An Account of two Books.

I. *SAGGI di NATURALI ESPERIENZE fatte nell' ACADEMIA del CIMENTO, in FIRENZE, A. 1667. in Fol.*

THis Book was lately by two excellent perſons of the *Florentine* Virtuoſi, *viz. Lorenzo Magalotti,* and *Paulo Falconieri,* preſented to the *Royal Society*, in the name of His Highneſs Prince *Leopold* of *Tuſcany,* that great Patron to real Philoſophy. The Book contains theſe particulars:

1. An explication of the Inſtruments, employed in theſe Experiments.
2. Exp. belonging to the natural preſſure of the Air.
3. Exp. concerning artificial Conglaciations.
4. Exp. about natural Ice.
5. Exp. about the change of the capacity of Metal and Glaſs.
6. Exp. touching the compreſſion of Water.
7. Exp. to prove that there is no poſitive Lightneſs.
8. Exp. about the Magnet.
9. Exp. about Amber, and other ſubſtances of a vertue Electrical.
10. Exp. about ſome changes of Colours in divers Fluids.
11. Exp. touching the motions of Sound.
12. Exp. concerning Projectils.
13. Various Experiments.

As all theſe Heads are very conſiderable, and of main importance to Philoſophy, ſo doubtleſs will the handling of them be by competent Judges found worthy of theſe famous *Academians del Cimento.*

II. *VERA CIRCULI ET HYPERBOLÆ QUADRATURA, in propria ſua proportionis ſpecie inventa & demonſtrata, à JAC. GREGORIO SCOTO, Patavii,* in 4o.

THis Tract peruſed by ſome very able and judicious Mathematicians, and particularly by the Lord Viſcount *Brounker*, and the Reverend Dr. *John Wallis*, receiveth the Character of being very ingeniouſly and very Mathematically written, and well worthy the ſtudy of Men addicted to that

that Science: that in it the *Author* hath delivered a new Method Analytical for giving the Aggregate of an Infinite or Indefinite converging *Series*: and that from that ground he teaches a Method of *Squaring the Circle, Ellipsis*, and *Hyperbole*, by an Infinite Series, thence calculating the true dimenſions as near as you pleaſe: And laſtly, that by the ſame method from the *Hyperbola* he calculateth both the *Logarithms* of any *Natural* Number aſſign'd, and *vice verſa*, the *Natural* Number of any Logarithm given.

Only a few of theſe Books were printed by the *Author* for his own uſe, and that of his Friends, and a Copy ſent over whereby to reprint it here, which is now a doing.

The Mathematical Mr. John Collins, *upon a more particular examination of this Book, communicated what follows concerning the ſame.*

The *Author*'s Computation of the *Area* of a *Circle* agrees with the Numbers of *Van Ceulen*; and his computation of the *ſupplemental* ſpaces between the *Hyperbola* and its *Aſymptote* by Parallels to the other *Aſymptote*, is correſpondent to what *Gregory* of St. *Vincent* and his Commentators *Francis Aynſcomb* and *Alphonſe de Saraſa* have demonſtrated concerning the *Logarithms*, as repreſented by thoſe ſpaces, *viz.* That if one *Aſymptote* be divided into a rank of continual Proportionals, and if parallels to the other *Aſymptote* be drawn paſſing through the ſaid rank, and be terminated at the *Hyperbola*, the ſpaces contain'd between each ſuch pair of Parallels, are equal to each other, and ſo added or conceived to be one continued ſpace, may repreſent the *Logarithms*; or the ſaid Proportionals, fitted in parallel to the divided *Aſymptote*, do the like, by reaſon that a *Rectangle* apply'd to the ſeveral Terms of a *Geometrical* Progreſſion increaſing, renders another in the ſame *Ratio* decreaſing. And both performed by the above-mentioned Analytical method of conveying complicated *Polygons* circumſcrib'd and inſcrib'd in the *ſector* of a *Circle, Ellipſis*, or *Hyperbola*, which he aſſerts to be quantities like *Surds*, not abſolutely to be expreſs'd in Numbers.

And it being manifeſt, that the making of the *Table* of *Logarithms* is in effect the ſame thing as the computing of *Area's* of thoſe ſupplemental ſpaces, the *Author* accordingly applies it thereto

thereto, and finds the *Logarithms* of all *Primitive* Numbers under 1000 by one Multiplication, two Divisions, and the Extraction of the Square Root; but for *Prime* Numbers greater, much more easily.

Concerning the construction of *Logarithms*, Mr. *Nicholas Mercator* hath a Treatise, intituled *Logarithmotechnia*, likewise at the *Press*, from which the *Reader* may receive further satisfaction. And as for *Primitive* Numbers, and whether any odd number proposed less than 100000 be such, the *Reader* will meet with a satisfactory *Table* at the end of a Book of *Algebra*, written in *High Dutch* by *John Henry Rohn*, now translated and enriched, and near ready for publick view.

The Area of an Hyperbola *not being yet given by any Man, we think fit a little to explain the Author's meaning.*

In *Figure* 1. Let the Curve *D I L* represent an *Hyperbola*, whose *Asymptotes* A O, A K, make the Right Angle O A K, the Author propounds to find the *Hyperbolick* space I L N K, contained by the *Hyperbolical* Line I L, the *Asymptote* K M, and the two Right Lines I K, L M, which are parallel to the other *Asymptote* A O.

He puts the Lines I K = 1 000 000 000 000
L M = 1 000 000 000 000 0
A M = 1 000 000 000 000
Hence K M = 9 000 000 000 000

Whence he finds the space L I K M

to be { 2 230 258 509 299 404 562 401 78681 too little.
2 230 258 509 299 404 562 401 78704 too great. }

Note: If I K be put for an *Unit*, then L M may represent 10, and H G 1000, and F E 1024: And by what is demonstrated by *Gregory* of St. *Vincent*, it holds,

As the space I B L M K I, *Is* to the Logarithm of L M, to wit, of 10: *So* is the space I B E F K I, *To* the Logarithm of the Number represented by the Line E F, to wit, of 1024.

The *Author* by the same method finds the *Area* of the space G E F H to be 237 165 266 173 160 421 183 067, and the space L I K M abovesaid being taken for the Logarithm of 10, and tripled, is the Logarithm of 1000, the which added to the space now found, makes the sum 6931471805599452914171917 0, and 1024, being the 10*th* Power of 2, the 10*th* part of this number is the *Hyperbolical Logarithm* of the Numb. 2, to wit, 693147180559945291417191 7. And it holds by proportion,

As 2302585092994045624017 8700, the Logarithm of 10, *To* 6931471805599452914171917, the correspondent Logarithm of 2: *So* 1 000 000 000 000 000 000 000 000 0, the Logarithm of 10 in the Tables,

Tables, *To* 30102999566398119524058o4, the Logarithm of 2 in the Tables.

By this means the *Area* of one *Hyperbola* being computed, the *Area's* of all others may be thence argued, as is ſhewed by *Greg. St. Vincent*, and *Van Schooten* in *Tractatu de Organica Conicarum ſectionum deſcriptione*.

If the Logarithm of 1 be put 0; and of 10, 1,0000000: If between 1 and 10 you conceive 9999999 mean Proportionals interjected, the firſt is 1,000000230258 53.

If the Logarithm of 1 be put 0; and of 10, 100000: If you conceive 99999 mean Proportionals between 1 and 10, the firſt is 1,0000230258 53; if an infinite rank of theſe be continued, there is no number propoſed, but will go nigh to be found in this rank, and the number of Terms, by which it is removed from *Unit*, is the Logarithm of the Number ſo found. The *Ratio* of 1, to 1,000000230258 53, ſome call *Elementum Logarithmicum*. See *Cavallieri*'s Trigonometry.

The *Area* of an *Hyperbola* is frequently required in *Gaging*; as admit it were required to compute the Solidity of the *Segment* of an upright *Cone* cut by a *Plain*, that would cut the produced oppoſite *Cone*; in any ſuch *Caſe* the Section is an *Hyperbola*. But we will only take the Inſtance, when it is parallel to the *Axis*.

In *Figure II*. 1. Let BVA repreſent ſuch a *Cone*, VC its *Axis*, BSAR the *Circle* in the *Baſe*. And firſt, ſuppoſe this *Cone* cut by a *Plain* paſſing through the *Vertex* and the *Baſe* USRU; then is the whole *Cone* divided into ſuch proportions as the *Area* of the *Circle* in the *Baſe*. Whence we diſcover the *uſe* and the *want* of a good Table of *Area's* of Segments; the beſt of which kind yet extant is in *Sibrand Hantz* his *Century* of *Geometrical Problems*, tranſlated out of *Dutch* into *Engliſh* by Captain *Thomas Rudd*, who omitted the ſaid Table; uſeful likewiſe for finding the *Area* of the *Segment* of an *Ellipſis*, and the obtaining the quantity of Liquor out of, or left in a Cask part empty.

And we hint, that a Table of *Natural Verſed Sines* is to be found in *Maginus*, and of *Logarithmical* ones in *Cavallieri*'s *Directorium Univerſale Uranometricum*.

2. The former *Plain* did cut out a Chord-line in the *Baſe*, to wit, SR; through the ſame imagine another *Plain* to paſs, and to cut the *Cone* beneath the *Vertex*, as at O; then is the *Wedge* contain'd between both theſe *Plains* (to wit, VSROV) equal to $\frac{1}{3}$ of that *Cylindrick* or *Priſmatick* Figure, whoſe Altitude is equal to the Perpendicular VP falling from the *Vertex* of the *Cone* to the cutting *Plain*, and whoſe *Baſe* SORTS is the *Area* of the Figure cut; in this caſe, an *Hyperbola*: When the *Plain* paſſeth parallel to the ſide BV, a *Parabola*; when it will meet with VB produced, a Portion of an *Ellipſis*. By this means, if a Brewer's Tun (taken to be a Circular *Truncus Coni*) lean, and be not cover'd over with Liquor in its bottom, it may be computed by ſubtracting the two known before-mention'd

tion'd parts out of the whole: If it ſtand upright, and be divided by an *upright Plain* into two *Partitions*, imagine it to be a whole *Cone*, and firſt, by the method above, find the *Segment*, as of the *whole*, and afterwards of the additional Top-*Cone*, the difference of thoſe two gives the Content of the correſpondent Partition.

3. But if the Liquor cut both ſides, the Tun leaning, as BCDE, in *Figure III.* ſuppoſe BAE to be the Triangle through the *Axis* of the whole *Cone*, then the *Elliptick Cone* ACD to the whole ABE is in a Triplicate *Ratio* of the *Side-line* AB or AE, to the *Geometrical Mean* between AC and AD, that is,

As the *Cube* of the *Side-line* AB, *Is* to the *Solidity* of the whole *Cone* ABE: *So* is the *Cube* of the *Geometrical Mean* between AC and AD, *To* the *Solidity* of the *Elliptick Cone* ACD.

And this readily follows from the Doctrine of *Viviani de Maximis & Minimis*, where 'tis demonſtrated, that any ſuch *Elliptick Cones*, cut out of an *Upright Cone*, that have the *Area's* of their Triangles through the *Axis* equal, are equal to each other; and likewiſe to that *Upright Cone* which hath the ſame *Area* on its *Triangle* through the *Axis* on the former *Plain* thereof; and theſe *Area's* he calls their right *Canons*.

And the mean Proportional by 23. *E*. 6. finds the ſides of an *Iſoſceles Triangle* in the *Plain* of the *Axis* equal to the *Scalene Triangle*; and then theſe *Cones* are to each other in a Triplicate *Ratio* of their *Axes*, *Side-lines*, or *Baſe-lines*, which are proportional to their *Axes*.

The *Area* of an *Hyperbola* being obtain'd, the *Solidity* of the *Hyperbolical Fuſa* or Spindles (made by the rotation of an *Hyperbola* about its *Baſe*) and their *Trunci* are computed, according to *Cavallieri* (in his *Geometrical Exerciſes*, printed at *Bononia* 1647.) and the ſolid *Zones* of theſe Figures may be well taken to repreſent a Cask.

In the *SAVOY*,

Printed by *T. N.* for *John Martyn*, Printer to the *Royal Society*, and are to be ſold at the *Bell* a little without *Temple-Bar*, 1667.

Fig: I

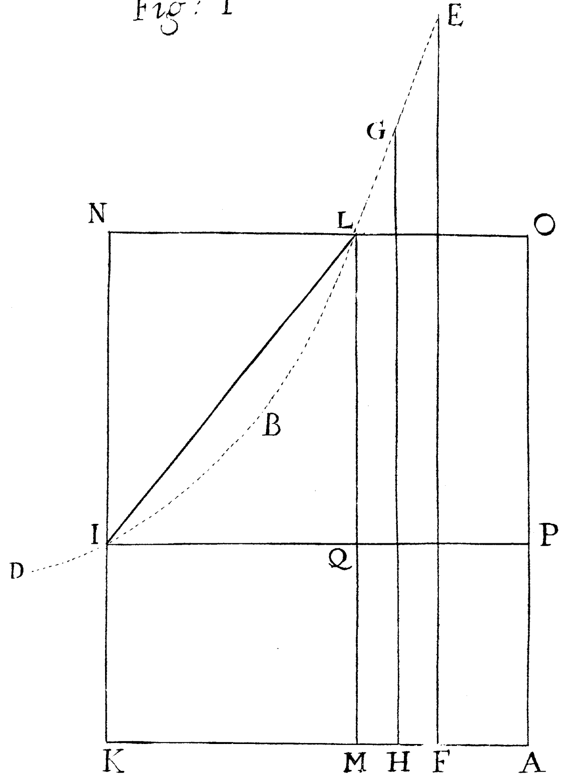

Fig: II.

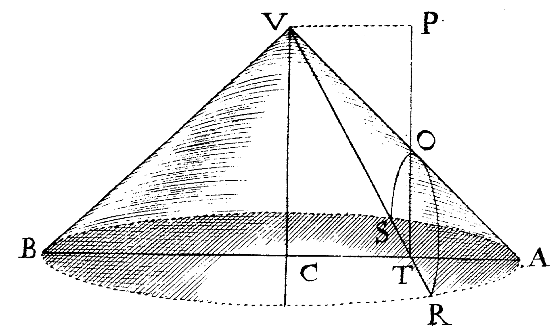

Fig: III