

John Maxwell's translation of the concluding three paragraphs of Proposition XLII, Problem XXII and the General Scholium to Isaac Newton's *Principia in A discourse concerning God* (1715)

A Translation of the latter part of the Second Edition of Sr. Isaac Newton's *Philosophiae Naturalis Principia Mathematica*, concerning *Comets*, the *Cartesian Hypothesis of Vortices*, and concerning *God*.

THE Comets by reason of their great Numbre, and the great Distance of their *Aphelia* from the Sun, and their long stay in the *Aphelia*, must be somewhat disturb'd by their mutual Attraction, and have their Eccentricities and the time of their Revolutions sometimes a little encreas'd, and sometimes a little retarded; whence it is not to be expected, that the same Comet should return exatly in the same Orb and the same Periodical time. It is sufficient if their Changes do not prove greater than what may be expected from the abovemention'd Causes. [96]

And hence a Reason is assigned, why the Comets are not comprehended in a *Zodiack* (as the Planets are) but recede there-from, and are carried by different Motions towards all parts of the Heaven, *viz.* to this purpose, that when they are moved most slowly in their *Aphelia*, they may be at a very great Distance from one another, and attract one another very little. Wherefore the Comets which descend the lowest, and so move the slowest in their *Aphelia*, ought to ascend the highest.

The Comet which appear'd in the Year 1680. was not in its *Perihelion* Distant from the Sun a sixth part of the Sun's Diameter; and because of its great Swiftness in that near approach, and the somewhat Dense Atmosphere of the Sun, it must encounter a little resistance, and be somewhat retarded, and so approach nearer to the Sun, and by approaching nearer to the Sun every Revelation, it will at last fall into the Body of the Sun; moreover in the *Aphelion*, where it is moved slowest, it may sometimes be retarded by the Attraction of other Comets, and for that reason fall down into the Sun. So also the fixed Stars, which by little and little wast in [97] Light and Vapour, may be repaired by the Comets falling down to them, and being revived by New Fuel may pass for New Stars. But the Vapours, which arise from the Sun and fixed Stars and the Tails of Comets, may fall down by their Gravity into the Atmospheres of the Planets, and there be Condensed and Converted into Water and moist Spirits, and afterwards pass gradually by a gentle Heat into Salts, and Sulphurs, and Tinctures, and Mud, and Clay, and Potters Earth, and Sand, and Stones, and Coral, and other Terrestrial Substances. But the Body of the Sun decreasing, the mean Motion of the Planets about the Sun will grow slower by degrees; and the Earth increasing, the mean Motion of the Moon about the Earth will by degrees be Augmented. And truly by comparing the *Babylonian* Observations of Eclipses with those of *Albategnius*, and with the present, our *Halley* first of all, that I know of, perceiv'd that the mean Motion of the Earth was little and

little Accelerated. [98]

A General *Scholium* from the whole Treatise of the *Principia*.

THE Hypothesis of *Vortices* is press'd with many Difficulties. That each Planet, with a *Radius* drawn to the Sun, may describe *Areas* proportional to the Time, the Periodical Times of the parts of the *Vortex* ought to be in a Duplicate Proportion of their Distances from the Sun. That the Periodical Times of the Planets may be in a Sesquiplicate Proportion of their Distances from the Sun, the Periodical Times of the parts of the *Vortex* ought to be in the same Proportion of the Distances. That the lesser *Vortices*, which roll round *Jupiter*, *Saturn*, and the other Planets, may be preserv'd, and Swim undisturbed in the *Vortex* of the Sun, the Periodical Times of the parts of the Solar *Vortex* should be equal. The Revolutions of the Sun and Planets upon their *Axes* differ from all these Proportions. The [99] Motions of the Comets are exactly Regular, and observe the same Laws with the Motions of the Planets, and cannot be explain'd by *Vortices*. The Comets are carried by Motions very Eccentrical toward all parts of the Heaven, which upon the supposition of *Vortices* is impossible. Projected Bodies in our Air, meet with no resistance but that of the Air. The Air being taken away, as it is in Mr. *Boyles* Air-Pump, the resistance ceases, seeing soft Down and solid Gold fall in such a *Vacuum* with equal Velocity; and the Case is the same in those Celestial Spaces above the Earth's Atmosphere. All Bodies ought to be moved most freely in those Spaces, and therefore the Planets and Comets ought perpetually to be resolv'd according to the Laws already Explain'd, in Orbs such in kind and position, as we have supposed. They will indeed be retain'd in their Orbits by the Laws of Gravity, but they could be no means at first acquire such a regular position of their Orbs by those Laws.

The Six Primary Planets revolve round the Sun in Circles Concentrical to the Sun, with the same direction of their Motion, and very nearly in the same [100] plain. The Ten *Moons* (or Secondary Planets) Revolve round the *Earth*, *Jupiter* and *Saturn*, with the same Direction of their Motion, and very nearly in the plain of the Orbs of the Planets. And all these regular Motions have not their rise from Mechanical Causes, seeing the Comets are carried in Orbs very Eccentrical, and that very freely thro' all parts of the Heaven. By which kind of Motion the Comets pass very swiftly and easily thro' the Orbs of the Planets, and in their *Aphelia* when they move more slowly, and are longer detain'd they are the most remotely distant from one another, and their mutual attraction by much the weakest. This most Elegant System of the Planets and Comets could not be produced but by and under the Contrivance and Dominion of an Intelligent and Powerful Being. And if the Fixed Stars are the Centers of such other Systems, all these being Framed by the like Council will be Subject to the Dominion of *One*, especially seeing the Light of the Fixed Stars is of the same Nature with that of the Sun, and the Light of all these Systems passes mutually from one to another. He governs all things, not as the Soul of the [101] World, but as the Lord of the Universe, and because of his Dominion, he is wont to be called Lord God παντοκράτωρ (i.e. Universal Emperor) for God is a Relative Word, and hath a Relation to Servants: And the Deity is the Empire of God, not over his own Body (as is the Opinion of those, who make him the Soul of the World) but over his Servants. The *Supreme God* is a Being Eternal,

Infinite, Absolutely Perfect; but a Being however Perfect, without Dominion, is not *Lord God*: For we say, *my God, your God, the God of Israel*, but we do not say, *my Eternal, your Eternal, the Eternal of Israel*; we do not say, *my Infinite, your Infinite, the Infinite of Israel*; we do not say, *my Perfect, your Perfect, the Perfect of Israel*. These Titles have no Relation to Servants. The word *God* frequently signifies Lord, but every Lord is not God. The Empire of a Spiritual being constitutes God, true Empire constitutes True God, Supreme the Supreme, Feigned the Feigned. And from his true Empire it follows that the true God is Living, Intelligent and Powerful, from his other Perfections, that he is the SuBreme or Supremely Perfect. He is *Eternal and Infinite, Omnipotent* and [102] *Omnipresent*, that is, he endures from Eternity to Eternity, and he is present from Infinity to Infinity, he Governs all Things, and Knows all Things which are or which can be known. He is not Eternity or Infinity, but he is Eternal and Infinite, he is not Duration or Space, but he Endures and is Present. He endures always and is present every where, and by existing always and every where, he Constitutes Duration and Space, Eternity and Infinity. Whereas every Particle of Space is *always*, and every Individual Moment of Duration is *every where*, certainly the Framer and Lord of the Universe shall not be (*nunquam nusquam*) *never no where*. He is Omnipresent not Virtually only, but also Substantially, for Power without Substance cannot Subsist. In him are contain'd and moved all things (so the Antients thought. *Aratus Phænomen*. at the beginning. *Paul* Acts 17. 27, 28. *Moses* Deut. 4. 39. and 10. 14. *David* Psalm 139. 7, 8. *Solomon* Kings 8. 27. *Job* 22. 12. *Jeremiah* 23. 23, 24.) but without mutual Passion. God suffers nothing from the Motions of Bodies: Nor do they suffer any Resistance from the Omnipresence of God. It is confess'd [103] that the Supreme God exists Necessarily, and by the same Necessity he is always and every where. Whence also he is wholly Similar, all Eye, all Ear, all Brain, all Arm, all the Power of Perceiving, Understanding and Acting; but after a manner not at all Corporeal, after a manner not like that of Men, after a manner wholly to us unknown. As a Blind Man has no Notion of Colours, so neither have we any Notion of the manner how the most wise God perceives and understands all things. He is wholly destitute of all Body and Bodily Shape, and therefore cannot be seen, heard, not touched; nor ought to be Worshipped under the Representation of any thing Corporeal. We have Ideas of his Attributes, but we know not at all what is the Substance of any thing whatever. We see only the Figures and Colours of Bodies, we hear only Sounds, we touch only the outward Surfaces, we smell only Odours and taste Tasts; but we know not by any sense or reflex Act the inward Substances; and much less have we any Notion of the Substance of God: We known him only by his Properties and Attributes, and by the most Wise and Excellent Structure of things, and by [104] Final Causes; but we Adore and Worship him upon account of his Dominion. For God, without Dominion, Providence and Final Causes, is nothing else than Fate and Nature. And so much of God, of whom to discourse from *Phænomena* belongs to *Experimental Philosophy*.

Hitherto I have explain'd the *Phænomena* of the Heavens and of our Sea by the Power of Gravity, but I have not at all assign'd the Causes of Gravity. This Power however arises from some Cause, which penetrates even to the Center of the Sun and Planets, without any diminution of its force, and which acts not in proportion to the quantity of the Surfaces of the Particles upon which it acts (as Mechanical Causes use to do) but according to the quantity of solid Matter; and whose Action is every way extended to Immense Distances, decreasing always in a Duplicate Proportion of those Distances. Gravity towards the Sun is compos'd of the Gravities towards each Particle of the Sun, and decreases from the Sun-ward accurately in a Duplicate Proportion of

those Distances as far as the Orb of *Saturn*, as is evidence from the rest of the *Aphelia* of the Planets, and as far as the remotest *Aphelia* of the [105] Comets, if their *Aphelia* also rest. But I have not yet been able to Deduce the Reason of these Properties of Gravity from *Phænomena*, and I do not Form *Hypotheses*, for whatever is not Deduced from Appearances is to be Term'd an Hypothesis, and Hypotheses whether Metaphysical, or Physical, or of Occult Qualities, or Mechanical, have no Place in Experimental Philosophy. In this Philosophy Propositions are Deduced from Appearances, and render'd General by Induction. So the Impenetrability, Mobility, and the Force of Bodies, and the Laws of Motion and of Gravity have been known. And it is enough that Gravity really exists, and acts according to the Laws explain'd by us, and suffices for all the Motions of the Heavenly Bodies, and of our Sea. I might now add something concerning a certain most subtile Spirit penetrating gross Bodies and lying hid in them, by whose Force and Action the Particles of Bodies attract one another mutually at the least distance, and cohere upon contact, and Electrical Bodies act at greater Distances, as well by Repelling as Attracting Neighbouring Bodies, and Light is Emitted, Reflected, Refracted and Inflected, and warms Bo[106] dies, and all Sensation is Excited, and the Members of Animals are moved according to the Will, *viz.* by the Vibration of this Spirit propagated along the solid Capillaments of the Nerves, from the External Organs of Sense to the Brain, and from the Brain to the Muscles. But these cannot be explained in a few words, neither have we a sufficient Number of Experiments, by which the Laws of the Actions of this Spirit ought to be accurately determin'd and demonstrated.



Bibliographic details

John Maxwell, *A discourse concerning God; wherein the meaning of his Name, his Providence, the nature and measure of his dominion are consider'd; with some remarks upon the rights of the creatures, and the doctrine of absolute reprobation. To which is subjoin'd a translation of Sir Isaac Newton's General Scholium at the end of the second edition of his Principia concerning the Cartesian vortices, and concerning God; as also a short account of the Cape of Good Hope. By John Maxwell.* London: Printed for W. Taylor, at the Ship in Pater-Noster-Row; and J. Senex at the Globe in Salisbury-Court, 1715, pp. 95–106.

Corrections

“SuBreme” near the end of page 101 should read “Supreme”. “Solomon Kings 8. 27.” near the end of page 102 should read “Solomon 1 Kings 8. 27.”, an error (or omission) that reflects the misprint of the 1713 Latin edition of the *Principia*.

Commentary

John Maxwell was an engraver who worked with the Fleet Street engraver and publisher John Senex. In his dedication, Maxwell explains his reason for translating the General Scholium into English:

The Translation from Sir Isaac Newton was made at the request of some of my Acquaintance, who, not understanding the Original, were however willing to know what the Author had deliver'd in the latter end of his *Principia* concerning God, which (perhaps) may be as acceptable to some others on the same Account (sig. A2^v).

Portions of the book enlarge sympathetically on Newton's ideas about God as expressed in the General Scholium and the short title is likely an allusion to the conclusion of the theological section. The book also makes it clear that Maxwell was a supporter of Samuel Clarke's doctrines. Maxwell's is the first full translation of the General Scholium into English.

