

'The president [Sir Christopher Wren] acquainted the Society with the undertaking of Mr JOHN ADAMS to survey all England, by measuring, taking angles, and also the latitudes of places; and in order to this running three several meridians clear through England: that Mr NEWTON of Cambridge had promised to assist him; and that he designed the next week to wait on the Society, in order to desire their directions and assistance' (Birch, iv, 65; see also pp. 66, 67, 87).

(3) Lady Newton was Mary, daughter of Sir Gervase Eyre of Rempstone, Notts.

249 FLAMSTEED TO CROMPTON

12 FEBRUARY 1680/1

From an extract,⁽¹⁾ made by Newton, in the University Library, Cambridge.
For answer see Letter 251

The appearance of ye Head of ye Comet I could never better compare then to those obscurer spots in ye moon wch wee esteem ye aqueous part of it. Whence it may seem that ye exteriour coat of ye Comet may be composed of a liquid wch reflects but little light. It was never well defined nor shewed any perfect limb but like a wisp of hay. May not this intimate that the globe of wch 'twas once compounded was broke & ye humid part spread over the rest, yet so as here & there some little pieces of ye more solid parts exert themselves above it & reflect to us ye light of ye Sun shining on it? For I noted that at the first I saw some little points of light scattered here & there through the haze. The taylor of ye Comet was nearly but not exactly in a streight line being a little curved backward, towards ye west.

Thus far Mr Flamsteed in a letter from Greenwich Feb. 12. 1680/81.

NOTE

(1) Newton wrote this extract upon a blank sheet of Letter 251.

250 FLAMSTEED TO HALLEY

17 FEBRUARY 1680/1

Extract from the original⁽¹⁾ in the Bodleian Library, Oxford

The Observatory Feb: 17 1681
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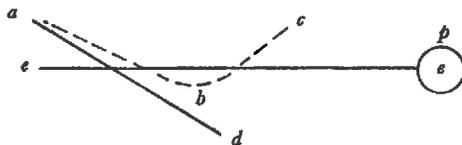
You tell me you have meditated upon Comets & come to a result yet desire my thoughts as to the Philosophicall part of them. if so you have resolved I doubt not but it is on such good grounds & consideration that my thoughts will

be needlesse. might I not also on this intimation from you have expected yours first? You seeme too close but you shall not accuse me of that fault; I shall willingly answer your desires & reckon my selfe a gainer, for betwixt freinds the agreement of opinions confirm them, the difference helps to correct the faults of either.

I must first thanke you for ye Account you sent me of Gallets⁽²⁾ course observations at Rome: from them I draw my first argument. I conceive the Comet which appeared in November to be the same wee lately observed.⁽³⁾ you may remember that I told you before you went hence when I had onely heard of it that wee should see it againe when it had passed ye Sun. Since, you have seene that prediction verified but the reason I must acknowledge of its late appearance is much different from my conceptions at that time

It appeares by such observations as were made here before Gallets, tho as course, that the Comet had North latitude first, then peirced the plane of ye ecliptick twice⁽⁴⁾ & so passed on towards ye Sun.

I conceive therefore that the Sun attracts all the planets and all like bodys that come within our Vortex, more or lesse according to the different substance of their bodies and nearenesse or remotenesse from him. that it drew the Comet by its northerne pole, the line of whose motion was at first really inclined from the North into the South part of the heavens but was by this attraction as



it drew nearer to him bent the Contrary way, as if *ee* were the plane of the Ecliptick, *p* ye North pole of ye Sun, *ad* ye line of its first inclination which by ye attraction of ye pole *p* is bent into ye curve *abc* in which Gallet observed it to move. The Comet was then to ye North of ye Solar Æquator & perhaps here the contrary motion of ye Vortex might helpe to beare it up from ye plaine of ye Ecliptick into ye Northerne latitude.

When it came within ye Compasse of ye *orbis annuus* this attraction of ye Sun would have drawne it neare him in a streight line, had not the laterall resistance of ye Matter of ye Vortex moved against it bent it into a Curve. as if in the figure on ye next Page [here p. 339] *ay* were ye line in which ye motion of ye Comet were directed. this by ye attraction of ye Sun is bent into *β, B*. & when ye Comet comes to *B* it would be carried on to ye Sun in ye streight line *BC*, were it not for ye motion of the Vortex beareing it out of yt line from *e* to *g*. the body of ye Comet I conceive to have a'lwayes the same part carried foremost in ye line

(as some have thought) *excursions in certain periods into our Systeme or Solar World*. I should rather think them to be made by ye *collection of Exhalations or Effluvia from ye Æther or Ætherial Bodies* & (as much as any) from ye solar. To which I find Mr Horrocks heretofore, & Dr Marsh of late, do incline allso. *The tail I take to be little more, if more, than the tinging of ye sunbeams passing through the Head*. As to what you say, of Worlds dying as well as men, (which to Aristotle, his followers, as to the Incorruptibility of or in the Cœlestial bodies, would be a great Paradox) it doth not seem so strange to me, since yt, divers of the stars noted by ye Ancients, are now wanting: And some others do, now, appear & disappear uncertainly. (which yet argues, yt *disappearing of a Star, is no certain argument that such Star is perished*, since sometimes it appears again). But I can hardly think such dissolutions so frequent as our sight of Comets. And yet, if they were much more frequent, it's yet a great chance *if any of them, or of their Satellites, do stray into our world*: which is so inconsiderable a part of ye vast Regions they have to make such excursions into; that perhaps one, of a thousand would be more than would come to our shore.¹

(9) See Letter 252. Halley had visited Paris in December 1680 at the beginning of a few months' stay in France: see p. 349 and note (6), p. 356.

(10) He was president for two years since the previous November.

(11) Possibly Lancelot Colson (fl. 1668), a physician and astrologer, of London, who published almanacks. See *D.N.B.*

There was too Nathaniel Colson (fl. 1674) who produced the *Mariner's New Kalendar*.

(12) This further postscript, like the marginal note (7), was probably added later by Flamsteed.

251 NEWTON TO CROMPTON FOR FLAMSTEED

28 FEBRUARY 1680/1

From the original in the Bodleian Library.

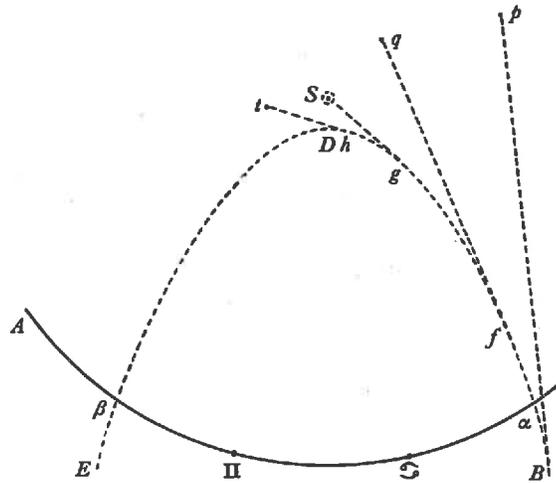
In reply to Letters 242, 245, 249; for answer see Letter 252

For Mr Crompton to be sent to Mr Flamstead.

I thank Mr Flamstead for his kind mention of me in his letters⁽¹⁾ to Mr Crompton. And as I commend his wisdom in deferring to publish his hypothetical notions till they have been well considered both by his friends & himself, so I shall act ye part of a friend in this paper⁽²⁾ not in objecting against it by way of opposition but in describing what I imagin might be objected by others & so leaving it to his consideration. If hereafter he shal please to publish his Theory & think any of ye objections I propound need an answer to prevent their being objected by others, he may describe ye objections as raised by himself or his friends in general wthout taking any notice of me.

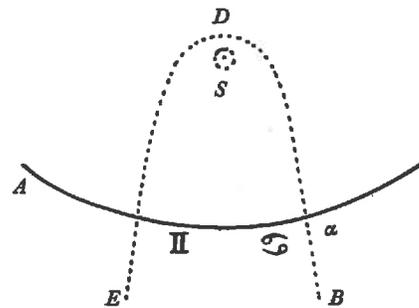
First then whereas in ye annexed figure⁽³⁾ he supposes that when ye earth is in Π , the comet moved from B to f & so to D & then to E , so as to be in its perige

twice, the first time at α when the earth was in Π the next time at β when ye Earth was in ϖ & in its perihelion at D to be between ye \odot & earth: draw Bp , fq , gS , ht tangents to ye line of ye Comets motion at B , f , g & h , & I can easily allow that ye attractive power of ye Sun as ye Comet approaches ye Sun passing from B to f & then to g , will make ye comet verge more & more from its former line of direction towards ye Sun, so that its line of direction wch at B was Bp , at f shal become fq , but I do not understand how it can make ye Comet ever move directly



towards ye \odot as at g where ye line of direction gS passes through ye center of ye Sun S , much less can it make ye line of direction verge to ye other side ye sun as at h where ye line of direction is ht . For if ye Comet at g moved directly towards ye \odot & the \odot also attracted it directly towards himself it would continue to go towards ye \odot in ye line gS till it fell upon ye \odot , there being no cause to turn it out of ye line of its direction gS towards h . The case is as if a bullet were shot from west to east. The attraction of ye earth by its gravity will make ye bullet tend more & more downwards, but it can never make it tend directly downwards much less verge from east to west. Nor will ye motion of ye Vortex⁽⁴⁾ relieve ye difficulty but rather increase it. For that being according to ye order of ye letters & marks $A\beta\Pi\varpi\alpha$ would make the Comet verge from ye line gS rather towards ye line fq then towards h . The only way to relieve this difficulty in my judgmt is to suppose ye Comet to have gone not between ye \odot & Earth but to have fetched a compass about ye \odot as in this figure.

Secondly though I can easily allow an attractive power in ye \odot whereby the Planets are kept in their courses about him from going away in tangent lines, yet I am the lesse inclined to beleive this attraction to be of a magnetick nature because ye \odot is a vehemently hot body & magnetick bodies when made red hot lose their vertue. A red hot loadstone attracts not iron, nor any Loadstone a red hot iron, nor will a loadstone propagate its vertue through a rod of iron made red hot in ye middle. Whence



probably ye Earth were it made red hot would lose its magnetism; & ye Sun being more then red hot, must be less capable of it.

But thirdly were ye ☉ a magnet he would act on ye Comet as a great magnet does on a little one floating in a wallnut shell or other little boat on water. If the little magnet were forcibly turned about by one's hand & put into a wrong or unagreeable position the great magnet so long as ye little one was forcibly detained in that wrong position would repell it, but so soon as ye little magnet was set at liberty the great magnet would make it nimbly turn about into an agreeable position & then attract it. And so ye sun, were ye Comet in a wrong position, would make it turn about quickly into a right one & then attract it & keep it constantly in that right position. How then the Comet being at first in a right position so as to be attracted by ye Sun should afterwards get into a wrong one so as be repelled from him I do not conceive. For ye directive vertue of a great magnet is stronger then its attractive vertue. The mariners needle is not sensibly attracted by ye earth, but it's strongly directed by it, so that you cannot make it stand in a wrong position. If then ye Sun be a magnet, the axis of ye Comet ought to be strongly directed by him into such a position as ye laws of magnetism require, & being so directed the Comet will be always attracted by ye Sun & never repelled. And so if ye axes of ye Planets be inclined to ye ecliptick by ye Sun's magnetism, they ought to be so directed as ye laws of magnetism require, wch I feare they are not.

I am further suspicious that ye Comets of November & December wch Mr Flamstead accounts one & ye same Comet were two different ones,⁽⁵⁾ & I find Cassini in a Copy of a letter of his wch Mr Ellis⁽⁶⁾ shewed me is of my mind. If they were but one Comet, it's motion was thrice accelerated & retarded. From Nov 18 to Nov 21 it moved after ye rate of almost six degrees a day. From Nov 23 to Decemb 5 after the rate of but 36 minutes a day. From Decemb 6 to Decemb 12 after the rate of almost 8 degrees a day. From Decemb 12 to Decemb 19 after ye rate of about $3\frac{1}{2}$ degrees a day. From Decemb 24 to Decemb 26 after ye rate of almost $4\frac{1}{2}$ degrees a day. From wch time ye motion decreased continually. This frequent increas & decreas of motion is too paradoxical⁽⁷⁾ to be admitted in one & the same Comet without some proof that there was but one. Besides it is very irregular. For after the 20th day of November when ye Comet was in its first perige as Mr Flamstead notes, & moved after ye rate of about six degrees a day, that it's motion should suddenly decrease so much as that from Novemb 23 to Decemb 5 to move but $7\frac{1}{4}$ degrees & consequently in ye middle part of that time (suppose at Novemb 29 or 30) to move after ye rate of less then half a degree a day, & this while ye Comet is going towards ye Sun & so has it's real motion continually accelerated, is very odd, & makes me question Father Gallet's⁽⁸⁾ observations on wch ye supposition of but