

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.

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 HMA about the Axis BC , is equal to $\frac{1}{2} \times BP \times HM \times BR \times DE$ (supposing the ratio of the radius to the Circumference to

to be as r to c) and the Surface generated by the Semicircumference BKA is equal to a Rectangle whose base is the sum of that Semicircumference and Diameter BA , and height the Circumference of a Circle whose Diameter is BC . As for the Surface generated by the arc GF , 'tis well known, that it is equal to a Rectangle whose base is the Circumference of a Circle whose Radius is BC , and height DE ; Therefore the Surface generated by the Conversion of the Portion $M H F G$ is known.

If upon BA (Fig. 2.) you take any two Points I, L , and draw IN, LV perpendicular to it, cutting the Quadrant in O and T , and the Circumference in N and V , the Solid generated by the conversion of the Portion ONU about the Axis BA , is equal to a Prism whose Base is $IOTL$, and height the Circumference of a Circle whose Diameter is BA .

Having bisected BA in R , and drawn CR meeting the Quadrant in G , the Surface generated by the Conversion of the Arc OT about BA is equal to $\frac{c}{r} \times CG \times IL - CR \times OT$.

Bisect DE in Y (Fig. 1.) through the Center R draw SQ parallel to BC , meeting the Circumference BKA in S , BK parallel to AC in V , and the Lines DH, EM in N and O ; the Solid generated by the Conversion of the Portion $FGMH$ about the Axis AC , is $\frac{c}{r} \times \frac{1}{2} MO^3 - \frac{1}{3} NH^3 + PC \times NOMH + CY \times DNOE - \frac{1}{3} EG^3 + \frac{1}{3} DF^3$, and the Solid generated by the Segment KBS is $\frac{c}{r} \times VK^3 + PC \times BUKS$. Therefore the Solid generated by the Semicircle BKA about AC is $\frac{c}{r} \times PC \times VQAK + \frac{1}{3} C \times BCQV - \frac{1}{3} AC^3 + \frac{2}{3} VK^3 + PC \times BVKS$, which by due reduction will be found equal to the Solid generated by the Conversion of the same Semicircle about the Axis BC .

The Solid generated by the Portion $ONVT$ about the Axis CD , is equal to $\frac{c}{r} \times \frac{1}{3} LV^3 - \frac{1}{3} IN^3 - \frac{1}{3} QT^3 + \frac{1}{3} PO^3 + CS \times PQIL$.

From the Points M, H , drop the two perpendiculars MZ, HW , upon CA prolong'd if need be; the Surface generated by the Conversion of the Arc HM about the Axis CA is equal to $\frac{c}{r} \times PC \times HM - RA \times WZ$, when the point Z is next to C , or $\frac{c}{r} \times PC \times H + MRA \times WZ$ when the point W is next to it.

Those that will think it worth their while to bestow some little pains to find the Demonstration of this, may solve the following Problem.

Any two Conic Sections being given, forming a *Lunula* by their Interfection, and a right line being given by position, about which, as an Axis, this *Lunula* is imagined to turn, to find the Solids generated by the Conversion of any of its parts, cut off by lines perpendicular to that axis, or parallel to it, or making any given Angle with it, as also the Surfaces made by that Conversion.

fig: 3.

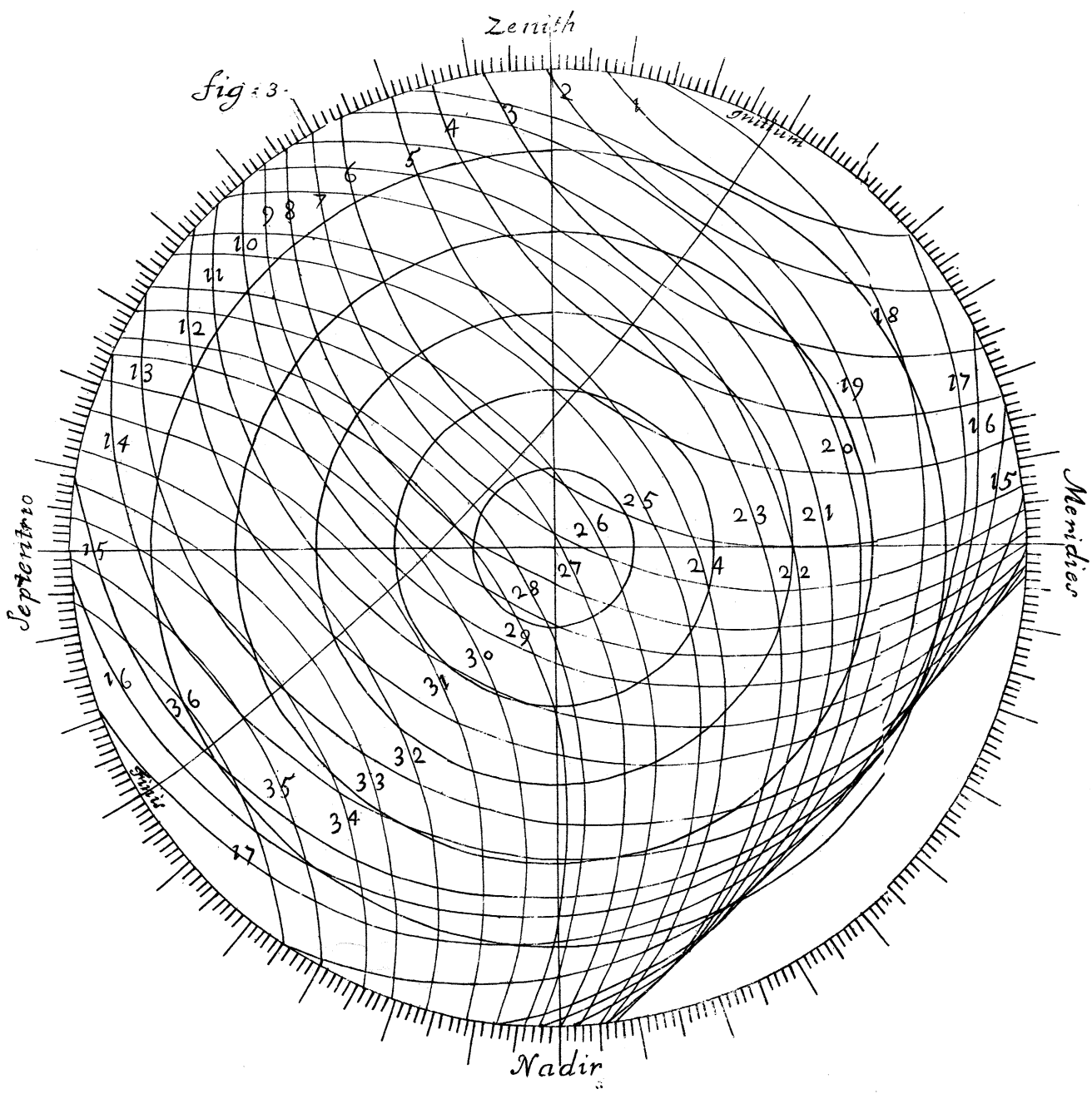


fig: 1.

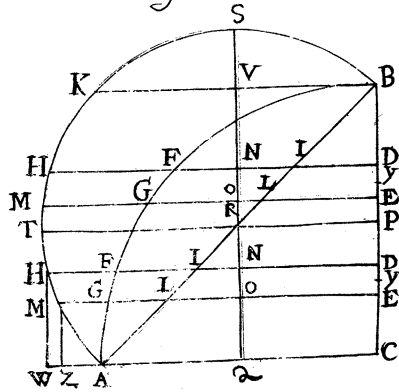
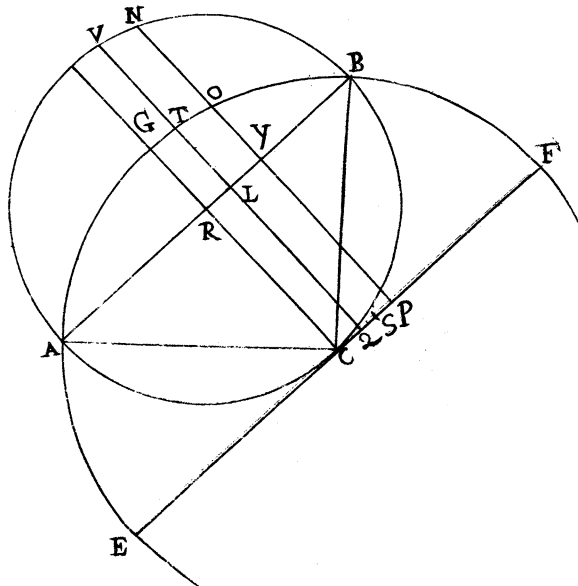


fig: 2.



Meridians

fig: 3.

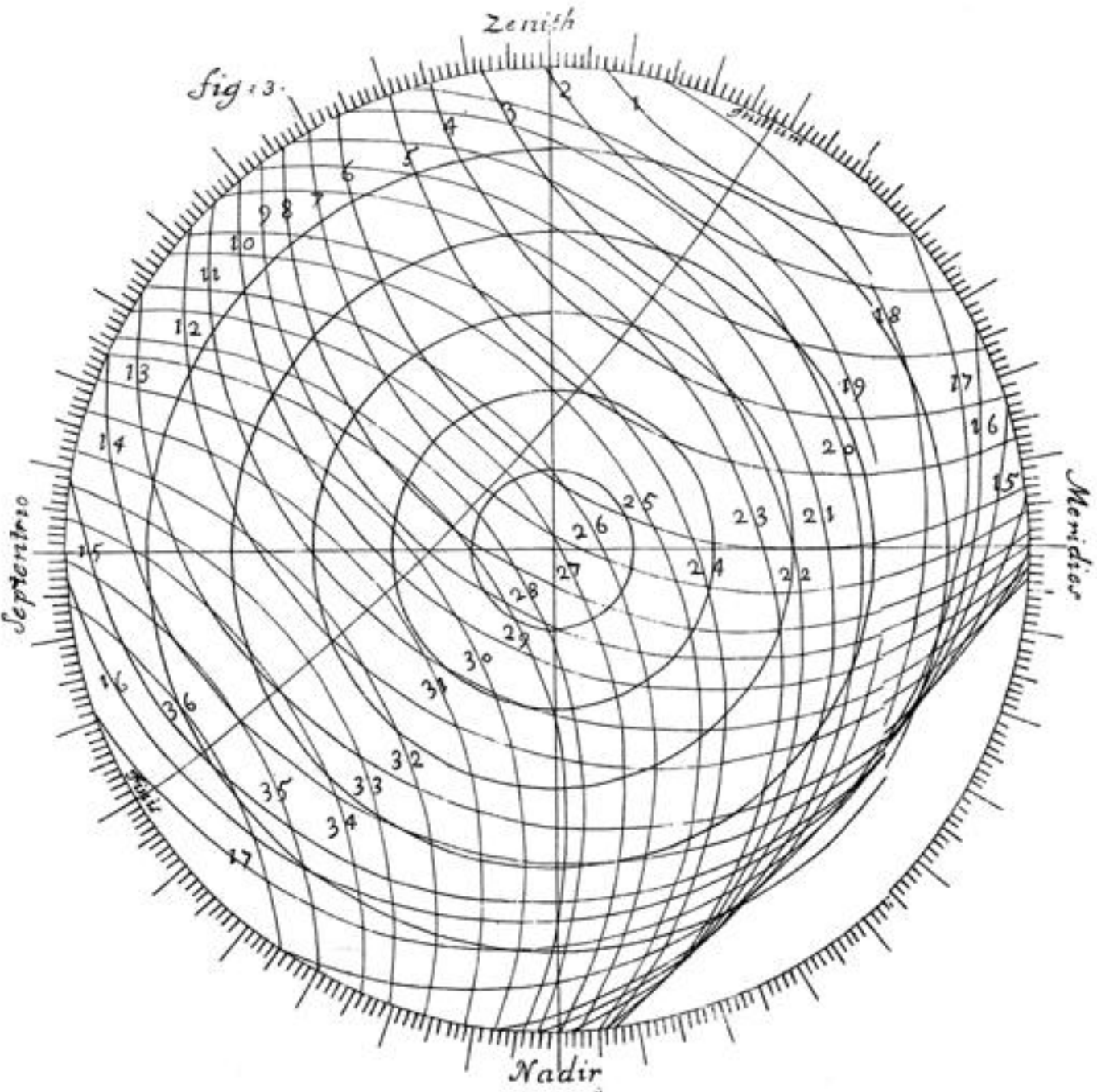


fig: 1.

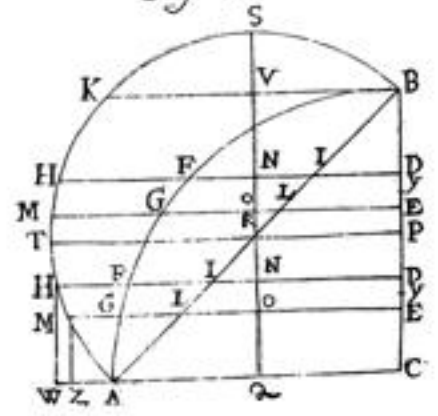


fig: 2.

