

Letter to Edmund Halley about Newton's correspondence with Huygens on vis centrifuga

Author: Isaac Newton

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Sir

Yesterday I unexpectedly struck upon a copy of the Letter I told you of to Hugenius. Tis in the hand of one M^r John Wickins who was then my chamber fellow & is now Parson of Stoak Edith neare Monmoth & so it is authentick. It begins thus being directed to M^r Oldenbur{g:}

"Sir

I received your letters with M. Hugins kind present, which I have viewed with great satisfaction, finding it full of very subtile & useful speculations very worthy of the Author. I am glad that we are to expect another discourse of the Vis centrifuga, which speculation may prove of good use in natural Philosophy & Astronomy, as well as Mechanicks. Thus for instance, if the reason why the same side of the moon is ever towards the earth be the greater conatus of the other side to recede from it, it will follow (upon supposition of the earths motion about the Sun) that the greatest distance of the sun from the earth is to the greatest distance of the Moon from the earth, not greater then 10000 to 56 & therefore the parallax of the Sun not less then $\frac{56}{10000}$ of the Parallax of the Moon: because were the Sun's distance less in proportion to that of the Moon she would have a greater conatus from the Sun then from the earth. I thought also sometime that the Moons Libration might depend upon her conatus from the Sun & earth compared together till I apprehended a better cause."

Thus far this Letter concerning the vis centrifuga. The rest of it for the most part concerning colours, is printed in the Ph. Transactions of July 21 1673. Num. 96. Now from these words its evident that I was at that time versed in the Theory of the force arising from circular motion, & had an eye upon the forces of the Planets, knowing how to compare them by the proportions of their periodical revolutions & distances from the center they move about, an instance of which you have here in the comparison of the forces of the Moon arising from her menstrual motion about the Earth & annual about the Sun. So then in this Theory I am plainly before M^r Hook. For he about a year after in his Attempt to prove the Motion of the Earth, declared expressly that the degrees by which gravity decreased he had not then experimentally verified, that is he knew not how to gather it from phaenomena, & therefore he there recommends it to the prosecution of others.

Now though I do not find the duplicate proportion exprest in this letter (as I hoped it might) thet if you compare this passage of it here transcrib{ed} with that Hypothesis of mine registred by M^r Oldenburg in your Book, you will see that I then understood it. For I there suppose that the descending spirit acts upon bodies here on the superficies of the earth with force proportional to the superficies of their parts, which cannot be unless the diminution of its velocity in acting upon the first parts of any body it <57v> meets with be recompensed by the increase of its density arising from that retardation. Whether this be true is not material. It suffices that it was the Hypothesis. Now if this spirit descend from above with uniform velocity, its density & consequently its force will be reciprocally proportionall to the square of its distance from the center. But if it descend with accelerated motion, its density will every where diminish as much as its velocity increases, & so its force (according to the Hypothesis) will be the same as before that is still reciprocally as the square of its distance from the center.

In short as these things compared together shew that I was before M^r Hook in what he pretends to have been my Master so I learnt nothing by his letters but this that bodies fall not only to the east but also in our latitud{e} to the south. In the rest his correcting & informing me was to be complained of. And thô his correcting my Spiral occasioned my finding the Theorem by which I afterward examined the Ellipsis; yet am I not beholden to him for any light into that business but only for the diversion he gave me from my other studies to think on these things & for his dogmaticalnes in writing as if he had found the motion in the Ellipsis, which inclined me to try it after I saw by what method it was to be done. Sir I am

Your affectionate Friend

& humble Servant

Is. Newton.

July 27th 1686.

< insertion from the center of f 57v >

M^r Newton of July 27
1686

< text from f 57v resumes >
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For M^r Edmund Halley
to be left with M^r Hunt
at Gresham College

London