

ADAM DROZDEK

## WILLIAM DERHAM: BETWEEN NATURE AND THEOLOGY

William Derham was a clergyman and a competent and accomplished researcher, an active Fellow of the Royal Society, an author of numerous scholarly contributions to the *Philosophical Transactions*,<sup>1</sup> who was keenly interested in scientific research and devoted to the truth of Christian religion. By combining the two, science and religion, he proposed “the Demonstration of the *Being* and *Attributes* of an infinitely wise and powerful Creator, from a cursory Survey of the Works of *Creation*, or, (as often called) of *Nature*” (Ph 3)<sup>2</sup> in his *Physico-theology* (1713) and in its follow up, *Astro-theology* (1714), that was envisioned as the work “designed for the good of Mankind, particularly for the Conviction

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1. A list of his 44 articles is provided by Thomas B. Gabrielson, Background and perspective: William Derham's *De moto soni* (On the motion of sound), *Acoustics Today* 5 (2009), no. 1, pp. 25-26. His detailed biography is given by A. D. Atkinson, William Derham, F.R.S. (1657-1735), *Annals of science* 8 (1952), 368-392.
2. References to the following books of William Derham are used:
  - A – *Astro-theology, or, a demonstration of the being and attributes of God from a survey of the heavens*, London: W. Innys 1720<sup>5</sup>.
  - Ch – *Christo-theology: or, a Demonstration of the Divine Authority of the Christian Religion*, London: W. Innys 1730.
  - Ph – *Physico-theology or, A demonstration of the being and attributes of God, from his works of creation*, London: W. Innys 1731<sup>6</sup>.

of Infidels and Irreligious, for the Promotion of the Fear and Honour of GOD, and the cultivating of true Religion, so it may have its desired Effect” (A lvi).<sup>3</sup> Derham may have been alarmed by a growing stream of deism – in his eyes, represented by infidels and the irreligious – such as Charles Blount, John Toland, and Anthony Collins, and he rather longingly looked back to olden times, to “the purer Ages of Christianity, when Scepticism and Infidelity did not appear barefac’d, but Religion was more set by, and Devotion was warmer than at this Day.”<sup>4</sup> Apparently, he saw his physico-theological approach as a means of restoration of this old time religion.

Both of his books were quite popular: the *Physico-theology* had eight editions during Derham’s lifetime and Derham saw six editions of the *Astro-theology*. Both books were also translated into several languages.

## Nature

Nature, “as often called,” was for Derham an enormous system of interconnected components, a system of system, a structure of structures in which hardly any change could be made without affecting other elements, which could take place through two kinds of causes, efficient and final (never mind formal and material causes), both kinds being a subject of science and both being of importance for theology.

Derham saw final causes everywhere in nature as having natural importance, but also impacting social life. For example, atmosphere and atmospheric phenomena are “a matter of Design and the infinitely wise Creator’s Work” as testified by its delicate makeup and its use for the sustenance of life (Ph 4). Winds agitate air without which air would be putrid (14), and they enable sea travel (18). Rain makes plants “Verdant and Flourishing, Gay and Ornamental” (21). Snow, although “an irksome Guest,” is useful for structuring the earth, preventing plagues (24). Mountains are a refuge for animals and humans. They are beautiful to look at and allow for beautiful views from them (70-71), are good for health by their finer air, are good for habitation, offer a variety of plants (72), are the origin of rivers (74), are a source of minerals, and are boundaries for nations (75). Such examples allow Derham to state that “we see nothing wanting, nothing redundant, or frivolous, nothing botching, or ill-made” in atmosphere, light, cloud, and rain, we can only see the work of the Designer (36).

3. And thus, his “real interest lay in the theological implications arising from scientific investigation, rather than in the pursuit of such knowledge for its own sake,” James Moseley, Derham’s *Astro-theology*, *Journal of the British Interplanetary Society* 32 (1979), p. 396.

4. W[illiam] Derham, *A defence of the churches right in leasehold estate*, London: W. Innys 1731, p. 10.

A sheer enormity of nature was for Derham a sure sign that it was not a matter of random emergence. Even when limiting oneself to the Solar system, the distances of planets from the sun and the sizes of their orbits proclaim the glory of God (A 25) and so does the fact that Planets are at such a distance from one another that they do not interfere, or clash with one another (16, 52). Also, when casting eyes onto the whole of the universe, the human admiration of God's work can only increase: how without God's guidance could all these "unwieldy Masses" move so orderly for all times? (103). Moreover, the fact that all celestial bodies are spherical indicates that they are the "Pieces of the same Hand" since had they been made by chance, they would have had different forms. If the form of these bodies and their regular motions are due to gravitation, how come that inanimate matter acquired this force? (125) It is God who endowed matter with this force and guided it in the formation of the world (144).

Derham believed that the earth was designed for human habitation and the position of the earth in the solar system points to this fact; for example, had the earth been closer to the sun, it would have been burnt (A 174). If it had been further away, the earth would have been frozen (175). In this, Derham addressed the problem of what is called today the anthropic principle.

The size of the universe is infinite in Derham's view, in comparison with which the earth can only be considered as "this little Heap on which we dwell" (A 26), which makes it easy to choose between Ptolemaic and Copernican systems. Since nature proceeds in the simplest manner (xi), it is difficult to see that the earth can be in the center of the universe and the entire heaven could revolve around it; however, "the prodigious and inconceivable Rapidity" of heavens required by the Ptolemaic system is removed in the Copernican system (xiii). Derham also spoke about the new astronomical system which was an extension of the Copernican system onto the whole of the universe: the new system extends the universe to an indefinite space. It is an extension of the Copernican system by rejecting the firmament of fixed stars. It considers each fixed star to be a sun with its own planets (xxxviii, 36). This system is the most rational and more probable than any other system since it is most magnificent and worthy of an infinite Creator (xlii, 38-39).

Important for Derham, an ecclesiastic, were Scriptural arguments used against the Copernican system. Several verses apparently point to the geocentric system. However, "since the design of the holy Writings is not to instruct Men in Philosophical, but Divine Matters, therefore it is not necessary to restrain the Sense of those Texts to the strict propriety of the Words, but take them to be spoken according to the appearance of things and the vulgar notions and opinions which

men have of them, not according to their reality, or Philosophical verity” (A xx); in fact, even philosophers and Copernicans speak about the sunrise and sunset using “vulgar Discourse” (xxi). When Biblical verses speak about the stability of the earth, they refer to “the Condition, State and Order of the World inhabiting the Earth, particularly the Peace and Prosperity thereof” (xxii). These verses “only express some Moral, Theological Truths.” Moreover, if motion is literally ascribed to the sun, then the sun should also be viewed as a living entity that has desires and moves in and out of its house. However, this is but a “poetical description” (xxv-xxvi). Thus, various Biblical passages “are spoken more according as things appear than as really they are” (xxix). However, Derham accepted solar miracles in Joshua’s and Hezekiah’s days as real (Ph 45), but he considered them as caused by stopping the earth rather than the sun or “by means of some preternatural Refractions, or extraordinary Meteors” (A xxviii).

The acceptance of the reality of the Copernican system has two consequences. First, “the Parity, and constant Uniformity observable in all God’s Works” indicates that each star is the sun of its own planetary system (A 36); however, what would be the reason for their existence? Fixed stars are suns for their planets, which is much better use of these stars than shining just “to enlighten and influence our lesser, and I may say inferior, Globe” (35). Also, if God arranged planets in our system, there is no doubt that He did it also in other planetary systems (61). It thus must be concluded that these planets are inhabited worlds in their own right (xlvi, 40). However, we cannot say what creatures inhabit other planets, which can be only learned through revelation (liv). Incidentally, this apparently includes the solar system. Derham said that all planets are placed at a proper distance from the sun to receive the proper amount of light and heat (172) and the orbits of planets should not interfere with one another and each planet should have as many orderly motions as is fitting for their inhabitants (73); thus, the existence of Martians, Venusians, etc. is allowed and even required; otherwise, why would these planets exist? This is also extended to the moon which Derham considered to be good for habitation (liii) which, as his own observations apparently indicated, was confirmed by the existence of atmosphere (181) and very likely oceans filled with water (xlix, 190).

This leads to the second consequence of the new astronomy: a blow against anthropocentrism. It is “the old vulgar Opinion, that all things were made for Man” (A 39). It was the ancients who believed that everything was created for man: Aristotle, Chrysippus, Seneca, Cicero, Pliny, but now “this narrow Opinion hath been exploded” (Ph 54). Derham, a Christian, passed with silence Christian authors who were of that opinion, even in his times (e.g., Pluche,

Saint-Pierre). On the other hand, he did not discard anthropocentrism altogether by limiting it to the earth. At the very least, without the rational man the world – the earth, that is – would be “a dull, uncouth, and desolate kind of Globe” (271). When discussing the size of the human body, he said that the size which would be “too Pygmean would have rendered him too puny a Lord of the Creation” (288) – a lord of earthly creation, that is.

Humans are intelligent beings whose technical, scientific, and artistic accomplishments are admirable, but their greatness is dimmed when compared with the works of nature. Using the microscope we can say that “Whereas the most curious Works of Art, the sharpest finest Needle, doth appear as a blunt rough Bar of Iron, coming from the Furnace or the Forge. The most accurate Engravings or Embossments seem such rude, bungling, deformed Works, as if they had been done with a Mattock, or a Trowel. So vast a difference is there betwixt the Skill of Nature, and the and Imperfection of Art” (Ph 38).<sup>5</sup>

This points to another aspect of nature, which testifies of its being the work of God: an intricate makeup of the world. This is clear on any level of analysis, the cosmic level down to the level that has to be investigated under the microscope. And thus, insects, “as despicable as they have been,” are “exquisitely contrived” (A 358) by the “wise Artist,” “careful, prudent Conservator”; who else “could contrive and make such a Set of curious parts exactly fitted”? (392). Derham spent a lot of time describing various elements of nature using state of the art research<sup>6</sup>: human and animal anatomy, workings of the five senses, physiology, reproduction, habitation and nourishment habits of animals, birds, and insects, the makeup of the natural world, etc. to show that it was, in his mind, impossible to bring about such a level of complexity as can be observed in nature be sheer randomness, by accident. For example, of the hair of mice he wrote that it “seems to be one single transparent Tube, with a Pith made up of a fibrous Substance running in dark Lines, in some Hairs transversely, in others spirally .... These darker medullary Parts, or Lines I have observed, are no other than small Fibres convolved round, and lying closer together than in other Parts of the Hair. They run from the bottom to the top of the Hair, and I imagine serve to the gentle Evacuation of some Humour out of the Body; perhaps the Hair serves as well for the *Insensible Perspiration* of hairy Animals, as to fence against Cold, and Wet” (Ph 220-221). Some of his experiments can be a bit disturbing. For instance, he locked various animals in an enclosure

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5. This is a quotation from John Wilkins, *Principles and duties of natural religion*, London 1722<sup>8</sup>, p. 71.

6. Derham used his own observations and experiments as well as data from scholarly articles and books to the extent that footnotes in the *Physico-theology* vastly surpass in size the main text.

from which he pumped out air to see how long they would live; he observed, for instance, that a mole lived without air for a minute, a bat, for two minutes, etc. for dozens of other different kinds of creatures (8). He also conducted experiments with the sound to measure its velocity. He determined “1. That there is some, although a small difference in the Velocity of Sounds with or against the Wind; which also is, 2. Augmented or diminished by the Strength or Weakness of the Wind. But that nothing else doth accelerate or retard it, not the differences of Day or Night, Heat or Cold, Summer or Winter, Cloudy or Clear, Barometer high or low, &c. 3. That all kinds of Sounds have the same Motion, whether they be loud or languid, of Bells, Guns, great or small, or any other sonorous Body. 4. That they fly equal Spaces in equal Times. 5th and lastly, That the Mean of their Flight is at the Rate of a Mile in 9  $\frac{1}{4}$  half Seconds, or 1142 Feet in one Second of Time” (133-134).<sup>7</sup>

In all his observations and experiments, Derham’s conclusion was that “all the Works of the Lord, from the most regarded, admired, and praised, to the meanest and most slighted, are great and glorious Works, incomparably contrived, and as admirably made, fitted up, and placed in the World” and thus all these works should be investigated (Ph 426). “And the more we pry into, and discover of them, the greater and more glorious we find them to be, the more worthy of, and the more expressly to proclaim their great *Creator*” (427). The complexity of nature does not break up on any level of analysis, from macro to micro, and on each level the investigation inevitably detects the work of intelligent design.

## Theodicy

If nature is a work of God, how can disorder and evil in the world be explained? A teleological view of nature inevitably has to face the problem of theodicy, and Derham did not shun from addressing it.

Volcanoes allow “to vent the Fire and Vapours that would make dismal Havock” by earthquake (Ph 68). The great evil of an earthquake can be avoided by allowing a lesser evil of volcanoes.

“The fierce, poisonous, and noxious Creatures serve as Rods and Scourges to chastise us, as a means to excite our Wisdom, Care, and Industry, with more to the same purpose.” Presumably, in the face of evil, human care for one another can be forcefully manifested. Besides, although there are many “vile Animals,” there are also many ways to “obviate or escape their Evils”: antidotes

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7. For Derham’s experiments with the sound, see Gabrielson, *op. cit.*, pp. 16-26.

and remedies, warning signs of their arrival (Ph 54-57). In fact, even poisonous animals are useful for humans as medicine (397). This presumably would fall under the umbrella of exciting human wisdom to search for measures to counter the effects of the action of vile animals. Since wisdom is God's gift (269), and so is skill (270), then it appears that evil is a goad that activates human wisdom and skill from the dormant state and, possibly, also sharpens them.

What is useless in one place, age, or form is useful in another (Ph 58); thus, a less parochial view should be taken when complaining about what is viewed as evil or harmful. This includes the whole of nature: things considered harmful may be useful for animals (Ph 59); thus, an anthropocentric view of the world should be carried to the extreme. We should admit that in this world, "we find every thing necessary for the Sustentation, Use and Pleasure both of Man, and every other Creature here below; as well as some Whips, some Rods to scourge us for our Sins" (82). In particular God uses "noxious Creatures" as "Rods and Scourges, to execute the divine Chastisements upon ungrateful (398) and sinful Men. And I am apt to think that the Nations which know not God, are the most annoyed with those noxious Reptiles, and other pernicious Creatures" (399). For this reason, sometimes plagues and wars "may be not only a just Punishment of the Sins of Men, but also a wise Means to keep the Balance of Mankind even" (176). Malthus would approve: the evil of wars and plagues is balanced by the wellbeing of people living in the world free of overpopulation. On the other hand, the blame for wars and plagues should be put squarely on human shoulders and human sinfulness. Evil is meant to be evil, but it is caused by evil – the evil ingrained in human nature.

Rods and scourges can reach a cosmic scale. Derham spoke about the orbits of planets to be nearly circular and orderly but did not quite know what to do about comets and their elongated elliptical orbits which did not quite make them parts of particular planetary systems. Since they had been traditionally feared as portents of bad news, maybe such a traditional view was not all wrong; maybe God "might make such noxious Globes to execute his Justice, by affrighting and chastising sinful Men, at their approaches to the Earth; and not only so, but (as some have imagined) to be the place of their Habitation and Torment after Death" (A 55). On that note, since the sun is a "prodigious Mass of Fire" (168), it is quite possible that it is also hell (237), quite a different assessment from Herschel and Saint-Pierre for whom the sun was inhabited by blessed souls.

In the end, who is complaining! Final and thus limited human beings who try to make a judgment about the infinite work of nature of the infinite Creator:

“it is our own Ignorance, Dulness, or Prejudice, that makes us charge those noble Works of the Almighty, as Defects or Blunders, as Ill-contrived, or Ill-made. It is therefore fitter for such finite, weak, ignorant Beings, as we, to be humble and meek, and conscious of our Ignorance, and jealous of our own Judgment, when it thus confronteth infinite Wisdom. Let us remember how few things we know, how many we err about, and how many we are ignorant of; ... And should we therefore pretend to censure what God doth! Should we pretend to amend his Work! Or to advise infinite Wisdom! Or to know the Ends and Purposes of his infinite Will, as if we were of his Council! No, let us bear in mind, that these Objections are the Products, not of Reason, but of Peevishness” (Ph 81).

### Moral lessons

The “first and most ready and natural Deduction we can make from such a glorious Scene of Workmanship” is the existence of God (A 219). There is more. The works of God speak not only about His existence, but also about His power, wisdom, and goodness, about His omnipotence and infinity (227-228). To humankind, God is thus the Conservator, sovereign Lord, Ruler of the universe so marvelously cared by Him; therefore, people should revere, fear, worship, serve, obey, be grateful, love Him since He is Love (230-231). The investigation of nature and the detection of the level of divine care should inspire not only wonder, but also inspire people to leading their life that would be pleasing to the Lord of all who is, primarily, Love. Appreciation of God’s work should be the appreciation of God; that is, people should not overvalue this world, should not desire pleasure, riches, and honor (238), but they should lift their eyes through nature to God Himself. In their lives, they should follow Christ. And when they become dissatisfied with an incomplete image they have about the world, they should keep in mind that their investigation of this world does not end with this life: the souls after death will investigate other worlds (246).

If the knowledge, partial as it may be, about God can be derived from nature, why would anyone deny His existence? Should there be any person “so stupid, so vile, so infatuated with their Vices, as to deny these *Works* to be GOD’s, and ascribe them to a *Necessity of Nature*, or indeed a mere *Nothing*, namely *Chance!*” only people “debauched ... with drink, and enervated ... by pleasures” would believe it. No one would consider a lighted candle or a lighthouse to be the result of chance (A 215-216). Only someone “daring and impudent, unworthy of a rational Being” would deny God’s existence (222). The level

of intelligence has nothing to do with it, since even “the most ignorant, and barbarous” person can conclude from the observation of nature that it is not a result of some accident but the work of God (219). Those who do not see it, are “wilfully blind, ... under the Power of the Devil, under the Government of Prejudice, Lust and Passion, not right Reason.” If thus there is really a true atheist, he is “a Monster among Rational Beings” adding, Christian clergyman that he was, that particularly monstrous are those who make such claims in the presence of the Gospel (Ph 429-430). Unbelief appears to be a matter of the will, willful blindness, deliberate renouncement of the testimony of nature. That is, Derham’s approach to win a person over to his faith by physico-theological proofs will be unsuccessful if this person does not want to be won over. No amount of rational convincing will do if the heart is against it.

Those who accept Derham’s arguments presumably will also be open to the side of religious belief that is given through revelation and, thereby, to the acceptance of the Christian faith and the Christian way of living by following Christ. Does this include doing things which, although not antireligious, are not exactly pro-religious? Derham, having an interest in horology, did not feel quite comfortable with the fact that he devoted some of his time to writing a nontheological, purely technical book about clocks and to ease a tinge of his guilt “for the Expence of so much Time, on a Subject different from my Profession,” even though it was done during his “vacant Hours of a Solitary Country Life,” he felt obligated to justify himself with the statement that this book may be of interest to those who have too much free time on their hands and “it may be a Means to compose their rambling Spirits” and “it may hinder their Commission of many Sins.”<sup>8</sup> It would be interesting to know how many idlers with too much free time were captivated by a very technical description of clock manufacturing. Interestingly, Derham expressed similar qualms when devoting his time to the preparation of Robert Hooke’s papers for publication since such occupation as being “not direct Divinity” could be viewed as being in “the Diversity of this [occupation] from the Business of my Profession,” but “what Diversion [can be] more innocent, or proper, than that which promotes

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8. W[illiam] D[erham], F.R.S., *The artificial clock-maker: a treatise of watch and clock-work*, London: Hames, John and Paul Knaption 1734<sup>4</sup> [1696], Preface. A valuable and popular book that it was, it was not free of errors, cf. Charles K. Aked, William Derham and the “artificial clockmaker,” *Antiquarian Horology* 6 (1968), nos. 6-8, pp. 362-372, 416-427, 495-505; Charles K. Aked, William Derham (1657-1735), *Essex Journal* 11 (1976-1977), pp. 74-79.

Knowledge, and Experience, and is a Discovery ... of any of the Works of the infinite Creator?" the discovery shown in Hooke's papers.<sup>9</sup>

## Teleology

It is rather surprising that Derham, who wanted to convey the Christian message in his natural theology books, mentioned Christ only once in each book (Ph 439, A 246). More interestingly and surprisingly, in his sermon devoted to the truth of the Christian religion, he never once referred to natural theology, although he did mention his two physico-theology books, one that speaks about God "from his Works in this *lower World*" and another that speaks about God "from his Works in the *Heavens*" (Ch 6). His proofs of the validity of Christianity offered in this sermon were not new: "from the intrinsick Nature and real Excellence" of Christianity, from miracles, prophecies, and from the message of salvation offered by Christ (9-10, 27). The first proof is rather circular. Also, part of its excellence lies the fact that it speaks about the infinite power, wisdom, goodness, and other perfections of God (Ch 10, cf. Ph 471; A 227). This is where Derham's physico-theology appears to meet his Christo-theology: they both speak about God and His infinite attributes, whereby they support one another. Although Derham did not directly endorse Leibniz's view on this world being the best possible, he did say that the cosmos is a perfection (A 104); the planetary system is "a Work the best contrived for the Benefit of the World's Inhabitants" (161), that planetary movements "the very best manner may serve to their own Conservation and Benefit" (229). Animal sensory organs "are seated in the very best place for the Relief and Comfort, the Guard and Benefit of the Animal" (Ph 143); "the Structure of the Spine is the very best that can be contrived" (160); the human body is "a Multiplicity ... of the best Contrivance" (281) in which everything is made by "the shortest and best Method" (293, 312). Fish and water animals "are the best contrived and suited to that Place and Business in the Waters" (401). In fact, about all creatures it can be said that they are "all contrived and made in the best Manner" (432-433). So, it appears that this world is the best possible, and perceived imperfections speak about the imperfections of human observers rather than about the imperfections of the world. Therefore, the perfection of the world is a reflection of the perfection of the Creator. That would be the teleological proof of physico-theology: the perfect God exists since nature is perfect and

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9. W[illiam] Derham, To the reader, in: Robert Hooke, *Philosophical experiments and observations*, London: W. and J. Innys 1726.

this perfection just could not arise from randomness of motions of material elements. Teleological proof is also applied to Christianity itself: the Christian religion is perfect since it speaks about perfection of the infinite God. How could it be otherwise if it were an invention of the human fancy? Moreover, it is confirmed by prophecies and by miracles, the reality of the latter being also recognized by physico-theology. God thus is the author of nature in which He left His imprint to be investigated by science, and He is the author of Christianity through the person of Christ who calls humans to God through His message of salvation, thereby speaking to humans on a personal level. The recognition of the greatness of God on the personal level should lead to the investigation of nature to see this greatness imprinted on nature; the investigation of nature should lead to the recognition of the greatness of God and thus to acceptance of this greatness on the personal level.

## WILLIAM DERHAM: MIĘDZY PRZYRODĄ A TEOLOGIĄ

### Summary

William Derham is one of the most prominent figures in the physico-theology movement in the eighteenth century. He believed that the investigation of nature, its immensity, its complexity, and its harmoniousness can bring most people to the belief in the benevolent and omnipotent God. He strongly believed in the preeminence of final causality which led him to facing the problem of theodicy; he explained the existence of evil through the imperfection of human cognition and through the use of evil as punishment for sin.

**Słowa kluczowe:** Derham, fizyko-teologia, teodycea

**Key words:** Derham, physico-theology, theodicy

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