Inveſtigatio
Orbitæ Cometæ
qui A. 1744. apparuit.

Obſervationes, ex quibus orbitam hujus cometæ ſum determinaturus, mecum Pariſiis ſunt communicatæ, quæ cum videantur omni cura inſtitutæ, perquam ſunt idoneæ, ad quas computus ſecundum methodum meam accommodetur. Prima quidem obſervatio facta eſt Lauſannæ jam die 13 Decembr. anni præterlapſi, quæ cum omnium, quas quidem adhuc mihi videre contigit, prima ſit, merito in hunc finem adhibetur. Hæc autem cum reliquis, quas accepi, ad meridianum Pariſinum revocata ſequenti modo ſe habebat.

Pariſiis Temp. appar.	Long. Cometæ	Lat. Com. bor.
1743 Dec. 13ᵈ, 8ʰ, 1′, 45″	♈ 28°, 26′, 13″	15°, 11′, 0″
1744 Jan. 3, 5, 27, 40	♈ 14, 11, 10	17, 32, 50
Jan. 7, 5, 1, 43	♈ 12, 3, 10	17, 51, 30
Jan. 18, 7, 2, 0	♈ 6, 57, 15	18, 37, 5

Quoniam igitur ad calculum inſtituendum mihi opus eſt tribus obſervationibus, inter quas temporum intervalla non nimis ſint inter ſe inæqualia, ex his elegi primam ſecundam & quartam, omittendo tertiam utpote ſecundæ nimis vicinam. Quia enim longitudo hujus cometæ hoc temporis intervallo parum fuit mutata, præſtat obſervationes aliquantum a ſe invicem remotas adhibere, quam nimis vicinas. Reductis ergo his obſervationibus ad tempus medium, ſupputatisque pro earum mo-

ſum de- atæ,quæ um ſunt cam ac- uſannæ m, quas hunc fi- cepi, ad bat. om.bor. 11′, 0″ 32, 50 51, 30 37, 5 t tribus i nimis & quar- Quia parum nvicem rgo his earum mo-

momentis terræ ſoliſve locis una cum diſtantiis ſolis a terra, ſequentia prodierunt data:

Ordo Obſ.	Berol. temp. medio	Longit. Comet.	Latitudo Com.
I.	1743 Dec. 13ᵈ, 8ʰ, 40′	0ˢ, 28°, 26′, 13″	15°, 11′, 0″
II.	1744 Jan. 3, 6, 17	0, 14, 11, 10	17, 32, 50
III.	Jan. 18, 7, 57	0, 6, 57, 15	18, 37, 5

Temp. Obſ.	Locus ſolis	Log. diſt. ☉ a Terra
I.	8ˢ, 21°, 30′, 14″	4, 9 9 2 9 0 3
II.	9, 12, 48, 18	4, 9 9 2 7 2 1
III.	9, 28, 9, 37	4, 9 9 3 0 3 2

Temporis ergo intervalla inter primam & ſecundam itemque ſecundam & tertiam obſervationem erunt

Inter I & II. $20^d, 21^h, 37'$

II & III. 15, 1, 40

Exprimantur horæ cum minutis in partibus diei decimalibus, ut obtineantur valores pro litteris α & β, quæ in calculum ingrediuntur, erit

$$\alpha = 20,9008 \quad | \quad l\,\alpha = 1,320136$$
$$\beta = 15,0694 \quad | \quad l\,\beta = 1,178096$$

Delineetur jam figura his obſervationibus conveniens, ſitque tabula planum eclipticæ repræſentante, S locus ſolis, f, g, h, loca terræ in ſua orbita momentis trium obſervationum; ſit porro $f\zeta$ longitudo cometæ in obſervatione prima, $g\eta$ in ſecunda & $h\theta$ in tertia. Ductisque his lineis, quarum prima & tertia ſe in k, prima autem & ſecunda ſe in m, & ſecunda cum tertia in q interſecet, erunt cum linea tum anguli: Fig. 9.

$l\,Sf = 4,992903$	$Sf\zeta = 126°, 55', 59''$
$l\,Sg = 4,992721$	$Sg\eta = 91, 22, 52$
$l\,Sb = 4,993032$	$Sb\theta = 68, 47, 38$
$fSg = 21°, 18', 4''$	$fk\theta = 21, 28, 58$
$gSb = 15, 21, 19$	$fmg = 14, 15, 3$
$fSb = 36, 39, 28$	$g\eta b = 7, 13, 55$

His præparatis, si nota esset cometæ a terra distantia vera in observatione media, orbita cometæ posset determinari, deficiente autem hac notitia, plures distantiæ fingi debebunt, ex singulisque orbita cometæ, quam esset habiturus, deduci, ut pateat, quænam hypothesis proxime ad parabolam manuducat, quoniam tuto assumere possumus, veram cometæ orbitam parum a parabola discrepare. Siquis autem de hoc dubitet, poterit cometæ observatio quædam quarta ab assumtis satis remota in subsidium vocari, atque ex orbitis, quas singulæ hypotheses suppeditaverunt, ad hoc tempus locus cometæ supputari, quo pateat, quænam earum proxime cum observatione hac quarta conveniat. In hunc finem adhibui observationem hic in Observatorio Academico factam die 18. Febr. cum cometa stellæ Marchab esset proximus, hinc autem collecta fuit.

Temp. medio Berol.	Longitudo Cometæ	Latitudo Bor.
A. 1744. Febr. $18^{d}, 6^{h}, 43''$	$11^{s}, 19°, 57', 0''$	$19°, 10', 56''$

Hoc autem tempore erat

Locus Solis $10^{s}, 29°, 30', 40''$

& log. dist. solis a terra $= 4,995309$.

Pluribus igitur factis hypothesibus circa distantiam cometæ a terra

55', 59''
22, 52
47, 38
28, 58
15, 3
13, 55
stantia vera in
inari, deficien-
ebunt, ex sin-
deduci, ut pa-
n manuducat,
metæ orbitam
hoc dubitet,
assumtis satis
quas singulæ
locus cometæ
e cum obser-
n adhibui ob-
m die 18. Febr.
nc autem col-
Latitudo Bor.
19°, 10', 56''
am cometæ a
terra

terra in observatione media, eam maxime huic observationi satisfacere deprehendi, quæ simul proxime parabolam exhiberet. Primum quidem suspicatus sum, cum iste cometa tantopere fulgeret, eum a nobis non admodum fuisse remotum, ideoque initio hanc distantiam finxi, 20000 & 30000 posita media terræ a sole distantia 100000, hinc autem orbita prodiit elliptica parum excentrica, non multum a circulo discrepans; unde hæ hypotheses nimium a veritate abhorrebant. Majores igitur valores tribui huic distantiæ, neque prius orbita in hyperbolam abire coeperat, quam istam distantiam = 110000 posuissem; limites autem, intra quos ea distantiæ magnitudo, quæ observationi quartæ satisfaceret, inveni 101000 & 106000; sicque præter expectationem distantia cometæ a terra multo major evasit, quam initio putaveram. Cometa igitur a nobis fere æque erat remotus ac sol, & cum ejus diameter apparens æstimaretur unius circiter minuti primi, ejus diameter vera ad diametrum terræ rationem fere habebat triplam.

Sit igitur G verus cometæ locus in observatione secunda, ex quo ad eclipticam demittatur perpendiculum $G\eta$, & quoniam distantia Gg tanquam cognita assumitur, ob angulum $Gg\eta$ latitudini observatæ, 17° 32', 50'' æqualem; prodibit $G\eta = Gg.\sin Gg\eta$ & $g\eta = Gg.\cos Gg\eta$. Factis ergo binis memoratis hypothesibus, calculus sequenti modo instituatur:

Hypoth.

	Hypoth. A.	Hypoth. B.
Gg =	101000	106000
$l\,Gg$ =	5, 004321	5, 025206
add. { l fin $Gg\eta$ =	9, 479275	9, 479275
l cof. $Gg\eta$ = }	9, 979306	9, 979306
$l\,G\eta$ =	4, 483596	4, 504581
$l\,g\eta$ =	4, 983627	5, 004612

Ducatur nunc ex fole recta $S\eta$, & cum in triangulo $Sg\eta$ dentur latera Sg, $g\eta$ cum angulo intercepto $Sg\eta = 91°, 22', 52''$ erit angulorum reliquorum fumma $= 88, 37, 8$, & femifumma $= 44°, 18', 34''$ unde per trigonometriam reliqui anguli reperiuntur, quibus inventis erit $S\eta = \frac{Sg.\,\text{fin}.\,Sg\eta}{\text{fin}\,S\eta g}$.

	A.	B.
A $l\,Sg$ =	4, 992721	4, 992721
fubtr. $l\,g\eta$ =	4, 983627	5, 004612
l tang.	10, 009094	−10, 011891
anguli.	45°, 36', −½''	−45°, 47' 3''.6
fubtrahatur	45°	45°
reft. ang.	0, 36, −½	0, 47, 3. 6
l tang. =	8, 019943	8, 136401
l tang. ½ fummæ.	9, 989530	9, 989530
l tang. ½ diff.	8, 009473	8, 125931
½ diff. =	0, 35, 8	0, 45, 56
½ fumma =	44, 18, 34	44, 18, 34
$S\eta g$ =	44, 53, 42	43, 32, 38
$gS\eta$ =	43, 43, 26	45, 4, 30

Porro

	A	B
Porro eft $l\,Sg$ =	4, 992721	4, 992721
l fin $Sg\eta$ =	9, 999874	9, 999874
	4, 992595	4, 992595
fubtr. l fin $S\eta g$ =	9, 848687	9, 838162
$l\,S\eta$ =	5, 143908	5, 154433
& $S\eta$ =	139287	142703

Quia nunc in triangulo $GS\eta$ ad η rectangulo dantur latera $S\eta$ & $G\eta$, erit tang $GS\eta = \frac{G\eta}{S\eta}$ & $GS = \frac{S\eta}{\text{cof}\,GS\eta}$.

	A	B
A $l\,G\eta$ =	4, 483596	4, 504581
fubtr. $l\,S\eta$ =	5, 143908	5, 154433
l tang $GS\eta$ =	9, 339688	9, 350148
II. Lat. hel. $GS\eta$ =	12, 19,55	12, 37,23
fubtr. l cof $GS\eta$ =	9, 989861	9, 989374
a $l\,S\eta$ =	5, 143908	5, 154433
II. Dift. Com. a ☉ $l\,SG$ =	5, 154047	5, 165059

Invento puncto G, fint F & H loca cometæ vera in prima ac tertia obfervatione, & ducta corda FH fecet SG in O. Oftendi autem in differtatione mea fore intervallum $GO = \frac{2c^3\,\text{fin}\,\alpha\tau.\,\text{fin}\beta\tau}{SG^2\,\text{cof}(\alpha-\beta)\tau}$, ubi τ denotat motum terræ femidiurnum medium $29', 34''. 098$, ita ut in minutis fecundis fit $\tau = 1774, 098$, & $l\tau = 3, 248977$, hinc ob litterarum α & β valores ante datos reperiuntur anguli $\alpha\tau$ & $\beta\tau$ hoc modo:

$l\tau =$	3, 248977	
add. $\begin{cases} l\alpha = \\ l\beta = \end{cases}$	1, 320163 1, 178096	
$l\alpha\tau =$	4, 569140	
$l\beta\tau =$	4, 427073	
unde $\alpha\tau =$	37080″ =	10°, 18′, 0″
$\beta\tau =$	26734 =	7, 25, 34
$(\alpha-\beta)\tau =$	10346 =	2, 52, 26

Cum igitur c denotet distantiam solis a terra mediam = 100000, valor sagittæ GO sequenti modo definietur.

	A	B
add $\begin{cases} l \text{ sin } \alpha\tau = \\ l \text{ sin } \beta\tau = \end{cases}$	9, 252373 9, 111422	
	8, 363795	
subtr. l cos $(\alpha-\beta)\tau =$	9, 999453	
	8, 364342	
add. $l\,2\,c^3 =$	15, 301030	
	13, 665372	13, 665372
subtr. $2\,l$SG =	10, 308094	10, 330118
lGO =	3, 357278	3, 335254
add. l cos GSη =	9, 989861	9, 989374
prodibit $l\eta o$ =	3, 347139	3, 324628
unde ηo =	2224	2112
subtr. ab Sη =	139287	142703
remanebit So =	137063	140591

demisso scilicet ex puncto O in planum eclipticæ perpendiculo Oo. Nunc secet recta Sη reliquas cometæ longitudines in μ & ν, ad quæ puncta invenienda in triangulo S$f\mu$ primum dantur:

lSf =

Ob d:
Sμ =
simili 1

	A	B
lSf =	4, 992903	4, 992903
ang. S$f\mu$ =	126, 55, 59	126, 55, 59
cujus deinc.	53, 4, 1	53, 4, 1
Ob ang. gSη =	43, 43, 26	45, 4, 30
subtr. fSg =	21, 18, 4	21, 18, 4
remanebit fSμ =	22, 25, 22	23, 46, 26
qui ablatus ab Sfk =	53, 4, 1	53, 4, 1
relinquet Sμf =	30, 38, 39	29, 17, 35

Ob datos ergo omnes angulos erit $f\mu = \frac{Sf.\ \text{sin}\ fS\mu}{\text{sin}\ S\mu f}$ & $S\mu = \frac{Sf.\ \text{sin}\ Sf\mu}{\text{sin}\ S\mu f}$, unde calculus dabit

	A	B
A lSf =	4, 992903	4, 992903
subtr. l sin Sμf =	9, 707318	9, 689554
	5, 285585	5, 303349
add. $\begin{cases} l \text{ sin } fS\mu = \\ l \text{ sin } Sf\mu = \end{cases}$	9, 581424 9, 902730	9, 605443 9, 902730
$lf\mu$ =	4, 867009	4, 908792
lSμ =	5, 188315	5, 206079
Ergo $f\mu$ =	73622	81057
Sμ =	154282	160723
subtr. So =	137063	140591
restabit $o\mu$ =	17219	20132

simili modo in triangulo S$b\nu$ data reperiuntur.

lSb =	4, 993032	4, 993032
ang. S$b\nu$ =	68, 47, 38	68, 47, 38
Ejus deinceps:	111, 12, 22	111, 12, 22
Deinde ob gSη =	43, 43, 26	45, 4, 30
add. gSb =	15, 21, 19	15, 21, 19

 erit

	A	B
erit $bS\nu$ =	59, 4, 45	60, 25, 49
qui ablatus ab externo =	111, 12, 22	111, 12, 22
relinquit $S\nu b$ =	52, 7, 37	50, 46, 33

Ob datos ergo omnes angulos cum latere Sb erit $b\nu = \frac{Sb.\ \text{fin}\ bS\nu}{\text{fin}\ S\nu b}$ & $S\nu = \frac{Sb.\ \text{fin}\ Sb\nu}{\text{fin}\ S\nu b}$. Ergo

	A	B
A lSb =	4, 993032	4, 993032
fubtr. l fin $S\nu b$ =	9, 897282	9, 889121
	5, 095750	5, 103911
add. { l fin $bS\nu$ =	9, 933425	9, 939397
add. { l fin $Sb\nu$ =	9, 969548	9, 969548
$lb\nu$ =	5, 029175	5, 043308
$lS\nu$ =	5, 065298	5, 073459
Ergo $b\nu$ =	106949	110486
$S\nu$ =	116225	118429
fubtr. ab So =	137063	140591
remanebit $o\nu$ =	20838	22162

Nunc per punctum o duci debet linea recta $\zeta o \theta$, cujus partes ζo & θo fint in ratione temporum $\alpha : \beta$. Producatur ergo $o\nu$ usque ad i, ut fit $oi : \nu o = \alpha : \beta$. feu $oi = \frac{\alpha}{\beta}.\ o\nu$, tum ducatur recta $i\zeta$ parallela ipfi $b\nu$, eritque recta $\zeta o \theta$ recta quæfita.

	A	B
Ad $lo\nu$ =	4, 318856	4, 345609
add. $l\alpha : \beta$ =	0, 142067	0, 142067
loi =	4, 460923	4, 487676
Ergo oi =	28902	30738
fubtr. $o\mu$ =	17219	20132
remanebit μi =	11683	10606

Nunc

Nunc in triangulo $\mu\zeta i$ dantur omnes anguli cum latere μi

	A	B
$l\mu i$ =	4, 067565	4, 025551
ang. $\zeta\mu i$ =	30, 38, 39	29, 17, 35
$\mu\zeta i$ =	21, 28, 58	21, 28, 58
180 − $\mu i \zeta$ =	52, 7, 37	50, 46, 33

Erit ergo $\zeta\mu = \frac{\mu i.\ \text{fin}\ \mu i \zeta}{\text{fin}\ \mu\zeta i}$ & $\zeta i = \frac{\mu i.\ \text{fin}\ \zeta\mu i}{\text{fin}\ \mu\zeta i}$.

	A	B
A $l\mu i$ =	4, 067565	4, 025551
fubtr. l fin $\mu\zeta i$ =	9, 563743	9, 563743
	4, 503822	4, 461808
add. { l fin $\mu i \zeta$ =	9, 897282	9, 889121
add. { l fin $\zeta\mu i$ =	9, 707318	9, 689554
$l\zeta\mu$ =	4, 401104	4, 350929
$l\zeta i$ =	4, 211140	4, 151362
Ergo $\zeta\mu$ =	25183	22435
add. $f\mu$ =	73622	81057
erit $f\zeta$ =	98805	103492

Jam in triangulo $oi\zeta$ dantur duo latera cum angulo intercepto $oi\zeta$

	A	B
A loi =	4, 460923	4, 487676
fubtr. $l\zeta i$ =	4, 211140	4, 151362
l tang:	10, 249783	10, 336314
ang:	60, 38, 13	65, 15, 3.8
fubtr.	45	45
	15, 38, 13	20, 15, 3.8
fumma ang:	52, 7, 37	50, 46, 33
femi fumma.	26, 3, 48.5	25, 23, 16.5
l tang. femif:	9, 689401	9, 676306
l tang. ang.	9, 447002	9, 566955

l tang

	A	B
l tang femid:	9, 136403	9, 243261
femi diff.	7, 47, 43	9, 55, 52
femi fumma	26, 3, 48	25, 23, 16
$o\zeta i$ =	33, 51, 31	35, 19, 8
$\zeta o i$ =	18, 16, 5	15, 27, 24

Porro eft $o\zeta = \frac{oi.\ \text{fin}\ oi\zeta}{\text{fin}\ oi\zeta}$ unde invenitur hoc modo

Ad *l* oi =	4, 460923	4, 487676
add. *l* fin $oi\zeta$ =	9, 897282	9, 889121
	4, 358205	4, 376797
fubtr. *l* fin $o\zeta i$ =	9, 745968	9, 762022
$lo\zeta$ =	4, 612237	4, 614775

fi itaque corda $\theta\zeta$ producatur in n ob $b\theta n = o\zeta i$ erit

ang. $b\theta n$ =	33, 51, 31	35, 19, 8

Nunc ob triangula $\nu o\theta$ & $io\zeta$ fimilia erit $\theta\nu = \frac{\beta}{\alpha}.\ \zeta i$ & $\theta o = \frac{\beta}{\alpha}.\ o\zeta$, unde fequenti modo invenientur

A *l* ζi =	4, 211140	4, 151362
fubtr. *l* α: β =	0, 142067	0, 142067
l $\theta\nu$ =	4, 069073	4, 009295
$\theta\nu$ =	11724	10216
fubtr. a $b\nu$ =	106949	110486
erit $b\theta$ =	95225	100270
A *l* $b\zeta$ =	4, 612237	4, 614775
fubtr. *l* α: β	0, 142067	0, 142067
l θo =	4, 470170	4, 472708
At eft $o\zeta$ =	40948	41188
& $o\theta$ =	29524	29696
unde $\zeta\theta$ =	70472	70884

Inventis

Inver
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Inventis punctis ζ & θ ducantur rectæ $S\zeta$ & $S\theta$, ad quas inveniendas confideretur primum triangulum $Sf\zeta$, in quo ob data latera Sf & $f\zeta$ cum angulo intercepto $Sf\zeta$ inveniuntur reliqua hoc modo.

fubtr. *l* Sf =	4, 992903	4, 992903
ab *l* $f\zeta$ =	4, 994779	5, 014906
l tang:	10, 001876	10, 022003
ang:	45, 7,25.5	46, 27,2.8
	45,	45,
	0, 7,25.5	1, 27,2.8
fumma angul.	53,4, 1	53, 4,1
femi fumma	26,32,0.5	26, 32,0.5
l tang. femif.	9, 698371	9, 698371
l tang. ang.	7, 334519	8, 403571
l tang femid:	7, 032890	8, 101942
femi diff:	0, 3, 42	0,43, 28
femi fumma	26, 32,0	26, 32, 0
$fS\zeta$ =	26, 35, 42	27, 15, 28
$S\zeta f$ =	26, 28, 18	25, 48, 32

Jam erit $S\zeta = \frac{Sf.\ \text{fin}\ Sf\zeta}{\text{fin}\ S\zeta f}$, hinc fiet

l Sf =	4, 992903	4, 992903
add. *l* $S_J\zeta$ =	9, 902730	9, 902730
	4, 895633	4, 895633
fubtr. *l* fin $S\zeta f$ =	9, 649096	9, 638859
l $S\zeta$ =	5, 246537	5, 256774

Simili modo in triangulo $Sb\theta$ ob data latera Sb, $b\theta$ cum angulo intercepto invenietur:

A *l* Sb =

	A	B
A lSb =	4, 993032	4, 993032
fubtr. l $b\theta$ =	4, 978751	5, 001171
l tang:	10, 014281	−10,008139
anguli =	45,56,30,7	45, 32,12,6
fubtr. =	45	45
	0, 46,30,7	0, 32,12,6
fumma ang:	111, 12,22	111, 12,22
femi fumma =	55, 36, 11	55, 36, 11
l tang femi fum: =	10, 164540	10, 164540
l tang. ang: =	8, 131313	7, 971728
l tang. femid: =	8, 295853	8, 136268
femidiff. =	1, 7, 56	0, 47, 3
femi fumma =	55, 36, 11	55, 36, 11
bSθ =	54, 28, 15	56, 23, 14
Sθb =	56, 44, 7	54, 49, 8

Deinde cum fit $S\theta = \frac{Sb.\ \text{fin}\ S\,b\,\theta}{\text{fin}\ S\,\theta\,b}$ fiet

Ad lSb =	4, 993032	4, 993032
add. l fin S$b\theta$ =	9, 969548	9, 969548
	4, 962580	4, 962580
fubtr. l fin Sθb =	9, 922281	9, 912399
lSθ =	5, 040299	5, 050181

Ex his longitudo Cometæ heliocentrica ad tempora trium obfervationum determinabitur hoc modo.

Cum fit fSζ =	26, 35, 42	27, 15, 28
Long. terræ ad I.	2, 21,30,14	2, 21,30,14
I. Long. Cometæ helioc.	1, 24,54,32	1, 24,14,46
fubtr. gSη =	1, 13,43,26	1, 15, 4,30
a Long. terræ ad II.	3, 12,48,18	3, 12,48,18

II. Long.

II.
III.
Cum
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rectun
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Fζ &
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I. D
Eule

	A	B
II. Long. Cometæ helioc.	1, 29, 4,52	1, 27,43,48
Porro bSϑ =	1, 24,28,15	1, 26,23,14
Long. terræ ad III	3, 28, 9,37	3, 28, 9,37
III. Long. Cometæ helioc. =	2 , 3,41,22	2 , 1,46,23
Hinc erit ang. ζSϑ =	8,46,50	7,31,37

Cum igitur longitudo cometæ a prima ad tertiam obfervationem crefcat, manifeftum eft, verum cometæ motum fuiffe directum, etiamfi ex terra retrogradus apparuerit.

Deinde etiam pofitio rectæ $\zeta\theta$ refpectu linearum Sζ & Sθ cognofcetur, hac linea ultra θ in n producenda

Cum enim fit $b\vartheta n$ =	33, 51, 31	35, 19, 8
fubtr. ab Sϑb =	56, 44, 7	54, 49, 8
erit Sϑn =	22, 52, 36	19, 30, 0
fubtr. ϑSζ =	8, 46, 50	7, 31, 37
prodit ang. Sζn =	14 , 5,46	11, 58,23

Ex latitudinibus nunc geocentricis, inveniuntur perpendicula Fζ & Hθ, cum veris cometæ a terra diftantiis Ff, Hb: Erit enim $F\zeta = f\zeta$. tang lat. I. $Ff = \frac{f\zeta}{\text{cof. lat. I.}}$: atque $H\theta = b\theta$ tang lat. III. & $Hb = \frac{b\theta}{\text{cof. lat. III.}}$.

$lf\zeta$ =	3, 994779	5, 014906
add. l tang. lat. I	9, 433580	9, 433580
fubtr. l cof lat. I	9, 984569	9, 984569
erit lFζ =	4, 428359	4, 448486
& lFf =	5, 010210	5, 030337
Hinc fit Fζ =	26813	28085
I. Dift. Com. a terra Ff =	102379	107235

Porro

	A	B
Porro *l*bϑ =	4, 978751	5, 001171
add. *l* tang lat. III =	9, 527485	9, 527485
fubtr. *l* cof lat. III =	9, 976656	9, 976656
erit *l*Hϑ =	4, 506236	4, 529656
& *l*Hb =	5, 002095	5, 024515
Hinc fit Hϑ =	32080	33780
III. Dift. Com. a terra Hb =	100484	105807
II. Dift. Com. a terra Gg =	101000	106000

Cognitis nunc perpendiculis Hϑ & Fζ, producatur recta HF, donec cum ϑζ prolongata concurrat in N, eritque recta SN linea nodorum cometæ: erit autem $\frac{H\vartheta - F\zeta}{\zeta\vartheta}$ $= \text{tang } HN\vartheta$ & $\vartheta N = \frac{H\vartheta}{\text{tang } HN\vartheta}$: Ergo

	A	B
A Hϑ =	32080	33780
fubtr. Fζ =	26813	28085
erit Hϑ − Fζ =	5267	5695
& *l*(Hϑ − Fζ) =	3, 721563	3, 755494
fubtr. *l*ζϑ =	4, 848017	4, 850548
l tang HNϑ =	8, 873546	8, 904946
fubtr. a *l*Hϑ =	4, 506236	4, 528656
*l*ϑN =	5, 632690	5, 623710

Confideretur nunc triangulum SϑN, in quo cum dentur latera Sϑ. ϑN cum angulo intercepto, reperietur angulus ϑSN.

	A	B
A *l*ϑN =	4, 632690	5, 623710
fubtr. *l*Sϑ =	5, 040299	5, 050181

l tang.

III
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	A	B
l tang.	10, 592391	10, 573529
ang.	75, 39, 39	75, 3, 7
fubtr.	45	45
	30, 39, 39	30, 3, 7
fumma ang: Sϑn =	22, 52, 36	19, 30, 0
femi fumma =	11, 26, 18	9, 45, 0
l tang femif: =	9, 306063	9, 235102
l tang ang: =	9, 772930	9, 762348
l tang femid: =	9, 078993	8, 997450
Ergo femid:	6, 50, 23	5, 40, 38
femif:	11, 26, 18	9, 45, 0
Ang. ϑSN =	18, 16, 41	15, 25, 38
III. Long. helioc. puncti ϑ =	2, 3, 41, 22	2, 1, 46, 23
Longit. Nodi Afcend: ☊ =	1, 15, 24, 41	1, 16, 20, 45

Demittatur nunc ex ϑ in lineam nodorum SN perpendiculum ϑP, ductaque HP erit angulus HPϑ æqualis inclinationi orbitæ cometæ ad Eclipticam; Fiet autem ϑP = Sϑ fin ϑSN & tang. $HP\vartheta = \frac{H\vartheta}{\vartheta P}$.

	A	B
Ad *l*Sϑ =	5, 040299	5, 050181
add. *l* fin ϑSN =	9, 496415	9, 424905
*l*ϑP =	4, 536714	4, 475086
a *l*Hϑ =	4, 506236	4, 528656
l tang HPϑ =	9, 969522	10, 053570
Ergo ang. HPϑ =	42, 59, 28	48, 31, 29
ideoque Inclinatio Orbitæ Cometæ ad Eclipticam =	42, 59, 28	48, 31, 29

Deter-

Determinemus nunc quoque latitudines cometæ heliocentricas; quæ erunt: tang. $FS\zeta = \frac{F\zeta}{S\zeta}$ & tang $HS\vartheta = \frac{H\vartheta}{S\vartheta}$. Diſtantiæ vero cometæ a Sole erunt $SF = \frac{S\zeta}{\text{cof} FS\zeta}$ & $SH = \frac{S\vartheta}{\text{cof} HS\vartheta}$.

A $l F\zeta$ =	4, 428359	4, 448486
ſubtr. $l S\zeta$ =	5, 246537	5, 256774
l tang. $FS\zeta$ =	9, 181822	9, 191712
I. Lat. helioc. $FS\zeta$ =	8, 38, 32	8, 50, 18
A $l S\zeta$ =	5, 246537	5, 256774
ſubtr. l cof $FS\zeta$ =	9, 995040	9, 994813
I. Diſt. Com. a Sole $l SF$ =	5, 251497	5, 261961
A $l H\vartheta$ =	4, 506236	4, 528656
ſubtr. $l S\vartheta$ =	5, 040299	5, 050181
l tang $HS\vartheta$ =	9, 465937	9, 478475
III. Lat. helioc. $HS\vartheta$ =	16, 17,51	16, 44,54
A $l S\vartheta$ =	5, 040299	5, 050181
ſubtr. l cof $HS\vartheta$ =	9, 982188	9, 981175
III. Diſt. Com. a Sole. $l SH$ =	5, 058111	5, 069006

Determinemus nunc quoque elongationes cometæ heliocentricas a nodo aſcendente ſeu linea SN, eritque cof FSN = cof FSζ. cof ζSN & cof HSN = cof HSϑ. cof ϑSN.

A ϑSN =	18, 16, 41	15, 25, 38
ſubtr. ϑSζ =	8, 46, 50	7, 31, 37
remanet ζSN =	9, 29, 51	7, 54, 1
l cof FSζ =	9, 995040	9, 994813
l cof ζSN =	9, 994006	9, 995858

l cof FSN =

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	A	B
l cof FSN =	9, 989046	9, 990671
Ergo ang. FSN =	12, 48, 52	11, 49, 59
l cof HSϑ =	9, 982188	9, 981175
l cof ϑSN =	9, 977516	9, 984063
l cof HSN =	9, 959704	9, 965238
Ergo ang. HSN =	24, 18, 6	22, 37, 11
ſubtr. FSN =	12, 48, 52	11, 49, 59
Erit ang. FSH =	11, 29, 14	10, 47, 12

Quoniam igitur duo habemus puncta cometæ in orbita vera, nempe F & H, quorum diſtantiæ a foco S una cum angulo FSH ſunt cognitæ, hinc naturam orbitæ determinare poterimus. Quia vero SH < SF apparet cometam his obſervationum temporibus ad ſuum Perihelium acceſſiſſe. Sit igitur AHF vera orbita cometæ, circa focum S, quem ſol occupat, deſcripta, cujus vertex ſeu perihelium ſit in A. Sit diſtantia perihelii a ſole $AS = a$. applicata ex foco S ad axem normalis ſeu ſemilatus rectum $SB = b$, anomalia vera ſeu angulus $ASH = v$; tum vero ponantur cognita $SH = y$; $SF = z$; & angulus $FSH = \Phi$. atque tempus, quo cometa ſpatium FH percurrit, in diebus expreſſum ſit $= T$. Ex his primum invenitur ſemilatus rectum $b = \frac{y^2 z^2}{4m^2 T^2} (\text{ſin}\,\Phi)^2 + \frac{Vyz}{3} (\text{ſin}\,\Phi)^2$ exiſtente $m = 271989,735$ & $lm = 5,4345525$. hincque $l2m = 5,7355825$. Deinde ſit tang $v = \text{cot}\,\Phi - \frac{(z-b)y}{(y-b)z\,\text{ſin}\,\Phi}$. tandemque $a = \frac{by\,\text{cof}\,v}{b-y+y\,\text{cof}\,v}$. Ponatur poſtea $\frac{2a-b}{b} = n$; Fig. 10.

tangens-

tangensque anguli $\frac{1}{2} v = t$ fietque, si orbita proxime ad parabolam accedat, tempus quo cometa a loco H in perihelium A pervenit

$$\frac{aa}{m\sqrt{b}}\left(t + \tfrac{1}{3}t^3 - \tfrac{2}{5}nt^5 + \tfrac{3}{7}n^2 t^7 - \tfrac{4}{9}n^3 t^9 + \&c. \atop + \tfrac{3}{7}n^2t^5 - \tfrac{4}{7}n^3t^7 + \tfrac{5}{9}n^4t^9 - \&c.\right)$$

quod tempus erit expressum in diebus, dieique partibus decimalibus. Quia igitur tempus tertiæ observationis, quo cometa in puncto H hæsit, cognitum est, hinc momentum, quo per perihelium transiit cognoscitur.

	A.	B.
Erit ergo $l y$ =	5, 058111	5, 069006
$l z$ =	5, 251497	5, 261961
$l y z$ =	10, 309608	10, 330967
$T = \alpha + \beta$ =	35, 9702	
$l T$ =	1, 555941	
Φ =	11, 29, 14	10, 47, 12
l sin Φ =	9, 299178	9, 272196
$l T^2$ =	3, 111882	
$l\, 4 m^2$ =	11, 471165	
$l\, 4 m^2 T^2$ =	14, 583047	
$l\, y^2 z^2$ =	20, 619216	20, 661934
add. $2\, l$ sin Φ =	8, 598356	8, 544392
	19, 217572	19, 206326
subtr. $l\, 4 m^2 T^2$ =	14, 583047	14, 583047
l Partis prior. =	4, 634525	4, 623279
$l \sqrt{y z}$ =	5, 154804	5, 165484
add. $2\, l$ sin Φ =	8, 598356	8, 544392
	3, 753160	3, 709876
subtr. $l\, 3$	0, 477121	0, 477121

l part.

	A	B
l part. post. =	3, 276039	3, 232755
Pars prior =	43105	42003
Pars post. =	1888	1709
b =	44993	43712
y =	114317	117221
z =	178442	182794
$y - b$ =	69324	73509
$z - b$ =	133449	139082
A $l\,(z-b)$ =	5, 125316	5, 143270
subtr. $l\,(y-b)$ =	4, 840884	4, 866341
	0, 284432	0, 276929
add. $l\,\frac{y}{z}$ =	9, 806614	9, 807045
	0, 091046	0, 083974
subtr. l sin Φ =	9, 299178	9, 272196
l part. subtr. =	0, 791868	0, 811778
Pars subtr. =	6, 19253	6, 48303
a cot Φ =	4, 92077	5, 24883
— tang v =	1, 27176	1, 23420
Ergo 180 — v =	51, 49, 18	50, 59, 3
& anomalia vera v =	128, 10, 42	129, 0, 57
ideoque ang. ASH =	4', 8, 10, 42	4, 9, 0, 57
add. HSN =	24, 18, 6	22, 37, 11
Dist. Perihelii a Nodo ☊:	5, 2, 28, 48	5, 1, 38, 8
Dist. ☋ a perihelio =	27, 31, 12	28, 21, 52
l — cos v =	9, 791067	9, 799021
$l\, y$ =	5, 058111	5, 069006
l — y cos v =	4, 849178	4, 868027
add. $l\, b$ =	4, 653145	4, 640601
l — Numer;	9, 502323	9, 508628

—y cos v

	A	B
$-y \cos v$ =	70661	73795
add. $y - b$ =	69324	73509
$-b + y - y \cos v$ =	139985	147304
l — Denom. =	5, 146081	5, 168214
a l — Num. =	9, 502323	9, 508628
$l\,a$ =	4, 356242	4, 340414
Dist. Perih. a Sole a =	22711	21898
hinc $2a$ =	45422	43796
b =	44993	43712
$2a - b$ =	429	84
$l\,(2a-b)$ =	2, 632458	1, 924280
subtr. $l\,b$ =	4, 653145	4, 640601
$l\,n$ =	7, 979313	7, 283679
$l\,aa$ =	8, 712484	8, 680828
subtr. $l\sqrt{b}$ =	2, 326572	2, 320300
	6, 385912	6, 360528
subtr. $l\,m$ =	5, 434553	5, 434553
$l\,\frac{aa}{m\sqrt{b}}$ =	0, 951359	0, 925975
Ob v =	128, 10, 42	129, 0, 57
erit $\frac{1}{2}v$ =	64, 5, 21	64, 30, 28
& $l\,t$ =	0, 313536	0, 321655
$l\,t^2$ =	0, 627072	0, 643310
$l\,t^3$ =	0, 940608	0, 964965
$l\,t^5$ =	1, 567680	1, 608275
$l\,t^7$ =	2, 194752	2, 251585
$l\,t^9$ =	2, 821824	2, 894895
$l\,n\,t^5$ =	9, 546993	8, 891954
$l\,n^2 t^5$ =	7, 526306	6, 175633

$l\,n^2 t^7 =$

subtr. $\frac{3}{5} n t^5$
add. $\frac{3}{5} n^2$
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	A	B
$l\,n^2 t^7$ =	8, 153378	6, 818943
$l\,n^3 t^7$ =	6, 132691	4, 102622
$l\,n^3 t^9$ =	6, 759763	4, 745932
Ergo t =	2, 05843	2, 09727
$+\frac{1}{3}t^3$ =	2, 90728	3, 07499
	4, 96571	5, 17226
subtr. $\frac{3}{5} n t^5 + \frac{4}{7} n^3 t^7 + \frac{1}{9} n^3 t^9$ =	0, 14126	0, 03119
	4, 82445	5, 14107
add. $\frac{3}{5} n^2 t^5 + \frac{3}{7} n^2 t^7 +$ &c. =	811	9
$t + \frac{1}{3} t^3 +$ &c. =	4, 83256	5, 14116
$l\,(t + \frac{1}{3} t^3 +$ &c. =	0, 684177	0, 711062
add. $l\,\frac{aa}{m\sqrt{b}}$ =	0, 951359	0, 925975
l temp. =	1, 635536	1, 637037
Temp. =	43, 205	43, 355
seu	$43^d, 4^h, 55'$	$43^d, 8^h, 31'$
At tertia Observ. Jan.	18, 7, 57	18, 7, 57
Cometa in Perih. Mart.	1, 12,52	1^d,16,28

Orbita ergo Cometæ sequentibus sex momentis determinabitur :

		A	B
Pro hypoth. G g	=	101000	106000
1. Distantia Perihelii a Sole seu a	=	22711	21898
& $l\,a$	=	4, 356242	4, 340414
2. Semilatus rectum orbitæ seu b	=	44993	43712
& $l\,b$	=	4, 653145	4, 640601

3. Cometa

	A	B
3. Cometa per perihelium tranſiit A. 1744 Menſe Martio Temp. medio Berol.	$1^d, 12^h, 52'$	$1^d, 16^h, 28'$
4. Diſtantia Perihelii a nodo aſcendente ☊ =	$152°, 28', 48''$	$151°, 38', 8''$
Hinc a Perihelio ad nodum deſcendentem ☋ = eſt anomalia vera =	27, 31, 12	28, 21, 52
5. Longitudo heliocentrica Nodi aſcend.	$1^s, 15°, 24', 41''$	$1^s, 16°, 20', 45''$
longitudo heliocentrica nodi deſcendentis =	$7^s, 15°, 24', 41''$	$7^s, 16°, 20', 45''$
6. Inclinatio Orbitæ Cometæ ad Eclipticam	$42°, 59', 28''$	$48°, 31', 29''$

Mox autem apparebit veram Cometæ orbitam intra hos duos limites tam parum a ſe invicem diſcrepantes contineri.

Computetur ergo ex utroque limite locus cometæ ad tempus obſervationis factæ d. 18 Febr. quæ adhuc ante appulſum ad perihelium contigit. Quæratur igitur primo intervallum temporis inter tranſitum cometæ per perihelium & momentum obſervationis, idque in diebus, diei que partibus decimalibus exprimatur, quod deinde vocetur = T.

	A	B
Perihel. Cometæ Mart.	$1^d, 12^h, 52'$	$1^d, 16^h, 28'$
ſubtrahatur Febr.	18, 6, 43	18, 6, 43
	12, 6, 9	12, 9, 45
Ergo eſt T =	12, 25 62	12, 40 62
& lT =	1, 088355	1, 093639

Ponatur

Pōnatu
ſitque tang.
Quoniam
ex tabula m
ſeu areæ p
$\theta + \frac{1}{3}\theta^3$
& quia t ve
erit $\rho = q +$
me $q = (\frac{2}{5}n -$
Ita ergo cal
Erg

Pōnatur anomalia vera huic tempori reſpondens $= v$, ſitque tang. $\frac{1}{2}v = t$, erit $T = \frac{aa}{m\sqrt{b}}\left(t + \frac{1}{3}t^3 - \frac{2}{5}n\,t^5 + \frac{1}{5}n^2 t^5 \text{ \&c.}\right)$

Quoniam orbita parum a parabola diſcrepat, quæratur ex tabula motus in parabola θ, ut ſit $\theta + \frac{1}{3}\theta^3 = \frac{m\sqrt{b}}{aa}.T$ ſeu areæ parabolicæ; quo valore ipſius θ invento erit

$$\theta + \frac{1}{3}\theta^3 = t + \frac{1}{3}t^3 - \frac{2}{5}n\,t^5 + \frac{3}{7}n^2 t^7 - \text{\&c.} + \frac{2}{5}n^2 t^5 - \frac{3}{7}n^3 t^7 +$$

& quia t vehementer parum a θ diſcrepat, ponatur $t = \theta + q$ erit $o = q + \theta\theta q - \frac{2}{5}n\,\theta^5 + \frac{3}{7}n^2\theta^7 - \text{\&c.} + \frac{2}{5}n^2\theta^5 - \frac{3}{7}n^3\theta^7 +$ ideoque fiet proxime

$$q = \frac{(\frac{2}{5}n - \frac{2}{5}n^2)\theta^5 - (\frac{3}{7}n^2 - \frac{4}{7}n^3)\theta^7 + (\frac{4}{9}n^3 - \frac{5}{9}n^4)\theta^9 - \text{\&c.}}{1 + \theta\theta}$$

Ita ergo calculus inſtituatur:

	A	B
lT =	1, 088355	1, 093639
ſubtr. $l\frac{aa}{m\sqrt{b}}$ =	0, 951359	0, 925975
$l(\theta + \frac{1}{3}\theta^3)$ =	0, 136996	0, 167664
Ergo 2 A tang θ =	$91°, 3', 20''$	$93°, 41', 55''$
& A tang θ =	45°, 31, 40	46, 50, 57
& $l\theta$ =	0, 008001	0, 028052
$l\theta^2$ =	0, 016002	0, 056104
$l\theta^5$ =	0, 040005	0, 140260
$l n$ =	7, 979313	7, 283679
$l n\theta^5$ =	8, 019318	7, 423939
$l n^2\theta^5$ =	5, 998631	4, 707618
$l n^2\theta^7$ =		

	A	B
$l n^2 \theta^7$ =	6, 014633	4, 763722
$l n^3 \theta^7$ =	3, 977946	
$+ \frac{2}{3} n \theta^5$ =	0, 004182	0, 001062
$- \frac{2}{3} n^2 \theta^5$ =	59	3
	0, 004123	0, 001059
$- \frac{1}{7} n^2 \theta^7$ =	44	3
Numerator =	0, 004079	0, 001056
θ^2 =	1, 037535	1, 137900
Denom $1 + \theta^2$ =	2, 037535	2, 137900
l Numerat. =	7, 610554	7, 023664
l denom. =	0, 309104	0, 329987
l q =	7, 301450	6, 693677
q =	0, 002002	0, 000494
θ =	1, 018595	1, 066725
t =	1, 020597	1, 067219
Ergo $\frac{1}{2} v$ =	45, 35, 2	46, 51, 45
Anomalia vera *v* =	91, 10, 4	93, 43, 30
Perihelium a Nodo afcend. =	152, 28, 48	151, 38, 8
Dift. Cometæ a Nodo =	61, 18, 44	57, 54, 38

Porro diftantia cometæ a Sole eft $= \frac{b}{1 + \frac{b-a}{a} \operatorname{cof} v}$.

	A	B
Ergo a *b* =	44993	43712
fubtr. *a* =	22711	21898
b—*a* =	22282	21814
l (*b*—*a*) =	4, 347954	4, 338735
fubtr. *l a* =	4, 356242	4, 340414
erit $l \frac{(b-a)}{a}$ =	9, 991712	9, 998321
add. *l*—cof *v*. =	8, 309196	8, 812697

l a—*b*

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	A	B
$l \frac{a-b}{a} \operatorname{cof} v$ =	8, 300908	8, 811018
$-\frac{b+a}{a} \operatorname{cof} v$ =	0, 019994	0, 064717
Denomin.	0, 980005	0, 935282
l b =	4, 653145	4, 640601
l Denom. =	9, 991228	9, 970942
l Dift. Com. a Sole =	4, 661917	4, 669659

Refolvendum nunc eft triangulum fphæricum ΩC*c*, in quo eft CΩ diftantia cometæ a nodo afcendente, & angulus Ω inclinatio orbitæ ad Eclipticam. Erit vero fin C*c* = fin ΩC. fin Ω & tang Ω*c* = tang ΩC. cof Ω. Fig. 11

	A	B
ΩC =	61, 18, 44	57, 54, 38
ang. Ω =	42, 59, 28	48, 31, 29
l fin ΩC =	9, 943122	9, 927995
l fin Ω =	9, 833710	9, 874621
l tang ΩC =	9, 776832	9, 802616
l cof Ω =	10, 261847	10, 202702
l tang ΩC. =	9, 864190	9, 821052
l fin C*c* =	10, 126037	10, 023754
Ergo lat. helioc. C*c* =	36, 44, 20	39, 24, 10
& ΩC =	1, 23, 12, 0	1, 16, 34, 0
addatur longitudo Ω =	1, 15, 24, 41	1, 16, 20, 45
Long. helioc. Cometæ =	3, 8, 36, 41	3, 2, 54, 45
Long. helioc. terræ =	4, 29, 30, 40	1, 29, 30, 40
Ang. TS*c* =	1, 20, 53, 59	1, 26, 35, 55
fumma ang. =	129, 6, 1	123, 24, 5
femi fumma =	64, 33, 0	61, 42, 2
l SC =	4, 661917	4, 669659
l fin CS*c* =	9, 776824	9, 802615
l cof CS*c* =	9, 903833	9, 888012

Fig. 12.

l C*c* =

	A	B
l Cc =	4, 438741	4, 472274
l Sc =	4, 565750	4, 557671
a lST =	4, 995309	4, 995309
l tang: =	10, 429559	10, 437638
ang:	69,35,57	69,56,42
fubtr.	45	45
	24,35,57	24,56,42
l tang:	9, 660692	9, 667583
l tang ½ fummæ:	10, 322480	10, 268869
l tang femid:	9, 983172	9, 936452
femi diff:	43,53,25	40,49,25
femi fumma:	64,33, 0	61,42, 2
ang. STc =	20,39,35	20,52,37
Addatur longitudo Solis	10,29,30,40	10,29,30,40
Longitudo Cometæ Geoc.	11,20,10,15	11,20,23,17

Cum igitur longitudo cometæ obfervata fit: 11′, 19°, 57′, 0″ vera orbita extra hos limites cadere videtur, ita ut ftatui deberet Gg = 96000. Videamus ergo quoque latitudinem, eft autem Tc = $\frac{\text{S}c\,\text{fin}\,\text{TS}c}{\text{fin}\,\text{ST}c}$.

l Sc =	4, 565750	4, 557671
fub l fin STc =	9, 547550	9, 551890
	5, 018200	5, 005781
add l fin TSc =	9, 889887	9, 921600
l Tc =	4, 908087	4, 927381
a l Cc =	4, 438741	4, 472274
l tang lat:	9, 530654	9, 544893
Lat. Geocentrica:	18°,44′,50″	19°,19′,30″

Cum

Cum igitur 2274 orbita vera 7671 autem latitu 5309 autem utriq 7638 utramque a 56,42 orbitam con 56,42 que error ir 7583 etiamfi fit m 8869 ferat, plus 6452 xime ad ver 19,25 42, 2 Interim 52,37 cometæ neq 30,40 vehementer 23,17 dicum. videtur, tum femi a quoque 7671 1890 5781 1600 7381 2274 Hinc 4893 cum C at ,30″ Cometa den quam Merc Cum

Cum igitur latitudo geocentrica effet obfervata 19°, 10′, 56″, orbita vera intra limites hofce contineri deberet: Videtur autem latitudini plus fidi oportere, quam longitudini; fin autem utrique æqualiter fidere velimus, aberrationesque in utramque æqualiter diftribuere, tum hypothefis A veram orbitam cometæ præbere effet cenfenda. Quoniam vero quoque error in obfervationibus tribus affumtis ineffe poteft, qui etiamfi fit minimus, tamen notabile difcrimen in orbitam inferat, plus affirmare non licet, quam hos duos limites proxime ad veritatem accedere.

Interim tamen hoc tuto concludi poffe videtur, orbitam cometæ neque hyperbolam effe, neque parabolam, fed ellipfin vehementer oblongam: unde ftatum habebit tempus periodicum. Erit enim diftantia aphelii a fole = $\frac{ab}{2a-b}$, tum femi axis transverfus = $\frac{aa}{2a-b}$ = e

	A	B
Ergo a $2la$ =	8, 712484	4, 680828
fubtr. $l(2a-b)$ =	2, 632458	1, 924280
le	6, 080026	6, 756548
$l\sqrt{e}$ =	3, 040013	3, 378274
unde $le\sqrt{e}$ =	9, 120039	10, 134822
fubtr. $le\sqrt{e}$ =	7, 500000	7, 500000
Hinc tempus periodicum Cometæ prodiret annorum:	1, 620039	2, 634822
	41, $\frac{68}{100}$	431, $\frac{34}{100}$

Cometa denique in fuo perihelio propius ad folem acceffit, quam Mercurius, dum in fuo perihelio verfatur. Hoc enim

tempore

tempore distantia mercurii a sole est = 30740, & quia medium inter utramque hypothesin sumendo distantia Cometæ in perihelio erat circiter 22000, illa ad hanc rationem proxime habebit ut 7 ad 5.

Definiamus vero adhuc tempus, quo cometa per suum nodum descendentem transierit; quo tempore erat ejus anomalia vera.

	A	B
$v =$	27°,31′,12″	28°,21′,52″

Cum autem angulus $\frac{1}{2}v$ fiat satis parvus, valor ipsius $t + \frac{1}{3}t^3 +$ &c. proxime ex hypothesi parabolæ reperietur fietque.

	A	B
$l\,(t + \frac{1}{3}t^3 +$ &c.$)$ =	9, 397478	9, 411748
add $l\,\frac{aa}{m\sqrt{b}}$ =	0, 951359	0, 925975
	0, 348837	0, 337723
Tempus a Perihelio in diebus =	2, 2327	2, 1764
seu =	$2^d,5^h,45'$	$2^d,4^h,13'$
Addatur temp. Perih. Mart.	1, 12, 52	1, 16, 28
Cometæ per nodum descendentem transiit A. 1744 Martio	$3^d,18^h,37$	$3^d,20^h,41'$

Quare cometa die quarto mensis martii circa ortum solis per eclipticam austrum versus est transgressus; motus ergo circa solem fuit celerrimus, quia duobus diebus fere 30 gradus in orbita sua absolvit. Tempus quo Cometa per nodum ascendentem transiit tam accurate definiri nequit, quia ob ingentem anomaliam veram 151°, minimus error in orbita ingens discrimen producere valet. Interim ex limite B colligitur cometa per nodum ascendentem transiisse. A. 1743. Mensis Augusti die septimo.

Quan-

Q 40, & quia
ta antia Come-
tic æ rationem
ex
ad a per suum
fer rat ejus ano-
pa B
dit 28°,21′,52″
+ ⅓ t³ + &c.
, 411748
, 925975
, 337723
2, 1764
′,4ʰ,13′
, 16, 28
Ut
co
orl ′,20ʰ,41′
I m solis per
2 ergo circa
gradus in
1′ dum ascen-
1 ; ob ingen-
1′ bita ingens
B colligi.
Hi -43. Mensis
Quan-

Quanquam orbita cometæ hoc modo inventa parum a veritate discrepat, tamen per easdem, quibus usus sum observationes multo accuratius potest determinari eo modo, quem exposui in Miscell. Berol. Volumine VII. ubi ostendi, quemadmodum, si orbita cometæ jam fere sit cognita, ea per observationes corrigi debeat. Fingamus ergo orbitam a veritate parum discrepantem parabolicam; quæ contineatur his conditionibus

	Orbita ficta	sitque orbita vera
Perihel. a sole	22000	$22000 - \alpha$
ratio $b : a$	2 : 1	$2 - \frac{\beta}{10000} : 1$
Com. in Perih. Mart.	$1^d, 6^h, 0'$	$1^d, 6^h, \gamma'$
Dist. Perih. a ☊	151°,	151°, δ'
Long. hel. ☊	1ˢ, 16°	1ˢ, 16° − ε'
Incl. Orbitæ	45°	$45° + \zeta$

Ut jam valores litterarum α, β, γ, δ, ε & ζ determinem, sex constituo hypotheses, quarum quælibet unica conditione ab orbita ficta discrepet. sintque:

Hyp. I	Hyp. II	Hyp. III	Hyp. IV	Hyp. V	Hyp. VI
22000	22000	22000	22000	21000	22000
2:1	2:1	2:1	2:1	2:1	$2 - \frac{50}{10000} : 1$
$1^d, 6^h$	$1^d, 6^h$,	$1^d, 6^h$	$1^d, 18^h$	$1^d, 6^h$	$1^d, 6^h$
151°	151°	152°	151°	151°	151°
1ˢ, 16°	1ˢ, 15°	1ˢ, 16°	1ˢ, 16°	1ˢ, 16°	1ˢ, 16°
50°	45°	45°	45°	45°	45°

His constitutis eligo quatuor observationes omni cura institututas, ad earumque tempora ex ficta orbita atque ex hypothesibus investigo longitudinem & latitudinem geocentricam cometæ; atque ex discrimine singularum hypothesium ab orbita ficta colligi poterit locus cometæ, quem orbita vera esset datura; qui cum observato comparatus dabit æquationem. Quoniam vero tantum sex opus est æquationibus, ex quatuor illis observationibus duas latitudines rejiciamus, quippe quæ per reliqua sponte determinantur. Hoc modo cum absolvissem calculum satis molestum, quem ob prolixitatem hic prætermitto, sex sequentes æquationes sum adeptus:

I. Ex longitudine Dec. $13^d, 8^h, 40'$ observata:

$$483\zeta + 9383\epsilon - 6366\delta - 46\gamma + 335\alpha + 4220\beta - 41000 = 0$$

II. Ex longitudine Jan. $3^d, 6^h, 17'$ observata

$$1550\zeta + 6116\epsilon - 3716\delta - 130\gamma + 179\alpha + 3620\beta - 124000 = 0$$

III. Ex latitudine Jan. $3^d, 6^h, 17'$ observata

$$1260\zeta - 1566\epsilon + 6866\delta - 88\gamma - 495\alpha - 1380\beta - 421000 = 0$$

IV. Ex longitudine Jan. $18^d, 7^h, 57'$ observata

$$1517\zeta + 3883\epsilon - 1233\delta - 188\gamma + 63\alpha + 2640\beta - 156000 = 0$$

V. Ex latitudine Jan. $18^d, 7^h, 57'$ observata

$$1257\zeta - 1566\epsilon + 5583\delta - 86\gamma - 459\alpha - 1100\beta - 378000 = 0$$

VI. Ex longitudine Febr. $18^d, 6^h, 43'$ observata

$$1140\zeta - 1817\epsilon + 1733\delta - 544\gamma - 250\alpha + 560\beta - 131000 = 0$$

Ex his sex æquationibus oriuntur sex sequentes valores ipsius ζ.

$0 = \zeta$

$$0 = \zeta + 19{,}426\epsilon - 13{,}180\delta - 0{,}0952\gamma + 0{,}6936\alpha + 8{,}737\beta - 84{,}886$$
$$0 = \zeta + 3{,}946\epsilon - 2{,}397\delta - 0{,}0838\gamma + 0{,}1154\alpha + 2{,}335\beta - 80{,}000$$
$$0 = \zeta - 1{,}243\epsilon + 5{,}449\delta - 0{,}0705\gamma - 0{,}3930\alpha - 1{,}100\beta - 334{,}127$$
$$0 = \zeta + 2{,}559\epsilon - 9{,}813\delta - 0{,}1239\gamma + 0{,}0415\alpha + 1{,}740\beta - 102{,}834$$
$$0 = \zeta - 1{,}246\epsilon + 4{,}442\delta - 0{,}0684\gamma - 0{,}3651\alpha - 0{,}875\beta - 300{,}716$$
$$0 = \zeta - 1{,}594\epsilon + 1{,}520\delta - 0{,}4772\gamma - 0{,}2193\alpha + 0{,}291\beta - 114{,}912$$

subtrahantur singulæ æquationes a prima eritque

$$0 = 15{,}480\epsilon - 10{,}783\delta - 0{,}0114\gamma + 0{,}5782\alpha + 6{,}402\beta - 4{,}886$$
$$0 = 20{,}699\epsilon - 18{,}629\delta - 0{,}0247\gamma + 1{,}0866\alpha + 9{,}837\beta + 249{,}241$$
$$0 = 16{,}867\epsilon - 12{,}367\delta + 0{,}0287\gamma + 0{,}6521\alpha + 6{,}997\beta + 17{,}948$$
$$0 = 20{,}672\epsilon - 17{,}622\delta - 0{,}0268\gamma + 1{,}0587\alpha + 9{,}612\beta + 215{,}830$$
$$0 = 21{,}020\epsilon - 14{,}700\delta + 0{,}3820\gamma + 0{,}9189\alpha + 8{,}246\beta + 30{,}026$$

hinc oriuntur quinque valores pro ϵ.

$$0 = \epsilon - 0{,}6966\delta - 0{,}0007\gamma + 0{,}0373\alpha + 0{,}4135\beta - 0{,}3156$$
$$0 = \epsilon - 0{,}9013\delta - 0{,}0012\gamma + 0{,}0526\alpha + 0{,}4776\beta + 12{,}0587$$
$$0 = \epsilon - 0{,}7332\delta + 0{,}0017\gamma + 0{,}0387\alpha + 0{,}4148\beta + 1{,}0641$$
$$0 = \epsilon - 0{,}8525\delta - 0{,}0013\gamma + 0{,}0512\alpha + 0{,}4650\beta + 10{,}4410$$
$$0 = \epsilon - 0{,}6993\delta + 0{,}0182\gamma + 0{,}0437\alpha + 0{,}3923\beta + 1{,}4284$$

Subtrahantur ab ultimo omnes reliqui, atque orientur quatuor sequentes æquationes.

$$0 = 0{,}0189\gamma - 0{,}0027\delta + 0{,}0064\alpha - 0{,}0212\beta + 1{,}7440$$
$$0 = 0{,}0194\gamma + 0{,}2020\delta - 0{,}0089\alpha - 0{,}0853\beta - 10{,}6303$$
$$0 = 0{,}0165\gamma + 0{,}0339\delta + 0{,}0050\alpha - 0{,}0225\beta + 0{,}3643$$
$$0 = 0{,}0195\gamma + 0{,}1532\delta - 0{,}0075\alpha - 0{,}0727\beta - 9{,}0126$$

 inveni-

inveniuntur ergo quatuor valores pro γ.

$$0 = \gamma - 0{,}1428\,\delta + 0{,}3386\,\alpha - 1{,}1217\,\beta + 92{,}275$$
$$0 = \gamma + 10{,}4124\,\delta - 0{,}4587\,\alpha - 4{,}4890\,\beta - 547{,}950$$
$$0 = \gamma + 0{,}2054\,\delta - 0{,}3030\,\alpha - 1{,}3036\,\beta + 22{,}078$$
$$0 = \gamma + 7{,}8564\,\delta - 0{,}3846\,\alpha - 3{,}7282\,\beta - 162{,}485$$

Subtrahantur prima ac tertia a secunda itemque prima a quarta.

$$0 = 10{,}5552\,\delta - 0{,}7973\,\alpha - 3{,}3673\,\beta - 640{,}225$$
$$0 = 10{,}2070\,\delta - 0{,}7617\,\alpha - 3{,}1254\,\beta - 570{,}028$$
$$0 = 7{,}9992\,\delta - 0{,}7232\,\alpha - 2{,}6065\,\beta - 554{,}460$$

Unde tres valores ipsius δ deducuntur:

$$\delta = 0{,}07554\,\alpha + 0{,}31902\,\beta + 60{,}655$$
$$\delta = 0{,}07462\,\alpha + 0{,}30620\,\beta + 55{,}846$$
$$\delta = 0{,}09041\,\alpha + 0{,}32585\,\beta + 69{,}315$$

subtrahatur medius ab utroque, eritque:

$$0 = 0{,}00092\,\alpha + 0{,}01282\,\beta + 4{,}809$$
$$0 = 0{,}01579\,\alpha + 0{,}01965\,\beta + 13{,}469$$

hincque bini valores pro β nascuntur:

$$\beta = -0{,}07176\,\alpha - 375{,}118$$
$$\beta = -0{,}80356\,\alpha - 685{,}492$$

subtrahatur posterior a priori eritque

$$0{,}73180\,\alpha + 310{,}374 = 0$$

Hinc

92, 275
547, 950
22, 078
162, 485
prima a
0, 225
0, 028
4, 460
5
6
5
Hinc

unde	$\alpha = -424{,}125$	$l - \alpha = 2{,}627493$
hincque	$\beta = -344{,}680$	$l - \beta = 2{,}537416$
	$\delta = -81{,}345$	$l - \delta = 1{,}910331$
	$\gamma = -346{,}889$	$l - \gamma = 2{,}540190$
	$\varepsilon = +101{,}755$	$l + \varepsilon = 2{,}007555$
	$\zeta = +311{,}44$	$l + \zeta = 2{,}493374$

Hinc ergo ob β negativum fiet orbita cometæ hyperbola sequentibus sex conditionibus determinata.

Distantia perihelii a Sole a =	22424
ratio $b : a$ =	$2 + \frac{344}{100000} : 1$
Ergo semilatus rectum b =	45619
Cometa per Perihelium transiit A. 1744. Mart.	$1^d, 0^h, 14'$
Dist. Perihelii a ☊	$149°, 39'$
Long. helioc. Nodi ☊	$1^s, 17°, 41'$
Inclinatio orbitæ	$50°, 11'$

Patet autem has determinationes maxime pendere a bonitate observationum, in quibus si vel minimum esset aberratum, orbita, quæ hic prodiit hyperbola, facile in ellipsin transmutari potuisset. Tum vero calculus quoque summa cura institui debet, ita ut in locis, quæ singulæ hypotheses præbent, ne minuta quidem secunda negligantur. Tantum laborem autem, nisi in observationibus tantam fiduciam collocare liceat, suscipere operæ non est pretium. Quare mihi quidem methodum ostendisse sufficiat, cujus ope, si accuracuratiſſimæ obſervationes ſuppetant, veræ orbitæ natura inveſtigari queat; quod negotium aliis expediendum relinquo.

Quoniam ergo ob defectum plurium obſervationum ſatis exactarum circa orbitæ naturam, utrum ſit in ſe rediens an in infinitum excurrens, nihil concludere licet, finem huic diſſertationi imponam, poſtquam quædam de hujus cometæ curſu tam obſervato quam futuro monuero. Primum igitur iſte cometa neque eclipticam neque æquatorem trajeciſſe viſus eſt, ſed quamdiu apparuit tam latitudinem quam declinationem habuit borealem, interim tamen ſi ad ejus tempus periodicum ſpectemus, quod ſi ullum eſt, plurium ſeculorum eſſe debet. Semeſtre tantum ſpatium in hemiſphærio boreali eſt verſatus, reliquo vero tot annorum ſpatio perpetuo in regione cœli auſtrali eſt commoratus. Deinde a 7 die Auguſti, quo per nodum aſcendentem tranſiit usque ad Februarii diem 25 ab ecliptica receſſit, hinc vero curſu ſatis celeri jam die Martii 4to per nodum deſcendentem eſt transgreſſus, quæ ingens anomalia certe cum nulla alia theoria, præter Neutonianam, conſiſtere poteſt. Sub finem ergo apparitionis ejus via apparens vehementer a circulo cœli maximo deflexit: unde manifeſtum eſt, hunc cometam non in plano per centrum terræ tranſeunte eſſe motum. Cum in nodo deſcendente verſaretur

ſaretur, ſoli quidem propior fuit quam Mercurius, ab hoc vero tam parum fuit remotus, ut, ſi vim attractivam pro ratione molis habuerit, notabilis perturbatio in motu mercurii oriri debuiſſet: hoc enim tempore longitudo Cometæ heliocentrica erat, in Scorpii gradu 15, Mercurius vero in ejusdem ſigni gradu 26 hærebat; atque corpus cometæ, ſi diametrum apparentem eo tempore, quo in diſtantia ſolis a nobis erat remotus, ſtatuamus 1′, plusquam tricies corpus terræ ſuperavit. Quamobrem operæ pretium erit inveſtigare, utrum mercurius adhuc in motu ſuo cum tabulis aſtronomicis conſentiat, an vero perturbationem a cometa ſit paſſus.

Poſt Februarii diem ultimum, quo cometa adhuc ante ſolis ortum erat conſpicuus, penitus evanuit, cum ob ſolis vicinitatem, tum ob diminutam ejus latitudinem borealem. Quia enim poſt diem Martii quartum in hemiſphærium auſtrale proceſſit, ante ortum ſolis non amplius ſupra horizontem noſtrum aſcendit. Quibus autem in cœli locis poſtea verſetur, ex his inventis ſatis accurate indicari poterit. Sic Aprilis die 15 iterum erit directus, & apparebit in 8vo Arietis gradu cum latitudine auſtrali 30° fere, & cum diſtantia a terra futura ſit paulo major quam ſolis, incolis terræ auſtralibus adhuc erit conſpicuus; qui poſt quartum diem martii hunc cometam ante ſolis ortum eximio ſplendore

ſplendore videre debuerunt. Quareſi in his regionibus commorarentur Aſtronomi, diu adhuc poſt nos eundem cometam obſervare potuiſſent. Atque ſi eum exquiſitis tubis proſequerentur, fortaſſe ultra menſem Julium conſpicere poſſent, namque primo die Julii ejus longitudo eſſe debebit ♈ 27°, cum latitudine auſtrali 48°, ſexto autem die ſeptembris longitudo iterum erit ♈ 3°, cum latitudine 53°, ejus vero diſtantia a terra ſe habebit ad diſtantiam ſolis ut $2\frac{1}{4}$ ad 1, unde niſi per bona teleſcopia vix ſpectari poterit. Hujusmodi autem obſervationes in regionibus terræ auſtralibus factæ maxime eſſent optandæ, cum ex iis facile omnia, quæ adhuc circa ejus orbitæ cognitionem deſiderantur, deduci ac ſuppleri poſſent. Utinam hoc tempore in capite bonæ ſpei idoneus aſtronomiæ cultor commoraretur, a quo iſtud ſupplementum expectare liceret.

Addita-

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Additamentum.

I.

Cum ſuperiorem diſſertationem abſolviſſem, atque orbitæ cometæ determinationem ex obſervationibus initio commemoratis deductam ad Academiam Regiam Pariſinam miſiſſem; Celeb. Caſſinus, ut deſiderio meo theoriam per obſervationes comprobandi ſatisfaceret, omnes quas fecerat, obſervationes mecum benevole communicavit. Sunt autem ſequentes.

Pariſiis tempore apparente					Longitudo Cometæ obſervata				Latitudo obſervata B.		
1743.	Dec.	21d,	6h,	58''	0s,	22°,	23',	0''	16°,	18',	57''
		30,	5,	54	0,	16,	29,	38	17,	12,	55
1744.	Jan.	1,	5,	41	0,	15,	19,	35	17,	23,	23
		3,	5,	28	0,	14,	11,	18	17,	32,	39
		4,	5,	21	0,	13,	38,	11	17,	37,	27
		5,	5,	14	0,	13,	5,	57	17,	42,	16
		6,	5,	8	0,	12,	34,	44	17,	46,	20
		7,	5,	2	0,	12,	3,	12	17,	51,	23
		8,	4,	55	0,	11,	33,	8	17,	55,	50
		10,	9,	42	0,	10,	24,	34	18,	5,	14
		11,	9,	1	0,	9,	58,	40	18,	9,	35
		12,	9,	11	0,	9,	31,	15	18,	13,	26
		13,	7,	52	0,	9,	5,	30	18,	17,	4
		16,	8,	43	0,	7,	45,	15	18,	30,	26
		17,	7,	41	0,	7,	20,	58	18,	34,	22
		18,	7,	0	0,	6,	56,	46	18,	38,	2

Febr.	1,	7,	55	0,	1,	9, 54	19,	34,	0
	3,	7,	49	0,	0,	18, 26	19,	42,	53
	7,	7,	55	11,	28,	16, 22	19,	53,	54
	10,	7,	17	11,	26,	32, 1	19,	56,	23
	11,	5,	47	11,	25,	52, 41	19,	57,	35
	12,	5,	51	11,	25,	12, 45	19,	56,	4
	13,	5,	39	11,	24,	28, 25	19,	53,	15
	15,	6,	46	11,	22,	46, 47	19,	44,	15
	16,	6,	19	11,	21,	54, 54	19,	36,	0
	17,	6,	30	11,	20,	55, 51	19,	23,	0
	18,	6,	3	11,	19,	54, 0	19,	10,	30
	23,	5,	34	11,	13,	12, 44	16,	41,	3
	24,	5,	47	11,	11,	36, 30	15,	48,	4
	25,	5,	22	11,	9,	52, 46	14,	39,	7
	29,	18,	44	11,	2,	31, 59	6,	28,	21

2. Primo quidem intuitu nostra hujus cometæ theoria his observationibus mirifice confirmatur. Cum enim cometa ab initio apparitionis usque ad diem 18mum Februarii latitudinem fere eandem tenuisset, atque etiam secundum longitudinem satis tarde esset motus, hinc quasi subito cursum eclipticam versus inflectit, simulque secundum longitudinem motu citatiori progreditur. Ita igitur facile perspicitur, quomodo cometa jam ante quartum Diem Martii ad eclipticam pervenire potuerit, uti theoria postulabat. Quin etiam si ad ista observationum tempora ex orbita ante inventa cometæ loca supputentur, vix notabile discrimen deprehenditur: hincque adeo certe nobis concludere licet, affectiones orbitæ cometicæ detectas ad veritatem proxime accedere.

3. At

34, 0
42, 53
53, 54
56, 23
57, 35
56, 4
53, 15
44, 15
36, 0
23, 0
10, 30
41, 3
48, 4
39, 7
28, 21
eoria his
meta ab
latitudi-
ngitudi-
eclipti-
motu
omodo
perve-
ad ista
æ loca
incque
meticæ
3. At

3. At vero quod caput rei est, & unde hoc additamentum est natum, istæ observationes adhiberi possunt, ad exiguas illas aberrationes, quibus orbita supra determinata adhuc laborat, emendandas, atque ad verum cometæ motum accuratissime definiendum. Hunc in finem ea ipsa methodus, quæ in hac dissertatione est exposita, hic quoque in usu vocari posset; quia autem tria loca cometæ admodum vicina requirit, multitudo & insigne observationum intervallum, quæ duæ res tamen maxime orbitis cometarum cognoscendis inserviunt, parum subsidii afferrent. Neque etiam hac methodo nunc amplius indigemus, cum orbita jam prope sit nota, atque aliam dederimus methodum orbitas jam vero proximas per plures observationes corrigendi.

4. Interim tamen & hæc methodus, qua jam sumus usi ad cursum cometæ ex observationibus accuratius determinandum, non contemnendas habet difficultates. Primo enim nimis longum ac tædiosum calculum requirit, ac deinde multitudo incognitarum, quas ex aberrationibus definiri oportet non solum operationem reddit molestissimam, sed etiam ob tot quantitates neglectas, minus certam. Quanquam enim istæ quantitates tam sunt parvæ, ut singulæ sine errore rejici possent, tamen eæ conjunctim sumtæ, errorem notabilem procreare possunt. Hanc ob causam in aliam methodum inquisivi, cujus ope orbita cometæ jam propemodum cognita non solum facilius & expeditius emendari queat, sed quæ etiam pauciores in-

S 2 cogni-

cognitas ad negotium absolvendum requirat. Cum igitur hoc desideratum aliquamdiu animo volvissem, sequentem methodum sum assecutus, cujus ope ex datis tribus tantum cometæ observationibus quibuscunque orbita jam pæne cognita exactissime assignari potest.

5. Ne igitur sex illa capita, quibus orbita cometæ determinatur, simul in computum inducantur, ex iis tantum aliquot tanquam cognita assumamus, unde ex dato quovis loco observato cometæ locus heliocentricus concludi queat. Hoc autem fieri potest ex positione lineæ nodorum, & inclinatione orbitæ ad eclipticam: his enim duobus tantum capitibus cognitis, ex quovis loco cometæ geocentrico ejus locus heliocentricus atque distantia a sole definiri potest, quæ methodus pro planetis jam pridem est nota & passim explicata; interim tamen ob nimis parvam inclinationem orbitarum planetarum, nisi observationes sint fere ad minuta secunda exactæ, tuto adhiberi nequit. Si enim inclinatio plane evanesceret, tum hinc nihil prorsus concludi posset: ex quo facile colligitur, quo minor sit orbitæ cujuspiam inclinatio, eo minus tuto hanc methodum adhiberi posse. Cum igitur cometarum orbitæ plerumque magnos angulos cum ecliptica constituant, ad eos hæc methodus maxime est accommodata, atque felicissimo successu usurpari poterit.

6. Si ergo assumamus positionem lineæ nodorum atque inclinationem orbitæ ad eclipticam esse datas, ex quovis cometæ loco observato ejus locum verum in cœlo assignare poterimus, ope sequentis problematis. Quanquam autem hæ duæ res tantum prope sunt cognitæ, solutio tamen istius problematis maximam afferet utilitatem, quoniam deinceps monstrabo, quemadmodum per tres observationes eædem accuratius determinari queant.

Problema I.

Datis orbitæ cometæ intersectione cum ecliptica & ejus inclinatione ad eam, ad datum quodvis tempus, quo longitudo & latitudo cometæ geocentrica est observata, ejus locum verum heliocentricum cum ejus a sole distantia invenire.

Solutio.

7. Computetur ad tempus propositum locus solis, sitque distantia terræ a sole $ST = c$. Denotet scilicet S solem, T terram, sitque SN linea nodorum, cujus positio cum sit data, dabitur angulus TSN qui ponatur $= s$. Deinde ducatur secundum longitudinem cometæ observatam recta TN lineam nodorum intersecans in N; eritque angulus STN differentia longitudinum solis & cometæ, & propterea datus. Posito ergo angulo hoc $STN = t$, erit angulus $SNT = 180° - s - t$, qui ponatur $= n$. Hinc in triangulo STN ob omnes angulos cum latere $ST = c$ cognitos, reperietur $TN = \frac{ST \sin s}{\sin n}$ Fig. 1

& $SN = \frac{ST \sin t}{\sin n}$. His præparatis sit C locus cometæ verus

verus in ſublimi poſitus, unde ad planum eclipticæ TSN demittatur perpendiculum Cc, eritque CTc latitudo cometæ geocentrica, quæ ſi ponatur $= p$, erit ang. $CTc = p$. Tum ſi ex c ad SN ducatur perpendicularis cP jungaturque recta CP, repræſentabit angulus CPc inclinationem orbitæ ad Eclipticam, ponatur ea $= i$, eritque $CPc = i$. Ex his conſiderationibus determinabitur punctum c. Poſita enim $cN = x$; & $TN = \frac{c \sin s}{\sin n} = a$, erit $Tc = a - x$. Deinde in triangulo cNP fiet $cP = x \sin n$, & ex triangulo CPc fiet $Cc = x \sin n . \tang i$. At ex triangulo CTc ſequitur $Cc = (a-x) \tang p$; quibus duobus valoribus æquatis reperitur $x = \frac{a \tang p}{\tang p + \sin n . \tang i} = cN$ & $Tc = \frac{a \sin n . \tang i}{\tang p + \sin n . \tang i}$ $= \frac{c \sin s . \tang i}{\tang p + \sin n . \tang i}$, hincque $TC = \frac{c \sin s . \tang i}{\sin p + \sin n . \cos p \tang i}$ quæ eſt diſtantia cometæ a terra. Porro vero invento $cN = x$, habebitur $PN = x \cos n$ & $cP = x \sin n$; cognoſceturque $SP = SN - NP$; unde oritur $\tang cSN = \frac{cP}{SP}$, cognitoque angulo cSN erit $Sc = \frac{cP}{\sin cSN} = \frac{SP}{\cos cSN}$. Tum vero erit $\tang CSc = \frac{Cc}{Sc}$; ſicque innoteſcit latitudo heliocentrica CSc, ex qua efficitur diſtantia cometæ a ſole $SC = \frac{Cc}{\sin CSc} = \frac{Sc}{\cos CSc}$. Denique cum ſit $\frac{SP}{SC} = \cos$ CSN,

SN de- cometæ p. Tum ue recta bitæ ad Ex his ta enim x. Dein- lo CPc ſequitur atis re- tang i n.tang i i ſp tang i invento cognos- SN = SP ſcSN latitudo a ſole = coſ CSN,

CSN, hic angulus indicabit elongationem cometæ heliocentricam a nodo N, in ſua orbita. Cum igitur planum orbitæ cometæ detur, ex angulo NSC & recta SC definitur locus cometæ verus heliocentricus. Q. E. J.

Coroll. 1.

8. Cum ſit $a = \frac{c \sin s}{\sin n}$, erit $x = cN = \frac{c \sin s \tang p}{\sin n (\tang p + \sin n \tang i)}$ & $cP = \frac{c \sin s \tang p}{\tang p + \sin n \tang i}$; ideoque $CP = \frac{c \sin s \tang p . \cos i}{\tang p + \sin n . \tang i}$. Tum vero erit $PN = \frac{c \sin s \tang p \cot n}{\tang p + \sin n \tang i}$ qui valor ſubtractus ab $SN = \frac{c \sin s}{\sin n}$ relinquit $SP = \frac{c (\sin s \tang p + \sin n . \sin s . \tang i - \cos n . \sin s \tang p)}{\sin n (\tang p + \sin n \tang i)}$. At ob $\sin s = \sin n \cos s + \cos n . \sin s$, habebitur $SP = \frac{c (\cos s \tang p + \sin s \tang i)}{\tang p + \sin n \tang i}$.

Coroll. 2.

9. Quia igitur $\frac{CP}{SP}$ dat tangentem anguli CSN, erit $\tang CSN = \frac{\sin s \tang p}{\cos i \cos s \tang p + \sin s \sin i}$. Hinc ergo erit $\cot CSN = \frac{\cos s}{\tang s} + \frac{\sin s \sin i}{\sin s \tang p}$. Ex ſolis ergo angulis cognitis s, s, i, & p invenitur elongatio cometæ a nodo ſeu angulus CSN.

Coroll. 3.

Coroll. 3.

10. Invento angulo CSN, ponatur iste angulus CSN $= m$, ut sit $\cot m = \frac{\cos i}{\tang s} + \frac{\sin \varepsilon \sin i}{\sin s . \tang p}$, fiet $\frac{\sin i}{\tang p}$ $= \frac{\sin s \cot m}{\sin \varepsilon} - \frac{\sin s \cos i}{\sin \varepsilon \tang s}$. Cum igitur inventum sit CP $= \frac{c \sin s \tang p : \cos i}{\tang p + \sin n . \tang i} = \frac{c \sin s}{\cos i + \sin n . \sin i : \tang p}$, si hic valor ille loco $\frac{\sin i}{\tang p}$ substituatur, erit CP $=$ $\frac{c \sin \varepsilon}{\cos i \cos n + \sin n . \cot m}$.

Coroll. 4.

11. Quia porro $\frac{CP}{\sin m}$ dat distantiam cometæ a sole SC erit CS $= \frac{c \sin \varepsilon}{\sin m . \cos n . \cos i + \sin n . \cos m}$. Hincque ex distantia terræ a sole ST $= c$, & angulis m, n, i & ε reperitur distantia cometæ a sole CS. At vero ob $\sin m . \cos n =$ $\frac{1}{2} \sin (m+n) + \frac{1}{2} \sin (m-n)$; $\cos m . \sin n = \frac{1}{2} \sin (m+n) - \frac{1}{2} \sin$ $(m-n)$ atque $\frac{1 + \cos i}{2} = (\cos \frac{1}{2} i)^2$ & $\frac{1 - \cos i}{2} = (\sin \frac{1}{2} i)^2$ erit

$$CS = \frac{c \sin \varepsilon}{\sin (m+n) (\cos \frac{1}{2} i)^2 - \sin (m-n) (\sin \frac{1}{2} i)^2}.$$

Coroll. 5.

12. Commodissime ergo calculus instituetur, quærendo primum has quantitates:

cot

$$\cot CSN = \frac{\cos i}{\tang s} + \frac{\sin \varepsilon . \sin i}{\sin s \tang p}$$

$$\frac{ST}{CP} = \frac{\cos i}{\sin s} + \frac{\sin n . \sin i}{\sin s . \tang p}$$

Quibus inventis erit $SC = \frac{CP.}{\sin CSN}$.

Coroll. 6.

13. Inventa autem recta CP statim innotescet distantia cometæ a terra CT. Cum enim sit $\sin p = \frac{Cc}{cT}$ & $\sin i = \frac{Cc}{CP}$ erit $\frac{\sin p}{\sin i} = \frac{CP}{CT}$ ideoque $CT = \frac{CP . \sin i}{\sin p}$. Ad institutum autem nostrum distantia cometæ a terra non indigemus

Coroll. 7.

14. Si cometa in ipsa ecliptica observetur, ita ut ejus latitudo geocentrica p sit nulla, fiet cot CSN $= \infty$ ideoque ipse angulus CSN evanescet. Versabitur ergo Cometa in ipso puncto N, eritque ejus distantia a sole $= \frac{c \sin \varepsilon}{\sin n}$.

Coroll. 8.

15. Si terra in ipsa linea nodorum versetur, fiet angulus TSN $= s = o$. Quo casu & CP & angulus CSN evanescere videtur. At vero hoc casu quoque fiet $\tang p + \sin n .$ $\tang i = o$, ita ut nihilominus lineæ cP & CP finitum valorem retineant. Quantæ autem sint istæ lineæ una cum angulis hoc casu definiri nequit. Quanquam autem hujusmodi observatio-

nes

nes ad præsens institutum inutiles videntur, tamen eæ inservient, si positio lineæ nodorum jam fuerit cognita, ad inclinationem orbitæ accurate definiendam, erit enim tang $i = -\frac{\tang p}{\sin n}$: unde ad orbitas planetarum determinandas insignis usus redundat.

Coroll. 9.

16. Si fiat angulus $n = o$, quod evenit, si longitudo cometæ geocentrica congruat cum longitudine nodi heliocentrica, erunt sinus angulorum s & t æquales, habebiturque distantia cometæ a terra $TC = \frac{c \sin s \tang i}{\sin p}$, & cot $CSN = \frac{\cos i}{\tang s} + \frac{\sin i}{\tang p}$ atque $\frac{ST}{CP} = \frac{\cos i}{\sin s}$ seu $CP = \frac{\sin s}{\cos i} \cdot ST$.

Coroll. 17.

17. Si cometa in oppositione vel conjunctione solis secundum longitudinem fuerit observatus, erit sin $t = o$: hoc ergo casu habebitur cot. $CSN = \frac{\cos i}{\tang s}$, atque $\frac{ST}{CP} = \frac{\cos i}{\sin s} + \frac{\sin i}{\tang p}$ ob sin n = sin s.

Coroll. 11.

18. Si tandem inclinatio orbitæ cometæ ad eclipticam evanesceret, ut esset $i = o$: tum necesse est ut quoque latitudo

æ inser- id incli- tang i inandas ngitudo li helio- bebitur- & cot CP = solis se- o: hoc $= \frac{\cos i}{\sin s}$ ipticam que la- titudo

titudo observata p sit nulla, hocque ergo casu ob fractionem $\frac{\sin i}{\tang p}$ indefinitam nihil concludi posset.

Coroll. 12.

19. Nisi ergo tempore observationis locus terræ fuerit prope lineam nodorum, ex loco cometæ geocentrico observato semper ejus locus verus, hoc est elongatio ejus heliocentrica ab altero nodo una cum ejus distantia a sole definiri potest.

20. Positis ergo linea nodorum & inclinatione orbitæ cognitis, si tria loca cometæ observata ad hunc calculum revocentur, invenientur tria loca cometæ vera in sua orbita. Quam cum constet esse sectionem conicam, cujus alter focus in ipso centro solis sit situs, ex istis tribus punctis inventis sectio conica poterit determinari, quem in finem sequens problema resolvemus.

Problema II.

Datis tribus cometæ locis veris, una cum ejus distantiis a sole, invenire ejus orbitam; hoc est positionem perihelii, ejus a sole distantiam, atque quantitatem lateris recti.

Solutio.

21. Repræsentet planum tabulæ id ipsum planum in quo cometa movetur, in quo sit S centrum solis & recta ☊ S ☋ linea nodorum seu intersectio hujus plani cum ecliptica. Sint F, G & H tria cometæ loca vera in ejus orbita, dabunturque primum distantiæ $SF = f$, $SG = g$ & $SH = h$; tum Fig. 2.

vero

vero per methodum præcedentem cognofcuntur anguli FS☋, GS☋ & HS☋; ex quibus fit FSG $= \phi$ & FSH $= \psi$. His datis contemplemur, quæ quæruntur, fitque A orbitæ perihelium, ASC orbitæ axis, ad quem in F applicata normalis SB exhibebit femi-latus rectum. Ponatur AS $= a$, BS $= b$, fitque angulus ASF $= v$, quæ eft anomalia vera refpondens loco F. Erit ergo ASG $= v + \phi$ & ASH $= v + \psi$. At ex fectionum conicarum proprietatibus erit $f = \frac{ab}{a + (b-a)\cos v}$

unde fit $a = \frac{bf\cos v}{b - f + f\cos v}$. Simili modo ex fecundo loco G erit $a = \frac{bg\cos(v+\phi)}{b - g + g\cos(v+\phi)}$ atque ex tertio loco H habetur $a = \frac{bb\cos(v+\psi)}{b - b + b\cos(v+\psi)}$. Ex prima & fecunda æquatione fequitur $(b-g)f\cos v = (b-f)g\cos(v+\phi) = (b-f)g(\cos v.\cos\phi - \sin v.\sin\phi)$; ac dividendo per $\cos v$ proveniet $(b-g)f = (b-f)g\cos\phi - (b-f)g\sin\phi\tang v$, unde obtinetur $\tang v = \cot\phi - \frac{f(b-g)}{g(b-f)}\operatorname{cofec.}\phi = \frac{1}{\tang\phi} - \frac{f(b-g)}{g(b-f)\sin\phi}$. Similiter prima æquatio cum tertia conjuncta dabit: $\tang v = \frac{1}{\tang\psi} - \frac{f(b-b)}{b(b-f)\sin\psi}$. Hisque binis ipfius tang v valoribus coæquatis erit $\frac{1}{\tang\phi} - \frac{f(b-g)}{g(b-f)\sin\phi} = \frac{1}{\tang\psi} - \frac{f(b-b)}{b(b-f)\sin\psi}$ feu $\frac{b-f}{\ldots}$

$\frac{b-f}{f\tang\phi} - \frac{b+g}{g\sin\phi} = \frac{b-f}{f\tang\psi} - \frac{b+b}{b\sin\psi}$: unde concluditur

$$b = \frac{\frac{1}{\tang\phi} - \frac{1}{\sin\phi} - \frac{1}{\tang\psi} + \frac{1}{\sin\psi}}{\frac{1}{f\tang\phi} - \frac{1}{g\sin\phi} - \frac{1}{f\tang\psi} + \frac{1}{b\sin\psi}},$$

quæ formula ad calculum fatis eft apta, faciliusque adhibebitur, quam conftructiones geometricæ, quæ de hoc problemate paffim inveniuntur. Invento igitur femi-latere recto b pofitio lineæ abfidum definietur ex angulo v, qui ex alterutra harum æquationum eruetur:

$$\tang v = \frac{1}{\tang\phi} - \frac{f(b-g)}{g(b-f)\sin\phi};\ \tang v = \frac{1}{\tang\psi} - \frac{f(b-b)}{b(b-f)\sin\psi}$$

Hincque denique affignari poterit diftantia perihelii a fole $a = \frac{bf\cos v}{b - f + f\cos v}$, ficque orbita cometæ cognofcetur.

Q. E. J.

Coroll. 1.

22. Si ex æquatione fupra inventa:

$$(b-g)f = (b-f)g\cos\phi - (b-f)g\sin\phi\tang v$$

loco tang v eliminemus b, reperitur, $b = \frac{fg - fg\cos\phi + fg\sin\phi\tang v}{f - g\cos\phi + g\sin\phi\tang v}$. Simili vero modo ex tertia obfervatione erit $b = \frac{fb - fb\cos\psi + fb\sin\psi\tang v}{f - b\cos\psi + b\sin\psi\tang v}$

Quibus inter fe comparatis erit:

$$g(1-\cos\phi).(f-b\cos\psi)+g(f-b\cos\psi)\sin\phi\,\mathrm{tang}\,v$$
$$-b(1-\cos\psi)(f-g\cos\phi)+gb(1-\cos\phi)\sin\psi\,\mathrm{tang}\,v=v$$
$$-b(f-g\cos\phi)\sin\psi\,\mathrm{tang}\,v$$
$$-gb(1-\cos\psi)\sin\phi\,\mathrm{tang}\,v$$

seu $f(g-b)-g(f-b)\cos\phi+b(f-g)\cos\psi+g(f-b)\sin\phi\,\mathrm{tang}\,v$ $-b(f-g)\sin\psi\,\mathrm{tang}\,v=o$ unde invenitur

$$\mathrm{tang}\,v=\frac{f(b-g)-g(b-f)\cos\phi+b(g-f)\cos\psi}{b(g-f)\sin\psi-g(b-f)\sin\phi},$$

Coroll. 2.

23. Si alter angulus ϕ æquetur duobus rectis ita ut rectæ FS, FG in directum sint positæ ob $\sin\phi=o$ & $\mathrm{tang}\,\phi=o$, fiet

$$b=\frac{\frac{1}{\mathrm{tang}\,\phi}-\frac{1}{\sin\phi}}{\frac{1}{f\,\mathrm{tang}\,\phi}-\frac{1}{g\sin\phi}}=\frac{\cos\phi-1}{\frac{\cos\phi}{f}-\frac{1}{g}}.$$

At est $\cos\phi=-1$, unde erit $b=\frac{2fg}{f+g}$ quæ est eximia sectionum conicarum proprietas jam quidem nota.

Coroll. 3.

24. Expressio autem generalis, quam pro valore semi-lateris recti invenimus, si ad lineas revocetur, sequens suppeditabit theorema, naturam sectionum conicarum non parum illustrans.

Theorema.

Fig. 3. *Si a tribus quibuscunque sectionis conicæ punctis F, G, H ad ejus alterum focum S ducantur rectæ FS, GS, & HS atque duo eorum G & H cum tertio F jungantur rectis GF & HF, ac denique ex G ducatur recta GIK parallela ipsi FS secans rectas HF, HS si opus*

= v
tang v
ψ,
ita ut
= o
=
fg / f+g
nota.
late-
itabit
ans.
H ad
duo
c de-
HS
opus

si opus est productas in I & K; erit GI ad SK + KG − SG uti SF ad semissem lateris recti.

Demonstratio.

25. Vocentur ut ante distantiæ $FS=f$; $GS=g$ & $HS=b$ itemque anguli $FSG=\phi$ & $FSH=\psi$. Demittatur ex S in GIK perpendiculum SL, quod vocetur $=r$. Cum igitur anguli GSL, KSL, sint complementa angulorum ϕ & ψ erit $GL=\frac{r}{\mathrm{tang}\,\phi}$; $KL=\frac{r}{\mathrm{tang}\,\psi}$: $SG=\frac{r}{\sin\phi}$ & $SK=\frac{r}{\sin\psi}$. Hinc $SK+KG-SG=\frac{r}{\sin\psi}+\frac{r}{\mathrm{tang}\,\phi}-\frac{r}{\mathrm{tang}\,\psi}-\frac{r}{\sin\phi}$. Ducatur KM parallela ipsi HF; erit SH: SK = SF: SM, seu $b:\frac{r}{\sin\psi}=f:SM$; unde fit $SM=\frac{fr}{b\sin\psi}$, ideoque $FM=IK=f-\frac{fr}{b\sin\psi}=\frac{fr}{r}-\frac{fr}{b\sin\psi}$. At ob $SG=\frac{r}{\sin\phi}=g$ erit $r=g\sin\phi$, hincque $IK=\frac{fr}{g\sin\phi}-\frac{fr}{b\sin\psi}$. Quare $GI=GK-KI=\frac{r}{\mathrm{tang}\,\phi}-\frac{r}{\mathrm{tang}\,\psi}-\frac{fr}{g\sin\phi}+\frac{fr}{b\sin\psi}$. Cum igitur invenerimus esse

$$b=\frac{\frac{1}{\mathrm{tang}\,\phi}-\frac{1}{\sin\phi}-\frac{1}{\mathrm{tang}\,\psi}+\frac{1}{\sin\psi}}{\frac{1}{f\,\mathrm{tang}\,\phi}-\frac{1}{g\sin\phi}-\frac{1}{f\,\mathrm{tang}\,\psi}+\frac{1}{b\sin\psi}}=$$

$$\frac{\frac{r}{\mathrm{tang}\,\phi}-\frac{r}{\sin\phi}-\frac{r}{\mathrm{tang}\,\psi}+\frac{r}{\sin\psi}}{\frac{r}{\mathrm{tang}\,\phi}-\frac{r}{g\sin\phi}-\frac{r}{\mathrm{tang}\,\psi}+\frac{fr}{b\sin\psi}}\,f,$$ erit semi-latus rectum

$b=$

$b = \frac{SK + KG - SG}{GI}$. SF, ideoque GI: SF = SK + KG − SG: ſemi-latus rectum. Q. E. D.

27. Hactenus temporum, quæ inter obſervationes effluxerunt nullam habuimus rationem. Nunc igitur cognita orbita ope præceptorum ſupra traditorum definiri poterunt tempora, quibus cometa a perihelio A, ad unumquodque trium punctorum F, G, & H pervenire debuit, hisque inventis prodibunt temporum intervalla inter obſervationes elapſa, quæ ſi cum temporibus obſervatis convenire deprehendantur, hoc certum erit ſignum, poſitionem lineæ nodorum atque inclinationem orbitæ cometæ ad eclipticam recte eſſe aſſumtas. Sin autem hæc tempora per calculum eruta cum obſervatis minus congruant, concludendum erit vel in aſſumtione lineæ nodorum, vel inclinationis vel utriusque eſſe aberratum. Qui error ſi fuerit ſatis parvus, debebit autem eſſe talis, ſi quidem hæc elementa jam per methodum primam proxime noverimus, ex ipſa aberrationis quantitate corrigi poterit. Et quia duo habemus temporum intervalla, quæ cum calculo comparari poſſunt, duæ reſultabunt comparationes, quæ ad utrumque errorem, qui forte ſint commiſſi, emendandum ſufficient. Ita igitur tres cometæ obſervationes ſufficient ad ejus orbitam vere cognoſcendam.

27. Poſtquam ergo ope methodi ante expoſitæ orbita cometæ jam propemodum fuerit determinata, exinde tam poſitio lineæ nodorum quam inclinatio orbitæ ad eclipticam ſatis exacte ad hoc inſtitutum cognoſcentur; neque etiam opus erit illum calculum

F =
effluxe-
a orbita
mpora,
puncto-
nt tem-
tempo-
im erit
orbitæ
ec tem-
t, con-
inclina-
tis par-
am per
rationis
rum in-
ltabunt
nt com-
obſer-
a come-
ſitio li-
exacte
t illum
lculum

calculum ſummo ſtudio ad finem perducere, ſed ſufficiet ope conſtructionum geometricarum hæc momenta ſaltem circiter determinaviſſe; quo pacto totus labor mirifice contrahi poterit. Quando igitur eousque tantum fuerit perventum, ut certo ſciamus lineam nodorum una cum inclinatione ad eclipticam non multum a veritate abhorrere: ſtatim hac altera methodo uti licebit, quam in ſequente problemate explicabo.

Problema III.

Cognitis jam propemodum poſitione lineæ nodorum & inclinatione orbitæ cometæ ad eclipticam, veram cometæ orbitam ex tribus obſervationibus exacte determinare.

Solutio.

28. Sit L longitudo nodi puta aſcendentis per ſuperiorem methodum inventa, & I ſit inclinatio orbitæ ad eclipticam, ibidem eruta. Conſtituantur tres hypotheſes, in quarum prima longitudo nodi aſſumatur = L & inclinatio = I. In ſecunda hypotheſi longitudo nodi denuo ſtatuatur = L, inclinatio autem aſſumatur = I + η, ſumendo pro η unum, duosve gradus, prouti errorem minorem majoremve æſtimamus. In tertia hypotheſi ſtatuatur longitudo nodi = L + λ, inclinatio vero maneat = I, ubi iterum ipſi λ valor arbitrarius tribui poteſt, major minorve, prout diſcrepantiam ipſius L a veritate majorem minoremve judicamus. Quo autem propius jam noverimus valores ipſarum L & I, eo minores poterimus litteras η & λ aſſumere, dummodo veritas inter tres hypotheſes tanquam limites contineatur. His hypotheſibus conſtitutis eligantur tres cometæ obſervationes quæcunque, quæ quo longius a ſe invicem fuerint remotæ, eo accuratiorem reddent determinationem: interim tamen evitari debebunt ejusmodi obſervationes, quæ ſint inſtitutæ tum, cum terra prope lineam nodorum verſaretur.

 Deinde

Deinde ad tempora harum obſervationum ſupputentur loca ſolis, cum ejus a terra diſtantiis, tum ſecundum problema primum hujus additamenti pro unaquaque hypotheſi definiantur cometæ a ſole diſtantiæ, atque elongationes a linea nodorum. Quo facto ex ſuperiori problemate determinetur orbita cometæ unicuique hypotheſi conveniens, ſicque obtinebuntur tres diverſæ orbitæ, inter quas vera continebitur; Ad quam inveniendam calculo eruantur temporum intervalla, quæ ſecundum quamlibet hypotheſin inter obſervationes binas præterlabi debuiſſent. Sit T tempus inter primam & ſecundam obſervationem, quod ex prima hypotheſi invenitur; T + p tempus quod ex ſecunda, & T + q tempus quod ex tertia hypotheſi eruitur. Tempus autem obſervatum ſit = T + k. Si jam ſumamus in orbita cometæ vera eſſe longitudinem nodi accendentis = L + x & inclinationem ad eclipticam = I + y, ut res hoc modo ſe habeat.

	Hypoth. I	Hyp. II	Hyp. III	Orbita vera
Longitudo nodi —	L	L	L + λ	L + x
Inclinatio — —	I	I + η	I	I + y
Tempus inter I & II obſervationem	T	T + p	T + q	T + k

Nunc ita ratiocinemur, quoniam ſi inclinationi I augmentum = η tribuitur, tempus T incrementum capit = p incrementum y inclinationis dabit temporis incrementum = $\frac{py}{\eta}$. Deinde quoniam longitudinis nodi incrementum λ producit temporis incrementum = q, longitudinis L incrementum = x producet temporis incrementum = $\frac{qx}{\lambda}$. Quare ex orbita vera erit intervallum temporis inter primam & ſecundam obſervationem = T + $\frac{py}{\eta}$ + $\frac{qx}{\lambda}$, quod cum

æquale

æquale eſſe debeat tempori obſervato T + k: habebitur æquatio $\frac{py}{\eta} + \frac{qx}{\lambda} = k$. Similis æquatio elicietur ex intervallo temporis inter primam & tertiam obſervationem, atque ex his duabus æquationibus definientur quantitates x & y, hincque innotescent & vera longitudo nodi aſcendentis = L + x, & vera inclinatio orbitæ ad eclipticam = I + y. Denique cum ex comparatione trium aſſumtarum hypotheſium conſtet, quantum incrementa η & λ cum latus rectum orbitæ b tum diſtantiam perihelii a ſole a, item anomaliam veram primæ obſervationis v una cum tempore a perihelio ad primam obſervationem elapſo, immutaverint, per regulam auream definientur harum rerum mutationes ex incrementis x & y ſimul ſumtis oriunda. Hocque modo determinabuntur orbitæ veræ latus rectum, diſtantia perihelii a ſole, elongatio perihelii a loco primæ obſervationis, ideoque etiam ab altero, ac tandem tempus quo cometa per perihelium tranſierit. Q. E. J.

Coroll. 1.

29. Cognitis anomaliis veris cometæ in ſingulis obſervationibus, tempora, quibus eæ a tranſitu cometæ per perihelium diſtant modo ſupra expoſito aſſignabuntur. Sit enim a diſtantia perihelii a ſole, b ſemi-latus rectum & v anomalia vera cometæ in obſervatione propoſita. Ponatur $\frac{2a-b}{b} = n$ erit n numerus valde parvus ſi orbita proxime fuerit parabolica, ſitque t = tang $\frac{1}{2}v$. & quæratur valor ſequentis ſeriei

$$S = t + \tfrac{1}{3}t^3 - \tfrac{2}{5}nt^5 + \tfrac{3}{7}n^2t^7 - \tfrac{4}{9}n^3t^9 + \tfrac{5}{11}n^4t^{11} \text{ \&c.}$$
$$+ \tfrac{3}{5}n^2t^5 - \tfrac{4}{7}n^3t^7 + \tfrac{5}{9}n^4t^9 - \tfrac{6}{11}n^5t^{11}$$

quo invento erit tempus quæſitum in diebus expreſſum = $\frac{aa}{m\sqrt{b}}$S, exiſtente m = 271989, 739 &c. lm = 5, 4345525139.

Coroll. 2.

30. Si correctiones x & y, quæ hoc modo inveniuntur prodeant nimis magnæ, minus quoque erunt accuratæ. Quod enim poſuimus

mus variationes ab incrementis, quas longitudini nodi & inclinationi tribuimus, oriundas his ipsis incrementis esse proportionales, hoc tantum locum habere potest, si incrementa fuerint minima. Interim tamen iste labor non erit inutilis, sed ejus ope cognoscemus positionem lineæ nodorum & inclinationem orbitæ ad eclipticam multo propius, quam assumseramus; sicque exinde novas hypotheses veritati magis consentaneas & inter se propiores formare poterimus. Quo facto si idem calculus, qui in solutione hujus problematis est præscriptus, denuo instituatur, tum exacte orbita cometæ vera cognoscetur, quantum quidem per minimos errores, quibus etiam exactissimæ observationes sunt obnoxiæ, sperare licet.

31. Hac igitur methodo usus sum ad orbitam cometæ priori methodo repertam corrigendam. Quoniam vero observationes, quæ tum erant in potestate, nimis longe a perihelio erant remotæ, inclinatio imprimis ad eclipticam nimis prodiit incerta, quoniam parva mutatio in hypothesi distantiæ cometæ a terra facta differentiam aliquot graduum produxerat. Hanc obrem coactus fui calculum hic traditum bis applicare: atque ex prima operatione statim cognovi inclinationem orbitæ ad eclipticam notabiliter minorem esse, quam supra essem suspicatus, atque 47° vix excedere. Feci igitur pro secunda operatione hypotheses cum inter se tum veritati propiores. Elegi ad hoc institutum ex observationibus a Celeb. Cassino mecum communicatis primam & ultimam, utpote maxime a se invicem remotas, ac propterea orbitam cometæ accuratissime determinantes; cum ultima fere in ipso perihelio sit facta, ubi motus erat velocissimus, ac minima aberratio satis sensibile discrimen producere debebat. Præterea vero elegi observationem penultimam, quæ etsi ratione temporis ultimæ nimis vicina videatur, tamen angulus, quem cometa interea circa solem descripsit, satis est notabilis, ita ut ista tria puncta aptissima videantur ad orbitam determinandam. Hunc igitur calculum integrum, quo secunda operatio constabat, hic apponam, prætermisso priori, quippe cujus ratio ex hoc facile perspicitur.

Tempo-

Tempore medio Parisino St. novi.

A. 1743.	Long. Cometæ	Lat. Com. boreal.
Dec. $21^d, 6^h, 57'$	$0^s, 22°, 23', 0''$	$16°, 18', 57'' = p$
Locus Solis.	8, 29, 36, 0	4, 992675 = lST
x = S T N =	3, 22, 47, 0 =	$112°, 47', 0''$

	Hypoth. I.	Hypoth. II.	Hypoth. III
Incl. ad Ecl. = i =	$46°, 50', 0''$	$47°, 10', 0''$	$46°, 50', 0''$
Long. ☊ helioc. =	$1^s, 15, 50, 0$	1, 15, 50, 0	1, 16, 10, 0
Long. Terræ =	2, 29, 36, 0	2, 29, 36, 0	2, 29, 36, 0
s = TSN =	43, 46, 0	43, 46, 0	43, 26, 0
x = STN =	112, 47, 0	112, 47, 0	112, 47, 0
$s + x$ =	156, 33, 0	156, 33, 0	156, 13, 0
n = SNT =	23, 27, 0	23, 27, 0	23, 47, 0
A l cos i =	9, 835134	9, 832425	9, 835134
subtr. { l tang s =	9, 981297	9, 981297	9, 976238
subtr. { l sin s =	9, 839932	9, 839932	9, 837279
l cos i : tang s =	9, 853837	9, 851128	9, 858896
l cos i : sin s =	9, 995202	9, 992493	9, 997855
Ad l tang p =	9, 466453	9, 466453	9, 466453
add. l sin s =	9, 839932	9, 839932	9, 837279
	9, 306385	9, 306385	9, 303732
subtr. a l sin i =	9, 862946	9, 865302	9, 862946
	0, 556561	0, 558917	0, 559214
add { l sin x =	9, 964719	9, 964719	9, 964719
add { l sin n =	9, 599827	9, 599827	9, 605606
l sin x. sin i : sin s. tang p =	0, 521280	0, 523636	0, 523933
l sin n. sin i : sin s. tang p =	0, 156388	0, 158744	0, 164820
cos i : tang s =	0, 714228	0, 709787	0, 722597
sin x. sin i : sin s. tang p =	3, 321080	3, 339160	3, 341440
cot. CSN =	4, 035308	4, 048947	4, 064037
l cot. CSN =	10, 605876	10, 607342	10, 608958

Ergo

Ergo CSN =	13°,55',5''	13°,52',25''	13°,49',25'
cos i: sin s =	0, 989015	0, 982865	0, 995075
sin n. sin i : sin s. tang p =	1, 433470	1, 441270	1, 461576
	2, 422485	2, 424135	2, 456651
log : =	0, 384260	0, 384556	0, 390343
a l ST =	4, 992675	4, 992675	4, 992675
l CP =	4, 608415	4, 608119	4, 602332
subtr. l sin CSN =	9, 381170	9, 379810	9, 378270
l SC =	5, 227245	5, 228309	5, 224062
SC =	168754	169165	167518

Tempore medio Parisino Sr. novi

A. 1744	Long. Com.	Lat. Com. Bor.
Febr. 25d, 5h, 36'	11'9°,52',46''	14°,39',7'' = p
Locus solis	11, 6, 31, 37	4,996003 = l S T
s = S T N =	3, 21, 10	

	Hypoth. I	Hypoth. II	Hypoth. III
Incl. ad Ecl. = i =	46, 50, 0	47, 10, 0	46, 50, 0
Long. ☊ helioc.	1, 15,50,0	1, 15,50,0	1, 16,10,0
Long. Terræ –	5 , 6,31,40	5 , 6,31,40	5 , 6,31,40
s = TSN =	3, 20,41,40	3, 20,41,40	3, 20,21,40
s = STN =	3,21,10	3,21,10	3,21,10
s + s =	3, 24, 2,50	3, 24, 2,50	3, 23,42,50
n = SNT =	65,57,10	65,57,10	66,17,10
A l cos i =	9, 835134	9, 832425	9, 835134
subtr. { l – tang s =	10, 422787	10, 422787	10, 430481
subtr. { l sin s =	9, 971034	9, 971034	9, 971980
l – cos i: tang s =	9, 412347	9, 409638	9, 404653
l cos i: sin s =	9, 864100	9, 861391	9, 863154
Ad l tang p =	9, 417386	9, 417386	9, 417386
add l sin s =	9, 971034	9, 971034	9, 971980

a l sin i =

	9, 388420	9, 388420	9, 389366
a l sin i =	9, 862946	9, 865302	9, 862946
	0, 474526	0, 476882	0, 473580
add. { l sin s =	8, 767038	8, 767038	8, 767038
add. { l sin n =	9, 960571	9, 960571	9, 961689
l sin s. sin i: sin s. tang p =	9, 241564	9, 243920	9, 240618
l sin n. sin i: sin s. tang p =	0, 435097	0, 437453	0, 435269
– cos i: tang s =	0, 258433	0, 256826	0, 253895
sin s. sin i: sin s. tang p =	0, 174407	0, 175356	0, 174027
– cot. CSN =	0, 084026	0, 081470	0, 079868
l – cot. CSN =	8, 924414	8, 910998	8, 902373
Ergo CS☋ =	85, 11,45	85, 20,35	85, 26,0
cos i: sin s =	0, 731308	0, 726760	0, 729716
sin n. sin i: sin s. tang p =	2, 723313	2, 738135	2, 724390
	3, 454621	3, 464895	3, 454106
log =	0, 538400	0, 539690	0, 538335
a l ST =	4, 996003	4, 996003	4, 996003
l CP =	4, 458603	4, 456313	4, 457668
subtr. l sin CS☋ =	9, 998471	9, 998564	9, 998619
l S C =	4, 460132	4, 457749	4, 459049
S C =	28849	28691	28777

Tempore medio Parisino Sr. novi

A. 1744	Long. Cometæ	Lat. Com. bor.
Febr. 29d, 18h, 57'	11',2°,32',0''	6°,28',21'' = p
Locus solis =	11, 11, 5,40	4, 996506 = l ST
– s = S T N =	8°,33',40''	

	Hypoth. I	Hypoth. II	Hypoth. III
Incl. ad Ecl. = i =	46°,50',0''	47°,10',0''	46°,50',0''
Long. ☊ helioc. =	1',15,50,0	1',15,50, 0	1',16, 10,0
Long Terræ =	5, 11, 5,40	5, 11, 5,40	5, 11, 5,40
s = TSN =	3, 25,15,40	3, 25,15,40	3, 24,55,40
– s = STN =	8,33,40	8,33,48	8,33,40

s + s =

$s + r$ =	3, 16,42,0	3, 16,42,0	3, 16,22,0
n = SNT =	73,18,0	73,18,0	73,38,0
A l cos i =	9, 835134	9, 832425	9, 835134
subtr. { l tang s =	10, 326180	10, 326180	10, 332758
l fin s =	9, 956347	9, 956347	9, 957531
l − cos i: tang s =	9, 508954	9, 506245	9, 502376
l cos i: fin s =	9, 878787	9, 876078	9, 877603
Ad l tang p =	9, 054784	9, 054784	9, 054784
add. l fin s =	9, 956347	9, 956347	9, 957531
	9, 011131	9, 011131	9, 012315
a l fin s =	9, 862946	9, 865302	9, 862946
	0, 851815	0, 854171	0, 850631
add. { l − fin s =	9, 172790	9, 172790	9, 172790
l fin n =	9, 981285	9, 981285	9, 982035
l − fin s. fin i: fin s: tang p =	0, 024605	0, 026961	0, 023421
l fin n. fin i: fin s: tang p =	0, 833100	0, 835456	0, 832666
− cos i: tang s =	0, 322815	0, 320808	0, 317963
l − fin s. fin i: fin s. tang p =	1, 058290	1, 064050	1, 055410
− cot CSN =	1, 381105	1, 384858	1, 373373
l − cot. CSN =	10, 140226	10, 141405	10, 137788
Ergo CSΩ =	35,54,25	35,50,0	36, 3,35
cos i: fin s =	0, 756462	0, 751759	0, 754404
fin n. fin i: fin s. tang p =	6, 809265	6, 846300	6, 802460
	7, 565727	7, 598059	7, 556864
log: =	0, 878850	0, 880702	0, 878341
a l ST =	4, 996506	4, 996506	4, 996506
l CP =	4, 117656	4, 115804	4, 118165
subtr. l fin CS☋ =	9, 768246	9, 767474	9, 769840
l SC =	4, 349410	4, 348330	4, 348325
SC =	22357	22301¼	22301

A. 1744

	Hypoth. I	Hypoth. II	Hypoth. III
A. 1744. Febr. $29^d, 18^h, 57'$ f =	22357	22301¼	22301
lSF = lf =	4, 349410	4, 348330	4, 348325
☋SF =	35,54,25	35,50,0	36, 3, 25
A. 1744. Febr. $25^d, 5^h, 36'$ g =	28849	28691	28777
lSG = lg =	4, 460132	4, 457749	4, 459049
☋SG =	85,11,45	85 20,35	85,26, 0
A. 1743. Dec. $21^d, 6^h, 57'$ h =	168754	169165	167518
lSH = lh =	5, 227245	5, 228309	5, 224062
☋SH =	166, 4, 55	166, 2, 35	166,10,35
FSG = Φ =	49,17,20	49,30,35	49,22,25
FSH = ψ =	130,10,30	130,17,35	130,7 , 0
180 − ψ = χ =	49.49,30	49,42,25	49,53, 0
$l\frac{1}{\tang\chi}$ = l cot χ =	9, 926506	9, 928321	9, 925609
lf =	4, 349410	4, 348330	4, 348325
$l\frac{1}{f\tang\chi}$ =	5, 577096	5, 579991	5, 577284
l fin χ =	9, 883137	9, 882380	9, 883510
$l\frac{1}{\sin\chi}$ =	0, 116862	0, 117619	0, 116489
lh =	5, 227245	5, 228309	5, 224062
$l\frac{1}{h\sin\chi}$ =	4, 889617	4, 889310	4, 892427
$l\frac{1}{\tang\Phi}$ =	9, 934737	9, 931342	9, 933437
lf =	4, 349410	4, 348330	4, 348325
$l\frac{1}{f\tang\Phi}$ =	5, 585327	5, 583012	5, [illegible]5112

Euler Theoria Cometar. X l fin

	Hypoth. I	Hypoth. II	Hypoth. III
$l \sin \varphi =$	9, 879674	9, 881109	9, 880225
$l \frac{1}{\sin \varphi} =$	0, 120325	0, 118890	0, 119774
$l g =$	4, 460132	4, 457749	4, 459049
$l \frac{1}{g \sin \varphi} =$	5, 660193	5, 661141	5, 660725
1 : tang χ =	0, 844319	0, 847854	0, 842576
1 : sin χ =	1, 308770	1, 311055	1, 307643
1 : tang φ =	0, 860472	0, 853772	0, 857900
	3, 013561	3, 012681	3, 008119
1 : sin φ =	1, 319246	1, 314892	1, 317573
Numer:	1, 694315	1, 697789	1, 690546
l Num:	0, 228994	0, 229883	0, 228026
1 : *f* tang χ =	377656	380182	377820
1 : *f* tang φ =	384882	382835	384691
1 : *b* sin χ =	77556	77502	78060
	840094	840519	840571
1 : *g* sin φ =	457292	458291	457852
Denom: =	382802	382228	382719
l Denom: =	5, 582974	5, 582322	5, 582879
l Num: =	0, 228994	0, 229883	0, 228026
l b =	4, 646020	4, 647561	4, 645147
b =	44261	44418	44172
g =	28849	28691	28777
f =	22357	22301	23301
b − *g* =	15412	15727	15395
b − *f* =	21904	22117	21871
l f =	4, 349410	4, 348330	4, 348325
l 1 : *g* sin φ =	5, 660193	5, 661141	5, 660725
l b − *g* =	4, 187159	4, 196646	4, 187380

l (*b*−*f*) =

	Hypoth. I	Hypoth. II	Hypoth. III
	4, 196762	4, 206117	4, 196430
l (*b*−*f*) =	4, 340523	4, 344726	4, 339869
	9, 856239	9, 861391	9, 856561
Numer. =	0, 718190	0, 726760	0, 718723
a cot φ =	0, 860472	0, 853772	0, 857900
tang *v* =	0, 142282	0, 127012	0, 139177
l tang *v* =	9, 153150	9, 103844	9, 143566
v =	8°, 5′, 50″	7°, 14′, 10″	7°, 55′, 20″
l cos *v* =	9, 995648	9, 996527	9, 995835
l f =	4, 349410	4, 348330	4, 348325
l f cos *v* =	4, 345058	4, 344857	4, 344160
l b =	4, 646020	4, 647561	4, 645147
l Num: =	8, 991078	8, 992418	8, 989307
f cos *v* =	22134	22123	22088
b − *f* =	21904	22117	21871
Denom: =	44038	44240	43959
l Denom: =	4, 643827	4, 645815	4, 643048
A *l* Num: =	8, 991078	8, 992418	8, 989307
l a =	4, 347251	4, 346603	4, 346259
a =	22246	22213	22195
2 *a* =	44492	44426	44390
b =	44261	44418	44172
2 *a* − *b* =	231	8	218
l (2*a* − *b*) =	2, 363612	0, 903090	2, 338456
l b =	4, 646020	4, 647561	4, 645147
l n =	7, 717592	6, 255529	7, 693309
l aa =	8, 694502	8, 693206	8, 692518
l √*b* =	2, 323010	2, 323780	2, 322573
	6, 371492	6, 369426	6, 369945
l m =	5, 434553	5, 434553	5, 434553

l N =

$l\,N =$	0, 936939	0, 934873	0, 935392
$\frac{1}{2}v =$	4°,2',55''	3, 37, 5	3, 57, 40
$l\,t =$	8, 849906	8, 800928	8, 840387
$l\,t^3 =$	6, 549718	6, 402784	6, 521161
$l\,3 =$	0, 477121	0, 477121	0, 477121
$l\,\frac{1}{3}t^3 =$	6, 072597	5, 925663	6, 044040
$l\,N =$	0, 936939	0, 934873	0, 935392
$l\,N\,t =$	9, 786845	9, 735801	9, 775779
$l\,\frac{1}{3}N\,t^3 =$	7, 009536	6, 860536	6, 979432
$N\,t =$	0, 61213	0, 54425	0, 59673
$\frac{1}{3}N\,t^3 =$	0, 00102	0, 00072	0, 00095
A Perih. ad I.	0, 61315	0, 54497	0, 59768
observationem	$14^h,42'$	$13^h,5$	$14^h,20'$
Com. per Perih.	29, 18, 57	29, 18,57	29, 18,57
trans: 1744. Mart.	$1^d,9^h,39'$	$1^d,8^h,2'$	$1^d,9^h,17'$
$\frac{1}{2}v =$	4, 2, 55	3, 37, 5	3, 57, 40
$\frac{1}{2}\Phi =$	24, 38, 40	24, 45, 17½	24, 41, 12½
$\frac{1}{2}v' =$	28, 41, 35	28, 22, 20	28, 38, 50
$l\,t =$	9, 738250	9, 732451	9, 737421
$l\,t^3 =$	9, 214750	9, 197353	9, 212263
$l\,3 =$	0, 477121	0, 477121	0, 477121
$l\,\frac{1}{3}t^3 =$	8, 737629	8, 720232	8, 735142
$l\,t^5 =$	8, 691250	8, 662255	8, 687105
$l\,n =$	7, 717592	6, 255529	7, 693309
$l\,n\,t^5 =$	6, 408842	5, 977784	6, 380414
$l\,n^2t^5 =$	4, 126434	2, 173313	4, 073723
$t =$	0, 54733	0, 54007	0, 54629
$\frac{1}{3}t^3 =$	0, 05465	0, 05251	0, 05434
	0, 60198	0, 59258	0, 60063
subtr. $\frac{2}{5}n\,t^2 =$	0, 00010	0, 00003	0, 00010

S =

	Hypoth. I.	Hypoth. II.	Hypoth. III
$S =$	0, 60188	0, 59255	0, 60053
$l\,S =$	9, 779510	9, 772725	9, 778535
$l\,N =$	0, 936939	0, 934873	0, 935392
A Perih: ad	0, 716449	0, 707598	0, 713927
II Observ: dier:	5, 2053	5, 1003	5, 1752
A Per. ad I - -	0, 6131	0, 5449	0, 5977
A I ad II - - - -	4, 5922	4, 5554	4, 5775
$\frac{1}{2}v =$	4, 2, 55	3, 37, 5''	3, 57, 40
$\frac{1}{2}\psi =$	65, 5, 15	65, 8, 37	65, 3, 30
$\frac{1}{2}v'' =$	69, 8, 10	69, 45, 40	69, 1, 10
$l\,t =$	0, 418914	0, 410435	0, 416263
$l\,t^3 =$	1, 256742	1, 231305	1, 248789
$l\,3 =$	0, 477121	0, 477121	0, 477121
$l\,\frac{1}{3}t^3 =$	0, 779621	0, 754184	0, 771668
$l\,t^5 =$	2, 094570	2, 052175	2, 081315
$l\,n =$	7, 717592	6, 255529	7, 693309
$l\,n\,t^5 =$	9, 812162	8, 307704	9, 774624
$l\,n^2t^5 =$	7, 529754	4, 563233	7, 467933
$l\,t^2 =$	0, 837828	0, 820870	0, 832526
$l\,n^2t^7 =$	8, 367582	5, 384103	8, 300459
$l\,n =$	7, 717592	6, 255529	7, 693309
$l\,n^3t^7 =$	6, 085174	1, 639632	5, 993768
$l\,t^2 =$	0, 837828	0, 820870	0, 832526
$l\,n^3t^9 =$	6, 923002	2, 460502	6, 826294
$l\,n =$	7, 717592	— — — —	7, 693309
$l\,n^4t^9 =$	4, 640594		4, 519603
$l\,n^4t^{11} =$	5, 478422		5, 352129
$t =$	2, 62370	2, 57297	2, 60774
$+\frac{1}{3}t^3$	6, 02034	5, 67785	5, 91110

$-\frac{2}{5}n^2t^5 =$

	8, 64404	8, 25082	8, 51884
$-\frac{1}{5}nt^5 =$	0, 25956	0, 00812	0, 23806
	8, 38448	8, 24270	8, 28078
$+\frac{2}{3}n^2t^5 =$	203		176
	8, 38651	8, 24270	8, 28254
$+\frac{3}{5}n^2t^7 =$	1000	1	856
	8, 39651	0, 24271	8, 29110
$-\frac{4}{7}n^3t^7 =$	0, 00007		0, 00005
	8, 39644	8, 24271	8, 29105
$-\frac{4}{9}n^3t^9 =$	0, 00037		0, 00029
	8, 39607	8, 24271	8, 29076
$+\frac{5}{11}n^4t^{11} =$	1		1
S =	8, 39608	8, 24271	8, 29077
l S =	0, 924076	0, 916070	0, 918595
l N =	0, 936939	0, 934873	0, 935392
A Perihelio	1 , 861015	1 , 850943	1 , 853987
a III Obferv. dies	72, 6131	70, 9485	71, 4475
A Perih. ad I -	0, 6131	5, 5449	0, 5977
A I ad III - - -	72, 0000	70, 4036	70, 8498

32. Si igitur correctionem in §. 28. traditam adhibere velimus, fiet: L = 1, 15, 50, 0 & I = 46°, 50′, 0″ item λ = 20′ & η = 20′. Ponatur ergo pro orbita vera Longitudo nodi afc. ☊ = 1ˢ, 15°, 50′ + x′
Inclinatio orbitæ ad Eclipt. = 46°, 50′ + y′
Confideremus nunc intervallum temporis inter primam & fecundam obfervationem, quod revera erat. 4^d, 13^h, 21′ = 4, 5562 dies. Calculo vero ita prodiit

Tempus a I ad II	Hypoth. I	Hypoth. II	Hypoth. III
	4, 5922	4, 5554	4, 5775
T + k =	4, 5562	4, 5922	4, 5922

k = − 360 ; p = − 368 ; q = − 147

Cum

Cum ergo fit $\frac{py}{\eta} + \frac{qx}{\lambda} = k$ erit 360 = 18, 4 y + 7,3

fimili modo cum tempus inter primam & tertiam obfervationem fuerit = 70^d, 12^h = 7, 5000, hypothefes vero habeant.

Tempus ad I ad III	Hyp. I	Hyp. II	Hyp. III
	72, 0000	70, 4036	70, 8498
T + k =	70, 5000	72, 0000	72, 0000

k = − 1, 5000 p = − 1, 5964 q = − 1, 1502

Erit ergo 15000 = 798, 2y + 575, 1x. Ex prima æquatione fit x = 49, 3 − 2, 5 y, qui valor in altera fubftitutus dat 6395 y = 133524, unde fit: y = 20′, 53″ hincque erit x = − 3′, 54″. Quare habebitur Pro orbita cometæ vera:
Longitudo nodi afcendentis − − − 1ˢ, 15°, 46′, 6″
Inclinatio Orbitæ ad Eclipticam 47°, 10′, 53″

33. Hinc reliqua elementa per interpolationem determinabuntur.

	Hypoth. I	Hypoth. II	Hypoth. III
a =	22246	22213	22195
		22246	22246

p = − 33 q = − 51

Cum igitur fit quantitas ad a addenda $k = \frac{py}{\eta} + \frac{qx}{\lambda}$ fiet k = − 34 + 10 = − 24, ideoque vere a = 22222.

Deinde

Deinde in erat $b =$	Hypoth. I	Hyp. II	Hyp. III
	44261	44418	44172
		44261	44261

$p = 157; \; q = -89$

Ad b ergo addi debet quantitas $k = \frac{py}{\eta} + \frac{qx}{\lambda}$; hoc eft $k = 164 + 17 = 181$, unde fit vere $b = 44442$

Cometa per Perih. tranfiit A. 1744 Mart.	Hyp. I	Hyp. II.	Hyp. III
	$1^d, 9^h, 39'$	$1^d, 8^h, 2'$	$1^d, 9^h, 17'$
		$1, 9, 39$	$1, 9, 39$

$p = -1, 37 \quad q = -22'$

Hinc $k = \frac{py}{\eta} + \frac{qx}{\lambda} = -1^h, 38'$. Quare revera: Cometa per perihelium tranfiit:

A. 1744 Martii $1^d, 8^h, 2'$.

Denique	Hyp. I	Hyp. II	Hyp. III
I. Obf. an. vera	$8°, 5', 50''$	$7, 14, 10$	$7, 55, 20$
I. Obf. a ☋	$35, 54, 25$	$35, 50, 0$	$36, 3, 35$
☋ a Perihel.	$27, 48, 35$	$28, 35, 50$	$28, 8, 15$
		$27, 48, 35$	$37, 48, 35$

$p = 47, 15; \; q = 19, 40$

Ergo $k = \frac{py}{\eta} + \frac{qx}{\lambda} = 45', 33''$. Quocirca diftantia nodi descendentis a perihelio erit $28°, 34', 8''$. Orbita igitur cometæ vera fequentibus fex elementis definietur.

I. Diftantia

I. Diftantia perihelii a fole	a	$=$	22222
	$l\,a$	$=$	4, 346783
II. Semi-latus rectum . . .	b	$=$	44442
	$l\,b$	$=$	4, 647793

III. Cometa per Perihelium tranfiit A. 1744 Mart. $1^d, 8^h, 2'$ tempore medio Parifino.

IV. Elongatio nodi defcendentis ☋ a perihelio feu angulus AS☋ $= 28°, 34', 8''$

V. Longitudo nodi afcendentis ☊ - $1^s, 15°, 46', 6''$

VI. Inclinatio orbitæ ad Eclipticam $47°, 10', 53''$

34. Orbita ergo hujus cometæ tam parum a parabola difcrepat, ut fine fenfibili errore in calculo pro parabola haberi poffit. Hinc neceffe eft, ut ejus tempus periodicum fit longiffimum, plurimisque demum feculis abfolvatur; quod quoque experientia confirmatur, cum nullum in tabula Cometarum Hallejana vestigium inveniamus cujusquam cometæ, cujus orbita faltem ratione quorumdam elementorum cum præfenti conveniat. Quoniam autem hæc determinatio cum tribus electis obfervationibus perfecte congruit, dubitare non poterimus, quin eadem & reliquis obfervationibus fit fatis factura. Quod ut appareat, fupputemus ex hac theoria locum cometæ geocentricum pro Februarii $3^d, 8^h, 3\frac{1}{2}'$ tempore medio Parifino, quo tempore obfervata eft

longitudo Cometæ $0^s, 0°, 18', 26''$

Latitudo Cometæ $19, 42, 53''$

Ex

Ex tabulis autem solaribus reperitur pro hoc tempore

Longitudo solis	10ˢ, 14,26,13
& log. dist Solis a Terra	4, 993967
Subtrahatur ergo tempus propositum	Febr. 3^d, 8^h; $3\frac{1}{2}'$
a tempore perihelii — — — —	Febr. 30, 8, 2
erit temp. intervallum	$= 27^d - 1\frac{1}{2}'$
seu — — —	= 26,9989 dieb.

Jam ad anomaliam veram inveniendam, quæratur numerus

$$N = \frac{aa}{m\sqrt{b}}.$$

$l a^2 =$	8, 693586
$l \sqrt{b} =$	2, 323896
	6, 369690
$l m =$	5, 434553
$l N =$	0, 935137
subtr. a l int. temp.	1, 431346
$l(t + \frac{1}{3}t^3 - \frac{2}{3}nt^5) =$	0, 496209

35. Quoniam vero numerus n tantopere est exiguus ut pro nihilo haberi queat, hinc anomalia vera v ex tabula pro motu cometarum parabolico ad finem hujus opusculi annexa inveniri poterit. Prodibit autem interpolatione adhibita.

$v =$	117°,27',24''
Perih. a ☊ —	151, 25, 52
Elongatio Cometæ a ☊ —	33°,58',28''

Ex ano-

Ex ... npore
= ... 13
... 7
f = ... 3½'
... 2
... ½'
... dieb.
... nerus
Hæ ... 586
... 896
... 690
... 553
... 137
huj ... 346
... 209
f; ... us ut
ptic ... abula
tæ ... nexa
coll ... ita.
... 24''
... 52
... 28''
ano-

Ex anomalia vera v reperitur distantia cometæ a sole SC $= f$. Cum enim sit $f = \frac{ab}{a + (b-a)\cos v}$ ob $b = 2a$ erit $f = \frac{2a}{1 + \cos v} = \frac{a}{(\cos\frac{1}{2}v)^2}$. Cum ergo sit

$\frac{1}{2}v =$	58°,43',42
erit $l\cos\frac{1}{2}v =$	9, 715250
$2\, l\cos\frac{1}{2}v =$	9, 430500
a $l a =$	4, 346783
Erit $l f =$	4, 916283

Hæc igitur ad figuram primam referendo. Cum sit:

Locus Nodi ☊ —	1ˢ,15°,46',6''
Long. Terræ —	4, 14, 26, 13
Erit angulus TSN $= s =$	88°,40,7''

36. Ex determinationibus, quas supra in explicatione hujus figuræ invenimus, dum posuimus: ST $= c$, SC $= f$; CSN $= \Phi$, TSN $= s$, inclinationem orbitæ ad Ecli- pticam $= i$; atque ang. SNT $= n$, & latitudinem cometæ geocentricam $= p$; ex supra inquam inventis formulis colligitur fore: $\tang n = \frac{c\sin s - f\sin\Phi\cos i}{f\cos\Phi - \cos s}$, &

$$\frac{\cos n}{\tang p} = \frac{f\cos\Phi - c\cos s}{f\sin\Phi\sin i}.$$

 Quæ for-

Quæ formulæ fortaſſe commodiores ſunt ad locum geocentricum ex heliocentrico inveniendum, quam modus trigonometricus uſitatus. Cum igitur ſit

$l\,c =$	4, 993967
$l\,f =$	4, 916283
$i =$	47°,10′,53″
$s =$	88°,40, 7″
$\phi =$	33°,58′,28″

calculus ſequenti modo commodiſſime inſtituetur.

$l\,c =$	4, 993967
add { l ſin $s =$	9, 999882
add { l coſ $s =$	8, 366080
$l\,c$ ſin $s =$	4, 993849
$l\,c$ coſ $s =$	3, 359967
$l\,f =$	4, 916283
add. { l ſin $\phi =$	9, 747270
add. { l coſ $\phi =$	9, 918705
$l\,f$ coſ $\phi =$	4, 834988
$l\,f$ ſin $\phi =$	4, 663553
add. { l coſ $i =$	9, 832300
add. { l ſin $i =$	9, 865400
$l\,f$ ſin ϕ coſ $i =$	4, 495853
$l\,f$ ſin ϕ ſin $i =$	4, 528953
c ſin $s =$	98594
f ſin ϕ coſ $i =$	31322
Num: $=$	67272
f coſ $\phi =$	68389
c coſ $s =$	2291

Denom.

Longitudo
tantum 12·
autem tant
que occur
37. I
meta per ſ
conſtent a

Denom. $=$	66098
l Num: $=$	4, 827834
l Den. $=$	4, 820188
l tang $n =$	10, 007646
Ergo $n =$	45, 30, 15
add. $s =$	88, 40, 7
	134, 10, 22
STN $= t =$	45, 49, 38
ſeu $t =$	1ˢ, 15, 49, 38
Locus ſolis $=$	10, 14, 26, 13
Longitudo Cometæ $=$	0ˢ, 0, 15, 51
l coſ $n =$	9, 845630
$l\,f$ ſin ϕ ſin $i =$	4, 528953
	4, 374583
l Denom. $=$	4, 820188
l tang $p =$	9, 554395
Latitudo Geocentr.	19°,43′,5″

Longitudo ergo per calculum inventa 2′, 35″, & latitudo tantum 12″ ab obſervationibus diſcrepant. Hujus modi autem tantilli errores cum adeo in planetis majores quandoque occurrere ſoleant, merito condonantur.

37. Determinemus jam temporis momenta, quibus cometa per ſuos nodos tranſierit. Quorum locorum cum conſtent anomaliæ veræ, calculus ita ſe habebit.

 Pro ☊

	Pro ☊	Pro ☋	
Anomalia vera v =	151, 25,52	28, 34, 8	
$\frac{1}{2}v$ =	75, 42,55	14, 17, 5	
$l\,r$ =	0, 594110	9, 405870	
$l\,r^3$ =	1, 782330	8, 217610	
$l\,3$ =	0, 477121	0, 477121	
$l\frac{1}{3}r^3$ =	1, 305209	7, 740489	
r =	3, 9274	0, 25461	
$\frac{1}{3}r^3$ =	20, 1934	0, 00550	
S =	24, 1208	0, 26011	
lS =	1, 382392	9, 415157	
l N =	0, 935137	0, 935137	
	2, 313529	0, 350294	
Temp. a Perihelio	207, 744	2, 2402	
seu in diebus:	$207^d, 17^h, 50'$	$2^d, 5^h, 45'$	
Perihelium accidit A. 1743. Aug.	21, 8',2	1, 8, 2	Mart. 1744
A. 1743. Aug.	6, 14, 12	3, 13, 47	Mart. 1744

Hinc cognoscimus cometam per suum nodum ascendentem jam transiisse anno 1743 Mensis Augusti die 7mo mane: Per nodum autem descendentem transiit A. 1744 Mart. d. 3, 13^h, $47'$ tempore Parisino medio, quæ satis congruunt cum iis, quæ supra jam ex orbita cometæ minus exacte cognita derivavimus. Ex observationibus autem Cassinianis quilibet facile concludet, cometam hoc circiter tempore eclipticam trajicere debuisse, propterea quod ejus latitudo a Febr. d. 25. usque ad 29mum jam octo gradibus decrevisset, hocque posteriori tempore adhuc tantum esset

6 graduum

6 graduum, quos æstimatione circiter tribus diebus conficere debuisset.

38. Omnino ergo citra eclipticam iste cometa commoratus est 209^d, 23^h, $35'$, quod tempus si a toto tempore periodico, quod plurium est seculorum subtrahatur, relinquetur spatium temporis, quo cometa in hemisphærio australi est versatus; sicque summa inæqualitas inter ejus moram cis & trans eclipticam perspicitur. Cum autem ab Augusto mense anni elapsi in regiones boreales migrasset, tamdiu ab ecliptica boream versus recessit, quoad ejus latitudo heliocentrica maxima seu ipsi inclinationi orbitæ æqualis esset facta, quod evenit dum ab utroque nodo angulo recto esset elongatus. Simili modo post tertium diem Martii austrum versus ab ecliptica recessit, donec a nodo descendente esset angulo 90° remotus. Quando ergo istæ binæ cometæ ab ecliptica maximæ elongationes evenerint investigemus.

Pro maxima Elongatione	boreali	Australi
Anomalia vera Cometæ v =	61°,25'52'	118°,34',8''
$\frac{1}{2}v$ =	30°,42,56	59, 17',4
$l\,r$ =	9, 773875	0, 226123
$l\,r^3$ =	9, 321625	0, 678369
$l\,3$ =	0, 477121	0, 477121
$l\frac{1}{3}r^3$ =	8, 844504	0, 201248
lN =	0, 935137	0, 935137

lNr =

$l N t$	=	0, 709012	1, 161260
$l \tfrac{1}{3} N t^3$	=	9, 779641	1, 136385
$N t$	=	5, 11696	14, 4964
$\tfrac{1}{3} N t^3$	=	0, 60206	13, 6894
A Perihelio ad Elongationem maximam		5, 71902	28, 1858
		$5^d, 17^h, 15'$	$28^d, 4^h, 27'$
Perihelium erat Mart.		1, 8, 2	1, 8, 2
ſeu Febr.		30, 8, 2	
Febr.		24, 14, 47	29, 12, 29' Mart.

Cometa ergo maximam habuit latitudinem borealem heliocentricam Menſe Februario $24^d, 14^h, 47'$, hinc ab Auguſto anni præteriti cometa usque ad hoc tempus ab ecliptica receſſit per tempus $202^d, 0^h, 35'$; inde autem ad eclipticam reverſus eſt 7 diebus 23 horis. Deinde poſtquam noſtris oculis ſe ſubduxiſſet ob nimiam declinationem auſtralem, latitudo ejus heliocentrica increvit usque ad Martii diem $29, 12^h, 29'$, quo tempore erat $47°, 10', 53''$. Nunc igitur iterum ad eclipticam accedit, quam tamen non attinget niſi poſtquam ab aphelio reverſus pervenerit ad anomaliam veram $151°, 25', 52''$, quod demum poſt complura ſecula eveniet.

39. Quanquam hanc poſtremam methodum adhibendo tres tantum cometæ obſervationes ſufficiunt ad ejus orbitam determinandam, tamen quoque in hunc finem plures obſervationes in uſum vocari, ſicque errores, qui forte in obſervationes irrepſerint inter omnes æqualiter diſtribui poterunt ut hoc modo orbita eo propius ad veritatem perducatur.

Sumta

Mart.
helio-
Augu-
ab ecli-
tem ad
poſtquam
auſtra-
tii diem
nc igi-
attinget
maliam
ſecula
hibendo
orbitam
s obſer-
n obſer-
oterunt
lucatur.
Sumta

ſumta ſcilicet quacunque obſervatione quarta, ex ea computetur tantum ejus elongatio a linea nodorum pro ſingulis tribus aſſumtis hypotheſibus neque enim ejus diſtantia a ſole opus erit. Quo facto ex elementis ope trium priorum obſervationum inventis, pro ſingulis quoque hypotheſibus quæratur tempus, quo cometa a perihelio ad eam anomaliam veram, quæ quartæ obſervationi competere deprehenſa eſt, pervenire deberet, ſeu computetur ad unamquamque hypotheſin, tempus, quod inter primam obſervationem & quartam interjacet, hocque intervallum cum obſervato comparatum, dabit novam æquationem pro erroribus x & y definiendis, ita ut omnino tres habeantur ejusmodi æquationes, ex quibus duplici modo has litteras x & y determinare licebit. Quodſi utroque modo iidem pro his litteris valores prodeant, indicio id erit, jam primam determinationem eſſe exactam, ſin autem quæpiam diſcrepantia reſultet, tum pro x & y valores inter utrosque medii aſſumantur, quo aberratio theoriæ ab obſervationibus ſingulis circiter æqualis reddatur. Simili autem modo quinta, ſexta, pluresque obſervationes in ſubſidium vocari poterunt, quarum ope, ſi iſta præcepta obſerventur, vera cometæ orbita ſatis accurate definiri poterit, etiamſi ſingulæ obſervationes non nimis fuerint exactæ. Hac autem correctione orbita cometæ hic jam inventa non indigere videtur, cum omnibus obſervationibus tam prope ſatisfaciat, ut major conſenſus expectari non debeat.

Cometæ, qui Anno 1742 apparuit, loca obſervata ad tempus aſtronomicum medium ſtili veteris & meridianum Londinenſem reducta.

Locus obſervationis	Tempus æquale Londini St. vet.	Longitudo Cometæ	Latitudo Cometæ bor.
	Febr. 1742		
Peckini	18^d,8^h,57′	9^s,12°,24′,0″	16°, 58′,0
Peckini	19, 10, 27	9, 13, 35,0	22 , 54,
Peckini	20 , 8, 26	9, 14, 44,0	28 , 4,0
Peckini	21 , 9, 11	9, 16 , 2,0	33 , 33,0
Pariſiis	21, 17, 34	9, 16 , 6,5	35 , 9 , 55
Pariſiis	22, 17, 34	9, 17, 46, 35	40, 58 , 37
Peckini	23 , 8, 26	9, 19, 32,0	45 , 9 , 0
Petropoli	25, 10, 0	9, 24, 13,0	56 , 29,0
Peckini	27 , 6, 55	10, 3, 6, 0	66 , 22,0
Petropoli	27, 10, 13	10, 3,16, 0	66 , 41,0
Petropoli	28 , 6, 49	10, 9, 3, 0	70 , 30,0
Peckini	28 , 8, 55	10, 9,56, 0	70 , 53,0
Petropoli	28, 15, 8	10, 11,56,0	71 , 54,0
	Mart.		
Peckini	1 , 7 , 39	10, 18,19,0	74 , 20,0
Petropoli	1 , 7 , 57	10, 19,12,0	74 , 30,0

ca ob-
ſtili
ido
tæ bor.
58′,0″
54,0
4,0
33,0
9 , 55
58, 37
9 , 0
29,0
22,0
41,0
30,0
53,0
54,0
20,0
30,0
Petropoli

Petropoli	1, 15, 10	10, 22, 13,0	75, 29, 0
Petropoli	2 , 7 , 2	11, 1, 49,0	77, 24, 0
Petropoli	2 , 7, 39	11, 2, 15,0	77, 28, 0
Peckini	2 , 8, 24	11, 2, 20,0	77, 33, 0
Pariſiis	2 , 8, 44	11, 2, 30,5	77, 29, 3
Peckini	3 , 7, 39	11, 19,20,0	79, 22, 0
Peckini	4 , 8, 23	0 , 8,35,0	79, 59, 0
Petropoli	4, 14, 34	0, 13,20,0	79, 55, 0
Peckini	5 , 8, 53	0, 26, 57,0	79, 31, 0
Peckini	6 , 8, 23	1, 10, 11,0	78, 23, 0
Petropoli	6, 13, 55	1, 12, 24,0	77, 46, 0
Petropoli	6, 14, 15	1, 12, 44,0	77, 37, 0
Pariſiis	7 , 7, 58	1, 19, 44,40	76, 42, 27½
Peckini	7 , 8, 22	1, 20, 27,0	76, 49, 0
Londini	7, 10, 13	1, 20 , 9,0	76, 38, 0
Pariſiis	7, 10, 37	1, 20, 34,0	76, 32, 10
Peckini	8 , 0, 42	1, 24, 46,0	75, 53, 0
Peckini	11, 1, 21	2 , 8, 19,0	71 , 5, 0
Londini	11, 8, 33	2 , 8, 32,0	71 , 8, 0
Peckini	12, 2, 6	2, 10, 52,0	69, 41, 0
Peckini	13, 2, 36	2, 12, 53,0	68, 23, 0
Petropoli	15, 6, 45	2, 16, 18,0	65, 20, 0
Petropoli	16, 6, 38	2, 17, 31,0	64, 16, 0
Peckini	17, 0, 59	2, 18, 34,0	63, 32, 0
Peckini	17, 5, 49	2, 18, 56,0	63 , 8, 0
Petropoli	17, 7, 50	2, 18, 52,0	63, 13, 0
Peckini	18, 6, 19	2, 19, 38,0	62, 21, 0

		180		
Peckini	19, 6, 43	2, 20,19,0	61, 33, 0
Peckini	20, 7, 8	2, 20,56,0	60, 47, 0
Parisiis	20, 9, 4	2, 21,12,30	60, 42, 40
Peckini	21, 7, 30	2, 22, 9,0	59, 43, 0

Orbita hujus Cometæ determinata prostat

Tom. VII. Miscellan. Berolinensium.

Distantia perihelii a sole a = 73766 , 36

la = 4, 8678584

Semilatus rectum b est ad a ut 192952 ad 100000

Cometa per perihelium transiit Londini M. Jan. 21^d, 21^h, 52$'$

Distantia perihelii a nodo ascendente, 30° 32′ 55″

Longitudo nodi ascendentis 6^s 16° 8′ 55″

Inclinatio orbitæ ad eclipticam 56° 35′ 7″

TABULA

33, 0
47, 0
42, 40
43, 0
21^h, 52$'$
LA

TABULA MOTUS COMETAE IN PARABOLA.

Anom. vera = v & t = tang ½ v.

v. An. vera	$t + \frac{1}{3}t^3$ AreaParab	$l(t + \frac{1}{3}t^3)$ Logar. Ar.	v. An. vera	$t + \frac{1}{3}t^3$ AreaParab.	$l(t + \frac{1}{3}t^3)$ Lo. Ar. Par.
grad. 0	0, 0000000	− ∞	grad. 9	0, 0788642	8, 8968799
	87271	∞		88477	461737
1.	0, 0087271	7, 9408700	10	0, 0877119	8, 9430586
	87297	3010946		88747	4185·4
2.	0, 0174568	8, 2419646	11.	0, 0965866	8, 9849170
	87351	1752024		89046	382992
3.	0, 0261919	8, 4171670	12.	0, 1054912	9, 0232162
	87431	1260937		89374	353183
4.	0, 0349350	8, 5432607	13.	0, 1144286	9, 0585345
	87536	971075		89731	327867
5.	0, 0436886	8, 6403682	14.	0, 1234017	9, 0913212
	87672	794253		90114	306097
6.	0, 0524558	8, 7197935	15.	0, 1324131	9, 1219309
	87831	672339		90530	287215
7.	0, 0612389	8, 7870274	16.	0, 1414661	9, 1506524
	88019	583237		90976	270·79
8.	0, 0700408	8, 8453511	17.	0, 1505637	9, 1777203
	88234	515288		91451	255974
9.	0, 0788642	8, 8968799	18.	0, 1597088	9, 2033177

v.

v. An. vera	$t+\frac{1}{3}t^3$ Ar. Parob.	$l(t+\frac{1}{3}t^3)$ Logar. Ar.	v. An. vera	$t+\frac{1}{3}t^3$ Ar. Parab.	$l(t+\frac{1}{3}t^3)$ Lo. Ar. Par.
grad. 18	0, 1597088	9, 2033177	grad. 33	0, 3048770	9, 4841247
	91959	243240		103816	145422
19.	0, 1689047	9, 2276417	34.	0, 3152586	9, 4986669
	92497	231548		104885	142137
20.	0, 1781544	9, 2507965	35.	0, 3257471	9, 5128806
	93068	221149		106068	139059
21.	0, 1874612	9, 2729114	36.	0, 3363539	9, 5267965
	93672	211763		107278	136352
22.	0, 1968284	9, 2940877	37.	0, 3470817	9, 5404317
	94310	203259		108539	133731
23.	0, 2062594	9, 3144136	38.	0, 3579356	9, 5538048
	94982	195525		109852	131283
24.	0, 2157576	9, 3339661	39.	0, 3689208	9, 5669331
	95691	188466		111216	128990
25.	0, 2253267	9, 3528127	40.	0, 3800424	6, 5798321
	96433	181997		112641	126850
26.	0, 2349700	6, 3710124	41.	0, 3913065	9, 5925171
	97212	176060		114118	124843
27.	0, 2446912	9, 3886184	42.	0, 4027183	9, 6050014
	98033	170599		115660	122971
28.	0, 2544945	9, 4056783	43.	0, 4142843	9, 6172985
	98888	165557		117260	121216
29.	0, 2643833	9, 4222340	44.	0, 4260103	9, 6294201
	99784	160895		118926	119577
30.	0, 2743617	9, 4383235	45.	0, 4379029	9, 6413778
	100724	156582		120658	118045
31.	0, 2844341	9, 4539817	46.	0, 4499687	9, 6531823
	101703	152575		122459	116614
32.	0, 2946044	9, 4692392	47.	0, 4622146	9, 6648437
	102726	148855		124331	115276
33.	0, 3048770	9, 4841247	48.	0, 4746477	9, 6763713

v. An. vera	$t+\frac{1}{3}t^3$ Ar. Parab.	$l(t+\frac{1}{3}t^3)$ Lo. Ar. Par.	v. An. vera	$t+\frac{1}{3}t^3$ Ar. Parab.	$l(t+\frac{1}{3}t^3)$ Lo. Ar. Par.
grad. 48	0, 4746477	9, 6763713	grad. 62.	0, 6731708	9, 8281252
	126281	114036		163373	104142
49.	0, 4872758	9, 6877749	63.	0, 6895081	9, 8385394
	128303	112873		166905	103875
50.	0, 5001061	9, 6990622	64.	0, 7061986	9, 8489269
	130409	111796		170584	103657
51.	0, 5131470	9, 7102418	65.	0, 7232570	9, 8592926
	132601	110800		174422	103493
52.	0, 5264071	9, 7213218	66.	0, 7406992	9, 8696419
	134876	109873		178421	103374
53.	0, 5398947	9, 7323091	67.	0, 7585413	9, 8799793
	137244	109020		182590	103300
54.	0, 5536191	9, 7432111	68.	0, 7768003	9, 8903093
	139707	108235		186942	103279
55.	0, 5675898	9, 7540346	69.	0, 7954945	9, 9006372
	142270	107517		191480	103298
56.	0, 5818168	9, 7647863	70.	0, 8146425	9, 9109670
	144935	106860		196220	103368
57.	0, 5963103	9, 7754723	71.	0, 8342645	9, 9213038
	147708	106266		201166	103479
58.	0, 6110811	9, 7860989	72.	0, 8543811	9, 9316517
	150594	105729		206334	103635
59.	0, 6261405	9, 7966718	73.	0, 8750145	9, 9420152
	153598	105251		211731	103837
60.	0, 6415003	9, 8071960	74.	0, 8961876	9, 9523989
	156725	104827		217378	104084
61.	0, 6571728	9, 8176796	75.	0, 9179254	9, 9628073
	159980	104456		223277	104375
62.	0, 6731708	9, 8281252	76.	0, 9402531	9, 9732448

v. An.vera	$t+\frac{1}{3}t^3$ Ar. Parab.	$l(t+\frac{1}{3}t^3)$ Lo.Ar.Par.	v. An.vera	$t+\frac{1}{3}t^3$ Ar. Parab.	$l(t+\frac{1}{3}t^3)$ Lo.Ar.Par.
76.	0,9402531	9,9732448	91.	1,3688601	10,1363592
	229451	104709		368111	115245
77.	0,9631982	9,9837157	92.	1,4056712	10,1478837
	235911	105087		381665	116346
78.	0,9867893	9,9942244	93.	1,4438377	10,1595183
	242677	105512		395965	117500
79.	1,0110570	10,0047756	94.	1,4834342	10,1712683
	249760	105982		411070	118708
80.	1,0360330	10,0153738	95.	1,5245412	10,1831391
	257185	106491		427036	119978
81.	1,0617515	10,0260229	96.	1,5672448	10,1951369
	264969	107052		443914	121302
82.	1,0882484	10,0367281	97.	1,6116362	10,2072671
	273131	107655		461777	122686
83.	1,1155615	10,0474936	98.	1,6578139	10,2195357
	281699	108304		480706	124140
84.	1,1437314	10,0583240	99.	1,7058845	10,2319497
	290689	109001		500758	125650
85.	1,1728003	10,0692241	100.	1,7559603	10,2445147
	300141	109749		522027	127129
86.	1,2028154	10,0801990	101.	1,8081630	0,2572376
	310074	110539		544617	128869
87.	1,2338228	10,0912529	102.	1,8626247	10,2701245
	320519	111378		568605	130604
88.	1,2658747	10,1023907	103.	1,9194852	10,2831849
	331508	112270		594116	132373
89.	1,2990255	10,1136177	104.	1,9788968	10,2964222
	343078	113209		621261	134256
90.	1,3333333	10,1249386	105.	2,0410229	10,3098478
	355268	114206		650185	136192
91.	1,3688601	10,1363592	106.	2,1060414	10,3234670

v.

v. An.vera	$t+\frac{1}{3}t^3$ Ar. Parob.	$l(t+\frac{1}{3}t^3)$ Lo.Ar.Par.	v. An.vera	$t+\frac{1}{3}t^3$ Ar. Parab.	$l(t+\frac{1}{3}t^3)$ Lo.Ar.Par.
106.	2,1060414	10,3234670	120.	3,4641016	10,5395906
	681009	138210		1439648	176840
107.	2,1741423	10,3372880	121.	3,6080664	10,5572746
	715916	140702		1531254	180508
108.	2,2457339	10,3513582	122.	3,7611918	10,5753254
	747051	142120		1630816	184339
109.	2,3204390	10,3655702	123.	3,9242734	10,5937593
	786624	144783		1739121	188323
110.	2,3991014	10,3800485	124.	4,0981855	10,6125916
	826836	147157		1857152	192478
111.	2,4817850	10,3947642	125.	4,2839007	10,6318394
	869928	149623		1985965	196806
112.	2,5687778	10,4097265	126.	4,4824972	10,6515200
	916132	152190		2126822	201322
113.	2,6603910	10,4249455	127.	4,6951794	10,6716522
	965746	154857		2281094	206031
114.	2,7569656	10,4404312	128.	4,9232888	10,6922553
	1019103	157641		2450375	210947
115.	2,8588759	10,4561953	129.	5,1683263	10,7133500
	1076486	160525		2636466	216076
116.	2,9665245	10,4722478	130.	5,4319729	10,7349576
	1138350	163535		2841418	221434
117.	3,0803595	10,4886013	131.	5,7161147	10,7571010
	1205088	166665		3067691	227035
118.	3,2008683	10,5052678	132.	6,0228838	10,7798045
	1277168	169919		3317927	232890
119.	3,3285851	10,5222597	133.	6,3546765	10,8030935
	1355165	173309		3593349	238885
120.	3,4641016	10,5395906	134.	6,7140114	10,8269820

 v.

v. An. vera	$t+\frac{1}{3}t^3$ Area Parab.	$l(t+\frac{1}{3}t^3)$ Lo. Ar. Par.	v. An. vera	$t+\frac{1}{3}t^3$ Area Parab.	$l(t+\frac{1}{3}t^3)$ Lo. Ar. Par.
134.	6,7140114	10,8269820	148.	17,625464	11,2461405
	3905592	245558		1,608797	379350
135.	7,1045706	10,8515378	149.	19,234261	11,2840755
	4246883	252144		1,824706	393616
136.	7,5292589	10,8767522	150.	21,058967	11,3234371
	4630260	259188		2,078751	408835
137.	7,9922849	10,9026710	151.	23,137718	11,3643206
	5059412	266572		2,379354	425102
138.	8,4982261	10,9293282	152.	25,517072	11,4068308
	5541169	274327		2,737148	442525
139.	9,0523430	10,9567609	153.	28,254220	11,4510833
	6083643	282480		3,165844	461238
140.	9,6607073	10,9850089	154.	31,420064	11,4972071
	669622	291052		3,683004	481379
141.	10,330329	11,0141141	155.	35,103068	11,5453450
	739010	300076		4,311613	503130
142.	11,069339	11,0441217	156.	39,414681	11,5956580
	817891	309590		5,081856	526683
143.	11,887230	11,0750807	157.	44,496537	11,6483263
	907868	319629		6,034015	552278
144.	12,795098	11,1070436	158.	50,530552	11,7035541
	1,010869	330233		7,222367	580197
145.	13,805967	11,1400669	159.	57,752919	11,7615738
	1,129269	341451		8,720981	610774
146.	14,935236	11,1742120	160.	66,473900	11,8226512
	1,265913	353338		10,632908	644416
147.	16,201149	11,2095458	161.	77,106808	11,8870928
	1,424315	365947		13,102930	681607
148.	17,625464	11,2461405	162.	90,209738	11,9552535

v.

$\frac{1}{3}t^3)$
r.Par.
1405
9350
0755
3616
4371
8835
3206
5102
8308
2525
0833
1238
2071
1379
3450
3130
6580
6683
3263
2278
5541
0197
5738
0774
6512
4416
0928
1607
2535
v.

v. An. vera	$t+\frac{1}{3}t^3$ Ar. Parab.	$l(t+\frac{1}{3}t^3)$ Lo. Ar. Par.	v. An. vera	$t+\frac{1}{3}t^3$ Ar. Parab.	$l(t+\frac{1}{3}t^3)$ Lo. Ar. Par.
162.	90,209738	11,9552535	171.	696,50162	12,8429220
	16,339289	722960		292,67111	1523501
163.	106,549027	12,0275495	172.	989,17273	12,9952721
	20,64650	769223		484,0461	1729950
164.	127,19553	12,1044718	173.	1473,2188	13,1682671
	26,48042	821340		861,6103	1999880
165.	153,67595	12,1866058	174.	2334,8291	13,3682551
	34,54088	880526		1693,0339	2368196
166.	188,21683	12,2746584	175.	4027,8630	13,6050747
	45,93237	948342		3802,5759	2887114
167.	234,14920	12,3694926	176.	7830,4389	13,8937861
	62,45521	1026849		10737,522	3749781
168.	296,60441	12,4721775	177.	18567,960	14,2687642
	87,15848	1118855		44167,208	5287469
169.	383,76289	12,5840630	178.	62735,168	14,7975111
	125,43102	1228203		438917,01	9028915
170.	509,19391	12,7068833	179.	501652,17	15,7004026
	187,30771	1360387		∞	∞
171.	696,50162	12,8429220	180.	infinitum.	infinitum.

NOTA.

NOTA.

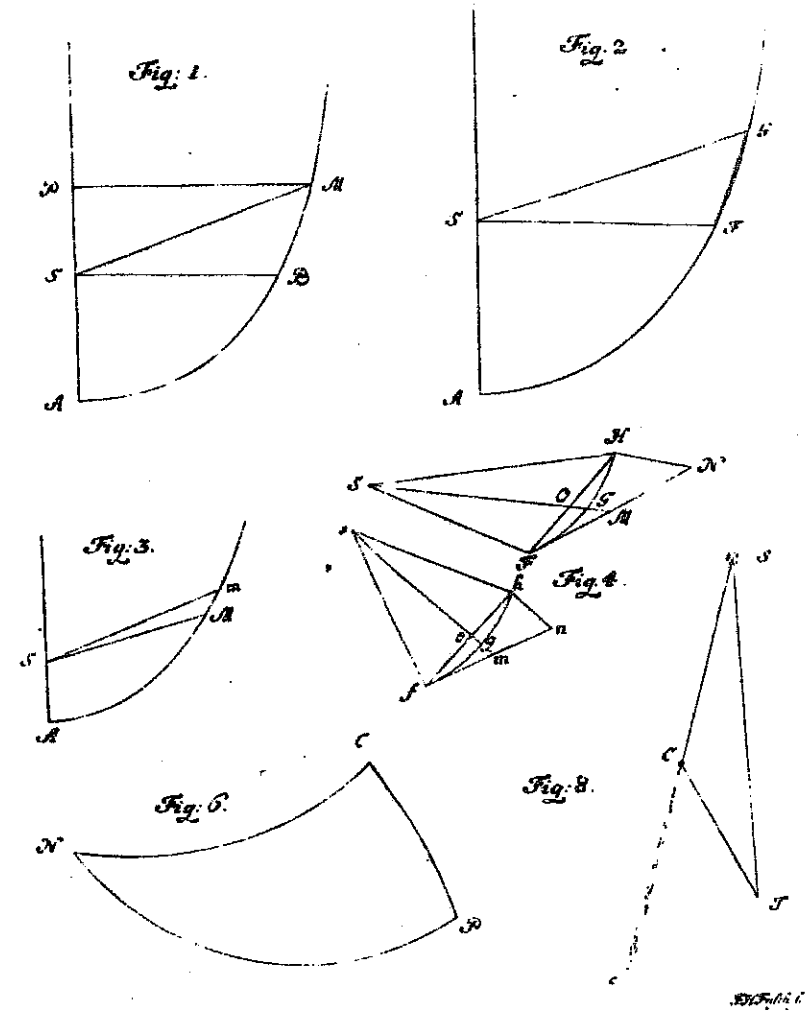
Orbita Cometæ A. 1742. quæ hic ex Volumine VII. Miſcellan. Berol. recenſetur, eſt ea quidem, quæ per correctionem ibi adhibitam prodiit, cum autem ea ſit nimis lubrica atque a vero vehementer ſeducere poſſit, ſi in obſervationes vel minimus error irrepſerit, præſtabit orbitam ibi primo inventam retinuiſſe, donec ea per methodum ultimam hic expoſitam emendetur: Erat ergo.

I. Diſtantia Perihelii a Sole = 75210
II. Semi-latus rectum = 150420
III. Cometa per perih. tranſiit Tempore Lond. medio St. vet. A. 1742. M. Januario $27^d, 4^h, 14'$
IV. Diſtantia Perihelii a nodo aſcendente $31^\circ, 17', 16''$
V. Longitudo helioc. Nodi aſcendentis $6^s, 9^\circ, 32', 7''$
VI. Inclinatio Orbitæ ad Eclipticam. 61, 43, 44

Berolini 1744.

Ære Michaelis.

Tabula I.



Tabula II.

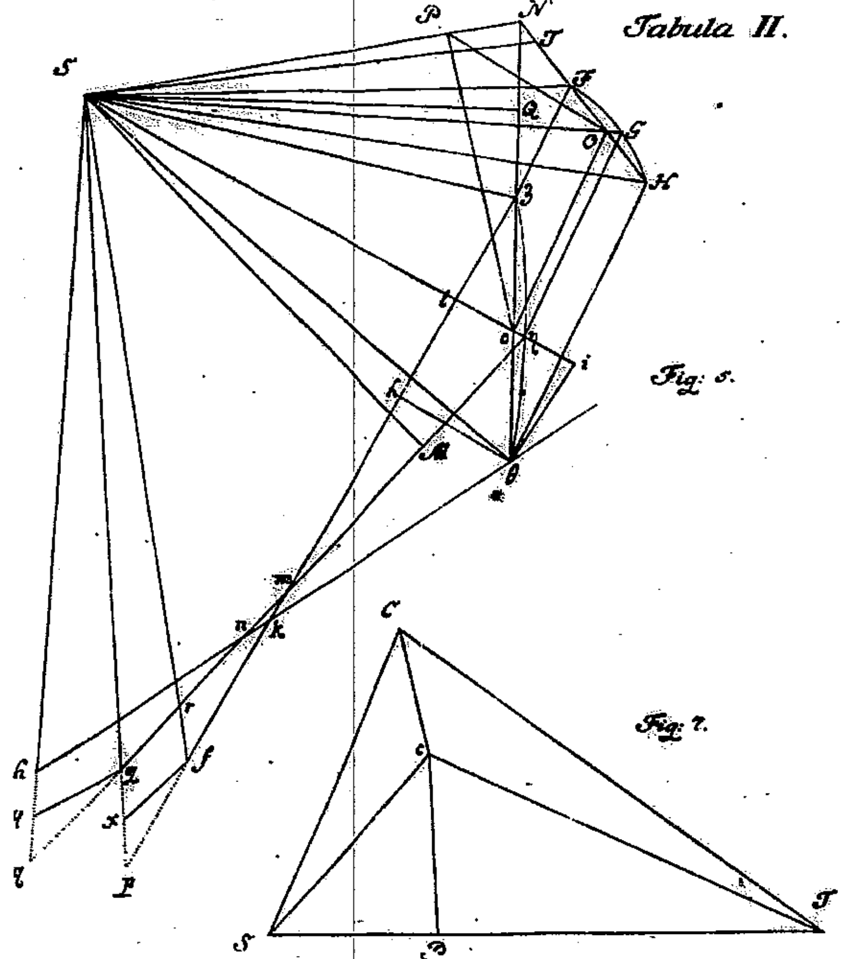


Fig: 5.

Fig: 7.

Tabula III.

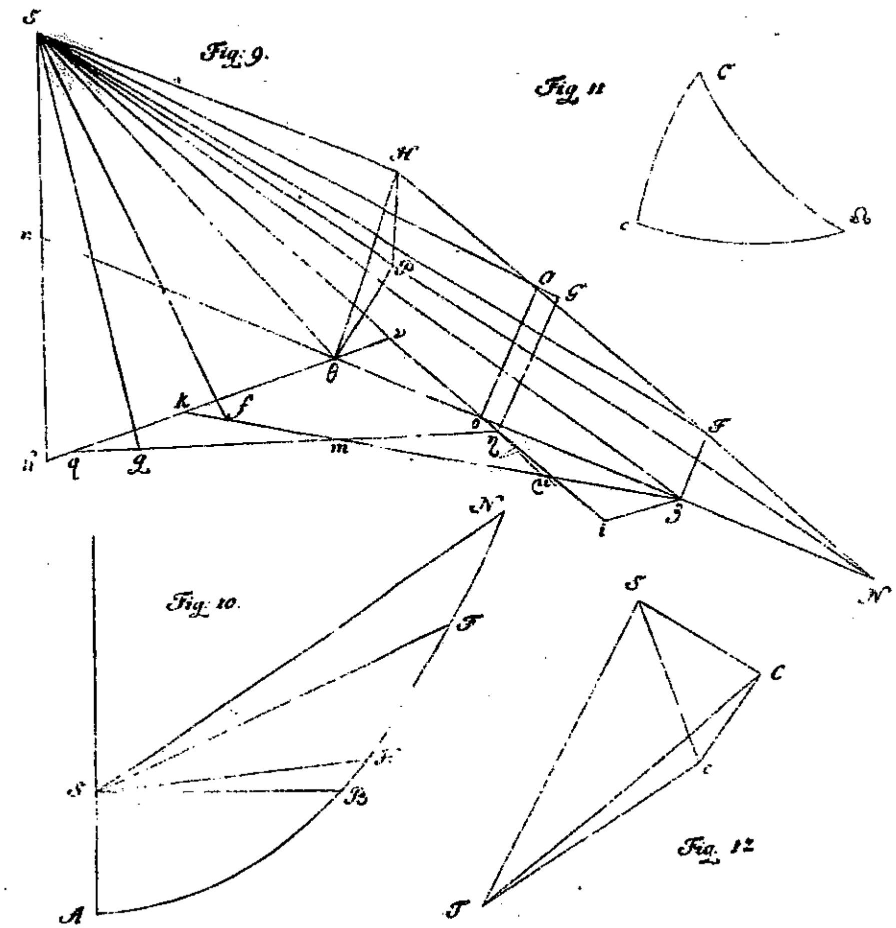


Fig: 9.

Fig: 11

Fig: 10.

Fig: 12

Tabula ad Additamentum

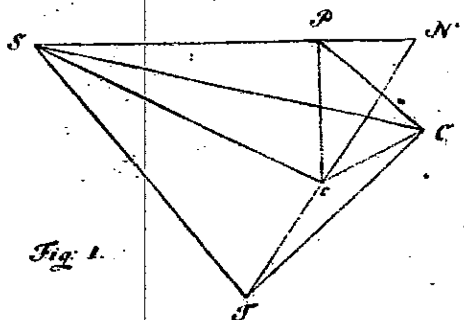


Fig: 1.

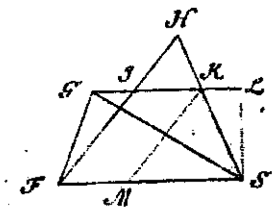


Fig: 3.

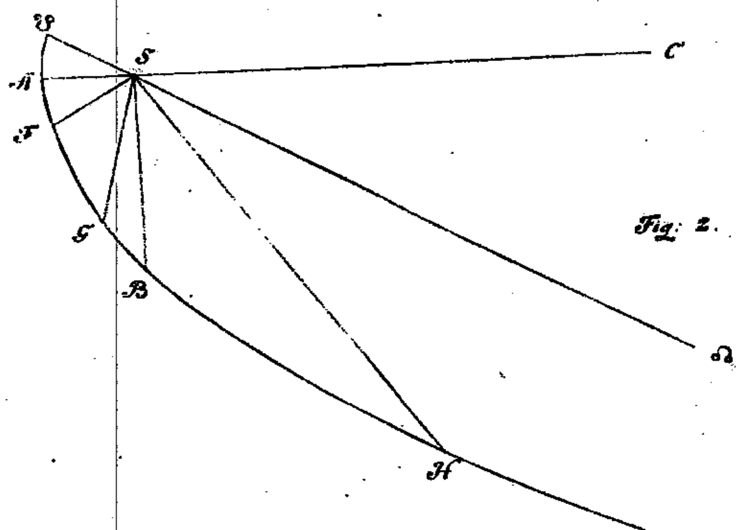


Fig: 2.