

Original letter from Isaac Newton to Richard Bentley, dated 10 December 1692

Author: Isaac Newton

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Sir

When I wrote my treatise about our Systeme I had an eye upon such Principles as might work with considering men for the beleife of a Deity & nothing can rejoyce me more then to find it usefull for that purpose But if I have done the publick any service this way 'tis due to nothing but industry & a patient thought.

As to your first Query, it seems to me that if the matter of our Sun & Planets & all the matter in the Vniverse was evenly scattered throughout all the heavens, & every particle had an innate gravity towards all the rest & the whole space throughout which this matter was scattered, was but finite: the matter on the outside of this space would by its gravity tend towards all the matter on the inside & by consequence fall down to the middle of the whole space & there compose one great spherical mass But if the matter was evenly diffused through an infinite space, it would never convene into one mass but some of it convene into one mass & some into another so as to make an infinite number of great masses scattered at great distances from one another throughout all that infinite space. And thus might the Sun and ffixt stars be formed supposing the matter were of a lucid nature. But how the matter should divide it self into two sorts & that part of it which is fit to compose a shining body should fall down into one mass & make a Sun & the rest which is fit to compose an opake body should coalesce not into one great body like the shining matter but into many little ones: or if the Sun was at first an opake body like the Planets or the Planets lucid bodies like the Sun, how he alone should be changed into a shining body whilst all they continue opake or all they be changed into opake ones whilst he remains unchanged, I do not think explicable by mere natural causes but am forced to ascribe it to the counsel & contrivance of a voluntary Agent. The same power whether natural or supernatural, which placed the Sun in the center of the orbs of the six primary Planets, placed Saturn in the center of the orbs of his five secondary Planets & Iupiter in the center of the orbs of his four secondary ones & the earth in the center of the Moons orb; & therefore had this cause been a blind one without contrivance & designe the Sun would have been a body of the same kind with Saturn Iupiter & the earth, that is without light & heat. Why there is one body in our Systeme qualified to give light & heat to all the rest I know no reason but because the author of the Systeme thought it convenient, & why there is but one body of this kind I know no reason but because one was sufficient to warm & enlighten all the rest. ffor the Cartesian Hypothesis of Sun's loosing their light & then turning into Comets & Comets into Planets can have no place in my systeme & is plainly erroneous because its certain that Comets as often as they appear to us descend into the <4v> system of our Planets lower then the orb of Iupiter & sometimes lower then the orbs of Venus & Mercury, & yet never stay here but always return from the Sun with the same degrees of motion by which they approached him.

To your second Query I answer that the motions which the Planets now have could not spring from any naturall cause alone but were imprest by an intelligent Agent. ffor since Comets descend into the region of our Planets & here move all manne{r} of ways going sometimes the same way with the Planets sometimes the contrary way & sometimes in cross ways in planes inclined to the plane of the Ecliptick at all kinds of angles: its plaine that there is no naturall cause which could determin all the Planets both primary & secondary to move the same way & in the same plane without any considerable variation. This must have been the effect of Counsel. Nor is there any natural cause which could give the Planets those just degrees of velocity in proportion to their distances from the Sun & other central bodies about which they move & to the quantity of matter contained in those bodies, which were requisite to make them move in concentrick orbs about those bodies. Had the Planets been as swift as Comets in proportion to their distances from the Sun (as they would have been, had their motions been caused by their gravity, whereby the matter at the first formation of the Planets might fall from the remotest regions towards the Sun) they would not move in concentric orbs but in such excentric ones as the Comets move in. Were all the Planets as swift as Mercury or as slow as Saturn or his Satellites, or were their several velocities otherwise much greater or less then they are (as they might have been had they arose from any other cause then their gravity) or had their distances from the centers about which they move been greater or less then they are with the same velocities; or had the quantity of matter in the Sun or in Saturn Iupiter & the earth & by consequence their gravitating power been greater or less then it is: the primary Planets could not have revolved about the Sun nor the secondary ones about Saturn Iupiter & the earth in concentrick circles as they do, but would have moved in Hyperbolas or Parabolas or in Ellipses very excentric. To make this systeme therefore with all its motions, required a Cause which understood & compared together the quantities of matter in the several bodies of the Sun & Planets & the gravitating powers resulting from thence, the several distances of the primary Planets from the Sun & secondary ones from Saturn Iupiter & the earth, & the velocities with which these Planets could revolve at those distances about those quantities of matter in the central bodies. And to compare & adjust all these things together in so great a variety of bodies argues that cause to be not blind & fortuitous, but very well skilled in Mechanicks & Geometry.

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To your third Query I answer that it may be represented that the Sun may by heating those Planets most which are nearest to him cause them to be better concocted & more condensed by concoction. But when I consider that our earth is much more heated in its bowells below the upper crust by subterraneous fermentations of mineral bodies then by the Sun, I see not why the interior parts of Iupiter & Saturn might not be as much heated concocted & coagulated by those fermentations as our earth is, & therefore this various density should have some other cause then the various distances of the Planets from the Sun: & I am confirmed in this opinion by considering that the Planets of Iupiter & Saturn as they are rarer then the rest so they are vastly greater & contein a far greater quantity of matter & have many Satellites about them: which qualifications surely arose not from their being placed at so great a distance from the Sun but were rather the cause why the creater placed them at that great distance. ffor by their gravitating powers they disturb one anothers motions very sensibly as I find by some late Observations of M^r Flamsteed, & had they been placed much nearer to the Sun & to one another they would by the same powers have caused a considerable disturbance in the whole Systeme.

To the 4th Query I answer that in the Hypotheses of Vort{ices} the inclination of the axis of the earth might in my opin{ion be} ascribed to the situation of the earth's vortex before it was {absorbed} by the neighbouring vortices & the earth turned from a Sun {to a} Comet; but this inclination ought constantly to decrease in {compli}ance with the motion of the earths vortex, whose axis is {much less} inclined to the Ecliptick as appears by the motion of the {Moon} carried about therein. If the sun by his rays could carry {about} the Planets, yet I do not see how he could thereby af{fect their} diurnal motions.

Lastly I see nothing extraordinary in the inclination of the {Earths} axis for proving a Deity unless you will urge it as a contrivance for winter & summer & for making the earth habitable towards the poles, & that the diurnal rotations of the Sun & Planets as they could hardly arise from any cause purely mechanical, so by being determined all the same way with the annual & menstrual motions they seem to make up that harmony in the systeme which (as I explained above) was the effect of choice rather then of chance.

There is yet another argument for a Deity which I take to be a very strong one, but till the principles on which tis grounded be better received I think it more advisable to let it sleep. I am

Your most humble Servant to command

Is. Newton.

Cambridge Dec. 10th

1692.

<envelope>

For the Reverend D^r Bentley
at the Bishop of Worcester's House
in Park stret in

Westminster

London
