In which $m:1$, as the greater axis of the generating ellipse is to the lesser. A is a circular arc, to the radius 1, whose tangent is $\sqrt{m^2-1}$, or its reciprocal, if $m^2-1 \rightleftharpoons 1$. And l is the natural logarithm of $\frac{S}{V}$, S being the sine of the arc, whose co-sine is $\frac{1}{m}$ × $\sqrt{m^2-1}$, and V the versed sine of the same arc.

Note, The two first theorems, by substituting t for $\sqrt{m^2-1}$, coincide with those of Mr. Maclaurin for the oblate spheroid, in his differtation on the tides.

III. *A Letter from the Rev. Mr.* George Costard, *Fellow of* Wadham-College, Oxford, *to Dr*. Bevis, *concerning the Year of the Eclipse foretold by* Thales.

Dear Sir,

I THANK you greatly for the use of the Peterfburg Acts, while in London, where Bayer suppofeth the eclipse foretold by Thales to the Ionians fell out the year before Christ 603. Since my return home, upon looking over some papers, that I had formerly drawn up on that subject, I find, that I had determined it to have been the very fame year. I will not trouble you with the chronological arguments, on which I founded that determination; and therefore shall only tranfcribe fo much of those papers as relates to calculation.

C Riccioli

Riccioli fuppofeth, that the eclipfe foretold byThales happened the year before Chrift 585; and quotes both Theon and Cleomedes, in confirmation of the opinion. Theon, perhaps, had Cleomedes's words in view; but neither of thefe authors have circumftances enough to determine what eclipfe in particular they meant. The paffage of Theon is in his chapter concerning the moon's parallax, where he fays, that Hipparchus, being in doubt whether the fun had any parallax at all, fuppofed, in the firft book of his treatife concerning Magnitudes and Diftances, that the earth, in refpect of the fun, was only a point; from whence, by means of an eclipfe there fet down by him, he framed two diftances of the fun, a lefs and a greater. Εν γὰρ τῷ Α περὶ μεγεθῶν κ᾽ ἀποστημάτων λαμβάνει φαινόμενον τᾶτο, Ἐκλειψιν Ἡλίε, ἐν μὲν τοῖς περὶ τὸν Ἑλλήσπον]ον τόποις ὅλη τᾶ Ἡλίε ἀκριβῶς γεγενεμένην, ὡςε μηδὲν αὐ]ᾶ παραφαίνεᾷ ἐν Ἀλεξανδρείᾳ δὲ τῇ καθ᾽ Αἰγυπ]ον τὰ Δ μάλιςα πεμπ]ημόρια τῆς διαμέξ]ρε ἐκλελοιπότα.

All then that is here faid is, that the eclipfe made ufe of by Hipparchus was total at the Hellefpont; but at Alexandria in Egypt a little more than 5 digits only. But he hath neither given us the æra of Nabonaffar, the place of the luminaries, nor any one circumftance befides, by which we might form any conclufion what year this eclipfe was in.

Cleomedes, who perhaps faw the fame treatife of Hipparchus, is as uncircumftantial as Theon. He fays only, that the diameter of the moon's fhadow at the earth is fomething more than 4000 ftadia. And to confirm this affertion, he fays, γεγόνε δὲ κ᾽ αὐ]ὴ τήξησις ἐπὶ τῆς καθὰ τὸν Ἡλιον Ἐκλεὶψεως, ὸς ὅλος ΠΟΤΕ

ἐν

ἐν Ἑλλήσποντῳ ἐκλείπων, ἐτηρηϑη ἐν Ἀλεξανδρᾳ παρα
τὸ πέμπτον τῆς ἰδίας ἐκλείπων διαμείρε· ὅπερ ἐςὶ καλα
τὴν φανλασίαν παρα δακτύλυς δύο ϰ βραχύ.

By the quantity of obfcuration here mentioned, this
feems to have been the fame eclipfe with that quoted
by Theon from Hipparchus; but as the place of ob-
fervation in both thefe authors appears to have been
Alexandria in Egypt, it muft have been after that place
was built. Confequently it was probably obferved
there by Hipparchus himfelf, and therefore could not
have been the eclipfe foretold by Thales. Befides,
was this eclipfe total upon the banks of the Helle-
fpont, I know not what reafon there is for fuppofing,
that the battle between the Lydians and the Medes
was fought there. It fhould rather feem, that the
engagement was on the confines of the two king-
doms : confequently in a more fouthern latitude, and
in a longitude more to the eaft of Alexandria, this
eclipfe could not have been total ; nor therefore (as
Herodotus faid it did) turn day into night.

Sir Ifaac Newton, in his chronology, likewife fup-
pofes the eclipfe meant to have been that in May,
the year before Chrift 585. But in this, perhaps,
he rather followed others, than adopted it after any
examination of his own. That treatife never had
the finifhing hand of its great author, and it is well
known now in what manner it came abroad.

According to Riccioli, this eclipfe was at the Hel-
lefpont central, and at Sardes fell out at 6 of the
clock in the afternoon; and therefore is rejected, you
find, by Maier, in the Peterfburg Acts, as being
too late in the day. " Quia ad littora Afiæ minoris

" (fays

" (fays he) fub folis occafum appulit, in Natolia
" nulla fuit eclipfis totalis, quin nec confpicua ob
" inftantem folis occafum."

According to my computation, the apparent time
of the true conjunction was at Greenwich, May 28,
4^h 35' 15".

	s	°	'	''
The place of the luminaries	1	29	0	24
Moon's latitude north			20	54
Semidiameter of the earth's difk			61	14
Semidiameter of the penumbra			32	40

	d	h	'	''
Time of the greateft obfcuration at Greenwich	28	4	32	33
Beginning of the general eclipfe		2	3	20
End of the general eclipfe		7	1	46
Duration		4	58	26

	°	'
Longitude of Sardes eaft from London	29	5
Its longitude north	38	10

Time of fun-fet there May 28, 7^h 6' 54".

The paffage of the centre of the penumbra over
the earth's difk was at the following times, as rec-
koned at Greenwich, thus :

Times			Longitudes			Latitudes		
h	'	''	♌	'	''	o	'	''
3	22	33	115	5	10 W	22	10	40 N
4	02	33	95	24	50	31	30	10
4	32	33	75	52	30	38	49	10
4	35	55	73	34	40	39	31	10
4	43	34	68	8	0	41	2	23
5	02	33	52	22	10	44	11	30
5	32	33	25	20	20	46	36	30

By this, I think, it pretty plainly appears, that the centre of the fhadow paffed fo far from any place, where we can reafonably fuppofe the battle between the Lydians and Medes to have been fought, that this can hardly have been the eclipfe mentioned by Herodotus.

Father Hardouin, in his chronology of the Old Teftament, rejects this eclipfe, as not happening, he fays, in the reign of Cyaxares, but in that of Aftyages; not on the fourth year of the Olympiad, but a month before it began; as falling out too late in the day; the greateft obfcuration being (at Sardes, I fuppofe he means) fcarce half an hour before fun-fet; and not total, or central, or 12.56' digits, as Riccioli makes it, but almoft 9. Tho' Pliny therefore fays this eclipfe was Olymp. XLVIII. 4. & A. V. C. CLX. yet fix MSS. he obferves, in the French king's library, have CLXX. and fo moft printed copies. He thinks therefore, that, inftead of CLXX the number fhould be CLVII. which, he fays, is Olympiad XLVIII. 4. and the year before Chrift 597; when there was an eclipfe of the fun, on Wednefday July the 9, at 6 of the clock in the morning.

This

This eclipfe Petavius likewife prefers; tho' he makes the digits eclipfed only 9.22': Which is ftrange enough, as it could not have been by any means the caufe of fuch a darknefs, as is defcribed by Herodotus. But F. Hardouin fuppofeth, that this battle was fought upon the banks of the river Halys in Cappadocia, and in latitude north 40°; where, fays he, this eclipfe muft have been central and annular.

According to Dr. Halley's tables, the year before Chrift 597 the apparent time of the true conjunction at Greenwich was July 8ᵈ 21ʰ 50' 9'; and

	s	o	,	"
The place of the luminaries	3	9	17	0
Moon's latitude north			33	32
Semidiameter of the earth's difk			54	38
Semidiameter of the penumbra			30	44
	d	h	'	"
Beginning of the general eclipfe		19	8	16
End of the general eclipfe	9	0	49	2
Duration		5	41	6
	Q	,	"	
Sun rofe centrally eclipfed, in longitude weft from Greenwich	83	33	0	
And in latitude north	43	26	50	
Sun fet centrally eclipfed, in longitude eaft from Greenwich	132	37	20	
And in latitude north	26	25	20	

The place of the centre of the penumbra was at the following times, as reckoned at Greenwich, thus:

Times

Times			Longitudes			Latitudes		
h	′	″	°	′	″	°	′	″
21	46	15	30	21	0 E	62	30	34 N
21	58	39	42	53	30	60	53	0
22	13	39	56	32	40	58	8	20
22	28	39	68	58	0	54	41	40

This eclipfe, therefore, at Sardes, or any-where elfe that we can well fuppofe this battle to have been fought, could not have been great enough to turn day into night; and therefore doth not anfwer Herodotus's defcription.

Archbifhop Ufher rejects both thefe eclipfes, as inconfiftent with his chronology; and fuppofes that intended to have been A. M. 4113. An. Nab. 147. before Chrift 601. Olymp. XLIV. 4. Sunday July 20. 3ʰ 25′. before noon, digits eclipfed 9. But this likewife is greatly defective as to quantity.

But tho' this is infufficient for the purpofe, yet there was one two years before this, or the year before Chrift 603, that will be found by good tables intirely fatisfactory. Petavius, indeed, makes the digits eclipfed only 7.20′; but, according to Dr. Halley's tables, the apparent time of the true conjunction was at Greenwich, May 17ᵈ 20ʰ 42′ 19″. The place of the luminaries 1ˢ. 19° 12′. and the moon's latitude north 25′ 17″.

	′	″
Semidiameter of the fun	15	49
Semidiameter of the moon	16	45
Semidiameter of the penumbra	32	34
Semidiameter of the earth's difk	60	50

Beginning

	h	′	″
Beginning of the central eclipfe	19	13	27
End of the central eclipfe	22	3	47
Duration	2	50	20

	°	′	″
Sun rofe centrally eclipfed, in longitude weft from Greenwich	43	46	10
And in latitude north	2	54	0
Sun fet centrally eclipfed, in longitude eaft from Greenwich	155	56	20
And in latitude north	42	38	10

The place of the centre was at the following times, as reckoned there, thus:

Times			Longitudes				Latitudes		
h	′	″	°	′	″		°	′	″
19	13	27	43	46	10	W	2	54	0 N
20	8	37	19	19	30	E	31	33	0
20	23	37	28	28	10	E	35	47	50
20	42	19	40	29	30	E	40	41	20
22	3	47	155	56	20	E	42	38	10

By this it appears, that, if modern maps and geographers may be depended upon, the center of the fhadow paffed over the kingdom of Barca and Africa, and croffed the Mediterranean between Candia and Cyprus, and then over Antiochetta and Erzroum, and a little to the fouth of Kars.

You will fee, Sir, how this agrees with what is faid in the Peterfburg Acts, pag. 332. which, therefore, I fhall not tranfcribe. I fhall only add, that, if any allowance is to be made for the moon's acceleration,

for the moon's acceleration, or any other caufe, the track here given, as you know, will be a little different. As I cannot make feveral ancient eclipfes, that I have tried, fucceed to my mind, without fome fuch fuppofition, I have done the fame with regard to this. What the quantity to be allowed is, I leave to you and others to determine: At prefent I make it 45'; at Mr. Whifton's rate of 1' in 54 years, or thereabouts. Then

	d	h	$'$	$''$
The apparent time of the true conjunction at Greenwich	17	20	42	19
For the moon's acceleration			45	0
Apparent time of the moon's conjunction at Greenwich corrected	17	19	57	19

Erom hence I find the paffage of the penumbra at the following times as reckon'd at Greenwich, thus:

Times			Longitudes			Latitudes		
h	$'$	$''$	o	$'$	$''$	o	$'$	$''$
19	23	37	30	49	30 E	31	33	0 N
19	38	37	39	58	10	35	47	50
19	57	19	60	30	0	40	41	20

By this table it appears, that the center paffed more to the fouth than the former, and went near Tripoli, Aracta, Nifabin, and Ardbil.

It is much to be wifh'd, that Herodotus had told us where this battle was fought; that, by this means, we might have known, which of thefe two paths to have preferred. However, as he hath not, and there

is nothing in either of them, that is inconfiftent with the hiftory, I conclude, from a number of other cir-cumftances befides, that this really was the eclipfe foretold by Thales. I was not a little pleafed, upon looking into my papers, to find, that Bayer and I agreed fo exactly in the very year, as I was a ftranger to what he had faid upon that fubject, till you brought me that volume of the *Petersburgh Acts*; and as the principles I proceeded upon were fome-thing different from his. This, however, is a pre-fumption, that we are right, and confirms my opinion of fome other articles in chronology, wherein I dif-fer from fome very great names. I am,

<div align="center">Dear Sir,</div>

Iflip, May 21, 1752.   Your very faithful and

<div align="right">obliged humble fervant,</div>

<div align="right">G. Coftard.</div>

IV. *An Account of the Cafe of* Anne Eliza-beth Queriot, *of* Paris, *whofe Bones were diftorted and foftened*; *by* Ambrofe Hofty, M. D. *of the Faculty of* Paris.

Read Jan, 25, 1753.   ANNE Elizabeth Queriot*, aged 35, native of Paris, was married in the year 1746 to a wool-carder. Tho' feemingly of

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* Her marriage-name was Supiot.