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Does the History of Science and Religion Change Depending on the Narrator? Some Atheist and Agnostic Perspectives¹

*During the seventeenth and eighteenth centuries the strategy of unbelievers revolved around attempting, without too much success, to draw out of Newtonianism some kind of justification for their materialism and their atheism. This affected how they viewed the historical relations between science and religion. But after the publication of *The Origin of Species* in 1859, evolutionary theory offered new opportunities for unbelievers for dealing with the Newton problem. It allowed them to create a new vision of science from the ground up using evolution, and not Newtonian physics, as their starting point. By separating science and religion into two separate spheres, they were now free to construct a religiously neutral scientific system and to offer a re-interpretation of the history of science and religion that relegated Newtonianism to the sidelines. But, in contrast to contemporary unbelievers, they saw themselves as agnostics who valued religion as an intrinsic dimension of the human condition.*

Key words: Newton, Voltaire, d’Holbach, Tyndall, Huxley, atheism, agnosticism

Herbert Spencer’s *First Principles* (1862), the first volume of his *System of Synthetic Philosophy*, is, at first glance, a peculiar book for those of us working in the history of the relationship between science and religion. We might anticipate that Spencer, a professed agnostic, and a close friend of Thomas Henry Huxley and John Tyndall, would embrace the conflict thesis. Though we have come to appreciate the value of John Brooke’s complexity thesis, which rejects the notion that we can interpret the historical relationship between science and religion through the lens of one master narrative, especially one based on the conflict thesis, it might be expected that Spencer would be attracted to the notion of a war between science and religion. As a rhetorical strategy during the heated debates after the publication of *The Origin of Species* (1859), the conflict thesis

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would appear to be ready-made for those who, like Spencer, were arguing for the validity of evolutionary theory. Moreover, we know that the conflict thesis was created in the latter half of the nineteenth century in the midst of the evolution controversy.

Yet, Spencer does not put forward the conflict thesis in *First Principles*. He asserts that in the past there has been a battle between science and religion. 'Of all the antagonisms of belief,' he declared, 'the oldest, the widest, the most profound and the most important, is that between Religion and Science.'² However, instead of perpetuating this antagonism, Spencer proposes in the first chapter of his book to locate the 'basis of a complete reconciliation'.³ In fact, this is the central aim of the book, to understand, as Spencer puts it, 'how Science and Religion express opposite sides of the same fact'.⁴ After subjecting ultimate religious and scientific ideas to a trenchant philosophical critique, only one element from each survives the destructive force of Spencer's analysis. But it turns out that that surviving element is identical in both cases. The common element that emerges, and which provides Spencer with the basis for a total reconciliation between science and religion, is the idea of a mysterious power underlying phenomena.

Spencer's book is divided into two parts, 'The Unknowable', in which he lays out his reconciliation of science and religion, and 'The Knowable', where he seeks the answer to the philosophical question: what is the highest generalisation we can make about the natural world? Spencer begins to answer the question by examining past scientific theories about matter, force and motion in chapters three to eleven of 'The Knowable.' None of the truths of Newtonian physics, 'which unify concrete phenomena belonging to all divisions of Nature', provide him with an answer to his question. None of them 'convey an idea of the Cosmos' or 'the totality of the manifestations of the Unknowable'.⁵ In other words, if you tried to use the truths of Newtonian physics as a basis for unifying knowledge you would find that they would not 'constitute that integrated knowledge in which only Philosophy finds its goal'.⁶ This is nothing less than a rejection of the eighteenth century quest to extend Newtonian physics into an entire system of knowledge. The rest of the 'The Knowable' is taken up with a discussion of evolution, which does provide Spencer with the basis for his system, though it requires some refining. For Spencer, evolution explains the process underlying matter and motion.⁷ Therefore the law of evolution is 'deeper' than the law of gravitation. 'Just as it was possible

2 Spencer, H. *First Principles of a New System of Philosophy*, New York: D. Appleton and Company (1882), p.11.

3 *ibid.*, p.21.

4 *ibid.*, p.22.

5 *ibid.*, p.273.

6 *ibid.*, p.274.

7 *ibid.*, p.305.

to interpret the empirical generalisations called Kepler's laws', Spencer declared, 'as necessary consequences of the law of gravitation; so it may be possible to interpret the foregoing empirical generalisations as necessary consequences of some deeper law.'⁸ The process of evolution is cosmic in nature; it directs the course of all phenomena, both in the natural and human worlds. Spencer's *First Principles* could be subtitled 'A Tale of Two Systems'. But in the remainder of his multi-volumed *System of Synthetic Philosophy* there is only one system discussed. Spencer's *magnum opus* is designed to demonstrate how the concept of evolution ties together all bodies of knowledge, including astronomy, geology, biology, psychology, sociology and so on.⁹

I have used Spencer's views on primacy of evolutionary law in nature as a way to introduce my discussion of the unbelievers because he draws our attention to a significant shift over the course of the eighteenth and nineteenth centuries in how they dealt with the place of Isaac Newton in the history of the relationship between science and religion. During the seventeenth and eighteenth centuries the strategy of unbelievers revolved around attempting, without too much success, to draw out of Newtonianism some kind of justification for their materialism and their atheism. This affected how they viewed the historical relations between science and religion. But after the publication of *The Origin of Species*, evolutionary theory offered new opportunities to unbelievers for dealing with the Newton problem. It allowed them to create a new vision of science from the ground up, using evolution, and not Newtonian physics, as their starting point. By separating science and religion into two separate spheres, as did Spencer, they were now free to construct a religiously neutral scientific system and to offer a re-interpretation of the history of science and religion that relegated Newtonianism to the sidelines.

I have chosen to concentrate on eighteenth century atheists, like Baron d'Holbach, and nineteenth century agnostics, like John Tyndall and Thomas Henry Huxley, rather than on contemporary historians of science and religion. I am not sure that an analysis of the latter's beliefs will take us very far. In his *Galileo Goes to Jail and Other Myths About Science and Religion*, Ron Numbers has brought together many of the most important scholars in the field. Half of the contributors identify themselves as agnostic or atheist. Half of the unbelievers, and Numbers includes himself here, grew up in devout Christian homes, some as fundamentalists or evangelicals. Numbers isn't sure what to make of this, but he claims that as a group the authors 'have no obvious scientific or theological axes to grind'.¹⁰ Whatever their backgrounds, all of the authors subscribe to

8 *ibid.*, p.397.

9 *ibid.*, p.545.

10 Numbers, R.L. (ed.) *Galileo Goes to Jail: And Other Myths About Science and Religion*, Cambridge, Mass., and London: Harvard University Press (2009), pp. 6-7.

Brooke's complexity thesis, and I include myself among their number. In this paper I will be using the complexity thesis to try to understand how changing views on Newton's place in history shaped eighteenth and nineteenth century unbelief. Of course the history of science and religion changes depending on the narrator – or to be more precise, the narrator's stance on belief. But it also will depend on where they are situated historically, as strategies for defending a particular interpretation of history are created with whatever intellectual resources are available in that specific time and place. Our understanding of current controversies can be illuminated if we put them into historical perspective.

1. Baron D'Holbach and the Newton problem

If any atheists existed in Europe between the middle ages and the end of the seventeenth century, they largely practised their form of unbelief underground. It was only in the eighteenth century that atheism was introduced into the intellectual culture of the West with such strength that its presence was permanently secured. Baron D'Holbach, a radical Enlightenment *philosophe*, was one of the leading atheists. He defended atheism as the logical consequence of a rational inquiry into nature. Instead of dismissing atheists as 'absurd or knavish speculators', d'Holbach positively portrayed them as men who destroyed 'chimeras prejudicial to the human species, in order to reconduct men back to nature, to experience, and to reason'.¹¹ Like Spencer after him, d'Holbach was a system builder. His *System of Nature or Laws of the Moral and Physical World*, published anonymously in 1768, had as its goal the creation of a system based purely on the notion of self-acting matter. This system of nature, he believed, led logically to the atheistic position. But a major obstacle to achieving his goal was the existence of a competing system, the Newtonian one, based as it was upon the principles of natural theology. Many of the elements of the Newtonian system were important for d'Holbach's system. The difficulty for d'Holbach, and his allies among the radical Enlightenment thinkers, was how to finesse the Newton problem. If science was to provide intellectual support for atheism, it had to be purged of religious concepts that Newton had enshrined in the heart of his physics. If the history of thought over the previous few centuries was to be interpreted as the gradual elimination of medieval superstition and antiquated Christian theology due to the positive impact of rational, scientific ideas, then some explanation of Newton's contradictory role was essential.

A devout Unitarian, Isaac Newton believed that cosmic order – a design – lay at the heart of nature. His theology shaped his conception of nature. Newton's mechanical universe, in which passive material was moved by

11 d'Holbach, Baron *The System of Nature, or Laws of the Moral and Physical World*, 2 vols in one, New York: Burt Franklin (1970), vol. 2, pp. 300, 305.

a system of spiritual forces outside of matter, pointed to the existence of a providential creator who regulated and controlled nature. In the second edition of his *Opticks* (1717), Newton explicitly connected natural philosophy to natural theology. Here he affirmed that the chief business of natural philosophy was to answer a series of questions, including ‘How came the Bodies of Animals to be contrived with so much Arts, and for what ends were their several Parts? Was the Eye contrived without Skill in Opticks, and the Ear without Knowledge of Sounds?’ He declared that the study of ‘Phaenomena’ suggested ‘there is a Being incorporeal, living, intelligence, omnipresent’. Fearing that unbelievers were using the theories in his *Principia* (Mathematical Principles of Natural Philosophy, 1687) to justify their heterodoxy, he appended a new section titled the ‘General Scholium’ to the second edition in 1713. In this new section he spelled out his biblical conception of God as a creative and omnipotent deity, ever active in a natural world. He made it clear that his scientific system was inextricably connected to his central religious beliefs. Newton’s ‘General Scholium’ positioned him as a vigorous opponent to unbelievers, as well as to deists, who, though acknowledging the existence of a god, conceived of this divine being as indifferent to his creation. Privately, he held some heterodox beliefs of his own. An anti-Trinitarian millennialist, obsessed with alchemy, he kept these views hidden. His contemporaries, and subsequent generations, regarded him as an orthodox Christian whose natural philosophy was a boon to the faithful.¹²

Newton’s *Principia* assumed a special place in Protestant England in the aftermath of the Revolution of 1688-89 that brought William of Orange to the English throne. Newton’s divinely controlled mechanical universe became the model for the triumph of the new Whig constitution and for the liberal Christians who supported it. The natural, divine order at the core of Newton’s system sanctioned a stable social and constitutional order. It provided a means for Christian natural philosophers to prevent atheists from opportunistically hijacking atomism and fitting it into a materialistic system reminiscent of such ancient Greek atomists as Epicurus or Lucretius. Natural theology demonstrated that a chaos of atoms could not possibly produce the order observed in the physical world. With Newton’s consent his science was used by the early Newtonians, including the clergyman Richard Bentley and the metaphysician Samuel Clarke, to shore up the newly reconstituted monarchy and the established church as the bulwarks of order and stability.

12 Newton, I. *Opticks; or, A Treatise of the Reflections, Refractions, Inflections and Colours of Light*, 2nd edn., London (1717), p.344; Snobelen, S.D. “‘God of gods, and Lord of lords’: the theology of Isaac Newton’s general Scholium to the *Principia*”, *Osiris* (2001) 16, 172-177, 202; and Osler, M.J. ‘The Newtonian Scholarship and the Fate of the Scientific Revolution’, in Force, J. & Hutton, S. (eds.) *Newton and Newtonianism: New Studies*, Dordrecht: Kluwer (2004), pp. 8-10.

Newtonianism was also attractive to moderate Enlightenment *philosophes* such as Voltaire. Although Voltaire was vehemently opposed to organised religion, he was also a fervent opponent of atheism. He was committed to a strongly providential deism based on the argument from design and he believed that the stability of the moral and social order was dependent on the acknowledgement of a benign Creator. In this sense, he can be placed with the believers, despite his attacks on Catholic dogma. Voltaire drew extensively on Newtonian science to undermine unbelief. He was one of the key figures responsible for introducing Newton to the Continent. His *Letters Concerning the English Nation* (1733) was intended to advance the cause of the Lockean-Newtonian Enlightenment. His main aim was to demonstrate that Newtonianism curbed materialism and Spinozism. In his *Elements of Sir Isaac Newton's Philosophy* (1738), Voltaire pushed his agenda forward by making Newton's philosophy intelligible to his readers. Here he argued that Newton's theories revealed the divine design in nature. Voltaire's books touched off a wave of anglomania that swept Europe during the 1730s and 1740s. English ideas, influences and styles became fashionable, the British constitutional monarchy began to be widely admired, and Newton and John Locke were lionised throughout Europe. Thanks to Voltaire, Newtonian science became the bulwark of Christianity against atheism not only in England, but also throughout much of Europe.

But by 1745 Voltaire's Newtonianism no longer appealed to the Parisian *philosophes*. After that year a powerful contrary movement, dominated by materialistic unbelievers who rejected Voltaire's anglomania, opposed the moderate Enlightenment that he represented. Younger *philosophes*, such as Denis Diderot, broke with Voltaire. Diderot, along with Jean d'Alembert, Claude Adrien Helvétius, d'Holbach, and others, became the leaders of a radical Enlightenment tradition. These radicals became increasingly anti-Newtonian. They turned against physico-theology and adopted atheistic doctrines. D'Holbach, for example, rejected the deism of moderates like Voltaire, grouping it together with theism. The 'God of the *deist* is useless,' he declared in his *System of Nature*.¹³ Diderot and his circle embraced a more radical social and political position, which emphasised the ideas of toleration, equality, individual freedom, freedom of expression, sexual liberation and anti-colonialism. This group became influential in the latter half of the century, and they were the first group of modern intellectuals to espouse atheism.

D'Holbach's atheistic and radical opinions were broadly in line with the other radical Enlightenment *philosophes*. Born in 1723, d'Holbach was raised in Paris and attended the University of Leiden. In the early 1750s he inherited a considerable fortune. He used his wealth to throw extrava-

13 D'Holbach *op. cit.*, (11), vol. 2, pp. 258-259.

gant dinner parties at his salon on the rue Royale from the early 1750s until the early 1780s. A coterie of intellectuals, including Diderot, attended on a regular basis. His salon was known for its openness. D'Holbach was a prolific writer. He authored or co-authored over fifty books and over four hundred articles. The more radical publications, like the *System of Nature*, were published anonymously.

His *System of Nature* was based on the notion that nature was entirely composed of self-acting matter. He asserted that the universe 'presents only matter and motion: the whole offers to our contemplation nothing but an immense, an uninterrupted succession of causes and effects'. As he developed the notion that 'the essence of matter is to act', D'Holbach pressed Newton into service as an ally. Natural philosophers had supposed the existence of 'chimerical causes' for the movements of heavenly bodies 'until the immortal NEWTON demonstrated that it was the effect of the gravitation of these celestial bodies towards each other'. The operations of nature could be explained fully through Newton's theory of gravity without any need to resort to a divine being. Having established that motion was an inherent characteristic of matter, d'Holbach presented natural philosophy as having its own enclosed world and its own principle, while eliminating the natural theologies of the Christian believer or the Voltairean deist.¹⁴ In his efforts to offer a completely materialistic system of nature, he attempted to co-opt Newton's world system.

To d'Holbach, the history of science and religion confirmed the validity of materialism. The first notions of Divinity had come from fear of natural catastrophes. Humans supposed that they were caused by 'unknown agents' in heaven rather than by nature herself. 'It was in the lap of ignorance', d'Holbach explained, 'in the season of alarm and calamity, that mankind ever formed his first notions of the Divinity. From hence it is obvious that his ideas on this subject are to be suspected as false.' Unenlightened as to the 'powers of nature', humans allowed their ignorance to give birth to the gods. But according to d'Holbach, 'knowledge of nature is calculated to destroy them'. As the human mind becomes enlightened by science, the Gods will die.¹⁵ D'Holbach backed up his views on the emptiness of theology with an examination of the arguments for the existence of God. Samuel Clarke's arguments, for example, were based on the assumption that matter was passive and that it therefore required an active God in order to move. But matter itself was eternal, immutable, self-existent and infinite. All of the qualities attributed to a divine being were to be found in matter. Theology had 'only personified the principle of mobility inherent in matter'.¹⁶

14 *ibid.*, vol. 1, pp. 15, 18-19.

15 *ibid.*, vol. 1, pp. 166, 171, 174.

16 *ibid.*, vol. 2, pp. 224.

After rejecting Clarke's arguments, d'Holbach raises similar objections to the proofs offered by Descartes, Malebranche and, finally, Newton himself. 'Let us now see if the immortal Newton will give us ideas more true, and proofs more certain of the existence of God', d'Holbach declared. Although Newton's 'extensive genius' had allowed him to unravel 'nature and its laws', as soon as he had 'lost sight' of those laws he 'bewildered himself' and became 'a slave to the prejudices of his infancy'. Newton had not recognised that the powers of nature were sufficient 'for it to produce all those phenomena which he has himself so happily explained'. Newton was 'no more than an infant, when he quits physics and demonstration, to lose himself in the imaginary regions of theology'.¹⁷ In sum, according to d'Holbach, Newton was wildly inconsistent when it came to theology because he refused to apply his own empiricist methodology to the issue of God's existence. In order to save the scientific Newton from the theological Newton, d'Holbach had to turn him into a schizophrenic. The war between science and religion that d'Holbach perceived in history, was played out inside Newton's mind. This justified d'Holbach's contention that it was possible to divorce the theological principles grounding Newtonianism from the scientific theories that were celebrated by the Enlightenment.

The French physicist Pierre-Simon Laplace (1749-1827) took d'Holbach's reservations about Newton's inconsistencies a step further. Laplace championed the effort within French science at the end of the eighteenth century to advance the Newtonian research programme. In his mathematical physics, he drew on gravitational theory to resolve apparent anomalies in the movements of Jupiter and Saturn, and thereby demonstrated that Newtonian principles were sufficient for an understanding of the functioning of the entire solar system without bringing in God as had Newton. Near the end of his life Laplace began to inquire into the private life of Newton. He became obsessed with understanding why Newton had made his pronouncements on religious matters in the second edition of the *Principia*. He could not imagine that someone as brilliant as Newton could have been genuinely committed to a belief in God. Rather than seeing Newton's religious and scientific beliefs as being congruent, Laplace wanted to believe that Newton's religious statements had been the result of mental illness, not merely, as d'Holbach had claimed, inconsistency.¹⁸ Finessing the Newton problem led atheists like Laplace and d'Holbach to deny the obvious links between Newton's science and religion.

2. John Tyndall

In 1876 Andrew Dickson White, the President of Cornell University, pub-

¹⁷ *ibid.*, vol. 2, pp. 227-230.

¹⁸ Hahn, R. *Pierre Simon Laplace 1749-1827: A Determined Scientist*, Cambridge, Mass.: London: Harvard University Press (2005), p.201.

lished a book entitled *The Warfare of Science*. Like John William Draper's *History of the Conflict between Religion and Science*, published two years earlier, White offered a historical study of the warfare between science and religion. White's better-known two-volume *A History of the Warfare of Science with Theology in Christendom*, published in 1896, explored the same theme in greater detail. The historian James Moore has discussed the tremendous appeal of these books. Draper's book became the best seller of the International Scientific Series. Moore asserts, 'in capturing the imaginations of their authors' contemporaries, they employed a metaphor to describe the historical relations of science and Christian faith which has captivated writers on the subject ... for one hundred years'.¹⁹ That metaphor, which Moore refers to as the military metaphor, became a staple of subsequent studies, scholarly or otherwise, up until the 1970s.

White's 1876 book contained a short, prefatory note by the eminent British physicist John Tyndall. In the note Tyndall recollected meeting White in 1873, when he was in the United States, and he heard him speak. 'The hue, moral and intellectual, of the words he then uttered remained with me as a memory', Tyndall recalled. Tyndall praised White's book, remarking that 'an entire absence of bigotry characterises the little volume; and to this I would more especially direct the attention of intelligent Catholics both in England and Ireland. They are not here addressed by the exponent of a creed hostile to their own.' Although later in the note Tyndall was particularly harsh in his criticism of the Catholic Church, whose chance of success, he claimed, depended on keeping the human race in ignorance, Tyndall's note is curiously conciliatory towards religion.²⁰ This is in line with Moore's insistence that there is an important distinction to be made between Draper's and White's works. Moore rightly points out, as did Tyndall, that White, despite his use of the military metaphor, was a professed Christian. Moreover, Moore observes, one of White's aims is to strengthen religious teachers by enabling them to understand the lessons of history. For White did not see all of Christianity as the foe. Rather, he believed that the warfare took place between the liberality of the scientific outlook and the constraints imposed by sectarian dogmatic theology. White rejected, as profoundly mistaken, the notion that religion and science are necessarily enemies.²¹ Nevertheless, White's views were routinely conflated with Draper's more simplistic, black and white approach to the historical relationship between science and religion.

Similarly, Tyndall has often been misunderstood. After he delivered his 'Belfast Address' in 1874 he was accused of being an atheist and a materi-

19 Moore, J. *The Post-Darwinian Controversies*, Cambridge: Cambridge University Press (1979), p.40.

20 Tyndall, J. 'Note by Professor Tyndall', in White, A.D. *The Warfare of Science*, London: Henry S. King (1876), pp. iii-iv.

21 Moore *op. cit.*, (19), pp. 37-38, 40.

alist. Contemporaries often portrayed him as an implacable foe to all forms of religion. Historians have treated him as one of the most aggressive of the Darwinians. But Tyndall's position is far more complex than that. More an agnostic than an atheist, like White he rejected the notion that science and religion were inevitably in conflict. Here he did not follow in the footsteps of radical Enlightenment philosophers like d'Holbach. But, and here he sided with d'Holbach, Tyndall was somewhat ambivalent in his attitude towards Newton, in part due to his, Tyndall's, hostility towards natural theology. Tyndall's position is significant because he represents the views of a new group of unbelievers who rejected the atheism of d'Holbach's generation. This coloured their account of the historical relationship between science and religion.

Tyndall was born in 1820 at Leighlinbridge, County Carlow, in southern Ireland. His father, unsuccessful as a shoemaker and leather dealer, joined the Irish Constabulary. He was an ardent Orangeman who insisted on a strong Protestant household and educated his son in the art of theological debate. At the age of eighteen Tyndall joined the Ordinance Survey as a civil assistant. Four years later he was transferred to the English Survey in Preston. There he became a member of the Preston Mechanics' Institute in order to attend its lectures, use the library and continue his programme of self-improvement. After reading Thomas Carlyle, and experiencing the hard times of the forties first-hand when riots broke out among the starving weavers in Preston, Tyndall became radicalised. Unhappy with the inefficiency of the survey's administration and their unfairness to the Irish assistants, Tyndall formally protested and was dismissed in 1843. But he found a position in a private surveyor's office in Preston and for the next three years Tyndall was in the thick of the railway mania of the late forties. In 1847 he accepted an appointment as teacher of mathematics at Queenwood College in Hampshire, and the following year went to Germany to attend Marburg University, where he earned his doctoral degree. Returning to England in 1851, Tyndall was forced to take up his old position at Queenwood because he was unable to find a scientific post. A number of years of frustration ended in 1853 when he was elected Professor of Natural Philosophy of the Royal Institution. Once ensconced at the Royal Institution, he established himself as one of the foremost scientific lecturers in Britain and used the well-equipped laboratory there to conduct research into radiant heat, atmospheric gases, glaciers and spontaneous generation. He eventually succeeded Michael Faraday as the director of the Royal Institution.

Tyndall's religious position is not easy to define. By 1847 he had given up many of the main doctrines of Victorian Christianity. In a journal entry for 26 June he wrote,

I cannot for an instant imagine that a good and merciful God would ever make our eternal salvation depend upon such slender links, as

conformity with what some are pleased to call the essentials of religion. I was long fettered by these things, but now thank God they are placed upon the same shelf with the swaddling clothes which bound up my infancy.²²

But his rejection of Christian doctrines did not lead him to atheism. In a private letter, likely written shortly after he delivered the provocative 'Belfast Address' in 1874, he told his correspondent, 'You *are* correct in saying that *I am not an Atheist*.'²³ Even when Tyndall experienced religious doubts he 'could by no means get rid of the idea that aspects of nature and the consciousness of man implied the operation of a power altogether beyond my grasp – an energy the thought of which raised the temperature of the mind, though it refused to accept shape, personal or otherwise, from the intellect'.²⁴ Though he never used the term 'agnosticism' to describe his position, the last part of this quotation demonstrates his commitment to the notion that the divine being was beyond the limits of knowledge, a hallmark of agnostic thought.

Tyndall's refusal to accept a simplistic conflict model again points to his rejection of atheism. He believed that science and religion, as he defined them, could exist in peaceful harmony. Subjective religious feeling, 'as true as any other part of human consciousness', was safe from scientific attack. But any attempt to objectivise emotions, to thrust poetic conceptions into 'the region of facts and knowledge', is met by science with hostility. Tyndall pointed out that science therefore makes war only on the scenery, not the substance, of religion. 'Let that scenery be taken for what it is worth', Tyndall declared,

as an effort on the part of man to name what by him is unnameable, to express what by him is inexpressible, to bring in short the mystery of life and its surroundings within the range of his capacities, let it be accepted as a symbol instead of asserted as a fact – a temporary rendering in the terms of knowledge of that which transcends all knowledge – and nine-tenths of the 'conflict between science and religion' would cease.²⁵

Religion, in its subjective dimension and its articulation through symbol, could be reconciled with the objective facts of science if the boundaries between the two 'magisteria', as Stephen Jay Gould referred to them, were maintained.

22 Royal Institution, Journals of John Tyndall, 26 June 1847, 220.

23 John Tyndall to Mrs. E. D. Steuart, 7 September [1874], Royal Institution, R.I. MSST., 10/C7, 52.

24 Tyndall, *J. Fragments of Science*, 2 vols, 8th edn. London: Longmans, Green, and Co. (1892), vol. 2, p.382.

25 Royal Institution, John Tyndall's MS. Note-Books, 'Religion, Carlyle, Political, Etc.', 15-16. (R.I. MSS T., 2/E8). Tyndall offers a similar version, but without the crucial final phrase in Tyndall *op. cit.*, (24), vol. 2, p.374.

Tyndall applied his position on the relationship between science and religion to historical questions in his 'Belfast Address'. Tyndall's topic was the relationship of science, past and present, to philosophical materialism. The address ignited a storm of controversy that surrounded Tyndall for the rest of his life. Tyndall began his address with the birth of science in ancient Greece. He discussed Democritus, Epicurus and Lucretius, brave men whose atomic theory was geared to eliminate the 'mob of gods and demons' preventing the discovery of true knowledge.²⁶ He then discussed the Middle Ages, depicting it as a period ravaged by scientific drought due to the pernicious influence of Aristotle. Copernicus, Bruno, and Galileo later revolutionised science, despite the retrograde impact of Christianity. An account of Bacon, Descartes and Gassendi stressed their contributions to atomic theory, for Tyndall an essential component of any valid scientific system. Tyndall's historical survey ended with a celebration of the achievements of Charles Darwin and the importance of the doctrine of the Conservation of Energy.

In the last two sections of the address, Tyndall outlined his views on the philosophical implications of modern science in light of its basis in materialistic atomic theory. Tyndall painstakingly distanced himself from the simplistic materialism of Democritus, which not only disregarded the existence of human consciousness but also went beyond the limits of human knowledge in reducing everything to matter. Moreover, vulgar materialism ignored 'the manifestation of a Power absolutely inscrutable to the intellect of man' in the world of nature. Materialism was fruitful as a scientific methodology, but it could not be a complete philosophy of life. In order to distinguish himself from vulgar materialism, Tyndall referred to his own position as a 'higher materialism' that found in matter 'the promise and potency of all terrestrial life'.²⁷ In the final section of the address, Tyndall asserted where the boundaries between science and religion should be located. Religion added 'inward completeness and dignity to man', but it was restricted to the 'region of poetry and emotion'. The region of objective knowledge belonged to science alone. Any systems that infringed 'upon the domain of science' must 'submit to its control'. Scientists, Tyndall aggressively declared, 'claim, and we shall wrest from theology, the entire domain of cosmological theory'.²⁸ Despite Tyndall's rejection of conventional materialism, the pulpits of Belfast lashed out at him. Belfast Protestants and Catholics joined together in branding him a dangerous materialist and atheist.

Tyndall's historical account of the relationship between materialism, science and religion is notable for its de-emphasis on Newton's role in

²⁶ *ibid.*, vol. 2, pp. 136-137.

²⁷ *ibid.*, vol. 2, pp. 191-193.

²⁸ *ibid.*, vol. 2, pp. 196-197.

the story. The heroes of the seventeenth century scientific revolution are Giordano Bruno and Rene Descartes. Tyndall credited Descartes with restoring philosophy. Bruno, Tyndall claims, concluded that Nature's process is one of 'unraveling and unfolding. The infinity of forms under which matter appears was not imposed upon it by an external artificer; by its own intrinsic force and virtue it brings these forms forth.'²⁹ That is, Bruno was a proto-evolutionist. Newton only comes in when Tyndall discusses the appeal of natural theology to some of the seventeenth century scientists. 'Newton and Boyle', Tyndall asserts, 'lived and worked happily under the influence' of the conception of God as the divine being who bestowed existence and order on the vast machine of nature. But this conception of the relation of nature to its author was 'perfectly intolerable to others', such as Goethe, 'who rejected it with vehemence, and the same repugnance to accept it is manifest in Carlyle'.³⁰

It is clear where Tyndall's sympathies lay. Earlier in the 'Belfast Address' he had already praised Goethe for being an important contributor to natural history as well as a great poet.³¹ In his published work Tyndall quoted from Goethe on several occasions and penned an entire essay on his *Farbenlehre*. Tyndall voiced his debt to Carlyle on numerous occasions. He acknowledged that Carlyle's conception of nature as a living, organic entity had had a profound influence on him. Tyndall devoted two essays to Carlyle, quoted from him at least twice and corresponded directly with him.³² Like Carlyle, Tyndall was hostile towards natural theology. Not only did it drag non-empirical factors into science, it also conveyed a degraded conception of God. In an entry in his Journal for 1849, Tyndall recorded that he had read William Paley's *Natural Theology*, and that he had concluded that 'the Great Spirit is not to be come at in this way; if so, his cognition would only be accessible to the scientific and to very little purpose even here'.³³ A year later he wrote in his Journal that he did not believe in 'a detached God – a God outside his Universe who superintends the clockwork thereof'.³⁴ Here Tyndall linked natural theology to deism and rejected both. Ironically, he was asked in 1854 to edit a new edition of Prout's Bridgewater Treatise. His reaction, upon reading the book, was decidedly negative. 'If no better Deity than this can be purchased for the eight thousand pounds of the Earl of Bridgewater it is a dear bargain', Tyndall wrote in his Journal. Prout had been motivated to write the book 'for money' as it lacked 'even common scientific depth, not to speak of re-

29 *ibid.*, vol. 2, p.154.

30 *ibid.*, vol. 2, p.158.

31 *ibid.*, vol. 2, p.148.

32 Lightman, B. 'Science and Culture', in O'Gorman, F. (ed.) *The Cambridge Companion to Victorian Culture*, Cambridge: Cambridge University Press (2010), p.23.

33 Royal Institution, Journals of John Tyndall, January 2, 1849, 413.

34 *ibid.*, Sept. 25, 1850, 511.

ligious inspiration'.³⁵ Tyndall's dislike of natural theology put him with Goethe and Carlyle and not Newton and Boyle. While Tyndall downplays the contributions of Newton to modern science in the 'Belfast Address' – a striking move given that he was a physicist – he discusses Darwin at length, praising the 'vast amount of labour, both of observation and of thought' in the production of *The Origin of Species*.³⁶ He also draws the reader's attention to Darwin's informed rejection of natural theology.³⁷

Shortly after Faraday's death in 1867, Tyndall wrote a book entitled *Faraday as a Discoverer* (1868). He praised Faraday's scientific abilities. In his opinion, Faraday 'was the greatest experimental philosopher the world has ever seen'.³⁸ Tyndall felt deeply indebted to Faraday. Faraday had been his patron when he returned from Germany with his PhD and no scientific position. Not only did Faraday write letters on his behalf when positions opened up, when no job materialised for Tyndall he persuaded the managers of the Royal Institution to hire him. It seems unimaginable that a devoutly religious Sandemanian like Faraday could befriend an aggressive agnostic like Tyndall. But they never seem to have quarrelled about religious issues. Tyndall recalled in his book on Faraday, 'never once during an intimacy of fifteen years did he mention religion to me, save when I drew him on to the subject'. What impressed Tyndall about Faraday in these moments, was how 'the contemplation of Nature, and his own relation to her, produced in Faraday a kind of spiritual exaltation'.³⁹ The same could be said of Tyndall, and it was this relationship to Nature, underlying their scientific work, that helped to forge a strong bond between them. Both perceived themselves as being intensely religious, but not in a conventional way. For Tyndall, science and religion were not at war as long as they kept to their respective spheres of authority. Tyndall went on the attack only when supporters of religion crossed the line, as in the case of natural theology or when they criticised Darwin's evolutionary theory on theological grounds. Tyndall's hostility towards natural theology shaped the way he treated Newton when he looked back on the history of science and religion. Rather than describing Newton as inconsistent, like d'Holbach, or even mad, like Laplace, Tyndall merely displaced him from the centre of the story of the making of modern science. The main heroes of the story became Bruno, a proto-evolutionist, and Darwin, whose rejection of natural theology allowed biology to be dealt with on a truly scientific basis.

35 *ibid.*, Nov. 19, 1854, 698. Also quoted in Eve, A.S. & Creasey, C.H. *Life and Work of John Tyndall*, London: Macmillan & Co. (1945), p.56.

36 Tyndall *op. cit.*, (26), vol. 2, p.174.

37 *ibid.*, vol. 2, p.176.

38 Tyndall, J. *Faraday as a Discoverer*, London: Longmans, Green, & Co. (1868), p.147.

39 *ibid.*, pp. 151-152.

3. T. H. Huxley

In the past, before Brooke and others persuaded scholars that the complexity thesis was a valuable guide to understanding the historical relationship of science and religion, historians looked to the writings of Thomas Henry Huxley for a colourful quotation to sum up the conflict thesis. Moore refers to Huxley as the ‘self-styled “gladiator-general” of evolutionary science’, and asserts, ‘warfare was his favourite metaphor by which to describe the scientific pursuit of truth in the face of ecclesiastical constraints on truth-seeking and failures at truth-telling’.⁴⁰ Perhaps, and I am imagining what a sceptical reader may be thinking at the moment, Tyndall did not subscribe to the conflict thesis, but surely Huxley did.

Here is a quotation from Huxley’s article ‘The Origin of Species’, published anonymously in the *Westminster Review* in 1860.⁴¹ It is typical of Huxley’s inflammatory rhetoric:

In this nineteenth century, as at the dawn of modern physical science, the cosmogony of the semi-barbarous Hebrew is the incubus of the philosopher and the opprobrium of the orthodox. Who shall number the patient and earnest seekers after truth, from the days of Galileo until now, whose lives have been embittered and their good name blasted by the mistaken zeal of Bibliolaters? Who shall count the host of weaker men whose sense of truth has been destroyed in the effort to harmonise impossibilities – whose life has been wasted in the attempt to force the generous new wine of Science into the old bottles of Judaism, compelled by the outcry of the same strong party?

It is true that if philosophers have suffered, their cause has been amply avenged. Extinguished theologians lie about the cradle of every science as the strangled snakes beside that of Hercules; and history records that whenever science and orthodoxy have been fairly opposed, the latter has been forced to retire from the lists, bleeding and crushed, if not annihilated; scotched, if not slain.⁴²

This seems to be a fairly straightforward historical account of the relationship between science and religion that draws on a series of gory military metaphors.

But just as historians have demonstrated that the so-called showdown between Huxley and Bishop Samuel Wilberforce at Oxford in 1860 was not what it seems, there is more than meets the eye to Huxley’s position on the science-religion relationship.⁴³ His true position was similar to Tyndall’s.

40 Moore *op. cit.*, (19), p.58.

41 [Huxley, T.H.] ‘The Origin of Species’, *Westminster R.* (1860) 17, 541-570.

42 Huxley, T.H. *Darwiniana*, London: Macmillan & Co. (1899), p.52.

43 Hesketh, H. *Of Apes and Ancestors: Evolution, Christianity, and the Oxford Debate*, Toronto: University of Toronto Press (2009).

An agnostic, and not an atheist, Huxley held to the idea that science and religion belonged to two distinct realms. He denied that there could be a conflict between them if they stayed within their proper sphere of influence. Like Tyndall, Huxley de-emphasised Newton's role in the history of their relationship. The doctrine of evolution, according to Huxley, was far more important than Newton's gravitational theory in the story of the rise of modern science.

Huxley was born into an impoverished, lower-middle-class family. He studied medicine and then entered the Royal Navy medical service in 1846. Just as Darwin had received important scientific training through his experiences on a long sea voyage aboard the *Beagle*, Huxley's career gathered momentum between 1846 and 1850, while he was doing research as assistant surgeon and naturalist aboard the HMS *Rattlesnake*. In 1854 he was appointed lecturer at the Royal School of Mines, and then later moved up to professor. Huxley subsequently held professorships at the Royal Institution and the Royal College of Surgeons in addition to the deanship of the Normal School of Science at South Kensington. He enjoyed a long and distinguished career as one of Victorian England's greatest scientists and popularisers of science due to his unremitting efforts in public lecture halls, in the pages of fashionable periodicals and in important government committees. Huxley was also notorious for his vigorous defence of evolutionary theory, which won him the title 'Darwin's bulldog'. Huxley reportedly accepted the nickname. According to Henry Fairfield Osborn, twentieth-century American paleontologist and director of the American Museum of Natural History, Huxley told him in the mid-seventies, 'You know I have to take care of him [Darwin] – in fact, I have always been Darwin's bull dog.'⁴⁴

Like Tyndall, Huxley denied that he was an atheist. In a letter to the editor of the *Spectator* in 1866, he objected to an article published a week earlier in the journal that referred to him as an atheist. On the contrary, Huxley asserted, it was a 'favourite tenet' of his that 'atheism is as absurd, logically speaking, as polytheism'.⁴⁵ It was Huxley who coined the term 'agnosticism' in 1869 at one of the early meetings of the Metaphysical Society, so that he could distinguish his position from atheism, theism, pantheism, materialism, idealism and Christian. The origin of the term makes it clear that Huxley did not see himself as being in total opposition to the Christian tradition. Agnosticism, to Huxley, was the opposite of Gnosticism. The Gnostics, a sect that existed in the first three centuries AD, claimed to possess superior knowledge derived from secret revelations. They were eventually proclaimed to be heretics by the Christian Church. In calling

44 Osborn, H.F. *Impressions of Great Naturalists: Reminiscences of Darwin, Huxley, Balfour, Cope and Others*, New York: C. Scribner's Sons (1925), pp. 78-79.

45 Huxley, T.H. 'Mr. Huxley's Doctrine', *Spectator* (10 Feb 1866) 39, 158.

himself an agnostic Huxley was siding with the early Christian Church in denying the validity of secret revelations: those who claimed to possess a higher knowledge of the transcendental world were deluded. Throughout his writings Huxley applied the concept that there are limits to human knowledge – the essence of his notion of agnosticism – to criticise the wild extravagances of nineteenth-century Christian theologians. This implied that they were the real heretics, modern day representatives of Gnosticism.⁴⁶

The main target of Huxley's aggressive rhetoric was actually theology, not religion. This becomes clear once we understand how Huxley viewed the relationship between science, religion and theology. Huxley insisted, like Tyndall, that the spheres of science and religion had to be kept apart from each other. While religion belonged to the realm of feeling, science was a part of the world of intellect. Rightly conceived, Huxley believed, science and religion could never come into conflict because each realm was distinct and without authority outside its proper sphere of interest. In 1859, the year of the publication of Darwin's *The Origin of Species*, Huxley was asserting that science and religion were not opposed to each other, rather 'true science and true religion are twin-sisters'.⁴⁷ Much later, in the late 1880s, Huxley consistently asserted that the doctrine of evolution was 'neither Anti-theistic nor Theistic' since it did not 'come into contact with Theism, considered as a philosophical doctrine'.⁴⁸ Conflict arose when theology was confused with religion. Huxley distinguished religion from theology, the latter operating in the scientific world of intellect because of its attempt to embody religious feelings in concrete facts. Theology was potentially in conflict with science. In 1894 Huxley wrote, 'Most people mix up "Religion" with Theology and conceive that the essence of religion is the worship of some theological hypostasis or other.'⁴⁹ When that happened, there could appear to be a war between science and religion. Huxley declared, 'the antagonism between science and religion about which we hear so much, appears to me to be purely factitious – fabricated, on the one hand, by short-sighted religious people who confound a certain branch of science, theology, with religion; and, on the other, by equally short-sighted scientific people who forget that science takes for its province only that which is susceptible of clear intellectual comprehension'.⁵⁰

Although Huxley sees a conflict between theology and science when he looks into the past, Newton is not part of this story. The Newton who was

46 Lightman, B. *The Origins of Agnosticism: Victorian Unbelief and the Limits of Knowledge*, Baltimore and London: Johns Hopkins University Press (1987), pp. 11-13.

47 [Huxley, T.H.] 'Science and Religion', *The Builder* (1859), 18, 35.

48 Huxley, T.H. 'On the Reception of the "Origin of Species"', in Darwin, F. (ed.) *The Life and Letters of Charles Darwin*, 2 vols, New York: D. Appleton & Company (1887), vol. 1, pp. 555-556.

49 Imperial College, Huxley Papers, Huxley to James Creelman, 11 June 1894, vol. 12, 343.

50 Huxley, T.H. *Science and Hebrew Tradition*, London: Macmillan (1893), pp. 160-161.

a major figure in the British natural theology tradition is replaced by a secular Newton, cleansed of all association to the design argument. In his essay 'Science and Pseudo-Science' (1887), Huxley summed up Newton's major achievement. 'Newton defined the laws, rules, or observed order of the phenomena of motion, which come under our daily observation, with greater precision than had been before attained,' Huxley declared, 'and, by following out, with marvellous power and subtlety, the mathematical consequences of these rules, he almost created the modern science of pure mechanics.' He was therefore the founder of 'modern physical astronomy'. Huxley praised Newton for avoiding 'pseudo-scientific realism' since he did not confound laws with causes.⁵¹ But Huxley does not discuss how Newton perceived a profound relationship between universal natural laws and a divine being. Re-interpreted by Huxley, Newton stands as the exemplary empirical scientist.

Huxley held a rather critical attitude toward radical Enlightenment figures, despite their attack on 'Supernaturalism in its biblical stronghold'. D'Holbach, placed by Huxley on the 'extreme left of the free-thinking host', was part of 'the sceptical insurrection of the eighteenth century [that] made a terrific noise and frightened not a few worthy people out of their wits'. However Huxley believed that 'the efforts of the later rebels were no more likely than those of the earlier, to furnish permanent resting places for the spirit of scientific inquiry'. They were as prone as their enemies to share in the 'fatal weakness of a priori philosophising'. Their lack of appreciation of history as the 'record of the moral and social evolution of the human race' led them to present 'preposterous theories' to account for the 'religious phenomena which are natural products of that evolution'. Though they represented a 'naturalistic movement', they constituted an 'imperfect indication' of such a movement.⁵² The Enlightenment *philosophes* were just too critical and destructive.

Huxley saw himself as belonging to the scientific naturalist movement, which he traced back to the Renaissance and to Descartes. According to Huxley, this movement culminated in the latter half of the nineteenth century. 'The present incarnation of the spirit of the Renaissance differs from its predecessor in the eighteenth century', Huxley affirmed, 'in that it builds up, as well as pulls down.' The foundation that allows for the construction of a 'superstructure' is 'the doctrine of evolution'.⁵³ Though Huxley was not prepared to accept Spencer's evolutionary system whole hog – he thought it was premature to construct an entire system – he believed that 'scientific investigation, in all directions, is tending' to find a 'sufficient foundation for the doctrine of evolution' in astronomy and phys-

51 Huxley, T.H. *Science and Christian Tradition*, New York: D. Appleton and Company (1894), pp. 106-108.

52 *ibid.*, pp. 18-20.

53 *ibid.*, p.41.

ics, chemistry, and the development of human society, of language and of religions.⁵⁴ And it was evolutionary theory that had the greatest potential, since the time of Newton, to expand the range of science dramatically. Looking back over the history of biology in the last quarter of the century justified the assertion, Huxley insisted, that ‘the most potent instrument for the extension of the realm of natural knowledge which has come into men’s hands, since the publication of Newton’s “Principia”, is Darwin’s “Origin of Species”’.⁵⁵ Not only does Huxley put Newton into the history of the lineage of scientific naturalism here, he also replaces Newton’s *Principia* with Darwin’s *Origin* as the driving force behind its triumph.

4. Conclusion

Attempts by early modern unbelievers, like d’Holbach, to finesse Newton in order to use science to support atheism were doomed to failure and based on a fanciful interpretation of Newton’s place in history. The founder of the Newtonian system unambiguously based his concept of nature on the principle of divine order. For Newton, science and religion were inevitably in harmony. Despite efforts to portray Newton as inconsistent or mad, and in the face of attempts to eliminate the God of the gaps, the natural theology tradition was incredibly resilient throughout the eighteenth and early nineteenth centuries. The establishment of a new form of unbelief, agnosticism, in the middle of the nineteenth century was inextricably entwined with the triumph of evolutionary theory. Evolution, whether in its Darwinian or Spencerian form, offered the opportunity to build a new scientific system that was more neutral than the Newtonian one in its metaphysical implications. Huxley and Tyndall coupled their defence of evolutionary theory with an affirmation of the position that science and religion were non-overlapping magisteria. Separating science and religion allowed them to push for autonomy for scientists when they considered controversial new scientific theories like evolution. Scientists, they argued, did not need to take religious beliefs into account when evaluating scientific theories. Their job was to stick to the empirical world of fact. However, accepting the two spheres position also committed them to defending the validity of religious experience against the atheist. For both, science was in need of the spiritual sustenance afforded by religion. In an entry in his journal for 1854, Tyndall wrote ‘there are principles in the human heart that cannot be roused by science – principles upon which the culture of science and all other duties depend’.⁵⁶

Contemporary atheists are eager to base their unbelief on evolution, exploiting all the advantages of the strategy first developed by Huxley and Tyndall. In his *Dreams of a Final Theory*, Steven Weinberg, the American

54 *ibid.*, pp. 41, 43.

55 Huxley *op. cit.*, (48), p.557.

56 Royal Institution, Journals of John Tyndall, 31 Dec. 1854, 709.

theoretical physicist and Nobel Laureate, has argued that ‘all our experience throughout the history of science’ has tended to move us further away from finding ‘signs of the workings of an interested God’ in nature. Weinberg argues that Darwin contributed significantly to the demystification of life by showing how living things evolve with no outside plan or guidance.⁵⁷ Richard Dawkins, even more than Weinberg, has emphasised the role of Darwin in strengthening the linkage between science and atheism. He contends that the atheistic position is virtually built into the theory of natural selection, since it ‘raises our consciousness to the power of science to explain how organised complexity can emerge from simple beginnings without any deliberate guidance’. Darwin shattered the illusion of design within the domain of biology, and it taught us ‘to be suspicious of any kind of design hypothesis in physics and cosmology as well’.⁵⁸

Since Dawkins and Weinberg follow Huxley and Tyndall in emphasising the link between evolution and unbelief, the four are often seen as belonging to the same group of unbelievers. Take Dawkins and Huxley, for example. Dawkins has been referred to in the media as ‘Darwin’s Rottweiler’, while Huxley is widely known as ‘Darwin’s Bulldog’. But these playful ‘pet’ names, which point to the aggressiveness with which both have defended Darwin’s theory of evolution, conceal significant differences between the two biologists and unbelievers. In the first place, Huxley never fully accepted Darwin’s theory of natural selection while Dawkins makes it the basis of his biology. Huxley was an agnostic; Dawkins is an atheist. But more important for our purposes is that Huxley made the concept of non-overlapping magisteria (NOMA) the basis for his reconciliation of science and religion. In doing so, he maintained an autonomy and value to religion. Dawkins and Weinberg both reject NOMA.⁵⁹ They also assert that there is inevitably a conflict between science and religion, and military metaphors play an important role in their defence of atheism. They have far more in common with Enlightenment *philosophes* like d’Holbach than they do with Victorian agnostics such as Huxley and Tyndall. Contemporary atheists, from their point of view, have taken the strategy developed by the original Darwinians a step further. Since they do not need to try to finesse Newton, as did early modern unbelievers, their atheism, and their perpetuation of the conflict thesis in history – though historians have exploded this myth in the last few decades – seems, to the uninformed, to have the complete backing of science.

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57 Weinberg, S. *Dreams of a Final Theory*, New York: Vintage Books (1994), pp. 245-246.

58 Dawkins, R. *The God Delusion*, Boston, New York: Houghton Mifflin Company (2006), pp. 114, 116, 118.

59 Weinberg *op. cit.*, (47), p.249. Weinberg explicitly rejects Gould’s separation of science and religion and implies that there is a conflict.