

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.*

S I R,

**A**strological 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 13th 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.*

**A**Mongst divers Observations communicated to us of the late Remarkable Eclipse of the Sun, we  
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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.

( 621 )

A Table, shewing

| The Order of the Phases. | The Quantities Eclipsed. | The times by a Pendulum Clock. |
|--------------------------|--------------------------|--------------------------------|
| Numbr.                   | 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 20                     | 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 interfections 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   | '  | "  | }  | But by the | d        | h  | '  | "  |    |
| <i>March</i> | 9.  | 20 | 35 | 27 | }          | Author's | 9  | 20 | 40 | 30 |
| <i>Sept.</i> | 12. | 10 | 22 | 42 | }          | Tables.  | 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 sum of them. The former began at 9 a clock, and ended at 11<sup>h</sup>. 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 9<sup>h</sup>. 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

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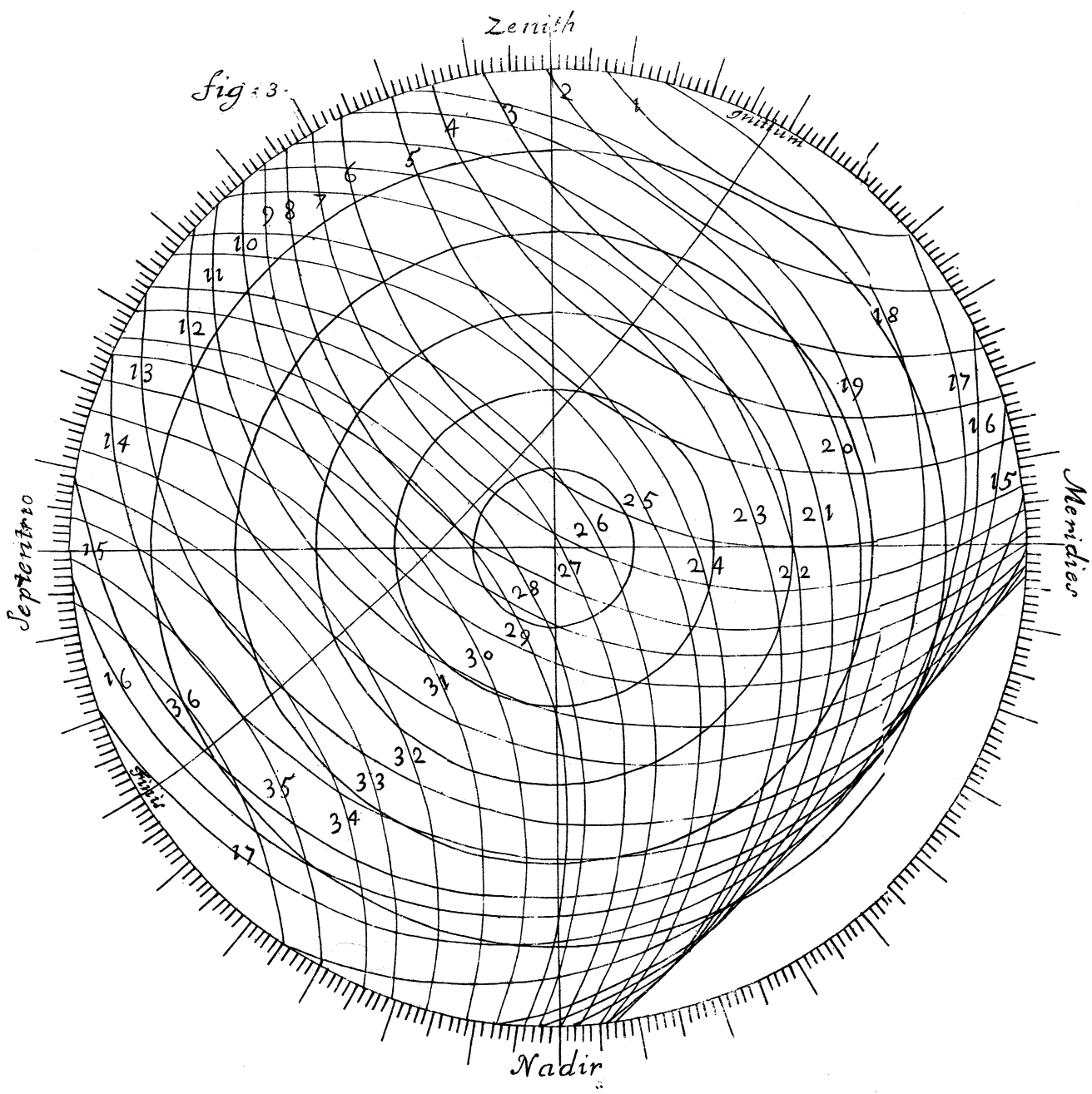
III. *The Dimension of the Solids generated by the Conversion of Hippocrates's Lunula, and of its Parts about several Axes, with the Surfaces generated by that Conversion, by Ab. De Moivre, F. R. S.*

**L** Et  $BCA$  (Fig. 1.) be an Iſoſcelles Triangle right angled at  $C$ . with the Center  $C$ , and diſtance  $CB$ , deſcribe the Quadrant  $BFA$ ; on  $BA$ , as a Diameter, deſcribe a Semicircle  $BKA$ ; the Space comprehended between the Quadrantal arc  $BFA$ , and the Semicircumference  $BKA$ , is call'd *Hippocrates's Lunula*.

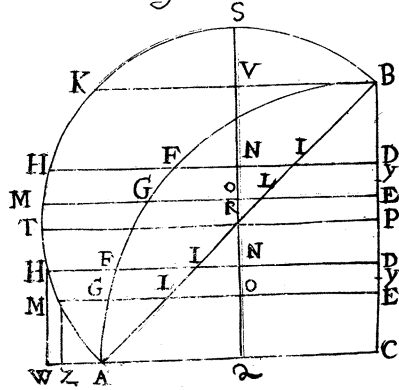
If upon  $BC$  you take my two Points  $D, E$ , and draw the Perpendiculars  $DH, EM$ , meeting  $BA$  in  $I$  &  $L$ , and cutting a Portion  $FGMH$  of the *Lunula*; the Solid generated by the conversion of this Portion about the Axis  $BC$ , is equal to a Priſm where Baſe is  $ILMH$ , and height the Circumference of a Circle whoſe Diameter is  $BC$ ; and the Solid generated by the Semicircle  $BKA$ , is equal to a Priſm or Semicylinder, whoſe baſe is the Semicircle  $BKA$ , and height the Circumference of a Circle whoſe Diameter is  $BC$ .

Having biſected  $BA$  in  $R$ , and  $BC$  in  $P$ , the Surface generated by the conversion of the Arc  $HM$  about the Axis  $BC$ , is equal to  $\frac{1}{2} \times BP \times HM \div BR \times DE$  (ſuppoſing the ratio of the radius to the Circumference to

fig: 3.



*fig: 1 -*



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*fig: 2.*

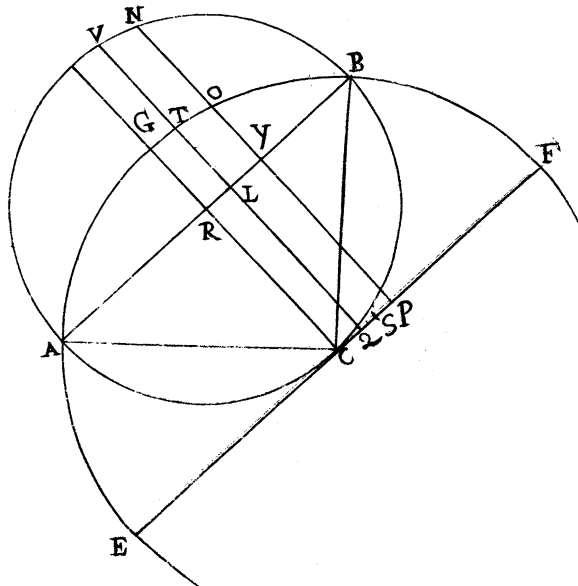




fig: 3.

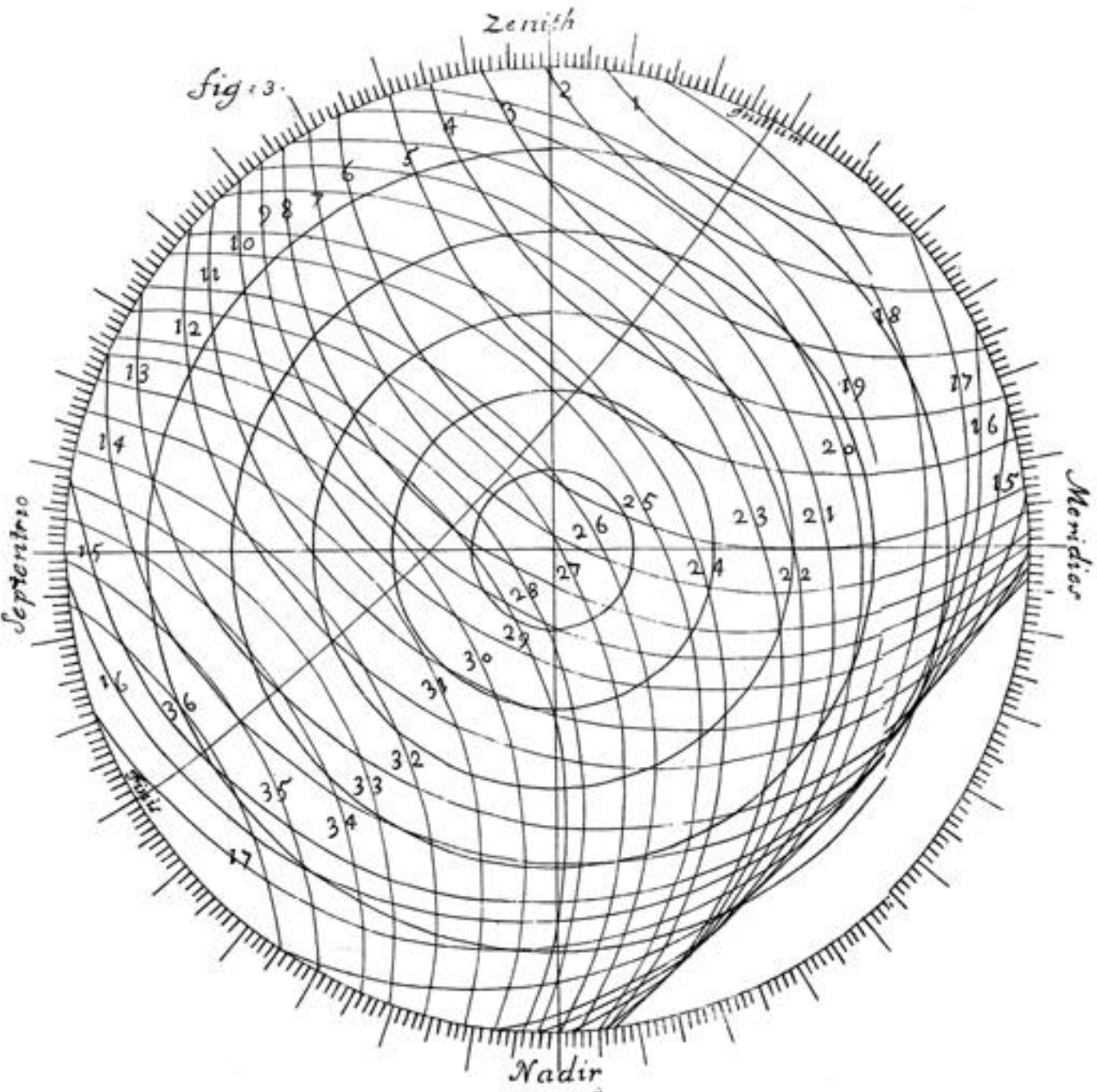


fig: 1.

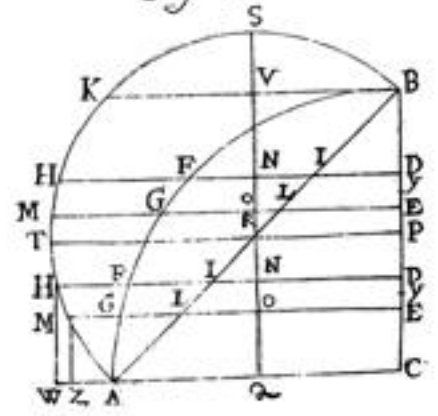


fig: 2.

