



LETTER THE FIRST.

*Opinions of the most eminent Authors whose Sentiments on the following Subject have been published in their Works.*

S I R,



EFLECTING upon the agreeable Conversation of our last Meeting, which you may remember chiefly turned upon the Stars, and the Nature of the planetary Bodies ; a Subject, which is generally allowed to give true Pleasure to all those who take Delight in mathematical Enquiries ; and having not a little Regard to the repeated Request in your late Letters, I have at length undertaken to explain to you, as far as I am able, my Theory of the *Universe*, and the Ideas I have form'd of the known Creation.

The Hypothesis upon which this new Astronomy is founded, and now reduced into a regular System, was the result of my Astronomical Studies \* full fifteen years ago, hence I hope you will allow, I have more than observed *Horace's* celebrated Aphorism,

*Nonumque prematur in annum.*

\* The first Scheme of this Hypothesis was plann'd in the Year 1734, representing in a Section of the Creation, eighteen Feet long and one broad, several thousand Worlds and Systems, and a great Number of emblematical Figures, now in the Author's Possession, together with a Scheme of the entire Creation, completed since, nine Feet long and six broad, more fully illustrating upon the same Construction the Innumerability of Systems and Worlds.

Cambridge University Press

978-1-108-07374-5 - An Original Theory or New Hypothesis of the Universe, Founded upon the Laws of Nature:  
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Thomas Wright

Excerpt

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The Subject, I have often observed, you have listened to with a pleased Attention, and I am the more encouraged to explain it at large to you, as I am perswaded you don't want to be convinced of its valuable Uses and Importance.

I remember you have often told me, that to apply ourselves to the Study of Nature, was the surest and readiest Way to come at any tolerable Knowledge of ourselves, however difficult the Task might prove either in the Attempt, or the attaining it, and the less to be neglected, as it never fails to introduce a proper Knowledge of the DIVINE BEING, as a certain Consequence along with it, and such a Knowledge, as will naturally make every Man, who has but a tolerable Share of common Sense, and is not a Slave to another's Reason, without any other Evidence or Motive, in all Stations, and under all Circumstances, ACT JUSTLY, LIVE CHEARFULLY, and DIE full of Hope in the Expectation of a happy Sequel, in Futurity.

*Eternity* is written in the Skies:  
Mankind's Eternity, nor *Faith* alone;  
*Virtue* grows there —————

Dr. YOUNG.

A learned Author on the Attributes, recommending these Studies as a reasonable and moral Service, says, "Sure, it is most becoming such imperfect Creatures as we are, to contemplate the Works of God with this Design, that we may discern the Manifestations of Wisdom in them; and thereby excite in ourselves those devout Affections, and that superlative Respect, which is the very Essence of Praise."

Who turns his Eye, on *Nature's Midnight Face*,  
*But must enquire* ————— what Hand behind the Scene,  
What ARM ALMIGHTY, put these wheeling Globes  
In Motion, and wound up the vast Machine?

The enchanting Idea *Milton* had of the Subjects of Astronomy (whose truly sublime Way of thinking and writing perhaps was never so nearly equalled, or attempted before this Reverend Author's *Night-Thoughts*, appear'd is finely shewn in the Eighth Book of his *Paradise Lost*, where he makes his *Adam*, so earnestly attentive to the Angel *Gabriel*, as to cease relating the Mysteries of Creation.

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The Angel ended, and his *Adam's* Ear  
So charming left his Voice, that he awhile  
Thought him still speaking; still stood fix'd to hear.

*Milton's* own Ideas of the Universe too, which no doubt he had gathered from astronomical Authors, and had reconciled himself to, we are fully made acquainted with in the same Book, where the Arch-angel says, in answer to *Adam's* Enquiries.

— Other Suns perhaps  
With their attendant Moons thou wilt descry  
Communicating Male and Female Light,  
Which two great Sexes animate the World,  
Stor'd in each Orb, perhaps with some that live:  
For such vast Room in Nature, unpossess'd  
By living Soul, desert and desolate,  
Only to shine, yet scarce to contribute  
Each Orb a Glimpse of Light, convey'd so far  
Down to this habitable, which returns  
Light back to them, is obvious to Dispute.

But before I presume to plan my own Discoveries and Conjectures into a Theory, both in Justice to those who have in some measure been in the same Way of Thinking, and also as a Defence of myself for producing so new an Hypothesis to the World, which otherwise (though any Apology made to you I know will be unnecessary) may appear to too many but an idle *Chimera* of my own. I judge it will be highly proper, by way of strengthening my own Arguments, and adding more Weight to what I shall myself advance in the following Letters, to give you in this the Opinions of the most able Writers, whose Works I have read upon the Subject. I mean so far as relates to the now general received Notion, that the Stars are all Suns, and surrounded with planetary Bodies, with which I shall set out; and shew you, it is not a Thing merely taken for granted, but has ever been the concurrent Notion of the Learned of all Nations, as shall be further shewn, in its proper Place, and as nearly as Possibility will admit of, demonstrated to be Truth.

The following is an Extract from Mr. *Toland*, in his Account of the Works of

JORDANUS BRUNO.

“ The Divine Efficacy (says this Author in his infinite Creation) cannot  
“ stand idle, without the Want of Will or Power; but any Imbecillity in

B 2

“ such

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“such a Being argues Imperfection, and since any finite Produce compared with Infinity is as nothing, or rather as the Beginning of Good, it must be no less idle, and invidious in producing a finite Effect, than in producing none at all.

“Hence, as all Finites, singly considered, are but as Commencements of something more to be expected.

“Omnipotence, in making the Creation finite, will appear to be no less blameable for not being willing, than for not being able, to make it otherwise; *i. e.* infinite, as being an infinite Agent upon a finite Subject, which is repugnant to Reason.”

It follows then that, Creation must be not only extensively, but intensively indefinite, and beyond the Reach of the human Understanding to comprehend; and that the one is as necessary as the other, *i. e.* an infinite Expanse is as reconcileable to our Reason, as infinite Parts are to our Senses.

All the Attributes of the Divine Being are, as any one of them, incompatible to his Creatures; why should our Imagination then be supposed to extend beyond the divine Activity?

“Thus, adds the above Author, the Excellency of God is adequately magnified, and the Grandeur of his Empire made manifest; he is not glorified in one, but in numberless Suns; not in one Earth, or in one World, but in ten thousand thousand of infinite Globes.”

An infinite Representation of an infinite Original, and a Spectacle befitting the Excellency and Eminence of him, that can neither be fully conceived, imagined, or comprehended.

What read we here? th'Existence of a GOD?

Yes, and of other Beings, Man above,

Natives of Æther! Sons of higher Climes!

Dr. YOUNG.

“If the Existence of this one World be good or convenient, it is not less good or convenient that there be infinite others like it.

“The infinite efficient Cause would be absolutely defective, without an infinite Effect; and besides, by conceiving the Infinity of the Universe and innumerable Beings, the Understanding rests satisfied, and is reconciled with the Idea of an Eternity; whereas, by asserting the contrary, it is unavoidably plunged into innumerable Difficulties, and unsolvable Inconveniencies, Paradoxes, and Absurdities.

Again, says the same Writer, “Did we but consider and comprehend all this, oh! to what much further Considerations and Comprehensions  
“ should



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“ should we be carried ! as we might be sure to obtain that Happiness  
“ by virtue of this Science, which *in other Sciences is sought after in vain.*

This Prospect vast, what is it ? weigh'd aright,  
'Tis Nature's System of Divinity,  
And every Student of the Night inspires.

Dr. YOUNG.

'Tis elder Scripture, writ by God's own Hand ;  
Scripture authentic ! uncorrupt by Man.

“ This then is that Philosophy, which opens the Senses, which satisfies  
“ the Mind, which enlarges the Understanding, and which leads Man-  
“ kind to the only true Beatitude, whereof they are capable according to  
“ their natural State and Constitution ; for it frees us from the sollicitous  
“ Pursuit of Pleasure, and from the anxious Apprehensions of Pain, mak-  
“ ing us to enjoy the good Things of the present Hour, and not to fear  
“ more, than we hope from the future ; since that same Providence, or  
“ Fate, or Fortune, which causes the Vicissitudes of our particular Being,  
“ will not let us know more of the one, than we are ignorant of the  
“ other.”

And farther, “ From these Contemplations, if we do but rightly consider,  
“ it will follow, that we ought never to be dispirited by any strange Ac-  
“ cidents, through Excess of Fear or Pain, nor ever be elated by any prof-  
“ perous Event, through Excess of Hope or Pleasure ; whence we have  
“ the Path to true Morality, and following it, we shall of course become  
“ the magnanimous Despisers of what Men of weak Minds fondly  
“ Esteem, and be wise Judges of the History of Nature, which would be  
“ written in our Minds, and consequently be chearful and strict Execu-  
“ tioners of the divine Laws, which would thus be ingraven in the Cen-  
“ ter of our Hearts. Seeking, as it were, in ourselves, an Approbation of  
“ our own Action, which alone is capable of true Content and Happi-  
“ ness.”

## CHRISTOPHER HUYGENS,

To whom the World is much indebted for many curious Inventions, and  
Discoveries, says in his *Planetary Worlds*, “ I must be of the same  
“ Opinion with all the great Philosophers of our Age, that the  
“ Sun is of the same Nature with the fix'd Stars ; and this will give us a  
“ greater

† The Pendulum Clock ; the first Discovery of *Jupiter's* Satellites, and *Saturn's* Ring.

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“ greater Idea of the World than all other Opinions can. For then  
 “ why may not every one of these Stars, or Suns, have as great a Retinue,  
 “ as our Sun, of Planets, with their Moons to wait upon them? Nay,  
 “ there is a manifest Reason why they should ; for, if we imagine our-  
 “ selves placed at an equal Distance from the Sun and fix’d Stars, we  
 “ should then perceive no Difference at all betwixt them.

“ Why then may we not make use of the same Judgment that we  
 “ would in that Case ; and conclude, that our Star has no better Atten-  
 “ dance than the others ? So that what we allowed the Planets upon the  
 “ Account of our enjoying it, we must likewise grant to all those Planets  
 “ that surround that prodigious Number of Suns. They must have their  
 “ Plants and Animals, nay, their rational Creatures too, and those as great  
 “ Admirers and as diligent Observers of the Heavens as ourselves ; and  
 “ must consequently enjoy whatever is subservient to, and requisite for  
 “ such Knowledge.

“ What a wonderful and amazing Scheme have we here of the mag-  
 “ nificent Vastness of the Universe ! So many Suns, so many Earths, and  
 “ every one of them stock’d with so many Herbs, Trees, and Animals,  
 “ and adorned with so many Seas and Mountains ! And how must our  
 “ Wonder and Admiration be increased, when we consider the prodigious  
 “ Distance and Multitude of the Stars ?”

*The Opinion of Sir ISAAC NEWTON.*

This great Author, in his grand *Scholium* to the *Principia*, says : — “ The  
 “ most beautiful System of the Sun, Planets, and Comets, could only pro-  
 “ ceed from the Counsel and Dominion of an intelligent and powerful  
 “ Being : And if the fix’d Stars are the Centers of other like Systems, these,  
 “ being form’d by the like wise Counsel, must be all subject to the Do-  
 “ minion of One ; especially, since the Light of the fix’d Stars is of the  
 “ same Nature with the Light of the Sun, and from every System Light  
 “ passes into all the other Systems. And lest the Systems of the fix’d  
 “ Stars should by their Gravity fall mutually on each other, he (the Di-  
 “ vine Being) hath placed those Systems at immense Distances from one  
 “ another.”

*The*

## LETTER THE FIRST.

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*The Opinion of Dr. DERHAM, in his Astro-Theology.*

“ The new System, says he, supposeth there are many other Systems of Suns and Planets, besides that, in which we have our Residence ; namely, that every fix’d Star is a Sun, and encompassed with a System of Planets, both primary and secondary, as well as ours. These several Systems of the fixed Stars, as they are at a great and sufficient Distance from the Sun and us ; so they are imagined to be at as due, and regular Distances from one another : By which means it is that those Multitudes of fixed Stars appear to us of different Magnitudes, the nearest to us large ; those farther and farther, less and less ; and that some, if not all of those vast Globes of the Universe, have a Motion, is manifest to our Sight, and may easily be concluded of all, from the constant Similitude and Consent that the Works of Nature have with one another.”

To this we may add, that this System of the Universe, as it is physically demonstrable, is far the most rational and probable of any. *Because,*

“ It is far the most magnificent of any, and worthy of an infinite CREATOR, whose *Power* and *Wisdom*, as they are without Bounds and Measure, so may they, in all Probability, exert themselves in the Creation of many Systems as well as one. And as Myriads of Systems are more for the *Glory* of GOD, and more demonstrate his *Attributes* than one ; so it is no less probable than possible, there may be many besides this which we have the Privilege of living in.” And as the strongest Confirmation of this, “ we see it is really so, as far as it is possible it can be discerned by us, at such immense Distances as those Systems of the fixed Stars are from us ; and we cannot reasonably expect more.”

“ Since the Sun and fix’d Stars, says Dr. *Gregory*, are the only great Bodies of the Universe that have any native Light, they are justly esteemed by Philosophers to be of the same Kind, and designed for the same Uses ; and it is the Effect of a Man’s Temper that sets a greater Value upon his own Things than he ought, that makes him judge the Sun to be the biggest of them all.”

That, as an elegant \* Writer observes, which we call the Morning, or the Evening Star, is, in reality, a *Planetary World* ; which, with the four others, that so wonderfully, as *Milton* expresses it, “ vary their mystick Dance, are in themselves dark Bodies, and shine only by Reflection ; have Fields and Seas, and Skies of their own ; are furnished with all Accommodations for animal Subsistence, and are supposed to be the  
Abodes

\* Contemplations on the starry Heavens.

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“ Abodes of intellectual Life. Again, The Sun, with all its attendant Planets  
“ is but a very little Part of the grand Machine of the Universe. Every  
“ Star— is really a vast Globe, like the Sun, in Size and in Glory, no less  
“ spacious, no less luminous, than the radiant Source of our Day ; so that  
“ every Star is the Center of a magnificent System, has a Retinue of  
“ Worlds irradiated by its Beams, and revolves round its active Influence ;  
“ all which are lost to our Sight in immeasurable Tracts of Æther.

“ Could we, says the same Author, wing our Way to the highest ap-  
“ parent Star — we should there see other Skies expanded, other Suns,  
“ that distribute their inexhaustible Beams of Day ; other Stars, that gild  
“ the alternate Night ; and other perhaps nobler Systems established ;  
“ established in unknown Profusion, through the boundless Dimensions  
“ of Space. Nor does the Dominion of the great Sovereign end *there*,  
“ even at the End of this vast Tour, we should find ourselves advanced  
“ no farther than the Frontiers of Creation ; arrived only at the Suburbs  
“ of the great *Jehovah's* Kingdom.”

O for a Telescope his Throne to reach !  
Tell me ye Learn'd on Earth ! or Blest above !  
Ye searching, ye *Newtonian* Angels ! tell,  
Where your great Masters Orb ? His Planets where ?  
Those conscious Satellites, those Morning Stars,  
First-born of *Deity* from central Love.

Dr. YOUNG.

Many other Authorities might be produced from Writers of great Re-  
pute, were it necessary to trouble you with them † ; but I believe those  
above will be abundantly sufficient for the present Purpose, if even an  
Apology were wanting for my own Conjectures. I shall therefore con-  
clude this Letter with the following Passage out of *Pope's universal Prayer*,  
and in my next shall proceed in the Work I have undertaken.

Yet not to Earth's contracted Span,  
Thy Goodness let me bound ;  
Or think thee Lord alone of Man,  
When thousand Worlds are round.

*I am, &c.*

LETTER

† Particularly from *Fontenelle*, &c.



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## LETTER THE SECOND.

*Concerning the Nature of Mathematical Certainty, and the various  
Degrees of Moral Probability proper for Conjecture.*

S I R,

**Y**OU know how much I am an Enemy to the taking of any thing for granted, merely because a Person of reputed Judgment, has been heard to say, *it absolutely is so*; an *Ipse dixit*, and implicit Faith in some Cases, may be both necessary and useful; but here, in Astronomy, I mean, every Man's Reason, by the Help of a very little Mathematicks, is able to bring wonderful Truths to Light without them; and Truths not only of the highest Importance to every Individual, but of a great and common Consequence to all Mankind: And as such, in all Ages of the World, have been judged worthy to be enquired into, by the best and wisest of Philosophers.

You are likewise very sensible how far the human Understanding is even at the best, from being infallible, and don't want to be told, how difficult it is in a Subject of this Nature to arrive at any tolerable Degree of Certainty, which before the Days of the sagacious *Euclid*, and the penetrating *Archimedes*, was a Thing not to be expected. And many things which were then but barely Objects of Conjecture and Probability, have since been demonstrated to be infallibly true. Time and Observation will undoubtedly, at last, discover every thing to us necessary to our Natures, and proper for us to know. As a Proof of which, we see human Wisdom daily increases; and while a Capacity continues to make ourselves still more acquainted with the manifest Wisdom and Power of God in the Works of his Creation, who is to tell us where to stop our Enquiries? Or who is so impious to set Bounds to a Science, which so evidently spreads through all Infinity, the Attributes of God, and an eternal Basis for future Hope?

This Branch, or rather Body of Astronomy, I believe you will find to be quite new; and though evident Truths, are the principal Thing to be regarded in it, yet as being in its infant State, where linear Demon-

C

stration

stration fails, as in some Cases it cannot be otherwise, I hope you will give me Leave to make use of a weaker Way of Reasoning, to convince you of the Point in Dispute, I mean of that by the Analogy of known and natural Things.

I shall be extremely unwilling to affirm any thing for a *Fact*, or Truth, without hearing, if not the real Evidence, at least a plausible Reason, next to a Conviction, or moral Certainty, along with it; and therefore I will here endeavour to explain to you what I mean by moral Certainty and also by mathematical Proof.

Mathematical Proof, or Certainty, proper for Conjectures, may, to almost every Capacity, be illustrated as follows

Suppose you had accidentally found a very small Part of a visibly broken Medallion, with nothing more express upon it, than what is represented at *Fig. 1. Plate I.* a Person totally unacquainted with the mathematical Sciences, we may naturally conclude, would not be able to make any thing of it, or in the least comprehend what it originally was, or meant; but if an Astronomer should chance to see it, who of course we are to suppose knew the Order and Proportion of the planetary Orbits, he would immediately conclude, and with great Probability, on the Side of his Conjectures, that it might be Part of a Medal representing the Solar System. In such a Case may we not very naturally suppose he would reason thus?

The Arches A and B seem to be Portions of the respective Orbits of *Saturn* and *Jupiter*, and what may lead us to believe, that they are really so, and Part of the Solar System, is the oblique Curve C, which looks not unlike the Trajectory of a Comet.

This surely would be far from an irrational Conjecture, and consequently in some Degree probable: But this is not sufficient you'll say; To prove it we must have farther recourse to the Mathematicks, and a Mathematician would immediately thus demonstrate it to be true.

First, by compleating the Circles geometrically from the fourth Book of *Euclid*, by the Assistance of any three Points E. F. G. the original Figure will be restored, as at *Fig. 2.* And secondly, by assuming any two Points, as F, E in the Curve C, if admitted a Parabola, by a well-known Problem in Conic Sections the Heliocentric Portion X. Y. Z. will easily be projected and shewn, as in *Fig. 3.* Lastly, join this in Position to the former, and it will justly supply the Orbit, or Path of some one of the Comets; and if required, even what Comet may be discovered by comparing the Perihelion Distance Y. S. with their general Elements or Theories, in Dr. *Hally's Synopsis* of the Motion of these Bodies. And if a farther Confirmation of the Truth of these Conjectures were wanting,

the