Synopsis

Edmund Halley -*Synopsis de l'astronomie des comètes* – 1705. **(Extraits de la traduction du latin en anglais).**

[...]

But in the Year 1577, (*Tycho* ſeriouſly purſuing the Study of the Stars, and having gotten large Inſtruments for the Performing Cœleſtial Menſurations, with far greater Care and Certainty, than the Ancients cou'd ever hope for) there appear'd a very remarkable Comet; to the Obſervation of which, *Tycho* vigorouſly applied himſelf; and found by many juſt and faithful Trials, that it had not a *Diurnal Parallax* that was at all perceptible: And conſequently was not only no Aireal Vapour, but alſo much higher than the Moon; nay, might be plac'd amongſt the Planets for any thing that appear'd to the Contrary; the cavilling Oppoſition made by ſome of the *School-men* in the mean time, being to no Purpoſe.

Next to *Tycho*, came the Sagacious *Kepler*. He having the Advantage of *Tycho*'s Labours and Obſervations, found out the *true Phyſical* Syſtem of the World, and vaſtly improv'd the Aſtronomical Science.

For he demonſtrated that all the Planets perform their Revolutions in *Elliptick Orbits, whoſe Plains paſs thro' the Center of the Sun*, obſerving this Law, That the *Area's (of the Elliptick Sectors, taken at the Center of the Sun, which he proved to be in the common Focus of theſe Ellipſes) are always proportional to the Times, in which the correſpondent Elliptical Arches are deſcrib'd.* He diſcover'd alſo, That *the Diſtances of the Planets from the Sun are in the* Seſquialtera Ratio *of the Periodical Times*, or (which is all one) That *the Cubes of the Diſtances are as the Squares of the Times.* This great Aſtronomer had the Opportunity of obſerving Two Comets, one of which was a very remarkable one. And from the Obſervations of theſe (which afforded ſufficient Indications of an *Annual Parallax*) he concluded, That *the Comets mov'd freely thro' the Planetary Orbs, with a Motion not much different from a Rectilinear one; but of what Kind he cou'd not then preciſely determine.* Next, *Hevelius* (a Noble Emulator of *Tycho Brahe*) following in *Kepler*'s Steps, embraced the ſame Hypotheſis of the *Rectilinear Motion of Comets*, himſelf accurately obſerving many of them. Yet, he complain'd, that his Calculations did not perfectly agree to the Matter of Fact in the Heavens: And was aware, that *the Path of a Comet was bent into a Curve Line towards the Sun.* At length, came that prodigious Comet of the Year 1680. which deſcending (as it were) from an infinite Diſtance *Perpendicularly* towards the Sun, aroſe from him again with as great a Velocity.

This Comet, (which was ſeen for Four Months continually) by the very remarkable and peculiar Curvity of its Orbit (above all others) gave the fitteſt Occaſion for inveſtigating the *Theory of the Motion.* And the *Royal Obſervatories* at *Paris* and *Greenwich* having been for ſome time founded, and committed to the Care of moſt *excellent Aſtronomers*, the *apparent* Motion of this Comet was moſt accurately (perhaps as far as Humane Skill cou'd go) obſerv'd by Mrs. *Caſſini* and *Flamſteed.*

Not long after, that *Great Geometrician*, the *Illuſtrious Newton*, writing his *Mathematical Principles of Natural Philoſophy*, demonſtrated not only that what *Kepler* had found, did neceſſarily obtain in the *Planetary Syſtem*; but alſo, that all the *Phænomena* of Comets wou'd naturally follow from the ſame Principles; which he abundantly illuſtrated by the Example of the aforeſaid Comet of the Year 1680. ſhewing, at the ſame time, a Method of Delineating the Orbits of Comets Geometrically; wherein he (not without the higheſt Admiration of all Men) ſolv'd a Problem, whoſe Intricacy render'd it worthy of himſelf. This Comet he prov'd to move round the Sun in a Parabolical Orb, and to deſcribe Area's (taken at the Center of the Sun) proportional to the Times.

Wherefore (following the Steps of ſo *Great a Man*) I have attempted to bring the ſame Method to *Arithmetical Calculation*; and that with deſired Succeſs. For, having collected all the Obſervations of Comets I could, I fram'd this Table, the Reſult of a prodigious deal of Calculation, which, tho' but ſmall in Bulk, will be no unacceptable Preſent to Aſtronomers. For theſe Numbers are capable of Repreſenting all that has been yet obſerv'd about the Motion of Comets, by the Help only of the following *General Table*; in the making of which I ſpar'd no Labour, that it might come forth perfect, as a Thing conſecrated to Poſterity, and to laſt as long as *Aſtronomy* it ſelf.

A General Table for Calculating the Motions of Comets in a Parabolical Orbit.

Med mot.	Ang. a perihelio.	Logar. pro dist. à Sole.	Mea: mot.	Ang. a perihelio.	Logar. pro dist. à Sole.
○	gr. ′ ″		○	gr. ′ ″	
1	1.31.40	0.000077	31	42.55.06	0.062400
2	3. 3.15	0.000309	32	44. 3.20	0.065838
3	4.34.43	0.000694	33	45.10.29	0.069319
4	6. 6. 0	0.001231	34	46.16.35	0.072839
5	7.37. 1	0.001921	35	47.21.36	0.076396
6	9. 7.43	0.002759	36	48.25.33	0.079984
7	10.38. 2	0.003745	37	49.28.27	0.083600
8	12. 7.54	0.004876	38	50.30.19	0.087244
9	13.37.17	0.006151	39	51.31. 8	0.090910
10	15. 6. 7	0.007564	40	52.30.56	0.094596
11	16.34.20	0.009115	41	53.29.44	0.098300
12	18. 1.54	0.010798	42	54.27.32	0.102019
13	19.28.47	0.012609	43	55.24.21	0.105752
14	20.54.54	0.014550	44	56.20.12	0.109490
15	22.20.14	0.016607	45	57.15. 6	0.113240
16	23.44.44	0.018783	46	58. 9. 3	0.116995
17	25. 8.22	0.021072	47	59. 2. 4	0.120756
18	26.31. 8	0.023470	48	59.54.11	0.124518
19	27.52.55	0.025969	49	60.45.25	0.128278
20	29.13.47	0.028570	50	61.35.45	0.132035
21	30.33.40	0.031263	51	62.25.14	0.135792
22	31.52.32	0.034045	52	63.13.52	0.139544
23	33.10.23	0.036916	53	64. 1.40	0.143291
24	34.27.12	0.039864	54	64.48.38	0.147029
25	35.42.59	0.042892	55	65.34.50	0.150762
26	36.57.41	0.045989	56	66.20.13	0.154482
27	38.11.20	0.049154	57	67.04.50	0.158192
28	39.23.54	0.052382	58	67.48.42	0.161890
29	40.35.23	0.055668	59	68.31.50	0.165578
30	41.45.47	0.059009	60	69.14.16	0.169254

[...]

A

SYNOPSIS

OF THE

ASTRONOMY

OF

COMETS.

By EDMUND HALLEY, Savilian Professor of Geometry, at *Oxford*; And Fellow of the *Royal Society*.

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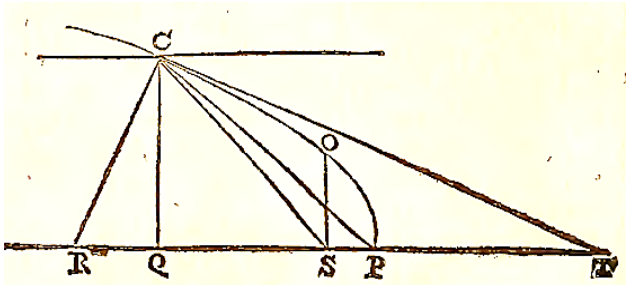

Let S be the *Sun*, POC the Orbit of a Comet, P the *Perihelion*, O the Place where the Comet is 90 *gr.* distant from the Sun, C any other Place. Draw the Right Lines CP, CS, and make ST, SR, equal to CS; and then having drawn the Right Lines CR, CT, (whereof the one is a Tangent, and the other a Perpendicular to the Curve) let fall CQ perpendicular to the *Axis* PSR.

EXAMPLE I.

Let it be requir'd to find the Place of the Comet of the Year $166\frac{4}{5}$, March 1^{d}, 7^{h}, $00'$, *P. M.* London. *That is.* 96^{d}, 19^{h}, $8'$, *after the* Perihelion, *which happen'd* Novemb. 24^{d}, 11^{h}, $52'$.

Log. Dist. Perihel.	0. 011044
Log. Sesquialt.	0. 016566
Comp. Arith.	9 983434
	9. 960128
Log. Temp.	1. 985862
Log. Med. Mot.	1. 929424
Medius Motus	85.001
Perihel. ☊	10. 41. 25
Ang. Corresp.	83. 38. 05—
Comet. in Orb. ♉	17. 3. 20
Ascend. Nod. ♊	21. 14. 00
Com. à Nodo	34. 10. 40
Red. ad Eclip.	32 19. 05
Com. Helioc. ♉	18. 54. 55
Incl. Bor.	11. 46. 50
Log. pro dist.	0. 255369
Log. Perihel.	0. 011044
Co-sin. Incl.	9. 990754
Log. dist. Curt.	0. 257167
Log. dist. ☉	9. 997918
☉ ♓	21. 44. 45
Com. Visus ♈	29. 18. 30
Lat. Visa	8. 36. 15