

Appendix to Frederik Dhondt and Steffen Ducheyne, ‘Theological and Religious Statements in Isaac Newton’s Queries/*Quaestiones* to the *Opticks/Optice*, 1704-1730’, *European Journal for Science and Theology*, vol. 17(3), 2021: Relevant fragments in Cambridge University Library, Add. MS. 3970¹

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Abstract: This document contains the appendix to a paper of ours that was published in 2021 in the *European Journal for Science and Technology*, vol. 17(3). It presents the manuscript material we have analysed in this paper and it also provides evidence for the relative datings we have offered there.

¹ We have started from the transcriptions of the draft versions for the Queries/*Quaestiones* available on the website of The Newton Project (URL=<<http://www.newtonproject.ox.ac.uk/view/texts/diplomatic/NATP00123>>) which each of us has then checked and corrected against the digital reproductions of CUL, Add. Ms. 3970 provided on the Cambridge Digital Library (URL=<<https://cdl.lib.cam.ac.uk/view/MS-ADD-03970/1>>). We have divided the fragments per theme and dated them relative to the published fragments. Afterwards, we verified our dating by taking into account the entire set to which a particular folio pertains. Due to the limited space in this appendix, we can only include the clearest and strongest arguments for our chronology. Here and throughout, we adhere to the following conventions in our transcriptions of Newton’s manuscripts: words between arrows pointing downwards were added to the text; words between double arrows contain two subsequent additions or corrections to the original; words that are struck through are words that Newton crossed out; words that are double struck through are words that Newton double crossed out; and letters of words that are illegible are indicated by [illegible].

The different published versions of the *Opticks/Optice* are Isaac Newton, *Opticks: Or, A treatise of the Reflections, Refractions, Inflexions and Colours of Light. Also Two Treatises of the Species and Magnitude of Curvilinear Figures* (London, 1704); id., *Optice: sive de reflexionibus, refractionibus, inflectionibus & coloribus lucis*, Latine reddidit Samuel Clarke (London, 1706); id., *Opticks: Or, a Treatise of the Reflections, Refractions, Inflexions and Colours of Light* (London, 1718); id., *Optice: sive de reflexionibus, refractionibus, inflectionibus & coloribus lucis*, Latine reddidit Samuel Clarke (London, 1719); id., *Opticks: Or, a Treatise of the Reflections, Refractions, Inflexions and Colours of Light* (London, 1721); and id., *Opticks: Or, a Treatise of the Reflections, Refractions, Inflexions and Colours of Light* (London, 1730).

1. Fragments related to active and passive principles²

f. 234r-v (1704-1706)³

Qu. 16. [...] The contrivance of the bodies of living creatures is admirable. Not a member but has its use & is mighty well fitted for that use. And ~~↓since the forms & uses of matter are infinite↓~~ can we believe that he who contrived y^e bodies of animals wth so much artifice [~~illegible~~] was not as skilful & curious in ~~the contrivance of matter~~ contriving the ~~↓its the↓~~ texture ~~of matter so as to fit it make it capable by corruption of all manner of forms & uses~~ [~~illegible~~] ~~↓uses⁴↓-applicab~~ ↓of matter for those↓ ends for which it is fitted. [...] [234v] Without these uses ~~matter~~ ↓the earth↓ would have been a dead lump ~~void of without~~ ↓void of↓ heat & motion ~~& generation~~ ↓& alteration↓ & variety of colours: & therefore it is reasonable to allow that he who contrived all things ↓with wisdom↓, framed matter in such a manner as to fit it best for these uses [...].⁵

Qu. 17. Is there not something ~~in~~ ↓diffused through all space in & through w^{ch} bodies move without resistance & by means of w^{ch} they act upon one another at a distance in harmonical propos↓r↓tions of their distances.

f. 291r (1704-1706)⁶

What is it by means of w^{ch} bodies act on one another at a distance. ↓And↓ To what Agent did the Ancients attribut the gravity of their atoms. ~~And is there not something in all space void of matter~~ ↓And ↓Or ↓ what did they mean by calling God an harmony & comparing him & ~~the material part~~ ↓corporeal part of the Universe to the ↓corporeal world ↓matter↓ to y^e God Pan & his Pipe.↓

² The first fragments included in this section, i.e. f. 234r-v up to ff. 252v, 254r, 255r and 256r, contain three themes that would become iconic in Newton's Queries: active and passive principles, God's sensorium, and agnosticism with respect to the cause of gravitation. In other words, these three themes have a shared thematic and textual evolution up until ff. 252v, 254r, 255r and 256r, after which the themes are separated and allocated to different parts and elaborated there. Fragments on active and passive principles are considered in this section, while the fragments in which Newton further developed his ideas on God's sensorium are discussed in the next section of the appendix. We address the fragments on Newton's agnosticism with respect to the cause of gravitation elsewhere (Steffen Ducheyne & Frederik Dhondt, 'Isaac Newton Explicating his Natural Philosophical Method: A Thematic Editorial History of the Queries/*Quaestiones* to the *Opticks/Optice*, ca. 1704-1717' (unpublished manuscript)). Regarding the evolution of the material on f. 234r-v up to ff. 252v, 254r, 255r and 256r, it should be noted that Newton's agnosticism with regards to the cause of gravitation and God's sensorium were first developed in early and rudimentary fragments on active and passive principles. Even though the three themes were already clearly present in the beginning, the active and passive principles dominated. By splitting up these interlaced themes, some passages previously associated with active and passive principles were relocated and repurposed in a different context.

³ The oldest draft material for the Queries present in the CUL, Add. Ms. 3970, is found on ff. 477v-478r and ff. 231r-233r & 359r. They contain tentative versions for the original 16 Queries of Newton, *Opticks* (1704). For some reason unbeknownst to us, the original Queries have been split up resulting in the Queries 1-14 being present on ff. 231r-233r and the original Queries 15-16 being present on f. 359r. What is peculiar, is that f. 234r (immediately following f. 233r containing the original Queries for Newton, *Opticks* (1704) up until Query 15) is a folio that also contains a draft for a Query 16 that does not correspond to the original one and also one for a Query 17. Even though this is not part of the original material, the fact that Newton intended to change Query 16 and the fact that it contains themes absent from Newton, *Opticks* (1704), but present in Newton, *Optice* (1706), suggests that this is a very early draft for Newton, *Optice* (1706). Queries 16 and 17 seem to be one of the fundamentals for the later Queries 19, 28 and 31 that all contain related material. We now focus on material that Newton gradually extended and evolved into the theological passages in Queries 28 and 31.

⁴ This "uses" should have been struck through, but was not.

⁵ The next time that this material is repurposed is in f. 249^{bis}r-v, for instance "he who contrived y^e bodies of animals wth so much artifice."

⁶ F. 291r contains a very solitary passage on "the Ancients" and "God" that does not relate to any material on the same folio nor to surrounding folios. Our dating is therefore merely based on the thematic and textual evidence in the passage itself. In line with f. 234v Newton talks about "something" diffused through all space, but in f. 291r he adds material relating to God and the ancient philosophers. This may be considered as the first step to Newton's later references in related draft material to the ancient philosophers. Textually, there is little evidence to substantiate our claim, but it does point towards our conclusion (e.g. "~~is there not something in all space~~").

Can any space be wthout something ↓in it↓ & what is that something in space void of matter [& what are its properties & operations ~~on matter~~]

f. 620v (1704-1706)⁷

And while these powers are of so large extent, I do not see but that they may be numbred among the ↓general↓ laws of motion. The Vis inertiae is a passive principle by w^{ch} bodies persist in their state motion or rest, receive motion in proportion to y^e force impressing it & resist ~~in proportion to y^e force~~ as much as they are resisted: ↓By this principle alone there could never have been any motion in the world.↓ Thinking is an active principle by w^{ch} we move o^e bodies according to o^e will, & thence arise other laws of motion unknown to us, w^{ch} ~~may be of great extent~~ if ↓if ↓all↓ Nature be alive & ↓ the Universe be the sensorium of a thinking B↓B↓eing, may be of great↓er↓ extent. Gravity was reckoned among the laws of motion & by the ancient Philosophers who attributed gravity to their Atoms in vacuo, & ~~the same~~ the forces by above mentioned by w^{ch} smal bodies act on one another seem to ↓at small distances may↓ have as good a title ↓as gravity↓ to be reckoned among those laws. [...] & [illegible] since ↓all things are framed wth ↓perfect [illegible] Art & ↓wisdom & Nature does nothing in vain ↓all matter duly formed is attended with signes of life:↓ if there be an universal life & all space be the sensorium of a thinking Being and [illegible] ↓finite↓ things [illegible] ↓[illegible] be↓ be ↓[illegible]↓ instead of ↓their↓ sensible pictures ↓formed by motion↓ in o^e Brain; ~~such~~ those laws may be of Universal extent.⁸

These forces may be reckoned among the laws of motion, & ~~perhaps~~ referred to an active principle ↓but whether they depend on↓ ↓For bodies alone bodies alone may be a question For.↓ Bodies ↓alone considered only as long broad & thick↓ are passive. ↓By their vis inertiae they↓ They continue in their state of moving or resting & receive motion proportional to y^e force impressing it & ↓are↓ resisted as much as they are ↓are↓ resisted↓ed↓; but they cannot move themselves; & without some other principle ↓then the vis inertiae↓ there could be no motion in the world. And what that Principle is & by ↓means or↓ laws it acts on matter is a mystery & how it stands related to matter is a [illegible] more difficult to explain And if there be another Principle ↓of motion↓ there must be other laws of motion ~~dep~~ depending on that Principle. [...] We find in o^e selves a power of moving our bodies by o^e thoughts ~~but the laws of this power were do not know~~ & see y^e same power in other living creatures but ↓how this is done & by what laws↓ the [illegible] of this pow laws of this power we do not know. {↓And↓ By this instance ↓& that of gravity↓ it appears that there are ↓other↓ laws of motion ↓then those w^{ch} arise from the vis inertiae↓ unknown to us, & [illegible] by consequence w^{ch} is enough to justify ↓& encourage↓ o^e search after them} ↓And↓ We cannot say that all Nature is not alive.

f. 619r-v (1704-1706)⁹

Qu. 23. By what means do ~~they~~ bodies act on one another at a distance. The ancient Philosophers who held Atoms & Vacuum attributed gravity to Atoms without telling us the means unless perhaps in figures: as by calling God Harmony & ~~comparing~~ ↓representing↓ him & matter by the God Pan & his Pipe, or by calling the Sun the prison of Jupiter because he keeps the Planets in their orbs. Whence it seems to have been an ancient opinion that matter depends upon a Deity for its ↓laws of↓ motion as well as for its existence. The Cartesians make God the author of all motion & its as reasonable to make him the author of the laws of motion. Matter is a passive principle & cannot move it self. It continues in its state of moving or resting unless disturbed. It receives motion proportional to the force impressing it. And resists as much as it is resisted. These are passive laws & to affirm that there are no other is to speak against experience. Ffor we find in o^e selves a power of moving our bodies by o^e thought ↓Life & thinking ↓will↓ are active Principles by w^{ch} we move our bodies, & thence arise other laws of motion unknown to us.↓

⁷ On f. 620v Newton expanded his thoughts on the previous draft material significantly. The comments on God’s sensorium, agnosticism regarding the cause of gravitation, and active and passive principles were greatly elaborated. The order that we suggest for ff. 234v, 291r and 620v is not conclusive due to the lack of material in the former two folios. This necessitated us to rely primarily on thematical closeness rather than textual evidence. Doubtful aspects of our order are, for instance, the presence of “God Pan & his Pipe” on ff. 234v, 291 and 619r-v but not on f. 620v.

⁸ All subsequent fragments are found at the bottom of f. 620v and are rotated.

⁹ This folio is a more polished version of f. 620v, as suggested by textual evidence (for instance “And since all matter duly formed [...] may be of universal extent”). It is also highly likely that f. 619r-v was intended as an addition to f. 620v given “— those laws,” with which Newton, as he frequently did elsewhere, indicated that the text following it is to be added to the passage on f. 620v ending in “those laws.”

And since all matter duly formed is attended with signes of life & all ~~natural~~ things are framed wth perfect ~~art~~ art & wisdom & Nature does nothing in vain; if there be an universal life & all space be the sensorium of a thinking being ↓who by immediate presence perceives all things in it as that w^{ch} thinks in us perceives ↓see↓ their pictures in the brain↓ & finite things therein ↓to what instead of their pictures formed in e^c sensorium by motion ↓are to us, ↓having a perception ↓perceiving ↓of these things ↓themselves his ↓by the actual presence of himself as we have a perception of ↓perceive ↓ their pictures by ↓actual presence of what thinks in us: these laws of motion ↓arising from life or will↓ may be of universal extent.

— those laws. To some such laws the ancient Philosophers seem to have alluded when they ~~called God Have said that God was~~ ↓called God↓ Harmony, & ~~represented ↓attributing musick to the spheres↓ ↓signified↓~~ his actuating the world matter & harmonically proportion by the God Pan's playing upon a Pipe & ~~attribute musick to the spheres↓~~ made the distances & motions of the heavenly bodies to be harmonical, & ~~called the Sun the Prison of Jupiter~~ represented the Planets by the seven strings of Apollo's Harp. [...]

—— If you think that y^e Vis inertia is sufficient for conserving motion, pray tell me the Experiments from whence you gather this conclusion. ~~For Does experim~~ Do you learn by any experiment that the beating of the heart gives no new motion to y^e blood, that the explosion of Gunpouder gives no new motion to a bullet or that a man by his will can give no new motion to his body? Or ~~do you learn~~ do you learn by experim^t that the beating of y^e heart takes ↓away↓ as much motion from something else as it gives to the blood or that explosion takes ↓away↓ as much motion from something else as it gives to a bullet or that a man by his will takes ↓away↓ as much motion from something else as he gives to his body? If so, tell me your experiments; if not, your opinion is ~~a dream ungrounded~~ ↓præcarious. ↓ Arguments Reasoning without experience is very slippery. A man may puzzle me by arguents against ↓local↓ motion but I'll believe ~~my eye experience~~ ↓my eyes. ↓ A man may puzzle me by ↓may bring plausible↓ arguents against ~~what I will ↓acting~~ ↓my will voluntary motion ↓the power of the will↓ but I'll believe experience. A man may argue plausibly against for blind fate against final causes but I find by experience that ~~all m~~ I am constantly aiming at something. Were it not for experience I should not know that ~~matter is ↓heavy or↓ impenetrable or moveable or that matter~~ or that ~~I think~~ I think or ↓am or↓ that there is ↓matter or↓ any thing ↓else. ↓ in the ~~being~~ And therefore to affirm any thing more then I know by experience & good reasoning upon it is precarious. ↓Even arguments for a Deity if not taken from Phænomena are slippery & serve only for ostentation. ↓ An A An Atheist will allow that there is a Being absolutely perfect, necessarily existing & the author of ~~all th~~ mankind & call it Nature: & if you talk of infinite wisdom ↓or of any perfection more then ↓he allows [in nature?]↓ heel ↓recon at a chimæra & ↓tell you that you have the notion of ↓finite or↓ limited wisdom from what you find in yo^r self & are able ~~without y^e~~ of your self to add ↓prefix↓ y^e word ~~to understand ↓not↓ ↓or more yⁿ~~ to any verb or adjective & ↓without the existence of wisdom not limited ↓or wisdom more then finite ↓ to understand the meaning of the sentence phrase words phrase as easily as Mathematicians understand ~~the p~~ what is meant by an infinite line or an infinite area. ~~Arguments not borrowed from~~ And heel ↓may↓ tell you further that y^e [619v] Author of mankind ~~was destitute of wisdom & designe~~ because there are no final causes & that matter ↓in space & therefore necessarily existing and having always the same quantity of motion, would↓ in infinite time ~~would~~ run through all variety of forms one of w^{ch} is ↓that of↓ a man ↓ Metaphysical arguments are intricate & understood by few↓ The arguments w^{ch} all men are capable of understanding & by w^{ch} the belief of a Deity has hitherto subsisted in the world is taken from Phænomena. We see the effects of a Deity in the creation & thence gather the cause & therefore the proof a Deity & what are his properties belongs to ~~Natur~~ Experimental Philosophy. Tis the business of this Philosophy to argue from the effects to their causes till we come at y^e first cause & not to argue from ~~any~~ ↓any↓ cause to the effect till the cause as to its being & quality is sufficiently discovered.

ff. 252v, 254r, 255r and 256r¹⁰ (1704-1706)¹¹

[254r] And thus Nature will be very conformable to her self & very simple, performing all the great motions of the heavenly bodies by the attraction of gravity w^{ch} intercedes those bodies, & almost all the small ones by of their

¹⁰ F. 254r follows f. 252r chronologically, since the sentence on f. 252r is continued on f. 254r. The folios found between ff. 252r-256r contain only dispersed notes that were added to those folios.

¹¹ The totality of ff. 245r and 252r-256r postdates f. 619r-v, as is revealed by close inspection. For instance, changes and deletions from f. 619r such as “if there be an universal life & all space be the sensorium of a thinking being & finite things therein [...] of what thinks in us ↓who by immediate presence perceives” are readily implemented on f. 252v.

particles by some other attractive & repelling power w^{ch} intercedes the particles.¹² ~~And while these powers are of so large an extent, I do not see but that they may be numbered among the general laws of motion. The Vis inertiae is a passive principle by w^{ch} bodies persist in their motion or rest, receive motion in proportion to the force impressing it, & resist as much as they are resisted. By this principle alone there could never have been any motion in the world. ~~Life & Will are active Principles by w^{ch} we move o^e bodies, & thence arise according to other Laws of motion not yet known to us. And since all matter dually formed by generation & nutrition is attended with signes of life, & all things are framed with ~ perfect art & wisdom, & Nature does nothing in vain; if there be an universal life, & all space be the sensorium of a immaterial living¹³ thinking Being, who by immediate presence perceives things in it as that w^{ch} thinks in us perceives their pictures in the brain, & whose Ideas work more powerfully upon fit matter than the Imagination of a mother works upon an Embrios, or that up of a man upon his body for promoting health or sickness: [text from higher up f. 252v resumes]; the laws of motion arising from Life or Will may be of universal extent. Gravity &e [text from f. 254r resumes] Thinking will are active principles by w^{ch} we move o^e bodies according to o^e will, & thence arise other laws of motion unknown to us, w^{ch} , if & if there be an universal life & all space the Universe be the sensorium of a thinking Being, (for Nature does nothing in vain) those laws may be of universal extent. Gravity was reconed among the laws of motion by the ancient Philosophers who attributed gravity to their atoms in vacuo as the first Principle of their Philosophy. And the forces above mentioned by w^{ch} small bodies act on one another at small distances may have as good a title as gravity to be reconed among those laws [...] Some other Principle was necessary for putting bodies into motion, & now they are in motion some other Principle is necessary for conserving the motion.~~~~

[255r] Seing therefore the variety of motion w^{ch} we see in the world is always decreasing, there is a necessity of conserving & recruiting it by active principles; such as are [the power of life & will by which animals move their bodies with great & lasting force;] the cause of gravity by which Comets & Planets & Comets keep their motions in their Orbs & all bodies acquire great motion in falling; & the cause of fermentation by w^{ch} the heart & blood of animals are kept in pepetual [sic] motion & heat, the inward parts of the earth are constantly warmed, & the inward parts of the earth are constantly warmed ~ ~ bodies burn & shine, mountains take fire, the caverns of the earth are blown up & the Sun continues violently hot & lucid & warms all things by his light. For we meet with very little motion in the world besides what is owing to these active principles and [256r] & therefore we ought to inquire diligently into the general Rules or Laws observed by nature in the preservation or production of motion by these principles as the Laws of motion on w^{ch} the frame of ~ Nature b depends & the genuine Principles of Mechanical Philosophy. & the inward parts of the earth are constantly warmed & generate hot sulphureous unhealthful exhalations w^{ch} breaking forth with violence cause earthquakes, tempests, & hurricanes, raise or subvert Islands & Mountains, sink Lakes & carry up the sea partly in columns, & partly in drops & thick mists, w^{ch} convening above fall down in spouts, & sulphureous steams set mountains on fire & the inward parts of the earth are constantly warmed. For we meet with very little motion in the world besides what is visibly owing to these active principles, & the power of the will¹⁴

¹² In the folios preceding f. 254r, Newton inserted this sentence twice, but decided against it and crossed them out.

¹³ This addition seems to be in a hand different from Newton's.

¹⁴ The sentence ends abruptly. F. 245r contains the statement: "Some other Principle was necessary for putting bodies into motion & after now they were are in motion some other Principle is necessary for conserving the motion. For from the various composition of motion — — — warms all things by the light, Mountains take fire & the inward parts of the earth are constantly warmed & send up generate hot sulphureous unhealthful steams exhalations which breaking forth with violence cause earthquakes & tempests & hurricanes, & raise or subvert Islands & mountains & sink lakes & carry up the sea in spouts columns & in drops & thick mists w^{ch} convening above fall down in other again in spouts." This folio was planned by Newton to be an addition to the text starting with "Some other Principle was necessary for putting bodies into motion [...]" on f. 254r and ending in "[...] & warms all things by his light." on f. 255r. He wanted to add this immediately after erasing roughly a quarter of a folio on f. 254r as indicated by the symbol '¶'. He erased the symbol on f. 254r because, upon final consideration, he decided to add the material from f. 245r on f. 256r. In the end, he deleted the material on f. 256r and retained a small fragment from it which he slightly expanded and added between the lines on f. 255r. In terms of chronology, this means that the bulk of ff. 254r-255r was written before f. 245r, but that the intended addition on f. 254r corresponding to f. 245r was added afterwards and that the addition above the line on f. 255r was written after f. 256r was completed.

Optice (1706), pp. 340-3¹⁵

Atq; hæc quidem omnia si ita sint, jam Natura universa valde erit simplex & consimilis sui: Perficiens nimirum magnos omnes *corporum cælestium* Motus, Attractione Gravitatis, quæ est mutua inter corpora [341] illa omnia; & minores fere omnes *particularum suarum* Motus, alia aliqua Vi attrahente & repellente, quæ est inter particulas illas mutua. *Vis inertiae*, est Principium passivum, quo Corpora in Motu suo vel Quiete perstant, recipiunt Motum Vi moventi semper proportionem respondentem, & resistunt tantum quantum sibi resistitur. Ab hoc solo Principio nullus unquam in rerum Universitate oriri potuisset Motus. Alio aliquo Principio omnino opus erat ad movenda Corpora; & jam, cum moventur, alio itidem Principio opus est, ad Motum ipsorum conservandum. Nam ex variis binorum Motuum compositionibus, manifestum est non semper eandem esse in Mundo quantitatem Motus. [...] [342] [343] Quoniam igitur varii illi Motus, qui in Mundo conspiciuntur, perpetuo decrescunt universi; necesse est prorsus, quo ii conservari & recrescere possint, ut ad actiosa aliqua principia recurramus: Qualia utiq; sunt *Gravitatis causa*, qua Planetæ & Cometæ Motus suos in perpetuis Orbibus conservant, Corporaq; omnia Motum magnum sibi acquirunt cadendo; & *Fermentationis causa*, qua Cor & Sanguis Animalium Motu & Calore perpetuo confoventur, partes interiores Terræ perpetuo calefiunt, corpora permulta ardent & lucent, Montes ignem concipiunt, cavernæ Telluris ictibus subitis disjiciuntur, & Sol ipse perpetuum vehementer candet & lucet & Luce sua omnia calefacit ac fovet. Nam admodum paullum Motus in mundo invenimus, præterquam quod vel ex his Principiis actiosis, vel ex imperio *Voluntatis*, manifesto oritur.

f. 621v (1706-1717)¹⁶

And if it were not for these Principles the ↓b↓odies of the Earth Planets ↓Comets↓ & Sun ↓& all things in them↓ would grow cold, & freeze ↓& become inactive masses↓, & putrefaction generation & vegetation & life would cease, & the Planets & Comets would not remain in their Orbs.

ff. 281r, 282r (1706-1717)¹⁷

And thus Nature will be very conformable to her self & very simple, performing all the great motions of the heavenly bodies by the attraction of gravity w^{ch} intercedes those bodies, & almost all the small ones of their particles by some other attractive & repelling powers w^{ch} intercede the particles. The *Vis inertiae* is a passive principle by w^{ch} bodies persist in their motion or rest, receive motion in proportion to the force impressing it, & resist as much as they are resisted. By this Principle alone there never could have been any motion in the world. Some other Principle was necessary for putting bodies into motion; & now they are in motion some other Principle is necessary for conserving the motion. For from the various composition of two motions tis very certain that there is not always the same quantity of motion in the world. [...] [282r] Seeing therefore the variety of motion which we see find in the world is always decreasing, there is a necessity of conserving & recruiting it by active principles, such as are the cause of gravity by which Planets & Comets keep their motions in their Orbs & bodies acquire great motion in falling; & the cause of fermentation by which the heart & blood of animals are kept in perpetual

¹⁵ From ff. 252v, 254r, 255r and 256r onwards, Newton disentangled the three contained themes (as observed in n. 2) and elaborated on them in isolation from one another. From these folios onward, we cover the theme of active and passive principles developed in its own right, i.e. independent from the theme of God's sensorium, from *Optice* (1706), pp. 340-3, onwards. Our chronological order, i.e. ff. 252v, 254r, 255r and 256r containing the last draft for Newton, *Optice* (1706), is suggested by the fact that those folios contain a highly polished version of the passage once all the corrections are implemented.

¹⁶ This folio is part of material prepared for the 1717 edition of the *Opticks*. We infer this from the fact that this material was first introduced in Newton, *Opticks* (1718), pp. 379 ("And if it were not for these Principles the Bodies of the Earth [...] the Planets and Comets would not remain in their Orbs.") and was still absent from Newton, *Optice* (1706), and all material prior to it. Where Newton intended this addition to be added is impossible to conclusively determine due to the absence of a reference mark. The fragment is less polished than ff. 281r-282r which we present next.

¹⁷ This folio is part of the set ff. 263r-284r that contains highly polished drafts for the 1717 edition of *Opticks*. We infer this from a comparison between both texts and the Query numbers present in the drafts. Some Queries were renumbered between 1706-1717, i.e. from Queries 17-23 to 25-31, and some were added in 1717, i.e. Queries 17-24. This draft contains identical Query numbers to the 1717 edition of *Opticks*. In fact, we are convinced that this is the set that was sent to the publisher for printing the 1717 edition of *Opticks*. The page numbers on all the respective folios and indications for specific insertions in the published edition, for instance, the text in the square on f. 280r, suggest this. Newton shows no similar accuracy and precision in any of his other manuscripts in MS Add. 3970.

motion & heat, the inward parts of the earth are constantly warmed & in some places grow very hot, bodies burn & shine, mountains take fire, the caverns of the earth are blown up, & the Sun continues violently hot & lucid & warms all things by his light. For we meet with very little motion in the world besides what is owing to these active Principles. And if it were not for these Principles the bodies of the Earth, Planets, Comets, Sun, & all things in them would grow cold & freeze & become inactive masses, & all putrefaction generation vegetation & life would cease, & ~~the Planets~~ the Planets & Comets would not remain in their Orbs.

Opticks (1718), pp. 372-3, p. 375

And thus Nature will be very conformable to her self and very simple, performing all the great Motions of the heavenly Bodies by the Attraction of Gravity which intercedes those Bodies, and almost all the small ones of their Particles by some other attractive and repelling Powers which intercede the Particles. The *Vis inertiae* is a passive Principle by which Bo [373] dies persist in their Motion or Rest, receive Motion in proportion to the Force impressing it, and resist as much as they are resisted. By this Principle alone there never could have been any Motion in the World. Some other Principle was necessary for putting Bodies into Motion; and now they are in Motion, some other Principle is necessary for conserving the Motion. For from the various Composition of two Motions, 'tis very certain that there is not always the same quantity of Motion in the World. [...] [375] Seeing therefore the variety of Motion which we find in the World is always decreasing, there is a necessity of conserving and recruiting it by active Principles, such as are the cause of Gravity, by which Planets and Comets keep their Motions in their Orbs, and Bodies acquire great Motion in falling; and the cause of Fermentation, by which the Heart and Blood of Animals are kept in perpetual Motion and Heat; the inward Parts of the Earth are constantly warm'd, and in some places grow very hot; Bodies burn and shine, Mountains take fire, the Caverns of the Earth are blown up, and the Sun continues violently hot and lucid, and warms all things by his Light. For we meet with very little Motion in the World, besides what is owing to these active Principles. And if it were not for these Principles the Bodies of the Earth, Planets, Comets, Sun, and all things in them would grow cold and freeze, and become inactive Masses; and all Putrefaction, Generation, Vegetation and Life would cease, and the Planets and Comets would not remain in their Orbs.¹⁸

2. Fragments related to God's sensorium¹⁹

f. 249_{bisr-v} (1704-1706 with a deletion and addition made between 1706-1717)²⁰

[T]he main business of natural Philosophy is to argue from effects to causes till we come to y^e very first cause, & not only to unfold the mechanism of the world but chiefly to resolve these & such like questions What is there in

¹⁸ This text remained unchanged in later editions (Newton, *Optice* (1719), pp. 404-7, Newton, *Opticks* (1721), pp. 372-5, and Newton, *Opticks* (1730), pp. 372-5).

¹⁹ From ff. 252v, 254r, 255r and 256r onwards, Newton disentangled the three contained themes and elaborated on them in isolation from one other. In this section we cover the theme of God's will and sensorium developed in its own right from f. 249_{bisr-v} onwards.

²⁰ The majority of this folio was written between 1704 and 1706. We infer this from the fact that the surrounding material on ff. 248r-256r, with all changes and additions implemented, corresponds almost exactly to Newton, *Optice* (1706), pp. 322-43 ("*Qu. 23. Annon exiguæ corporum [...] Voluntatis, manifesto oritur.*"). However, f. 249_{bisr} is a special case, for it appears that Newton after 1706 reused it and added material written in brighter and thicker ink (e.g. "dense" (twice), "almost") that first appeared with some modifications in Newton, *Opticks* (1718), p. 344. We are quite confident that the initial text on f. 249_{bisr} was written as an addition to ff. 288r-289r which contains "And for rejecting such a Medium we have ↓also↓ the authority of those the oldest & most celebrated Philosophers of Greece & Phenicia, ↓(~~Mochas, Pherecides, Thales, Pythagoras~~)↓ who made a Vacuum, Atoms & the gravity of Atoms the first principles of their philosophy." If this is the case, then by way of comparison of the different additions and deletions, we can confidently conclude that f. 249_{bisr-v} postdates ff. 252v-256r. For instance, we have identified the exact folio where Newton introduced the reformulation of the material on the ancient philosophers that remained the same in all subsequent editions ("And for rejecting [...] the first principles of their Philosophy"), i.e. f. 292v. This folio is chronologically situated in between ff. 252v-256r and f. 249_{bisr-v}, but it does not contain any explicit theological material as a result of which we omit it from the appendix. Another, more conclusive, argument for the proposed order is the fact that both ff. 252v-256r and f. 292v are still lacking anything equivalent to "tacitely attributing gravity to some other cause then ↓dense↓ matter" contained in all subsequent related draft material. All these arguments point in the same direction, i.e. that this folio was written

places ↓almost↓ empty of matter & whence is it that the Sun & Planets gravitate towards one another without ↓dense↓ matter between them? Whence is it that Nature does nothing in vain? And whence arises all that beauty that we see in y^e world? ↓To w^t end are Comets & whence is it that they move all manner of ways in Orbs very excentric & Planets all one way in orbs concentric, & what hinders the fixt stars from falling upon one another?↓ How come the bodies of animals to be contrived with so much art? & for what ends were their several parts? Was y^e eye contrived without skill in Opticks & y^e ear without the knowledge of sounds? ↓& how do y^e motions of the body follow from y^e will & whence is the instinct in animals? ↓~~To what end are Comets? ↓whence is it that their Orbs are very eccentric & those of Planets concentric?↓ & what hinders the fixt stars from falling upon one another.~~ And tho every true step made in this Philosophy brings us not immediately to the first cause knowledge of the first cause yet it brings us nearer to it & on that account is to be highly valued. [249_{bisv}]²¹ & ↓whence is it↓ ~~that they move all manner of ways in Orbs very excentric & Planets ↓all²²↓ one & the same way in Orbs concentric & in~~ And of which things the images only are [illegible] carried through our sensoriums the organs of sense into our little sensoriums ↓are↓ there seen & beheld by that w^{ch} in us perceives & thinks.

Optice (1706), pp. 314-5

Philosophiæ naturalis id revera præcipuum sit & Officium & Finis, ut ab Effectis ratiocinatione progrediamur ad Causas, donec ad ipsam demum *Causam primam* perveniamus; nec Mundi *Mechanismum* solummodo explicemus, verum etiam insuper & præcipue ut hasce & hujusmodi Quæstiones tandem expediamus; *Quidnam inest in Spatiis Materia vacuis? & Unde est quod Sol & Planetæ ad se invicem gravitent, sine Materia intersecta? Qui fit, ut Natura nihil Agat frustra? & Unde orta est eximia illa Mundi universi Species & Pulchritudo? Quem in finem facti sunt Cometæ & Unde est quod Cometæ in Orbibus valde admodum Eccentricis undiq; & quaquaversum ferantur in omnes cæli partes; cum Planetarum cursus sit unus omnium, unaq; Directione in Orbibus concentricis serantur eodem omnes? Et Quidnam est quod impedit, quominus Sol & Stellæ fixæ in se mutuo irruant? Qui [315] fit, ut Corpora Animalium tam exquisita sint Arte atq; Consilio fabricata? & Quod ad fines conformatæ sunt diversæ ipsorum Partes? Fierine potuit, ut Oculus sine scientia Optices fuerit constructus? aut Auris, sine Intelligentia Sonorum? Qui fit, ut Motus Corporis obsequantur Imperio Voluntatis? & Unde est Instinctus ille quem vocant, in Animalibus? Annon Sensorium Animalium, est locus cui Substantia sentiens adest, & in quem sensibiles rerum species per nervos & cerebrum deferuntur, ut ibi præsentis a præsentis sentiri possint? Atq; his quidem rite expeditis, Annon ex phænomenis constat, esse Entem Incorporeum, Viventem, Intelligentem, Omnipræsentem, qui in Spatio infinito, tanquam Sensorio suo, res Ipsas intime cernat, penitusq; perspiciat, totasq; intra se præsentis præsentis complectatur; quarum quidem rerum Id quod in nobis sentit & cogitat, Imagines tantum ad se per Organa Sensuum delatas, in Sensoriolo suo percipit & contuetur? Utq; si verus omnis in hac Philosophia factus progressus, non quidem statim nos ducit ad *Causæ primæ* cognitionem; at certe propius propiusq; nos ad eam perpetuo adducit, eaque re permagni est æstimandus.*

f. 247r (1706-1717)²³

[T]he main business of natural Philosophy is to argue from Phænomena without feigning Hypotheses & to deduce causes from effects till we come to the very first cause ↓which certainly is not mechanical;↓, & not only to unfold the mechanism of the world but chiefly to resolve these & such like questions. What is there in places almost empty of matter, & whence is it that the Sun & Planets gravitate towards one another without dense matter between

as a draft, probably the latest draft present in CUL, Add. Ms. 3970, for the 1706 edition of *Optice* that Newton reused as a draft for the 1717 edition of *Opticks*.

²¹ Over the crossed-out sentence on f. 249_{bisr} there occurs a ‘^’ with which Newton normally signaled additions. It seems that Newton wanted to replace this crossed-out sentence by the sentence on f. 249_{bisv} that was later crossed out. The remainder of the text on f. 249_{bisv}, which prima facie seems to come completely out of the blue, is in fact a continuation of a crossed-out fragment in Latin, written by a hand different from Newton’s, i.e. Samuel Clarke’s, that is a precursor of “*Annon ex phænomenis constat, esse Entem Incorporeum, Viventem, Intelligentem, Omnipræsentem, qui in Spatio infinito, tanquam Sensorio suo, res Ipsas intime cernat, penitusq; perspiciat, totasq; intra se præsentis præsentis complectatur; quarum quidem rerum Id quod in nobis sentit & cogitat*” in Newton, *Optice* (1706), p. 315. The addition on f. 249_{bisv} corresponds to “*quarum quidem rerum [...] Imagines tantum ad se per Organa Sensuum delatas, in Sensoriolo suo percipit & contuetur?*” in *ibid.*

²² This “all” should have been struck through, but was not.

²³ We infer this chronology from the fact that ff. 246r and 247r contain material (e.g. on f. 247r: “↓which certainly is not mechanical;↓” and “to argue from Phænomena without feigning Hypotheses”) that first appeared in Newton, *Opticks* (1718), pp. 340-5 (“the Matter into smaller Parts [...] is to be highly valued.”) . F. 247r predates ff. 270r-271r. We infer this from, for instance, the fact that the addition “↓which certainly is not mechanical;↓” on f. 247r is readily included on f. 270r.

them? Whence is it that Nature doth nothing in vain & whence arises all that beauty that we see in the world? To what end are Comets, & whence is it that ~~they move all manner of ways in orbs~~ Planets move all one & the same way in orbs concentric while Comets move all manner of ways in Orbs very excentrick; & what hinders the fixt Stars from falling upon one another? How come the bodies of animals to be contrived with so much art, & for what ends were their severall parts? Was the eye contrived without skill in Opticks & the ear without the knowledge of sounds? How do the motions of the body follow from the will, & whence is the instinct in animals? Is not the sensory of animal that place to which the sensitive substance is present, & into which the sensible species of things are carried through the nerves & brain that there they may be perceived by their immediate presence to that substance? And these things being rightly determined, dispatcht, ~~Does~~ does it not appear from phænomena that there is a Being incorporeal living intellingent [sic] omnipresent, who in infinite space as it were in his sensory, sees the things themselves intimately, & throughly perceives them, & comprehends them wholly by their immediate presence to himself; of w^{ch} things the images only carried through the organs of sense to it self, that w^{ch} in us perceives & thinks, sees & beholds in its little sensorium. And tho every true step made in this Philosophy brings us not e^di^mmediately to the knowledge of the first cause, yet it brings us nearer to it, & on that account is to be highly valued.

ff. 270r, 271r (1706-1717)²⁴

[T]he main business of natural Philosophy is to argue from Phænomena without feigning Hypotheses, & to deduce causes from effects till we come to the very first cause, w^{ch} certainly is not mechanical; & not only to unfold the mechanism of the world but chiefly to resolve these & such like questions. What is there in places almost empty of matter, & whence is it that the Sun & Planets gravitate towards one another without dense matter between them? Whence is it that Nature doth nothing in vain, & whence arises all that order & beauty w^{ch} we see in the world? To what end are Comets, & whence is it that Planets move all one & the same way in Orbs concentric, while Comets move all manner of ways in Orbs very excentric, & what hinders the fixt stars from falling upon one another? How came the bodies of animals to be contrived with so much art, & for what ends were their several parts? Was the eye contrived without skill in Opticks, & the ear without knowledge of sounds? How do the motions of the body follow from the will, & [271r] whence is the instinct in animals? Is not the sensory of animals that place to w^{ch} the ~~things~~ sensitive substance is present, & into which the sensible species of things are carried through the nerves & brain that there they may be perceived by their immediate presence to that substance? And these things being rightly dispatcht, does it not appear from phænomena that there is a Being incorporeal, living, intelligent, omnipresent, who in infinite space, as it were in his sensory, sees the things themselves intimately, & throughly perceives them & comprehends them wholly by their immediate presence to himself: of which things the images only carried through the organs of sense into ↓our↓ little sensoriums, are there seen & beheld by that w^{ch} in us perceives & thinks. And tho every true step made in this Philosophy brings us not immediately to the knowledge of the first cause, yet it brings us nearer to it, & on that account is to be highly valued.

Opticks (1718), pp. 343-5

[T]he main Business of Natural Philosophy is to argue from Phænomena without feigning Hypotheses, and to deduce Causes from Effects, till we come to the very first Cause, which certainly is not mechanical; and not only to unfold the Mechanism of the World, but chiefly to resolve these and such like Questions. What is there in places almost empty of Matter, and whence is it that the Sun and Planets gravitate towards one another, without dense Matter between them? Whence is it that Nature doth nothing in vain; and whence arises all that Order and Beauty which we see in the World? To what end are Comets, and whence is it that Planets move all one and the same way in Orbs concentrick, while Comets move all manner of ways in Orbs very excentrick, and what hinders the fix'd Stars from falling upon one another? How came the Bodies of Animals to be contrived with so much Art, and for what ends were their several Parts? Was the Eye contrived without Skill in in Opticks, and the Ear without Knowledge of Sounds? How do the Motions of the Body follow from the Will, and whence is the Instinct in Animals? Is not the Sensory of Animals that place to which the sensitive Substance is present, and into which the sensible Species of Things are carried through the Nerves and Brain, that there they may be perceived [345] by their immediate presence to that Substance? And these things being rightly dispatch'd, does it not appear from Phænomena that there is a Being incorporeal, living, intelligent, omnipresent, who in infinite Space, as it were in his Sensory, sees the things themselves intimately, and throughly perceives them, and comprehends them wholly by their immediate presence to himself: Of which things the Images only carried through the Organs of Sense into our little Sensoriums, are there seen and beheld by that which in us perceives and thinks. And tho' every true Step

²⁴ The order of the drafts is suggested by the fact that the above text is part of a highly polished draft for Query 28 that appears in the set ff. 263r-284r (see n. 17 for our dating of this set), and is nearly identical to Newton, *Opticks* (1718), pp. 336-345.

made in this Philosophy brings us not immediately to the Knowledge of the first Cause, yet it brings us nearer to it, and on that account is to be highly valued.²⁵

3. Fragments related to God's design

f. 244r (1704-1706)²⁶

It seems therefore that God ~~has~~ ↓Deus O. M. in the beginning↓ created the ↓~~hard~~ hard↓ particles of ↓~~hard~~ matter of such sizes & figurs↓re↓s & with such other properties & in such a quantity ↓in proportion to space↓ as most conduced to y^e ends for w^{ch} they were created, & of these variously convening & moveing amongst one another ~~has~~ formed the Universe [in?] corporeal part ↓of y^e↓ Univer: & that the various ~~changes which~~ forms ↓& changes↓ w^{ch} matter dayly ~~puts on~~ ↓undergoes↓ consists only in the various ~~separations & [illegible]~~ ↓coalitions & separations↓ of these particles while y^e particles themselves continue ~~unchanged being too hard to be broken by~~ one entire as they were at first created ↓& unaltered↓ no ↓ordinary↓ power in nature being able to divide what God ↓himself↓ [illegible] united in the first creation. While these particles continue entire corporeal nature may continue the same, ↓& produce the same sorts of fluids & solids in all a#↓g↓es↓ but should these be broken into less particles, the nature of things would be altered. Ffor these ↓broken↓ particles would scarce ↓[move?] ↓&↓ convene ↓& stick together↓ any more in the same ↓manner &↓ forms as ↓they do↓ at present, unless ↓re↓united ~~anew~~ by a divine power.

f. 243v (1704-1706)²⁷

These particles ↓being solid↓ seem to be so ↓very↓ hard as as [sic] never to wear or break in pieces no ordinary power being able to divide what the ~~almighty~~ power of God ↓himself↓ made one in the first creation. While these particles continue entire they ~~will [illegible] be~~ ↓remain↓ fit ↓in all ages↓ to compound bodies of ↓one &↓ the same nature & texture ↓in all ages↓ but should they weare or²⁸

f. 243r (1704-1706)²⁹

All these things being considered, it seems to me that [illegible] Deus O. M. in y^e beginning ↓~~without any compulsion or necessity~~↓ created matter in ↓(consisting of↓ hard & solid ↓& [illegible] impenetrable [illegible]↓moveable & heay [sic]↓↓ particles of such sizes ↓&↓ figuers [sic] & with such other properties & in such proportion to space as most conduced to the ends for w^{ch} he created them. {That these particles are so very hard as never to weare or break in pieces, ~~for should they were [sic] or break while they continue entire they will be~~ ↓For what power↓ ↓no ordinary power being able to divide what ~~God himself~~ the power of God himself made one in y^e fir creation. ffor While these particles continue entire they will be [illegible]↓ fit to compound bodies of ↓one &↓ the same nature ↓& texture↓ in all ages, but should they weare or break in pieces the nature of things depending on them would be changed. Water & Earth ↓~~now~~↓ composed ~~now~~ of ~~entire particles~~ ↓old↓ worn particles & p fragments of particles would not be ~~the same as in the beginning~~ of the same kind & composition as

²⁵ This text remained unchanged in later editions (Newton, *Optice* (1719), pp. 372-4, Newton, *Opticks* (1721), pp. 343-5, and Newton, *Opticks* (1730), pp. 343-5).

²⁶ F. 244r is the earliest version of this passage we identified in this collection of fragments. Being a highly unpolished fragment, it predates what we find in Newton, *Optice* (1706), as “Atq; his quidem omnibus bene perspectis & consideratis [...] Certe in his omnibus nihil est, quod velsecum ipsum, vel cum ratione pugnet.” By way of comparison, we infer that f. 244r predates f. 243v. For instance, “All things being considered” is still lacking in f. 244r, while “Deus O. M. in the beginning” and “in proportion to space” are added in f. 244r and readily included in f. 243r.

²⁷ It is very likely that the fragments on f. 243r and f. 243v were written at the same time and that Newton used either of these as a tentative draft for the other. Due to a great many uncertainties, the comparative study used to date these two drafts was inconclusive with respect to a definite chronological order. However, if we take into account the dating of fragments of the same set in other sections, then we are ensured that f. 243v was used as a tentative draft to change f. 243r. So f. 243r was probably written earlier, after which Newton wrote f. 243v not being satisfied with f. 243r, and in a last step implemented the changes from f. 243v in f. 243r.

²⁸ This fragment breaks off here.

²⁹ This folio, based on the material in f. 244r, is still in a highly unpolished state and contains a lot of corrections and additions. Due to the abundance of these alterations, we can confidently establish that f. 243r predates f. 242r-v. For instance, “for should they were or break for while they continue entire they will be” is deleted in the next version whilst additions such as “& texture” and “in their solid dimensions” are readily included.

~~in the beginning~~ ↓nature & texture ↓now↓ with↓ water & earth composed of entire particles in the beginning. Of these particles all ↓material↓ things seem to have been composed in the ~~beginning~~ ↓first creation↓ but not without the intervention of an intelligent Agent. ↓ffor it became him that created them to set them in order. And if he did so, its unphilosophical to seek for any other origin of the world or to pretend that it [illegible] might arise out of a Chaos by the mere laws of Nature. [~~which cannot be others then they are & suffice to produce the earth [Sun?]-& Planets [illegible]-all~~] ↓ffor while Comets move in very excentrick Orbs ~~situated~~ in all manner of positions, blind fate could never make ~~the orbs of~~ all the Planets move one & y^e same way in orbs ↓concentric↓. This ↓uniformity↓ must be allowed [illegible] ~~a matter of choise~~ the effect of choise. And so the ↓first↓ contrivance of the eyes [illegible] eyes ears ↓heart [illegible]↓ & other organs of sence & motion in animals ~~must be~~ can be the effect of nothing else then ↓the↓ wisdome & skill of a powerful ↓ever living↓ Agent who being indivisibly in all places peceives [sic] all things ↓in their ↓[illegible]↓ solid dimensions↓ by [their?] ↓the↓ immediate presence ↓of the things themselves↓ more perfectly then that which thinks in us perceives only the ↓superficial↓ pictures of things ↓made↓ in [illegible] ~~its~~ ↓our↓ sensorium ↓by motion↓, & ↓& who is ↓ is [sic] more able to ~~move, & govern~~ ↓by his will to move alter & reform↓ them then we are ↓by o^{es}↓ to move ↓[illegible]↓ o^e bodies. ↓[#³⁰ [all-sort?] animals of all sorts & man himself without any other further need of a Deity then to [illegible]-preserve matter & a certain quantity of motion↓ // The business of Experimental Philosophy is only to find out by experience & Observation ↓not how things were created but↓ what ~~are~~ is the present frame of nature.

f. 242r-v (1704-1706)³¹

~~All these things being considered it seems to me that God [Deus O. M.] in the beginning created matter in hard solid hard impenetrable moveable ↓massy↓ particles of such sizes & figures, & with such other properties, & in such proportion to space as most conduced to the end for w^{ch} he created them. ↓And↓ T↓t that these original particles being solids are incomparably harder then ↓any↓ porous bodies compounded of them; even so very hard as never to weare or break in pieces; no ordinary power being able to divide what God himself made one in the first creation. While these particles continue entire they may compound bodies of ~~one & the same~~ ↓like↓ nature ~~in all ages~~ & texture in all ages; but should they weare or break in pieces, the nature of things depending on them would be changed. Water & Earth composed of old worn particles & fragments of particles would not be of the same nature & texture now with water & earth composed of entire particles in the beginning^a. [insertion from f 242v] a It seems to me ~~also~~ ↓further↓ y^e these particles have not only a Vis inertia^e accompanied wth such ↓passive↓ Laws of motion as ↓naturally [sic]↓ result from ~~thence~~ ↓that force↓, but also that they are endued wth certain active Princib^l ↓p↓les of motions such as is that of gravity & that w^{ch} causes fermentation & the cohed↓s↓ion of bodies.³² [...]~~

Now by the ~~intervention~~ ↓help↓ of these Principles ↓of force & motion↓ all material things seem to ~~have been~~ composed of the ~~pa~~ ↓hard &↓ solid particles above mentioned variously associated ↓in the first creation↓, but not wthout the ~~help~~ ~~help of a inter~~ counsel & of an intelligent Agent. Ffor it became him who created them to set them in order. [text from f 242r resumes] Of these ↓solid↓ particles all material things seem to have been composed in the first creation, but not without the intervention of an intelligent Agent. For it became him who created them, to set them in order. And if he did so, its unphilosophical to seek for any other origin of the world, or to pretend that it might arise out of Chaos by the mere laws of nature ↓tho being once formed it may continue [illegible] by those laws for many ages.↓. For while Comets move in very excentrick orbs in all manner of positions, blind fate could never make all the Planets move one & the same way in orbs concentrick⁶. This uniformity must be allowed the effect of choise. And so the first contrivance of the eyes, ears, ↓brain, ↓ heart, ↓lungs, hands, wings, swimming bladders↓ & other organs of [242v] sense & motion in animals ↓& the ↓[illegible]↓ instinct of brutes & insects↓

³⁰ We were unable to locate a corresponding note or addition.

³¹ F. 242r-v contains an unpolished fragment for Newton, *Optice* (1706), that is more elaborate than f. 243r, as inferred from the inserted texts from f. 242v, but less than ff. 244v and 285r-286r. Although the first sentence is crossed out by Newton, it contains all the additions and leaves out the deletions from f. 243r, for instance “hard & solid ↓& [illegible] impenetrable [illegible]↓moveable & heay [sic]↓.” Examples of the additions included in the second paragraph – after the insertion from f. 242v – are “material” and “first creation.”

³² Newton composed two independent sections on active and passive principles that show a unique development. We covered the fragments pertaining to the first in section 1 of the appendix and we cover the ones pertaining to the second section here because they are embedded in fragments on God’s design. It is probable that Newton took inspiration from his early drafts on active and passive principles, for instance from f. 620v. But despite the obvious thematic resemblances, no clear development from any of the fragments in section 1 to the ones in this section suggests itself. Given their unique evolutions and their vastly different embedding, for instance God’s design in this case, we treated them separately.

can be the effect of nothing else ~~in animals~~ then the wisdom & skill of a powerfull ever living Agent who being indivisibly in ↓all places after some such manner↓ ~~all places~~ ↓as that w^{ch} thinks in us is in ~~o^r sensorium~~, all parts of our sensorium,↓ perceives all things ↓accurately↓ in their true solid dimensions by the immediate presence of the things themselves ↓~~in his sensorium~~↓ ~~more~~ while that which thinks in us perceives only the superficial pictures of things made in our sensorium by motion; & who is more able by his will to ~~move alter & reform the parts of the Universe~~ ↓~~forme~~ move the bodies in his sensorium & ↓& thereby↓ to form & reform the parts of the Universe↓ then we are by ~~o^r~~ ours to move o^r ↓down↓ bodies. And since space is divisible in infinitum & matter is not necessarily in all places, it must be also allowed that God is able to ↓of [sic]↓ create ~~matter in several parts of y^e Universe~~ particles of matter of several sizes & figures & in several proportions to space & ~~in several parts of the Universe~~ & thereby to vary the Laws of Nature, & make worlds of different sorts in several parts of y^e Universe.

f. 244v (1704-1706)³³

some ~~small~~ ↓inconsiderable↓ irregularities excepted w^{ch} may have risen from the mutual actions of Comets & Planets upon one another & w^{ch} will be apt to increase till this systeme wants a reformation. ~~This~~ ↓Such a wonderfull↓ uniformity ~~o^f~~ ↓in↓ the Planetary Systeme must be allowed the effect of choise. And so must the uniformity in the bodies of animal, they having generally a right side & a left side shaped alike & on either side of their bodies two legs behind & two arms or two legs or two wings ↓before↓ upon their shoulders & between their shoulders a neck with a head upon it & in the head two ears, two eyes, a nose, & a mouth, ~~alike situated~~ ↓&↓ a tongue & ~~teeth~~ alike situated.

ff. 285r-286r (1704-1706 with an addition made between 1706-1717)³⁴

All these things being considered it seems to me that God [Deus O. M.] in y^e beginning created ↓formed↓ matter in solid massy hard impenetrable moveable particles of such sizes & figures & with such other properties & in such proportion to space as most conduced to the end for w^{ch} he created them. And that these primitive particles being solids are incomparably harder then any porous bodies compounded of them; even so very hard as never to wear or break in pieces: no ordinary power being able to divide what God himself made one in the first creation. While these particles continue entire they may compose bodies of the same nature & texture in all ages: but should they wear ↓away↓ or break in pieces, the nature of things depending on them would be changed. Water & Earth composed of old worn particles & fragments of particles would not be of the same nature & texture now & ↓w↓ith water & earth composed of entire particles in the beginning. And therefore that nature may be lasting, the changes of ↓corporeal↓ things are to be placed only in y^e various separations & ↓&↓, new associations & motions of these permanent particles, ↓↓compound↓ bodies being apt to break not in the midst of solid particles but where those particles are laid together & only touch in a few points.↓

It seems to me further that these ~~permanent~~ particles have not only a Vis inertiae ~~accompanied~~ ↓accompanied↓ wth such passive laws of motion as naturally result from that force, but also that they are ~~endowed~~ ~~with~~ ↓accompanied moved by↓ certain active principles ~~o^f motion~~ such as is that of Gravity & that w^{ch} causes fermentation & the cohesion of bodies. [...] Now by the help of these Principles all material things seem to have been composed of the hard & solid Particles above mentioned variously associated in the first creation, ~~bu~~↓y↓ ~~not~~ ~~without~~ the counsel of an intelligent ~~a~~↓Agent. For it became him who created them to set them in order. And if he did so, it's unphilosophical to seek for any other origin of the world, or to pretend that it might arise out of a Chaos by the mere laws of Nature; tho being once formed it may continue by those laws for many ages. For while Comets move in very excentrick Orbs in all manner of positions, blind fate could never make all the Planets move one & the same way in orbs concentrick, some inconsiderable irregularities excepted w^{ch} may have risen from the

³³ F. 244v only contains a small part of “Atq; his quidem omnibus bene perspectis & consideratis [...] Certe in his omnibus nihil est, quod velsecum ipsum, vel cum ratione pugnet.” (Newton, *Optice* (1706), pp. 373-7). This passage is absent from f. 242r-v. In addition, f. 242r-v contains a reference (“⁶”) to an addition that is, despite the absence of the counterpart of that reference anywhere else, in all likelihood the very fragment on f. 244v. Finally, f. 244v also reworks and extends some material from f. 242r-v such as “This uniformity must be allowed the effect of choise.” This allows us to confidently conclude that f. 244v postdates f. 242r-v.

³⁴ Ff. 285r-286r contain a more polished version of the fragments on f. 242r-v and f. 244v, which leads us to conclude that it postdates them. In addition, given that the text from these folios is nearly identical to the corresponding text in Newton, *Optice* (1706), pp. 343-7, once all the corrections are implemented, we infer that this is the latest draft present in the collection before Newton published the 1706 edition of *Optice*. There are, however, indications that Newton reused this draft for preparing his 1717 edition of *Opticks*. For instance, f. 286r, which is part of the same set of drafts as f. 285r, contains a cautionary comment concerning God’s sensorium that appeared for the first time in Newton, *Opticks* (1718), pp. 379-80. Furthermore, in the above fragment the addition “uniform” and others first appeared in the 1717 edition of the *Opticks* (Newton, *Opticks* (1718), p. 379).

mutual actions of Comets & Planets upon one another, & w^{ch} will be apt to increase till this Systeme wants a reformation. Such a [286r] wonderful uniformity in the Planetary Systeme must be allowed the effect of choice. And so must the uniformity ↓~~observed~~↓ in the bodies of Animals, they having generally a right side & a left side shaped alike & on either ↓side↓ of their bodies two leggs behind & ↓either↓ two arms or two leggs or two wings before upon their shoulders, & between their shoulders a neck with a head upon it, & in the head two ears, two eyes, a nose, a mouth & a tongue alike situated. Also the first contrivance of those very artificial parts of ~ animals, the ↓~~Joynts, Muscles, Glands,~~↓ Eyes, Ears, Brain, ↓~~Nerves, Muscles, Glands,~~↓ heart, Lungs, Midriff, ↓~~Larynx,~~↓ Hands, Wings, Swimming bladders, natural Spectacles, & other Organs of sense ↓~~memory~~↓ & motion, & the instinct of Brutes & Insects, can be the effect of nothing else then the wisdom & skill of a powerfull ever living Agent; who is ~~being indivisibly in all places, after some such manner as that w^{ch} thinks in us is in all parts of our sensorium, perceives all things accurately in their true solid dimensions by the immediate presence of the things themselves, while that w^{ch} thinks in us perceives only the superficial pictures of the things made in our sensorium by motion conveyed thither from the things;~~ & who is more able by his will to move the bodies ↓wth↓ in his boundless ↓uniform unorganized↓ sensorium & thereby to forme & reform the parts of the Universe, then we are by our will to move ↓the parts of↓ our ~~bodies~~ own bodies. ↓†↓ [insertion from the middle of f 285v] † And yet we are not to consider the world as the body of God or the several parts thereof as the parts of God. They are his creatures subordinate to him & subservient to his will. And he is no more the soul of them then the soul of a man is the soul of the species of things carried through the Organs of sens↓~~ation~~↓ into the place ↓of sensation↓ where the soul ↓by means of its [illegible] immediate presence↓ perceives them. [text from f 286r resumes] And since space is divisible in infinitum & matter is not necessarily in all places, it must be also allowed that God is able to create particles of matter of several sizes & figures & ↓in several proportions to space & perhaps of different densities & forces, &↓ thereby to vary the laws of Nature & make worlds of different sizes ↓sorts↓ in several parts of the Universe. At least I see nothing of contradiction in all this.

Optice (1706), pp. 343-7

Atq; his quidem omnibus bene perspectis & consideratis, illud mihi videtur denique simillimum veri; utiq; Deum Optimum Maximum, in principio rerum, materiam ita creasse, ut primigeniæ ejus particulæ, equibus deinceps oritura esset corporea omnis natura, solidæ essent, firmæ, duræ, impenetrabiles innertes & mobiles; iis magnitudinibus & figuris, iisq; insuper proprietatibus, eoq; numero & quantitate pro ratione Spatii in quo futurum erat ut moverentur; quo possent ad eos fines, ad quos creatæ fuerant, optime deduci. Quæ [344] porro particulæ primigeniæ, quippe plane solidæ, longe longeq; duriores sint, quam ulla corpora ex iisdem deinceps cum occultis interjectis meatibus composita; imo tam perfecte duræ, ut nec deteri possint unquam, nec comminui; ne adeo ulla in consueto Naturæ cursu Vis sit, quæ id in plures partes dividere queat, quod Deus ipse in prima rerum fabricatione Unum fecerit. Tamdiu dum particulæ illæ integræ permanent, poterunt sane per omnia secula ex iis composita esse corpora ejusdem semper naturæ & texturæ: Verum si illæ deteri aut comminui possent; jam futurum sane esset, ut rerum natura, quæ ex iis pendet, immutaretur. Aqua & Terra, ex particulis imminutis & detritis, particularunq; fragminibus compositæ, non utiq; eandem hodie naturam texturamq; haberent, ac Aqua & Terra in principio ex particulis integris compositæ. Quare, ut Rerum Natura possit durare, existimandum est corporum omnium mutationes, in variis solummodo separationibus, novisq; conjunctionibus & Motibus durabilium illarum particularum consistere. Nam Corpora composita disrumpuntur, non particularum ipsarum solidarum fractura, sed separatione earum, qua parte eæ commissuris inter se junctæ erant, & paucis tantum in punctis se inter se continebant.

Porro, videntur mihi hæ particulæ primigeniæ, non modo in se *Vim inertiae* habere, Motusq; *Leges passivas* illas, quæ ex Vi ista necessario oriuntur; verum etiam *Motum* perpetuo accipere a certis *Principiis actuosis*; qualia nimirum sunt Gravitatis, & Causa Fermentationis & coherentiæ corporum. [...] [345]

Jam quidem, ope Principiorum istorum, res corporæ universæ videntur compositæ fuisse ex duris solidisq; Particulis supra dictis, varie inter se in prima rerum fabricatione sociatis & conjunctis, Nutu & Consilio Agentis intelligentis. Decuit enim eum, qui res omnes creavit, easdem disponere quoq; & in ordinem collocare. Quæ si vera rerum origo fuit; jam indignum erit Philosopho, alias Mundi condendi rationes exquirere, vel comminisci quemadmodum e Chao per meras Leges Naturæ mundus universus oriri potuerit; quamvis, formatus cum sit, possit is jam per istas Leges in multa quidem secula perdurare. Nam dum Cometæ moventur in Orbibus valde eccentricis, undiq; & quoquoersum in omnes cœli partes; utiq; nullo modo fieri potuit, ut cæco fato tribuendum sit, quod Planetæ in orbibus concentricis Motu consimili ferantur eodem omnes; exceptis nimirum irregularitatibus quibusdam [346] vix notatu dignis, quæ ex mutuis Cometarum & Planetarum in se invicem actionibus oriri potuerint, quæq; verisimile est fore ut longinquitate temporis majores usq; evadant, donec hæc Naturæ Compages manum emendatricem tandem sit desideratura. Tam miram uniformitatem in Planetarum Systemate, necessario fatendum est Ingelligentia & Consilio fuisse effectam. Idemq; dici possit de uniformitate illa, quæ est in Corporibus *Animalium*. Habent videlicet Animalia pleraq; omnia, bina Latera, dextrum & sinistrum, forma consimili; & in Lateribus illis, a posteriori quidem corporis sui parte, pedes binos; ab anteriori autem parte, binos armos, vel pedes,

vel alas, humeris affixas; interq; humeros Collum, cui affixum est Caput; in eoq; capite binas aures, binos oculos, nasum, os & linguam; similiter posita omnia, in omnibus fere Animalibus. Deinde Partes illæ Corporis, tam exquisita Arte atq; Consilio fabricatæ, Oculi, Aures, Cerebrum, Musculi, Glandes, Cor, Pulmones, Diaphragma, Larynx, Manus, Alæ, Vesicæ ad natandum, Membranæ pellucidæ Animalium quorundam Oculis instar Conspicillorum obductæ, aliaq; Sensus & Motus Organa, Instinctusq; in Animalibus brutis & infectis; horum sane omnium conformatio prima, nulli rei tribui potest, nisi Intelligentiæ & Sapientiæ Entis Potentis semperq; Viventis; quod sit ubiq; scilicet præsens, possitq; Voluntate sua corpora omnia in infinito suo *Sensorio* movere, adeoq; cunctas Mundi universi partes ad arbitrium suum fingere & refingere, multo magis quam Anima nostra, quæ est in Nobis Imago Dei, voluntate sua ad corporis nostri membra movenda valet. Porro, quoniam Spatium divisibile est in infinitum; Materia autem, non est [347] necessario in omnibus partibus Spatii; illud insuper concedi necesse est, utiq; posse Deum creare Materiæ particulas variis magnitudinibus & figuris, vario quoq; numero & quantitate pro ratione Spatii in quo insunt, forte etiam & diversis densitatibus diversisq; viribus; eoq; pacto variare Leges Naturæ, Mundosq; condere diversa Specie, in diversis Spatii universi partibus. Certe in his omnibus nihil est, quod velsecum ipsum, vel cum ratione pugnet.

f. 621v (1706-1717)³⁵

The Organs of sense are not for enabling the soul to perceive the species of things [~~illegible~~] in its Sensorium, but only for conveying them thither & God has no need of such Organs, ~~the things themselves being present to them.~~ he being every where present to the things themselves.

ff. 282r, 283r, and 284r (1706-1717)³⁶

All these things being considered, it seems to me that God in the beginning formed matter in solid massy hard impenetrable moveable particles of such sizes & figures & with such other properties & in such proportion to space as most conduced to y^e end for w^{ch} he formed them, & that these primitive particles being solids are incomparably harder then any porous bodies compounded of them; even so very hard as never to wear or break in pieces: no ordinary power being able to divide what God himself made one in the first creation. While the particles continue entire they may compose bodies of one & the same nature & texture in all ages: but should they weare away, or break in pieces, the nature of things depending on them, would be changed. Water & Earth composed of old worn particles & fragments of particles would not be of the same nature & texture now with water & earth composed of entire particles in the beginning. And therefore that nature may be lasting, the changes of corporeal things are to be placed only in the various separations & new associations & motions of these permanent particles; compound bodies being apt to break, not in the midst of solid particles, but where those particles are laid together [~~illegible~~] only touch in a few points.

[283r] It seems to me further that these particles have not only a Vis inertiae accompanied with such passive laws of motion as naturally result from that force, but also that they are moved by certain active principles such as is that of Gravity & that which causes fermentation & the cohesion of bodies. [...]

Now by the help of these Principles all [~~motions?~~] material things seem to have been composed of the hard & solid Particles above mentioned variously associated in the first creation by the counsell of an intelligent Agent. For it became him who created them to set them in order. And if he did so, it's unphilosophical to seek for any other origin of the world, or to pretend that it might arise out of a Chaos by the mere laws of nature; tho being once formed it may continue by those laws for many ages. For while Comets move in very excentric Orbs in all manner of positions, blind fate could never make all the Planets move one & the same way in Orbs concentrick, some inconsiderable irregularities excepted which may have risen from the mutual actions of Comets & Planets upon one another, & w^{ch} will be apt to increase till this Systeme wants a reformation. Such a wonderfull uniformity in the Planetary Systeme must be allowed the effect of choise. And so must the uniformity in the bodies of animals, they having generally a right & a left side shaped alike & on either side of their bodies two leggs behind & either two arms or two leggs or two wings before upon their sholders & between their sholders a neck

³⁵ This folio is part of material prepared for the 1717 edition of the *Opticks*. We infer this from the fact that it contains a comment on God's sensorium that was first introduced in Newton, *Opticks* (1718), pp. 379 ("without the Intervention of any third thing [...] very where present to the Things themselves."), and is still absent from ff. 285r-286r and Newton, *Optice* (1706). Where Newton intended this addition to be added, is impossible to conclusively determine due to the absence of a reference mark. The fragment is less polished than ff. 282r-284r which we present next.

³⁶ This folio combines all additions and corrections from the previous folios prepared for the 1717 edition of *Opticks* in a polished form and is, in that regard, nearly identical to Newton, *Opticks* (1718), pp. 375-7. This folio is also part of the set ff. 263r-284r (see n. 17 for our dating of this set).

running down into a back bone & a head upon it, & in the head two ears, two eyes, a nose, a mouth & a tongue alike situated. Also the first contrivance of those very artificial parts of animals, the eyes, ears, brain, muscles, heart, Lungs, Midriff, Glands, Larynx, Hands, Wings, Swimming-bladders, natural Spectacles, & other organs of sense & motion, & the Instinct of Brutes & Insects, can be the effect of nothing else then the wisdom & skill of a powerful ever living agent, who being in all places is more able by his Will to move the ~~bounds of~~ bodies within his boundless unorganized uniform Sensorium & thereby to form & reform the parts of the Universe, then we are by our will to move the parts of our own bodies. And yet we are not to consider the world as the body of God or the ~~parts~~ several parts thereof as the parts of God. ~~They~~ He is an uniform Being void of Organs, Members, or Parts, & they are his Creatures subordinate to him & subservient to his will, & his ~~is~~ is no more the soul of them then the Soul of a man is the Soul of the Species of things carried through the Organs of Sense into the place of its sensation, where it perceives them by means of its immediate presence without the intervention of any third thing. The Organs of Sense are not for enabling the soul to perceive the Species of things in its Sensorium, but only for conveying them thither, & God has no need of such Organs, he being every ~~where~~ present to the things themselves. And since space is divisible in infinitum & matter is not necessarily in all places, it may be also allowed that God is able to create ~~matter~~ particles of [?] [284r] matter of several sizes & figures & in several [...] proportions to space, & perhaps of different densities & forces, & thereby to vary the Laws of Nature, & make worlds of several sorts in several parts of the Universe. At least I see nothing of contradiction in all this.

Opticks (1718), pp. 375-7

All these things being consider'd, it seems probable to me, that God in the Beginning form'd Matter in solid, massy, hard, impenetrable, moveable Particles, of such Sizes and Figures, and with such other Properties, and in such Proportion [376] to Space, as most conduced to the End for which he form'd them; and that these primitive Particles being Solids, are incomparably harder than any porous Bodies compounded of them; even so very hard, as never to wear or break in pieces: No ordinary Power being able to divide what God himself made one in the first Creation. While the Particles continue entire, they may compose Bodies of one and the same Nature and Texture in all Ages: But should they wear away, or break in pieces, the Nature of Things depending on them, would be changed. Water and Earth composed of old worn Particles and Fragments of Particles, would not be of the same Nature and Texture now, with Water and Earth composed of entire Particles, in the Beginning. And therefore that Nature may be lasting, the Changes of corporeal Things are to be placed only in the various Separations and new Associations and Motions of these permanent Particles; compound Bodies being apt to break, not in the midst of solid Particles, but where those Particles are laid together, and only touch in a few Points.

It seems to me farther, that these Particles have not only a *Vis inertiae*, accompanied with such passive Laws of Motion as naturally result from that Force, but also that they are moved by certain active Principles, such as is that of Gravity, and that which causes Fermentation, and the Cohesion of Bodies. [...] [377]

Now by the help of these Principles, all material Things seem to have been composed of [378] the hard and solid Particles above mention'd, variously associated in the first Creation by the Counsel of an intelligent Agent. For it became him who created them to set them in order. And if he did so, it's unphilosophical to seek for any other Origin of the World, or to pretend that it might arise out of a Chaos by the mere Laws of Nature; though being once form'd, it may continue by those Laws for many Ages. For while Comets move in very excentrick Orbs in all manner of Positions, blind Fate could never make all the Planets move one and the same way in Orbs concentrick, some inconsiderable Irregularities excepted which may have risen from the mutual Actions of Comets and Planets upon one another, and which will be apt to increase, till this System wants a Reformation. Such a wonderful Uniformity in the Planetary System must be allowed the Effect of Choice. And so must the Uniformity in the Bodies of Animals, they having generally a right and a left side shaped alike, and on either side of their Bodies two Legs behind, and either two Arms, or two Legs, or two Wings before upon their Shoulders, and between their Shoulders a Neck running down into a Back-bone, and a Head upon it; and in the Head two Ears, two Eyes, a Nose, a Mouth and a Tongue, alike situated. Also the first Contrivance of those very artificial Parts of Animals, the Eyes, Ears, Brain, Muscles, Heart, Lungs, Midriff, Glands, Larynx, Hands, Wings, Swimming Bladders, natural Spectacles, and other Organs of Sense and Motion; and the Instinct of Brutes and Insects, can be the effect of nothing else than the Wisdom and Skill of a powerful ever-living Agent, who being in all Places, is more able by his Will to move the Bodies within his boundless uniform Sensorium, and thereby to form and reform the Parts of the Universe, than we are by our Will to move the Parts of our own Bodies. And yet we are not to consider the World as the Body of God, or the several Parts thereof, as the Parts of God. He is an uniform Being, void of Organs, Members or Parts, and they are his Creatures subordinate to him, and subservient to his Will; and he is no more the Soul of them, than the Soul of a Man is the Soul of the Species of Things carried through the Organs of Sense into the place of its Sensation, where it perceives them by means of its immediate Presence, without the Intervention of any third thing. The Organs of Sense are not for enabling the Soul to perceive the Species of Things in its Sensorium, but only for conveying them thither; and God has no need of such Organs, he being every where

present to the Things themselves. And since Space is divisible *in infinitum*, and Matter is not necessarily in all places, it may be also allow'd that God is able to create Particles of Matter of several Sizes and Figures, and in several Proportions to Space, and perhaps of different Densities and Forces, and thereby to vary the Laws of Nature, and make Worlds of several sorts in [380] several Parts of the Universe. At least, I see nothing of Contradiction in all this.³⁷

4. Fragments related to natural philosophy, God and moral philosophy

f. 243r (1704-1706)³⁸

And by pursuing this method ↓in other things as well as in light↓ we may hope by degrees by degrees to discover more & more ↓of↓ the causes & compositions ↓explanations↓ of things ↓& to put the discoveries out of dispute↓ till we come to as clear & full a knowledge of the ↓vey [sic]↓ first cause as we can expect from phaenomena. & And thereby ↓we shal [sic]↓ not only perfect Natural Philosophy. but also [illegible] enlarge the bounds of Moral Philosophy, by founding ↓establishing↓ upon the clear light of Nature the worship of a Deity as well as the love of o^e Neighbour.

f. 242v (1704-1706)³⁹

And by pursuing this method to ↓i↓ll we come to as clear & full a knowledge of the first cause as we can expect from Phaenomena, Natural Philosophy will be perfected, & a good foundation will be laid for enlarging the bounds of Moral Philosophy.

f. 244v (1704-1706)⁴⁰

— — —Moral Philosophy. ffor when ↓if↓ we know ↓see↓ clearly by the light of Nature that there is a God, we shall see ↓clearly↓ by the same light of Nature that he is to be feared & [illegible] praised thanked & worshipped with feare wth fit expressions of gratitude for the benefits we receive wth gratitude & supplication ↓acknowledged feared honoured & ↓ & [sic] adored. [...] And if ↓Natural Philosophy in all its parts↓ by pursuing this method Natural Philosophy shall at length be perfected, the bounds of moral Philosophy will be also enlarged by founding the worship of the first cause upon the light clearest light of Nature ffor when we know ↓so far as we shall ↓can↓ know by Natural Philosophy what ↓what dependence w power the first cause has over us & what benefits we ↓[illegible]↓ receive or may hope for ↓or may expect↓ from him, ↓so far↓ our duty towards him as well as ↓that↓ towards one another will ↓so far↓ appear to us by the clear light of nature. And no doubt, if the worship of fals Gods had not blinded the Heathens, their Moral Philosophy would have gone further then to the four Cardinal Vertues, & instead of teaching us to worship the Sun & Moon & dead mens Souls, they would that taught us the to worship of o^e great ↓true↓ Benefactor.

³⁷ This fragment remained identical in all later editions (Newton, *Optice* (1719), pp. 407-12, Newton, *Opticks* (1721), pp. 375-80 and Newton, *Opticks* (1730), pp. 375-80).

³⁸ F. 243r contains the oldest draft of its kind that we could identify. Here, Newton extensively elaborates on the benefits the pursuit of 'Natural Philosophy' has for 'Moral Philosophy'. In the next version, i.e. f. 242v, Newton shortens this fragment to a mere one sentence only to extend it again in subsequent related draft material. Proof of this can be found in the later drafts.

³⁹ This concise fragment on 'Natural and Moral Philosophy' is closer to the corresponding passage found in Newton, *Optice* (1706), p. 348 ("Quod si *Philosophia Naturalis*, hanc Methodum persequendo, tandem aliquando ab omni parte absoluta erit facta atq; perfecta Scientia; utiq; futurum erit, ut & *Philosophiae Moralis* fines itidem proferantur. Nam quatenus ex *Philosophia naturali* intelligere possimus, quænam sit prima rerum Causa."), than f. 243r, and thus postdates it. Remarkably, the fragment ends very abruptly in "[...] Moral Philosophy. Fo." From the surrounding passages and Newton's conventions for continuing a fragment on another folio, i.e. by adding "— — —" and the last words of the fragment that he wants to continue, we infer that the remainder of this fragment is found on f. 244v. The ink and handwriting suggest that they were written at the same time. In this case, Newton ran out of space on f. 242v and continued immediately on f. 244v.

⁴⁰ On f. 244v, we identified "— — —Moral Philosophy. For when [...] & adored" as a continuation of the passage stopping abruptly in "bounds of Moral Philosophy. Fo" on f. 242v. In similar ink and handwriting, Newton again immediately reworked the whole of ff. 242v and 244v on f. 244v, resulting in the fragment "And if ↓Natural Philosophy in all its parts↓ [...] to worship of o^e great ↓true↓ Benefactor." We conclude that both fragments on f. 244v were written immediately after f. 242v and thus, as a whole postdate them.

f. 286r (1704-1706)⁴¹

And if Natural Philosophy in all its parts, by pursuing this Method, shall at length be perfected, the bounds of Moral Philosophy will be also enlarged. ffor so far as we can know by Natural Philosophy what ~~power~~ ↓is↓ the first Cause, ↓what power he↓ has over us, & what benefits we receive from him, so far o° duty towards him as well as that towards one another will appear to us by the light of Nature. And no doubt, if the worship of false Gods had not blinded the Heathens, their Moral Philosophy would have gone further then to the four Cardinal Vertues. & instead of teaching us ↓the transmigration of Souls, &↓ to worship the Sun & Moon & dead Heroes, they would have taught us to worship o° true ↓Author &↓ Benefactor.

Optice (1706), p. 348

Quod si *Philosophia Naturalis*, hanc Methodum persequendo, tandem aliquando ab omni parte absoluta erit facta atq; perfecta Scientia; utiq; futurum erit, ut & *Philosophia Moralis* fines itidem proferantur. Nam quatenus ex *Philosophia naturali* intelligere possimus, quænam sit prima rerum Causa, & quam potestatem & jus ea in nos habeat, & quæ beneficia ei accepta sint referenda; eatenus Officium nostrum erga eam, æque ac erga nosmetipsos invicem, quid sit, per Lumen Naturæ innotescet. Omnino, si Deorum falsorum cultus non occæcasset animum gentibus, longius se inter eas extendisset *Philosophia Moralis*, quam ad *Cardinales* illas quatuor, quas vocant, Virtutes: Et qui Animarum Transmigrationem, Solisq; & Lunæ Heroumque mortuorum Cultum docebant; id sane multo potius docuissent, qua ratione optime colendus esset verus noster & beneficentissimus Author.

f. 621v (1706-1717)⁴²

† ~~Metaphysical proofs~~ ↓of a deity↓ ~~not grounded on Phænomena are~~ ↓no better↓ ~~dreams~~⁴³ † And even in proving a Deity all aguments [sic] ↓not↓ taken from Phænomena are little better then dreams.

f. 284r (1706-1717)⁴⁴

And if natural Philosophy in all its parts, by pursuing this method, shall at length be perfected, the bounds of moral Philosophy will be also enlarged. ffor so far as we can know by Natural Philosophy what is the first Cause, what power he has over us, & what benefits we receive from him, so far our duty towards him as well as that towards one another, will appear to us by the light of Nature. And no doubt, if the worship of fals Gods had not blinded the heathen, their moral Philosophy would have gone further then to the four Cardinal Vertues; & instead of teaching the transmigration of souls & to worship the Sun & Moon & dead Heroes, they would have taught us to worship our true Author & Benefactor.

Opticks (1718), pp. 381-2

And if natural Philosophy in all its Parts, by pursuing this Method, shall at length be perfected, the Bounds of moral Philosophy will be also enlarged. For so far as we can know by natural Philosophy what is the first Cause,

⁴¹ F. 286r, when all changes are implemented corresponds to Newton, *Optice* (1706), pp. 348 (“Quod si *Philosophia Naturalis*, hanc Methodum persequendo [...] beneficentissimus Author”). For instance, the additions and deletions of “what ~~power~~ ↓is↓ the first Cause, ↓what power he↓ has over us” and “↓the transmigration of Souls, &↓” in f. 286r are readily included in Newton, *Optice* (1706). This folio also postdates f. 244v given its highly polished state.

⁴² This fragment on f. 621v is not exactly a formal draft of the material we discuss in this section. Rather it is a draft for the passage on methodology just prior to the theological exposition covered in this section of the appendix. In that passage, Newton develops his methodological ideas in terms of induction and deduction from phenomena and, consequently, explicates his conception of natural philosophy. In the course of doing so, he explicitly dismisses metaphysics as a sound foundation for natural philosophy. Coming to the fragment considered here, Newton argues that such metaphysical approaches should also be dismissed in the context of theology and that instead, arguments in favour of God’s existence should be derived from phenomena. Due to this explicit link drawn between natural philosophy and theology, we include it in this section. The dating of this fragment, and more generally, the dating of the entire folio is predominantly undertaken in section 1 of the appendix. The last sentence of this fragment is still lacking in Newton, *Optice* (1706), 347-8, and thus shows that this fragment is a draft for the 1717 edition of *Opticks*. Further, the addition made in this fragment (e.g. “↓altho↓”) is readily incorporated in f. 284r proving that f. 621v predates f. 284r.

⁴³ The only other time that the word “dreams” is mentioned in this sense, is in f. 619r-v as draft material for Newton, *Optice* (1706).

⁴⁴ This highly polished fragment on f. 284r is identical to Newton, *Opticks* (1718), pp. 381-2, and part of the set ff. 263r-284r (see n. 17 for our dating of this set).

what Power he has over us, and what Benefits we receive from him, so far our Duty towards him, as well as that towards one another, will appear to us by the Light of Nature. And no doubt, if the Worship of false Gods had not blinded the Heathen, their moral Philosophy would have gone farther than to the four Cardinal Virtues; and [382] instead of teaching the Transmigration of Souls, and to worship the Sun and Moon, and dead Heroes, they would have taught us to worship our true Author and Benefactor.

Addition to a copy of the *Opticks* (1717) after “our true Author and Benefactor” (1717-1721)⁴⁵

, as their ancestors did before they corrupted themselves. For the seven Precepts of the Noachides were originally the moral law of all nations; & the first of them was to ↓have↓ but one supreme Lord God & not to alienate his worship; the second was not to profane his name; & the rest were to abstain from ↓blood or homicide & from↓ fornication, (that is from incest adultery & all unlawfull lusts,) & from homicide theft & all injuries, & to be merciful even to bruit beasts, & to set up magistrates for putting these laws in execution. Whence came the moral Philosophy of the ↓ancient↓ Greeks.

Optice (1719), pp. 414-5

Quod si *philosophia naturalis*, hanc methodum persequendo, tandem aliquando ab omni parte absoluta erit facta atque perfecta scientia; utique futurum erit, ut & *philosophiæ moralis* fines itidem proferantur. Nam quatenus ex philosophia naturali intelligere possimus, quænam sit prima rerum causa, & quam potestatem & jus Ille in nos habeat, & quæ beneficia Ei accepta sint referenda; eatenus officium nostrum erga Eum, æque ac erga nosmetipsos invicem, quid sit, per lumen naturæ innotescet. Omnino, si deorum falsorum cultus non occæcasset animum gentibus, longius se inter eos extendisset philosophia moralis, quam ad *Cardinales* illas quatuor, quas vocant, virtutes. Et qui animarum transmirationem, solisque & luneæ, heroumque mortuorum cultum docebant; id sane multo potius docuissent, qua ratione optime colendus [415] esset verus noster & beneficentissimus Author. Quod quidem fecerunt majores ipsorum, antequam animum moresque suos corruperant. Lex enim moralis ab origine gentibus universis, erant septem illa *Noachidarum* præcepta: Quorum præceptorum *primum* erat, UNUM esse agnoscendum summum Dominum Deum, ejusque *cultum* non esse in alios transferendum. Etenim sine hoc principio, nihil esset *virtus* aliud, nisi merum nomen.

Opticks (1721), pp. 381-2

And if natural Philosophy in all its Parts, by pursuing this Method, shall at length be perfected, the Bounds of Moral Philosophy will be also enlarged. For so far as we can know by natural Philosophy what is the first Cause, what Power he has over us, and what Benefits we receive from him, so far our Duty towards him, as well as that towards one another, will appear to us by the Light of Nature. And no doubt, if the Worship of false Gods had not blinded the Heathen, their moral Philosophy would have gone farther than to the four Cardinal Virtues; and [382] instead of teaching the Transmigration of Souls, and to worship the Sun and Moon, and dead Heroes, they would have taught us to worship our true Author and Benefactor, as their Ancestors did under the Government of *Noah* and his Sons before they corrupted themselves.⁴⁶

⁴⁵ Huntington Library, call n° 700873, p. 382. Our transcription is based on the image of this page in Frank E. Manuel, *Isaac Newton: Historian* (Cambridge (Mass.), The Belknap Press of Harvard University Press, 1963), image 10, i.e. the image facing p. 117. We are indebted to Stephen D. Snobelen, “La Lumière de la Nature:” Dieu et la philosophie naturelle dans l’*Optique* de Newton’, *Lumières*, n° 4, 2004, pp. 65-104; id., “La luz de la naturaleza:” Dios y filosofía natural en la *Óptica* de Isaac Newton’, *Estudios de Filosofía*, n° 35, 2006, p. 48; and id., “The Light of Nature:” God and Natural Philosophy in Isaac Newton’s *Opticks*’ (unpublished manuscript) for this reference. It is impossible to determine whether this addition was composed before or after the two manuscripts we discuss next. It is likely that it was composed before the publication of the 1721 edition of the *Opticks*.

⁴⁶ The section on God and Moral Philosophy remained the same in the fourth English edition (Newton, *Opticks* (1730), pp. 381-2).