th phaſis none leſs than one deſcribed of a Radius of 16'. 5". would agree with, or equal the appearance; and conſequently that the Diameter of the Moon about the end of the Eclipſe did æqualize, if not exceed that of the Sun.

To this obſervation it will not be impertinent to add, that in the 27th phaſis, (when the obſcure part was 6. 6'. Digits) the body of the Moon did obſcure more than two thirds of the Sun's Limb; which is an argument that its ſemi-diameter at that time was æqual to that of the Sun. We at *Leipſick* attending on the moment of the ſhadow's touching the center of the Sun both before and after the greateſt obſcurity, were not ſo happy, by reaſon of ſome impediments, as by exactly taking notice of the interſections of the peripheries,

to

to find the parts of the Sun's Limb intercepted by the Moon, and ſo of making a compariſon between the Diameter of the Moon with that of the Sun; and whether in this interval of time it ſuffer'd any ſenſible change, however by the judgment of the eye, ſupported by other arguments, it was accounted to be leſs.

The Æquinoxes of this year (1699.) according to the Author's Obſervations hapned.

| | d. | h | ′ | ″ | | d | h | ′ | ″ |
|---|---|---|---|---|---|---|---|---|---|
| *March* | 9. | 20 | 35 | 27 | But by the Author's Tables. | 9 | 20 | 40 | 30 |
| *Sept.* | 12. | 10 | 22 | 42 | | 12 | 10 | 32 | 52 |

Beſides this Obſervation, we have two others of very eminent men, *viz.* of M. *Godfred. Tuber*, Arch-Deacon of *Ciza* and of M. *Jacob Honold*, Paſtor in the Village of *Hervelſing*, in the Dioceſs of *Ulm*. The former was obſerved at *Ciza*, the later at *Hervelſing* near *Ulm* of *Suevia*: and both of them moſt neatly expreſſed, which the want of room hindred us from inſerting here entire; however, we have given the ſumm of them. The former began at 9 a clock, and ended at 11h. 35′. and increaſed to 11 digits. The later began at 8. 55. and ended at 11. 31. and its greateſt defect was 10 digits.

To us at *Leipſick* the Moon was obſerved to enter the Diſc. of the Sun at 9h. 11′. (by the times corrected by altitudes taken of the Sun) and to end at 12 h. 38′. 30″. The greateſt obſcurity was 11. 20 digits. It laſted from 10 h. 16′. 45″. for 6′. Ten digits being obſcured, the Sky (being otherwiſe very clear,) began to appear of a more livid or wan complexion, and more ſad than it uſually looks with a clear Sky when the Sun is ſet, or below the Horizon. The Cocks alſo, which had hitherto crowed very frequently, as if ſilenced, going to rooſt left off crowing, and did not

renew it till by the recovery of the Suns light they had recovered their former gayety and mirth: However we cannot learn that any Star beſides that of *Venus* was diſcovered by thoſe which were ſpectators of it in the open air.

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## III. *The Dimenſion of the Solids generated by the Converſion of* Hippocrates's Lunula, *and of its Parts about ſeveral Axes, with the Surfaces generated by that Converſion, by* Ab. De Moivre, *F. R. S.*

LEt B C A (Fig. 1.) be an Iſoſcelles Triangle right angled at C. with the Center C, and diſtance C B, deſcribe the Quadrant B F A; on B A, as a Diameter, deſcribe a Semicircle B K A; the Space comprehended between the Quadrantal arc B F A, and the Semicircumference B K A, is call'd *Hippocrates's Lunula.*

If upon B C you take my two Points D, E, and draw the Perpendiculars D H, E M, meeting B A in I & L, and cutting a Portion F G M H of the *Lunula*; the Solid generated by the converſion of this Portion about the Axis B C, is equal to a Priſm where Baſe is I L M H, and height the Circumference of a Circle whoſe Diameter is B C; and the Solid generated by the Semicircle B K A, is equal to a Priſm or Semicylinder, whoſe baſe is the Semicircle B K A, and height the Circumference of a Circle whoſe Diameter is B C.

Having biſected B A in R, and B C in P, the Surface generated by the converſion of the Arc H M about the Axis B C, is equal to $\frac{1}{2}$ B P × H M + B R × D E (ſuppoſing the ratio of the radius to the Circumference

to