# Science and Christian Belief

Volume 36 (1) 1-152
**April 2024**

Science and Christian Belief

**A journal concerned with the interactions of science and religion, with particular reference to Christianity**
(www.scienceandchristianbelief.org)

## *Editors*

Professor Keith R. Fox MA MPhil PhD
*University of Southampton, UK*

Dr Todd Kantchev
*Review Editor*

## *Associate Editors*

Dr Justin Barrett
*Blueprint 1543*

Dr Peter J. Bussey MA PhD ScD
*University of Glasgow, UK*

Professor Edward B. Davis MA PhD
*Messiah College, USA*

Professor D. Gareth Jones MD DSc
*University of Otago, New Zealand*

Professor Neil Messer
*University of Winchester, UK*

Professor Robert S. White MA PhD FRS
*University of Cambridge, UK*

## *Editorial Board*

Dr Denis R. Alexander
*The Faraday Institute, Cambridge, UK*

Professor David Block FRAS
*University of Witwatersrand, South Africa*

Professor David Booth
*University of Birmingham, UK*

Professor G. Andrew D. Briggs
*University of Oxford, UK*

Professor John Bryant
*University of Exeter, UK*

Professor Russell P. Cowburn FRS
*University of Cambridge, UK*

Professor Calvin De Witt
*University of Wisconsin-Maddison, USA*

Dr Valgene Dunham
*Coastal Carolina University, USA*

Professor Owen Gingerich
*Harvard Smithsonian Institute Centre for Astrophysics, USA*

Professor Andrew Halestrap
*University of Bristol, UK*

Dr Rhoda Hawkins
*University of Sheffield, UK*

Professor Sir Brian Heap FRS
*University of Cambridge, UK*

Professor Paul Helm
*Formerly Kings College London, UK*

Professor Sir Colin Humphreys FRS, FIM, FinstP
*Queen Mary College London, UK*

Professor Malcolm A. Jeeves CBE, FRSE
*University of St Andrews, UK*

Professor Christopher Kaiser
*Western Theological Seminary, USA*

Professor George Kinoti
*University of Nairobi, Kenya*

Professor David Livingstone FBA
*Queen's University Belfast, UK*

Professor David Lyon FRSC
*Queen's University, Canada*

Professor Alister E. McGrath
*University of Oxford , UK*

Professor Ross McKenzie
*University of Queensland, Australia*

Professor Andrew Miller CBE, FRSE
*Edinburgh University, UK*

Professor David Myers
*Hope College, USA*

Professor Don Page
*University of Alberta in Edmonton, Canada*

Professor John Pilbrow FInstP
*Monash University, Australia*

Professor Ghillean Prance, FRS
*Former Director of the Royal Botanic Gardens, Kew, UK*

Professor Jeffrey P. Schloss
*Westmore College, USA*

Dr Bob Sluka
*A Rocha International*

Professor Bob White
*University of Cambridge, UK*

Dr Jennifer Wiseman
*American Association for the Advancement of Science*

## *Sponsoring Bodies*

**Christians in Science**
78 Ashton Road
Hyde, Cheshire
SK14 4RN, UK
www.cis.org.uk

**The Victoria Institute**
c/o John Buxton
15 The Drive, Harlow, Essex CM20 3QD, UK
www.faithandthought.org.uk

Note: Membership of either body includes a subscription to the journal.

## *Indexing*

This journal is indexed in the ATLA Religion Database, published by the American Theological Library Association, 300 S. Wacker Dr., Suite 2100, Chicago, IL 60606 USA
E-mail: atla@atla.com, www:http://www.atla.com/

**Science & Christian belief (Online) ISSN 2756-0988**

# CONTENTS

## ARTICLES

S & CB Editorial … … … … … … … … … … … … … … … … … … … … … … … … … … … … … … … … … 5
*Keith Fox*

The 'Scientific' Interpretation of the Bible and the Victorian Conflict between Science and Religion … … … … … … … … … … … … … … … … … … … … … … … … … … … … 7
*James C. Ungureanu*

Zoology and Job 40: Review and critique of the arguments for Behemoth as a dinosaur … … … … … … … … … … … … … … … … … … … … … … … … … … … … … … … … 31
*Philip J. Senter*

Thomas Aquinas in Dialogue with Modern Causal Explanations … … … … … 63
*Michael Salvatore Politz*

Donald MacCrimmon MacKay (1922 – 1987): Scientist and Accidental Philosopher. A Critical Appreciation … … … … … … … … … … … … … … … … … … … … … … … … 83
*George M. Coghill*

Donald M. MacKay's Contributions to The Research Scientists Christian Fellowship and Christians in Science: The Early days … … … … … … … … … … … … … … … … … … …

# BOOK REVIEWS

*Human Becoming in an Age of Science, Technology, and Faith*... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...127
Philip Hefner (Todd Kantchev)

*Human Technological Enhancement and Theological Anthropology* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...128
Victoria Lorrimar (Noreen Herzfeld)

*God and Gaia: Science, Religion and Ethics on a Living Planet* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...130
Michael S Northcott (Robert White)

*Navigating Faith and Science* ... ... ... ... ... ... ... ... ... ... ... ... ...132
Joseph Vukov (Dr Christina Biggs)

*Naturalism in the Christian Imagination: Providence and Causality in Early Modern England* ... ... ... ... ... ... ...133
Peter N. Jordan (James Hannam)

*Is God Really Legit? Making sense of faith and science* ...134
Neil Laing (Malcolm S. Buchanan)

*The Person in Psychology and Christianity: A Faith Based Critique of Five Theories of Social Development* ... ... ... ...135
Marjorie Lindner Gunnoe (Peter Hampson)

*Four Views on Christian Metaphysics*... ... ... ... ... ... ... ... ... ...137
Timothy M. Mosteller (ed.) (Stephen Walley)

*Cosmic Chemistry: Do God and Science Mix?*... ... ... ... ... ...138
John C. Lennox (Keith Fox)

*God's Gift of Science: Theological presuppositions underlying exploration of the natural world*... ... ... ... ...141
Graeme Finlay (Michael Fuller)

*Dawn. A Proton's Tale of All That Came to* ... ... ... ... ... ...142
Be Cees Dekker, Corien Oranje, and Gijsbert van den Brink (Peter J. M. van der Burgt)

*Into the Headwinds: Why Belief Has Always Been Hard—and Still Is* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...143
Terryl & Nathaniel Givens (Pu Ji (Preston))

*Theology and Technology, Volume 1: Essays in Christian Analysis*
*Theology and Technology, Volume 2: Essays in Christian Exegesis and Historical Theology* ... ... ... ... ... ... ... ... ...145
Carl Mitcham, Jim Grote, and Levi Checketts (Scott Ryan Maybell)

*Natural Philosophy: On Retrieving a Lost Disciplinary Imaginary* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...146
Alister McGrath (Christopher Oldfield)

*Restless Devices: Recovering Personhood, Presence and Place in the Digital Age* ... ... ... ... ... ... ... ... ... ... ... ...148
Felicia Wu Song (Brian Monahan)

*KEITH FOX*

# Editorial

## In this issue

This issue contains three main articles. The first, by James Ungureanu, describes how historical-critical scholarship influenced the relationship between science and religion in the Victorian era. Ungureanu argues that most of the promoters of 'scientific naturalism,' including people like Thomas H. Huxley, John Tyndall, and Herbert Spencer, developed their views on the relationship between science and religion in response to historical-critical scholarship. Even John W. Draper and Andrew D. White, the founders of the conflict thesis, were significantly affected by this literature. By examining how historical criticism played a significant role in the thought of these writers the author reexamines the origins and meaning of the science-religion debate at the end of the nineteenth century.

The second article, by Philip Senter, considers in detail the nature of the creature Behemoth, which is described in Job chapter 40. The identity of this beast has been discussed for centuries, but more recently is has become a favourite of some Young Earth creationists, who cite this passage as 'evidence' that ancient humans co-existed with dinosaurs and were created by God on the same day about six thousand years ago. Arguing from Zoology and Biblical Hebrew, Senter shows that there is no argument that Behemoth is a dinosaur, but interprets it as a primordial, supernatural monster.

The third paper by Michael Politz explores the concept of material causality in modern science. He examines and challenges this using the examples of Big Bang theory and the mind/body problem. He uses the classical Thomistic view of causality and explains how reintroducing immaterial causality removes both explanatory gaps, thereby allowing explanation of the mechanics of both the origin of the universe and the mind/body problem.

The papers by George Coghill and Malcolm Jeeves are the authors' personal reflections on the life of Donald MacKay, which they presented at the CiS Autumn conference in 2022, 'The Clockwork Image – Humanity, Artificial Intelligence and God', which celebrated the 100th anniversary of Donald M MacKay.

As well as the usual compilation of book reviews, this issue contains a lengthy Essay Review by David McIlroy on Iain McGilchrist's massive book 'The Matter with Things: Our Brains, Our Delusions, and the Unmaking of the World' (1500 pages in two volumes), which is a demolition of reductive materialism, naturalism, and scientism. McGilchrist debunks the 'nothing buttery' of reductive materialism and gives his own views of consciousness, material reality, and how we should understand their inter-relatedness, concluding with a position that

amounts to panentheistic process theology. McKilroy sees much that is good in this work, but he presents a specifically Christian response and critique.

## Obituary

I am sorry to tell you that Prof. John White died last August. He had been a member of the S&CB Editorial Board for over 20 years. John was a Founding Member of ISCAST, the Australian sister organisation of Christians in Science, which was established in 1987. John White served as ISCAST President from 1992 to 2006. Emeritus Professor John Pilbrow, ISCAST President 2006–2009, has written an obituary for John White, which can be found on the ISCAST website at https://iscast.org/news/tribute-to-emeritus-professor-john-william-white/

**Keith Fox is Editor of *Science & Christian Belief*, Emeritus Professor of Biochemistry in Southampton University and former Director of the Faraday Institute for Science and Religion in Cambridge**

*JAMES C. UNGUREANU*

# The 'Scientific' Interpretation of the Bible and the Victorian Conflict between Science and Religion

*Historians of science and religion need to pay more attention to how historical-critical scholarship influenced perceptions of the relationship between science and religion in the Victorian era. In this paper, I would like to begin redressing this problem by examining how the rise of biblical criticism in general, and the issues of Christology in particular, had influenced views of the relationship between science and religion at the end of the nineteenth century. Indeed, almost all members and promoters of 'scientific naturalism,' including the Victorian coterie of the X-Club, Thomas H. Huxley, John Tyndall, and Herbert Spencer, among others, constructed their views on science-religion relations in response to historical-critical scholarship. Moreover, even the so-called 'cofounders' of the 'conflict thesis,' John W. Draper and Andrew D. White, were significantly affected by this literature. That is, developments in biblical criticism directly impacted how White, Draper, and others of their ilk understood the relationship between science and religion. By examining more carefully how historical criticism played a significant role in the thought of these writers during the Victorian period, I hope to relocate the origins, development, and meaning of the science-religion debate at the end of the nineteenth century.*

**Keywords:** science and religion, biblical criticism, historical Jesus, Victorian Britain, scientifical naturalism

## INTRODUCTION

In his *Autobiography*, British naturalist Charles Darwin (1809 – 1882) listed three main reasons for his religious doubts. First, he was morally repulsed by the Old Testament God, whom he saw as nothing more than a 'revengeful tyrant.' Second, the discovery of the 'fixed laws of nature' made belief in miracles 'incredible.' And finally, he believed the advent of historical-critical scholarship, or biblical criticism, demonstrated that the 'Gospels cannot be proved to have been written simultaneously with the events,—that they differ in many important details, far too important as it seemed to me to be admitted as the usual inaccuracies of eyewitnesses.' All of these alleged difficulties gradually eroded Darwin's belief in 'Christianity as a divine revelation.'[1]

1 *The Autobiography of Charles Darwin*, 1809-1882, New York: W. W. Norton & Company (1958) pp. 85-86.

Among scholars of the Victorian period, much has already been written on the moral critique of Christian orthodoxy during the so-called Victorian 'crisis of faith.'[2] Other scholars have also traced the development of the idea of 'laws of nature' or the 'uniformity of nature' among Victorian scientists.[3] Few if any have examined, however, the complex relationship between the rise of biblical criticism and the Victorian conflict between science and religion.[4] But as Adrian Desmond and James Moore observed in their vivid life of the 'tormented evolutionist,' Darwin was surrounded by friends interested in biblical criticism.[5]

Most historians of science are not biblical scholars. It is perhaps for this reason they have overlooked how crucial biblical criticism was in the formation of ideas found in the work of Darwin's closet friends and strident supporters, particularly among the leading 'scientific naturalists' of the Victorian age, biologist Thomas H. Huxley (1825-1895), physicist John Tyndall (1820-1893), and evolutionary philosopher Herbert Spencer (1820-1903). Besides this Victorian coterie, the so-called 'cofounders' of the 'conflict thesis,' the idea that science and religion are fundamentally and irrevocably at odds, were also greatly influenced by the rising tide of biblical criticism. Historians of science have typically traced the origins of the thesis to University of New York chemist John W. Draper's *History of the Conflict between Religion and Science* (1874) and first President of Cornell University Andrew D. White's *A History of the Warfare of Science with Theology in Christendom* (1896). But no study exists examining how biblical criticism affected their views on science and religion.[6]

2 See, e.g.Budd, S. 'The Loss of Faith: Reasons for Unbelief among Members of the Secular Movement in England, 1850-1950,' *Past & Present* (1967) 36, 106-25; Altholz, J. L. 'The Warfare of Conscience with Theology,' in Parsons, G. (ed). *Religion in Victorian Britain, Vol. IV: Interpretations*, Manchester: Manchester University Press, (1988) pp. 150-69; Bartholomew, M. 'The Moral Critique of Christian Orthodoxy,' in Parsons G. and Moore J. R. (eds) Religion in Victorian Britain, Vol. II: *Controversies*, Manchester: Manchester University Press (1988) pp. 166-90; Turner, F. M. 'The Victorian Crisis of Faith and the Faith That Was Lost,' in Helmstadter, R. J. (ed) *Victorian Faith in Crisis: Essays on Continuity and Change in Nineteenth-Century Religious Belief*, Stanford: Stanford University Press (1990) pp. 9-38.

3 See, e.g., Cannon, S.F. *Science in Culture: The Early Victorian Period*, New York: Science History Publications (1987). More recently, Stanley, M. *Huxley's Church and Maxwell's Demon: From Theistic Science to Naturalistic Science*, Chicago: University of Chicago Press (2015). See a summary of these ideas in Stanley's 'God and the Uniformity of Nature: The Case of Nineteenth-Century Physics,' in Harrison, P. and Roberts, J.H.(eds) *Science without God?: Rethinking the History of Scientific Naturalism*, Oxford: Oxford University Press (2019) pp. 98-110.

4 John Hedley Brooke, in his classic *Science and Religion: Some Historical Perspectives*, Cambridge: Cambridge University Press (1991), very briefly discussed 'the wider context of biblical criticism,' but did not sufficiently show the connection and influence of biblical criticism on leading figures of the Victorian science and religion debate (pp. 357-73).

5 See Desmond, A. and Moore, J. *Darwin: The Life of a Tormented Evolutionist*, New York: W. W. Norton & Company (1994) p. 216.

6 See the exception in the recent volume Ungureanu, J.C. *Science, Religion, and the Protestant Tradition: Retracing the Origins of Conflict*, Pittsburgh: Pittsburgh University Press (2019).

As I will argue here, it is, in fact, untenable to read Draper and White and not consider their debt to historical-critical scholarship. This is especially true in reading White's magnum opus. In his last and longest chapter in *A History of the Warfare*, for instance, White describes in vivid detail the 'laws governing the evolution of sacred literature,' offering essentially what biblical scholar and theologian Hans Frei put in another context, 'an analysis of analyses of the Bible.'[7]

But there is some irony here, for early biblical criticism was not anti-religious in origin or character. It was born out of a desire to reform religion rather than oppose it. The founders of the discipline saw themselves as challenging the cultural authority of institutional religion rather than seeking to undermine it. Criticism of the Bible originated in the opposition between church dogma and the new liberal political philosophy of emergent modern Europe. Indeed, while its proponents claimed that historical-critical scholarship was neutral and objective, this was not always the case.[8] Moreover, while its history predates the Protestant Reformation, a link between biblical criticism and a particular kind of Protestantism quickly formed. Many early champions of historical-critical scholarship applied the Protestant critique of the Roman Catholic Church to biblical studies, arguing that tradition had corrupted the original, simple, and pure message of Jesus and the apostles. As a result, consciously or unconsciously, many scholars began to view the Bible as a fully human product, and began to study it as they would any other ancient text. This naturalistic explanation of the origins of religion was combined with an evolutionary conception of history, which led many to a concerted effort to uncover the original message of Jesus as separate from church tradition.

This allegedly 'pious' motivation for criticism of the Bible was prevalent among Darwin's supporters. It is in this sense that I think many have misunderstood the very nature of the 'conflict' during the Victorian period. For instance, all three of the most important figures in nineteenth-century scientific naturalism, Huxley, Tyndall, and Spencer, in fact denied that there is any conflict between 'science and religion.' Perhaps more than any other historian, Bernard Lightman has revealed the nuances in the 'theology' of these Victorian agnostics.[9] Even Draper and White, who are often criticized by historians of sci-

7 Frei, H.W. *The Eclipse of Biblical Narrative: A Study in Eighteenth and Nineteenth Century Hermeneutics*, New Haven: Yale University Press (1974) p. vii.

8 See, e.g., the standard studies by Kümmel, W.G. *The New Testament: The History of the Investigation of its Problems*, Nashville: Abingdon Press (1972); Reventlow, H.G. *The Authority of the Bible and the Rise of the Modern World*, Philadephia: Fortress Press (1985); and Baird, W. *History of New Testament Research*, 3 vols. Minneapolis: Fortress Press (1992-2013). See also the shorter but helpful study by Harrsville R.A. and Sundberg, W. *The Bible in Modern Culture: Baruch Spinoza to Brevard Childs*, 2nd ed. Grand Rapids: Eerdmans (2002).

9 Lightman, B. *The Origins of Agnosticism: Victorian Unbelief and the Limits of Knowledge*, Baltimore: Johns Hopkins University Press (1987). See also more recently, 'The Theology of

ence, rebuffed the idea that there is a conflict between 'science and religion.'[10] What I want to emphasize here is that historical-critical scholarship played a crucial role in how all of these thinkers redefined 'religion,' and how in turn they attempted to reconcile the relationship between science and religion at the end of the century. As William Robertson Nicoll (1851-1923), a Scottish Free Church minister, pointed out in an 1887 article in the Nonconformist *British Weekly*, the real battle of the time was not with evolution or science, but with biblical criticism.[11] Indeed, the impact of biblical criticism on nineteenth century 'conflict' theorists was not only pervasive but decisive. By revealing the influence of biblical criticism on the alleged founders of the 'conflict thesis,' we can gain a deeper understanding of the relationship between science and religion at the end of the nineteenth century, and therefore better prepared to understand why such narratives continue to be perpetuated today.

## The *Leader* and the '*New Reformation*'

In late February of 1861, banker, liberal politician, and scientific naturalist Sir John Lubbock (1834-1913) began circulating a 'Scientists' Testimonial,' a document addressed to Anglican Broad Churchman Frederick Temple (1821-1902), one of the contributors to the controversial *Essays and Reviews*, which was published the previous year in 1860. The *Essays and Reviews* were a collection of seven essays written by English clergymen and a layman that questioned various doctrines of traditional Christian belief. Despite its seemingly innocuous title, the book brought the full impact of historical-critical scholarship to England, which provoked one of the greatest religious controversies of the Victorian period.[12] The 'Scientists' Testimonial' was created to support the essayists in their cause for 'liberal opinion,' 'honest inquiry,' and 'freedom of thought.' Many prominent men of science, including Charles Darwin, Charles Lyell, and William Spottiswoode, among others, enlisted their names in support of Lubbock's cause. While the signers did not commit themselves to any particular conclusion, they did wish to express 'our sense of the value which is

Victorian Scientific Naturalists,' in Harrison, P. and Roberts, J.H. (eds), *Science Without God?: Rethinking the History of Scientific Naturalism*, Oxford: Oxford University Press (2019) pp. 236-54; and 'The Nineteenth-Century Origins of the Problem: Naturalistic Metaphysics and the Dead Ends of Victorian Theology,' in Harrison, P., Milbank,J. and Tyson P. (eds), *After Science and Religion: Fresh Perspectives from Philosophy and Theology*, Cambridge: Cambridge University Press (2022) pp. 34-58.

10 See Ungureanu,J.C. *Science, Religion, and the Protestant Tradition*, esp. pp. 22-66, 67-103.

11 'The Coming Battle,' British Weekly (12 Aug, 1887): 225.

12 See Ellis, I. *Seven against Christ: A Study of 'Essays and Reviews*,' Leiden: Brill (1980); Altholz, J. L. *Anatomy of a Controversy: The Debate over 'Essays and Reviews,' 1860-1864*, Aldershot: Scholar Press (1994); Shea, V. and Whitla, W. (eds.), *Essays and Reviews: The 1860 text and its reading*, Charlottesville: University Press of Virginia (2000).

to be attached to enquiries conducted in the spirit so earnest and reverential, and our belief that such enquiries must tend to elicit truth, and to foster a spirit of sound religion.' As men of science, the signers declared that they felt the discoveries in science and the general progress of thought had necessitated some modification of the views generally held on theological matters. They thus welcomed attempts to establish religious teaching on a 'firmer and broader foundation.'[13] Although the address was never published, this collective effort shows how men of science rallied in support of liberal churchmen promoting biblical criticism.

Many scientific naturalists have had a long-standing interest in biblical criticism and liberal theology. Huxley, Tyndall, and Spencer, for example, were avid readers of the *Leader*, a radical weekly newspaper that was published between 1850 and 1860.[14] The *Leader* was edited by Chartist Thornton Leigh Hunt (1810-1873) and literary critic George Henry Lewes (1817-1878), and financially supported by liberal clergyman Edmund R. Larken (1809-1895). According to literary scholar Rosemary Ashton, the *Leader* promoted 'a larger Christian liberalism than then existed.'[15] Filling a gap between the arts-oriented *Athenaeum* and the more politically conservative *Spectator*, the *Leader* served as a record of radical causes and a forum of advanced opinion. Each title page of the weekly, for instance, began with a quote from Prussian explorer and naturalist Alexander von Humboldt's (1769-1859) multivolume *Cosmos: A Sketch of a Physical Description of the Universe* (1845-62):

> The one Idea which History exhibits as evermore developing itself into greater distinctness is the Idea of Humanity—the noble endeavour to throw down all the barriers erected between men by prejudice and one-sided views; and by setting aside the distinctions of Religion, Country, and Colour, to treat the whole Human race as one brotherhood, having one great object—the free development of our spiritual nature.[16]

Humboldt was an important figure in the German romantic movement, and his scientific works were both voluminous and controversial. Many readers were shocked by his refusal to refer to a Creator when discussing Creation. While he eschewed the language of natural theology, Humboldt nevertheless had a deep respect for the Bible, particularly the Old Testament, which he admired for its poetic love for nature.[17] Humboldt was also grateful to Christianity for exercising 'a favorable influence on the *humanization* of nations in their

13 This document is quoted in full in Shea and Whitla, *Essays and Reviews*, pp. 657-59.

14 See Francis, M. *Herbert Spencer and the Invention of Modern Life*, New York: Cornell University Press (2007) pp. 111-31.

15 See Ashton, R. *G. H. Lewes: A Life*, Oxford: Clarendon Press (1991) p. 88.

16 *Leader* (30 March, 1850) 1, no. 1, 1.

17 von Humboldt, A. *Cosmos: A Sketch of a Physical Description of the Universe*, vol 2, New York: Harper & Brothers (1877) pp. 57-60.

morals, manners, and institutions.'[18]

As many historians have pointed out, Humboldt was known for more than just his scientific discoveries.[19] He not only helped remove God from the scientific study of nature, but he also fashioned a heroic model of expeditionary science that combined personal narrative with an emphatic sense of quest for adventure. This appealed greatly to the editors of the *Leader*. They acclaimed Humboldt's inchoate 'developmental' view of the spiritual progress of man, even using it as a weapon against radical materialists who promoted a godless universe. His vision of nature as a unified, dynamic whole, from the smallest microbe to the largest forest, a 'net-like intricate fabric' of 'never-ending activity,' is now part of our own holistic view of ecology. To be sure, Humboldt rejected institutional religion and was more willing than earlier generations to explain the natural world without reference to God; but he nevertheless affirmed the spiritual and aesthetic motivations of his work. It's worth nothing, as Robert Richards has shown, that Humboldt's view of the natural world deeply influenced Darwin.[20]

Obviously, then, the contents of the *Leader* were not necessarily atheistic. The editors of the weekly spoke of a 'New Reformation' in religion, one that would bring humanity one step closer to fulfilling the Protestant Reformation of the sixteenth century.[21] They proclaimed their hope that this new Reformation would 'restore religion to its proper function.' But the new Reformation would go beyond Luther by offering 'absolute freedom,' giving every soul 'the sacred privilege of its own convictions.' In a revealing editorial, the *Leader* presented readers with their own history of the progress of religion. They agreed that Catholicism was a grand, colossal system but nevertheless representative of only 'one phase of our social transformation.' Protestantism likewise was simply another agent in the progress of civilization. But unlike Catholics, Protestants have '*democratized* Religion; it has declared that every human soul has the sacred right to freedom; it has wrested authority from the Church to rear that authority upon Convictions.'[22]

18 Humboldt, *Cosmos*, p. 199.

19 See Rupke, N. *Alexander von Humboldt: A Metabiography*, Frankfurt am Main: Peter Lang (2005).

20 Richards R.J. and Ruse, M. *Debating Darwin*, Chicago: University of Chicago Press (2016) esp. pp. 83-150. See also Richards, R.J. *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe*, Chicago: University of Chicago Press (2002).

21 On the pervasive concept of the 'New Reformation' among nineteenth-century dissident intellectuals, see Ungureanu, J.C. 'Science, Religion and the 'New Reformation' of the Nineteenth Century,' *Science & Christian Belief* (2019) 31, 46-61.

22 'The New Reformation,' *Leader* (27 Apr, 1850) 1, no. 5, 105-106. See also 'The Progress of the New Reformation,' *Leader* (11 May, 1850) no. 1, no. 7, 153; and 'Social Reform,' *Leader* (10 Aug, 1850) no. 1, no. 20, 469-70

It is essential to point out that both Lewes and Hunt saw themselves as part of a new era—a 'positive age' that was leaving behind all 'theological' and 'metaphysical' superstitions. The *Leader* was thus a disciple of French philosopher Auguste Comte (1798-1857). They saw orthodox religion as outdated, and its theology as nothing more than superstition. They thought that only science could solve society's practical problems, not established religion. Lewes had already applied this 'positive' approach in his *Biographical History of Philosophy*, which he wrote in 1846. He praised Comte for his demand that all social questions be treated the same way as other scientific questions.[23]

As a movement of protest, the *Leader* was very interested in using historical-critical approaches to study the Bible and early Christianity. According to one editorial, we are now entering a time of 'free inquiry' into both nature and Scripture. Rationalism is seen as a natural result of Protestantism, with the divisions among Protestants making the Bible an open question. Despite this, rationalists and skeptics are helping to usher in a new era of reformation where people will be free to think and express themselves without fear of hypocrisy or compromise. The divisions of Protestantism made the Bible an open question. In fact, Protestantism has already dealt a death blow to dogmatism by making private judgment sacred. The *Leader* believes that true Protestantism would involve scholars working to determine not just what the words mean, but what the writers intended.[24] The *Leader* thus called for a new edition of the Bible by 'scholars whose only purpose shall be to find out, not what the words may mean, but what the writers meant.'[25]

To this end, in its pages the editors of the *Leader* promoted the work of such scholars. In its decade-long run, the *Leader* published numerous articles and reviews of dissident intellectuals, including Robert William Mackay (1803-1882), Francis William Newman (1805-1897), William R. Greg (1809-1881), and Charles Hennell (1809-1850), among others. Newman, the younger brother of Cardinal Newman, became the *Leader*'s hero of religion. His spiritual autobiography *Phases of Faith*, first published in 1850, which chronicled his break with orthodox Christianity, was discussed extensively throughout the *Leader*. Newman's religion of 'pure light' became the new gospel for the editors, and the basis of the 'new Reformation.'[26]

Mackay was a philosopher and theologian who associated with radical publisher John Chapman (1821-1894) and was influenced by the Tübingen School of Theology. He published several works, including *The Progress of the Intellect,*

23 See Lewes, G.H. *The Biographical History of Philosophy*, New York: D. Appleton & Co. (1875), pp. 776-88.

24 'Protestantism Versus Luther and the Pope,' *Leader* (30 Nov, 1850) 1, no. 36, 850.

25 'Mackay's Progress of the Intellect,' *Leader* (10 Aug, 1850) 1, no. 20, 471-73, on 473.

26 These ran in the *Leader* from 18 May, 1850 to 29 June, 1850.

*as exemplified in the religious development of the Greeks and Hebrews* (1850), *A Sketch of the Rise and Progress of Christianity* (1853), and *The Tübingen school and its antecedents* (1863). He was in fact one of the earliest writers to introduce German historical criticism to an English audience. Perhaps unsurprisingly, Mackay believed that 'the hypothesis of miracle has lost its usefulness.' Mackay believed that miracles were inconsistent with the order of a perfect government. A 'perfect and immutable being,' he contended, 'cannot break his own laws, or be at variance with himself.' Thus notions of miracles should be replaced with the belief in the perfection and uniformity of natural law. Seen in this way, Mackay believed that 'religion and science are inseparable,' if by 'religion' we mean '*ascension mentis in Deum per scala creatarum rerum*, the evolving grounds of hope, faith, and duty from the known laws of our being and the constitution of the universe.' In the final analysis, Mackay concluded, historical Christianity must be replaced with a new and more rational religion.[27] The reviewer for the *Leader* lauded Mackay for his 'miraculous' feat of research.[28]

Greg's *Creed of Christendom*, written in 1851, similarly advocated for a more enlightened view of religion. Greg believed that science and theology need not be at odds with one another, as God had created a universe that was both mysterious and well-ordered. In fact, with the advancement of science came newfound progress in theology. Religion, accordingly, was necessarily progressive, ever-changing because humanity itself was ever-changing.[29] The *Leader* referred to Greg as a devout and practical writer, one of the 'pioneers of the New Reformation.' He was a leading opponent of 'dogmatic theology,' but should never be mistaken as an 'anti-religious zealot.' Instead, Greg represented a new kind of religious thinker, a new Reformer, one who recognized that 'dogmatic Christianity' is a 'misnomer.' The editors praised Greg for recognizing that Christianity was progressive, a 'truth of which society is in urgent need.'[30]

The *Leader* also compared Greg's *Creed of Christendom* favorably to Hennell's earlier *Inquiry Concerning the Origins of Christianity* (1838). Raised in a Unitarian household, Hennell came to the conclusion that the Bible should be approached like any other book. Nevertheless, he continued to view Christianity as 'the purest form yet existing of natural religion,' which he also wrote at length in his *Christian Theism* (1839). In his *Inquiry*, Hennell heaped generous praise upon Jesus and Christianity, and expressed the hope that his position could be construed as within the faith rather than without.[31] Reverent in spirit,

27 Mackay, R. W. *The Progress of the Intellect, As Exemplified in the Religious Development of the Greeks and Hebrews*, 2 vols. London: John Chapman (1850) vol. 1, pp. 20, 22, 40.

28 'Mackay's Progress of the Intellect,' *Leader* (10 Aug, 1850) 1, no. 20, 471-73.

29 Greg, W. R. *The Creed of Christendom*, London: John Chapman (1851) pp. viii-xvii, 192.

30 'The Creed of Christendom,' *Leader* (20 Sept, 1851) 2, no. 78, 897-99.

31 Hennell, C.C. *An Inquiry Concerning the Origin of Christianity*, London: T. Allman (1838) pp. vi-vii.

the *Leader* congratulated Hennell for ascertaining 'how far the popular idea of Christianity will sustain the test of impartial criticism.'[32]

German Protestant historians and early biblical critics greatly influenced all these writers and more. 'The German theological professors,' the editors of the *Leader* wrote, 'are proverbially prodigies of learning.' 'The eighteenth century was the era of demolition…to destroy superstition, to uproot dogmatic religion, to democratize Government, to rebel against class legislation, and protest in all shapes and in all places against whatever was arbitrary.'[33]German scholars such as Friedrich Christoph Schlosser (1776-1861), Karl Gottlieb Bretschneider (1776-1848), Augustus Neander (1789-1850), and Friedrich D. E. Schleiermacher (1768-1834) were extolled in its pages as among the highest 'religious teachers and reformers' of the century. In reviewing the English translation of Bretschneider's (1776-1848) *A Manual of Religion and of the History of the Christian Church* (1857), the *Leader* declared that in Germany 'there is a greater degree of liberality' on questions of theology.[34] The *Leader* also praised Neander's *Dogmengeschichte*, or 'Lectures on the History of Christian Dogmas.' Its editors were glad English readers could now 'participate in the advantages to be derived from a perusal of works which earned for themselves a wide-spread European reputation.'[35] And, again, unsurprisingly, the *Leader* promoted the English translation of the 'Life and Letters' of Schleiermacher. According to the editors, Schleiermacher 'roused the indifferent and sceptical by appealing directly to the true religious sentiment within us as the source of piety to God and love to man.' Indeed, the German pastor 'stands high among religious teachers and reformers.'[36]

It should come as no surprise, then, that the *Leader* also praised the American 'New Theology' movement, led by figures such as Horace Bushnell (1802-1876) and Theodore Parker (1810-1860).[37] The pervading character of this movement, the editors observed, is a 'protest more or less vigorously against the principle of religious dogmatism.' Bushnell was a champion of a 'freer theology,' while Parker presented a 'religion for our age.' The *Leader* reviewed Bushnell's *God in Christ* (1850), which sought to demonstrate that language is in its nature imperfect, that 'all dogmatism must partake of the crude and imperfect character of the vehicle, and, therefore, is of less authority than is

32 'The Creed of Christendom,' p. 899.

33 'Schlosser's History of the Eighteenth Century,' *Leader* (11 Jan, 1851) 2, no. 42, 39-40.

34 'German Protestantism,' *Leader* (28 Feb, 1857) 8, no. 362, 211.

35 'Lectures on Christian Dogmas,' *Leader* (29 Jan, 1859) 10, no. 462, 141-42.

36 'A German Pastor,' *Leader* (18 Feb, 1860) 11, no. 517, 164-65.

37 On American 'New Theology,' see, e.g., Hutchison, W.R. *The Modernist Impulse in American Protestantism*, Durham: Duke University Press (1992) and Dorrien, G. *The Making of American Liberal Theology: Imagining Progressive Religion*, 1805 – 1900, Louisville: Westminster John Knox Press (2001).

commonly conceded to it.' This led the editors to proclaim that 'religion cannot be written or spoken in *words*,' but rather is an emotional, imaginative, purely aesthetic element of human nature. The editors admit, however, that many might accuse Bushnell of the 'vaguest mysticism.' But they countered, 'the highest minds *have* a faith beyond all dogmatic expression.' Is not religion, they asked, 'itself in any and every sense essentially both idealistic and mystical to every human soul that has every truly thirsted for the waters of life?' The editors of the *Leader* were no doubt favorably inclined to Bushnell in his contention that 'God is preparing the introduction at last of some new religious era.' They concluded that Bushnell encourages a 'freer interpretation to the sacred writings, by utterly abandoning the doctrinal system in which they are at present confined.'[38]

The editors of the *Leader* discovered a 'religion for our age' in the writings of Parker. In their review of Parker's sermons, the *Leader* took another opportunity to express 'a few words in the more positive direction of our religious views.' Like Parker, they wished to 'cast aside as false or obstructive everything but the central ideas of Christianity.' For the *Leader*, the man who pursues truth, justice, and love, loves God. In this way, men of science and even skeptics may have, as Parker put it, an 'unconscious piety.' Indeed, the more a person follows truth, justice, and love, the more religious they are. Moreover, in studying the 'facts of nature,' the man of science studies 'the thought of God, for in the world of realities a fact is the direct speech of God.' In this sense, 'Science is eminently religious.' Christianity, the *Leader* argued, is 'not a belief in the "evidences" of his having lived, and done, and said, such and such things' but rather 'belief in Christ.'[39]

## The *Reader* and the '*Liberal Alliance*'

The *Leader* ultimately folded in 1860, gradually declining in interest against so many other competing weeklies of the period. However, the scientific naturalists were so impressed by its content that when they took over the literary journal the *Reader* in 1864, they adopted a similar approach. The *Reader*, which would eventually transform into the scientific journal *Nature*,[40] had a unique blend of literary traditions: scientific, religious, and social criticism. Interestingly, and perhaps most striking to modern eyes, was its dedication to publishing reviews and essays on the latest biblical scholarship. Established in

38 'Bushnell's Three Discourses,' *Leader*, (13 Jul, 1850) 1, no. 16, 376; (27 Jul, 1850) 1, no. 18, 424-25.

39 'The Religion for Our Age,' *Leader* (29 Jan, 1853) 4, no. 149, 111-12; (5 Feb, 1853) 4, no. 150, 139-40; and (26 Feb, 1853) 4, no. 153, 211-12.

40 See Baldwin, M. *Making 'Nature': The History of a Scientific Journal, Chicago*: University of Chicago Press (2015).

1863 by the Christian socialists J. M. Ludlow (1821-1911) and Thomas Hughes (1832-1917), along with astronomer Joseph Norman Lockyer (1836-1920), who were themselves all inspired by the writings of Broad Churchman Frederick D. Maurice (1805-1872), the *Reader* was soon acquired by the 'young guard' of scientific naturalism.[41] Indeed, beginning in 1864, Huxley and Tyndall started serving as its science editors, and Spencer became responsible for its content on philosophy, psychology, and theology.[42] Despite this takeover, the *Reader* remained a 'liberal alliance,' according to historian Ruth Barton.[43]

In its pages, for example, the *Reader* heaped praises on the controversial *Essays and Reviews* (1860). It was proclaimed as ushering in a 'new theology.'[44] Moreover, Edward V. Neale (1810-1892), a prominent Christian socialist who was also influenced by Maurice, also reviewed several critical pamphlets against John William Colenso's (1814-1883) *The Pentateuch and the Book of Joshua Critically Examined* (1862), which was, perhaps unsurprisingly, dedicated to Maurice. Colenso, who was Bishop of Natal in South Africa, argued that 'very considerable portions of the Mosaic narrative' are 'unhistorical,' including the whole account of the Exodus.[45] According to a later contemporary, Colenso's book was the first thoroughgoing attempt to introduce modern biblical criticism in British society.[46] In the *Pentateuch*, Colenso challenged conventional beliefs by using statistical analysis to question the logistical requirements for the wilderness experience of the Israelites. He concluded that it was impossible to accept the Old Testament as a divinely inspired account of history. Colenso presented his work as a labor on behalf of the cause of 'Truth,' as revealed by scientific investigation. He felt that science would revolutionize the Church of England. According to Colenso, science was 'God's precious gift,' and therefore called on theologians to accept the wave of new knowledge rather than resist it.[47] He even told his friends that he wished to form a scientific society, like one might have for geology or astronomy, for the scientific study of the origin and

41 On the 'Christian Socialists,' see Norman, E. *The Victorian Christian Socialists*, Cambridge: Cambridge University Press (1987).

42 Pollock, F. *Personal Remembrances*, 2 vols. London: Macmillan and Co. (1887), vol. 2, pp. 128-33. See also Pearson, K. *Life and Letters and Labours of Francis Galton*, 3 vols. (Cambridge: Cambridge University Press, 19-14-30), vol 2, pp. 67-69 (1924).

43 Barton, R. *The X Club: Power and Authority in Victorian Science*, Chicago: University of Chicago Press (2018) p. 202.

44 'The Edinburgh and the Quarterly on the New Theology,' *Reader* (July 30, 1864) 4, no. 83, 123-24.

45 Colenso, J.W. *The Pentateuch and Book of Joshua Critically Examined*, vol. 1, London: Longman, Green, Longman, Roberts, & Green (1862), pp. xvii, xix.

46 Cheyne, T.K. *Founders of Old Testament Criticism: Biographical, Descriptive, and Critical Studies*, London: Methuen & Co. )1893) p. 196.

47 Colenso, *The Pentateuch*, vol. 4, London: Longman, Green, Longman, Roberts, & Green (1863) p. 303.

history of all religions.[48] For his efforts, Colenso not only received invitations to the London Athenaeum Club, but was also a guest to many of the X Club dinners, which was a group of eminent scientists and long-time friends with a common devotion to science, pure and free, untrammeled by religious dogma. The X Club, unsurprisingly, boasted the membership of Huxley, Spencer, Tyndall, and others.[49]

In responding to critics of Colenso, the *Reader* asked if religious belief could survive critical inquiry. Despite being assailed by critics, Colenso has already provided an answer to this question. According to Neale, the foundation of faith should not be built on the 'hollow props' of 'infallibility.' The Church was established not on infallibility but the 'Spirit of Christ,' which is the 'perfect law of liberty,' he wrote. This foundation, he contended, is impervious to any criticism. No matter how much criticism it faces, this 'higher knowledge' cannot be undermined. Neale believed that instead of using Scripture to prove that God can override nature, they should be used to demonstrate that He can and does employ all natural powers, including the powers of human nature, to achieve ends that are higher than natural powers alone could achieve. In this way, Neale argued that 'every work of human art is supernatural,' including the art of science.[50]

Neale also reviewed Mackay's *Tübingen School and its Antecedents* (1863) for the *Reader*. Mackay's book gave Neale another opportunity to discuss the 'controversy now raging' over the criticism of Scripture. English theologians, Neale wrote, 'build their religious confidence upon the *words* of the Bible.' But this is a mistake. Before the canonical books, there was the 'Spirit' of God. Christian belief, as Mackay observed, must rest 'not on a doctrine but a life.'[51] The later Church developed doctrines and statements 'unknown either to the Scriptures or the earlier fathers,' according to Neale. The 'conclusions of critical criticism enable us to appeal, in evidence of the great truths of Christianity…, the whole course of thought at a great turning point in human history,' setting us 'free' from the 'oppression produced through…the teaching in the theology of Rome.' 'If the foundation goes, the building must fall,' Neale averred.[52]

Later, John Llewelyn Davies (1826-1916), another Broad Churchman influenced by Maurice, wrote that 'it is evident that we are at the beginning of a con-

48 Cox, G. W. *Life of John William Colenso*, 2 vols, London (1888) vol. pp. 234-37, 271. See also the collection of essays in. Draper, J.A. *The Eye of the Storm: Bishop John William Colenso and the Crisis of Biblical Inspiration*, London: T & T Clark International (2003).

49 Barton, *The X Club*, pp. 185-97.

50 'Bishop Colenso and His Critics: A Layman's View,' Reader (7 Feb, 1863) 1, no. 6, 139-40.

51 Mackay, R. W. *The Tübingen School and its Antecedents: A Review of the History and Present Condition of Modern Theology*, Edinburgh: Williams and Norgate (1863) p. 18.

52 'The Tübingen School,' *Reader* (27 Jun, 1863) 1, no. 26, 624.

siderable conflict between the prevalent opinion of the religious world and the discoveries of science.' He noted that similar conflicts had arisen in the past, such as in the fields of astronomy and geology. In those instances, Davies felt that science had emerged victorious over religious opinion, and that, indeed, 'religious opinion was worsted.' Despite this, Davies believed that these controversies had actually served to strengthen faith, leading to a more elevated and refined belief system, a 'higher and purer faith.' Davies credited Maurice with embracing science as a valuable instrument for faith. According to Davies, Maurice had separated or 'disengaged' the Bible from any 'subject for physical inquiry,' recognizing that its true focus was on the 'moral world.' Davies saw Maurice as a figure who had successfully combined a 'reverent faith in the Bible as a record of Divine Revelation with a fearless trust in the investigations of science.'[53]

The *Reader* also released two long notices on Dean of St. Paul Henry Hart Milman's (1791-1868) new edition of *History of the Jews*, first published in three volumes in 1830 by John Murray in his 'Family Library' series. Held captive by German liberal theology, Milman depicted the Israelites as 'more or less barbarians, alternately retrograding and improving.'[54] Significantly, he approached the history of Christianity in a naturalistic manner, showcasing religion as adapting itself to human progress. According to the *Reader*, Milman's approach to Jewish history, and in turn, Christian history, was similar to how Greek and Roman history were viewed. In the final analysis, Milman's conclusion showed that the 'supernatural events scattered throughout the sacred books are the natural result, not of actual Divine intervention in the national affairs, but of the interpretation put by the enthusiastic imagination of the people on the ordinary phenomena of life and nature.'[55] Milman's views thus aligned with other Broad Churchmen who aimed to make Christianity more acceptable in intellectual circles during the nineteenth century.

Like the *Leader* before it, the *Reader* praised American 'new theologian' Theodore Parker. As others have shown, Parker was instrumental in exposing New England to German biblical criticism.[56] The *Reader* noted that Parker was

53 'The Bible and Science: Dean Trench and Mr. Maurice,' *Reader* (6 Jun, 1863), 1, no. 23, 549-50. See also 'Promotions of Dean Trench and Canon Stanley,' *Reader* (14 Nov, 1863) 2, no. 46, 559-60.

54 Milman, H.H. *The History of the Jews. From the Earliest Period Down to Modern Times*, 3 vols. London: John Murray (1863) vol. 1, p. xxxvi.

55 'Dean Milman's History of the Jews,' *Reader* (23 May), 1, no. 21, 496-98; (30 May, 1863), 1, no. 22, 520-21. See also 'The History of the Jews,' *Reader* (29 Dec, 1866) 7, no. 209, 1032-34.

56 See, e.g., Brown, J.W. *The Rise of Biblical Criticism in America, 1800-1870*, Middleton, CT: Wesleyan University press (1969) pp. 153-70; Dorrien, G. *The Making of American Liberal Theology: Imagining Progressive Religion, 1805-1900*, Louisville: Wesminster John Knox Press (2001) pp. 58-110.

unique in his complete denial of a supernatural revelation, yet who still identified as a Christian. The *Reader* provided a brief description of Parker, calling him 'lively,' a 'vigorous thinker,' an 'eloquent speaker,' and a 'fearless man.' Parker taught three main things: the infinite perfection of God, the relative perfection of human nature, and 'natural religion,' which was the natural 'development of the feelings, the ideas, and the actions, of man.'[57] This basic theism is present throughout his *Collected Works*, which the *Reader* also reviewed in 1865, praising Parker and others like him for 'trying to lead others along the divine road which leads to perfect truth and perfect goodness.'[58]

Finally, it is worth noting that both the *Leader*[59] and *Reader*[60] celebrated the arrival of the naturalistic 'lives of Jesus' genre in the mid-nineteenth century, which aimed to portray Jesus of Nazareth as simply human. Both weeklies commented on numerous biographies of Christ, including *Das Leben Jesu* (1835) by David Friedrich Strauss (1808-1874), *La Vie de Jésus* (1863) by Joseph Ernest Renan (1823-1892), and *Ecce Homo: A Survey of the Life and Work of Jesus* (1865), published anonymously by John Robert Seeley (1834-1895), among others.[61] Although there is not enough space here to examine the topic of the Jesus of Victorian scientific naturalism, it is clear that many in this group believed Jesus was merely a wise teacher.[62] But as German theologian Martin Kähler famously contented at the end of the century in his *Der sogenannte historische Jesus und der geschichtliche, biblische Christus* (1892), the 'historical Jesus' of modern authors is a figment of their imagination, and in direct contrast to the 'historic Christ.'[63] Thus while professing 'religion,' both weeklies and the writers they supported combined a reverence for science, an evolutionary interpretation of history, political radicalism, and a new religious reformation.

57 'Life of Theodore Parker,' *Reader* (2 Jan, 1864), 3, no. 53, 4-5.

58 'Theodore Parker,' *Reader* (2 Sept, 1865) 6, no. 140, 252-53.

59 See, e.g.: 'Neander's Life of Christ,' *Leader* (8 Feb, 1851) 2, no. 46, 128-30; and 'Jesus Christ,' Leader (13 Nov, 1860) 9, no. 451, 1221-22.

60 See, e.g.: 'Renan's 'Life of Jesus,' *Reader* (18 Jul, 1863) 2, no. 29, 52-54; 'The Strasburg School of Theology,' *Reader* (3 Sept, 1864) 4, no. 88, 287; 'Life of Christ,' *Reader* (30 Sept, 1865) 6, no. 144, 367-68; 'Strauss' Life of Jesus,' *Reader* (25 Nov, 1865), 6, no. 152, 590-91; 'Ecce Homo,' *Reader*, (13 Jan, 1866) 13, no. 159, 33-34; 'De Pressense's Christ,' *Reader* (24 Mar, 1866) 7, no. 169, 295-96; and 'Renan's Apostles,' *Reader* (5 May, 1866) 7, 175 437.

61 On the 'lives of Jesus' genre, see, e.g., Stevens, J. *The Historical Jesus and the Literary Imagination, 1860-1920*, Liverpool University Press (2010); Pals, D.L. *The Victorian 'Lives' of Jesus, San Antonio*, TX: Trinity University Press (1982); and Hesketh, I. *Victorian Jesus: J. R. Seeley, Religion, and the Cultural Significance of Anonymity*, Toronto: University of Toronto Press (2017).

62 See, e.g., Thornton Hunt, 'Social Reform,' *Leader* (17 Aug, 1850) 1, no. 21, 493-94.

63 Kähler, M. *The So-Called Historical Jesus and the Historic, Biblical Christ*, trans. Braaten, C.E., Philadelphia: Fortress Press (1964). For those wishing to explore this topic in more detail, see the recent work of Brown, C. and Evans, C.A. *A History of the Quests for the Historical Jesus: From the Beginnings of Christianity to the End of World War II*, 2 vols. Grand Rapids: Zondervan (2022).

## The Bible of Scientific Naturalism

While much more can be said about the *Leader* and the *Reader*, it should now be clear that the scientific naturalists were well-informed about the latest and greatest in historical-critical scholarship. One example that stands out is Thomas H. Huxley, who, contrary to popular belief, was more of a literary man than a scientific one, as G. K. Chesterton once quipped.[64] In fact, he grew up in a strict 'evangelical' household[65] and had a deep love for the Bible as a child.[66] Despite later becoming an agnostic, Huxley continued to recognize the importance of the Bible in Victorian society, even arguing for its continued use in state schools.[67]

In the 1880s, Huxley seemingly abandoned scientific research altogether and embarked on a late second career as a biblical critic. He had even intended to write and deliver lectures on the Bible specifically for the working-class.[68] Biblical criticism, as historian Adrian Desmond put it, became Huxley's *cheval de bataille*.[69] In fact, in 1884 Huxley told his colleague, English physiologist Michael Foster, that 'I am principally occupied in studying the Gospels.'[70] Biblical studies thus dominated his thoughts and writing from 1885 until his death a decade later.

While he never completed his ambitious 'lectures on the Bible,' Huxley did write a series of interconnected and complimentary essays on the topic, most of which were published in the *Nineteenth Century* magazine between 1885-91. Incidentally, this is the period in which Huxley also expounded publicly what he meant by 'agnosticism,' in what ended up being a trilogy of articles: 'Agnosticism,' 'Agnosticism: A Rejoinder,' and 'Agnosticism and Christianity.'[71] In his attempt to explain how he came to coin the term 'agnosticism,' he also explores and discusses at length the synoptic problem in Gospel studies and other issues in biblical criticism.[72] These essays and others were compiled in

64 Chesterton, G. K. *The Victorian Age in Literature*, London: Williams and Norgate (1913) p. 39.

65 Huxley, T.H. *Essays upon some Controverted Questions*, London: Macmillan and Co. (1892) p. 346.

66 Huxley, T.H. *Collected Essays, Science and Education*, vol. 3, London: Macmillan and Co. (1894), p. 213.

67 See discussion in Larsen, T. *A People of One Book: The Bible and the Victorians*, Oxford: Oxford University Press (2011) pp. 196-218.

68 Huxley, L. *Life and Letters of Thomas Henry Huxley*, 3 vols. London: Macmillan and Co. (1908), vol. 3, pp. 279-80.

69 Desmond, A. *Huxley: From Devil's Disciple to Evolution's High Priest*, Reading, MA: Helix Books (1997) p. 571.

70 Huxley, *Life and Letters*, vol. 2, p. 362.

71 Huxley, *Essays Upon Some Controverted Questions*, pp. 236-93; 317-49; and 350-90.

72 See Huxley, *Essays Upon Some Controverted Questions*, pp. 262ff.

a massive 625-page volume entitled *Essays Upon Some Controverted Questions* (1892). As Desmond observed, 'ironically, after a life of science, his biggest book was of biblical criticism.'[73]

Furthermore, the prefaces and prologues to his *Collected Essays* (1892-94) also provide ample evidence of the influence of biblical criticism on Huxley's mind. Indeed, at the very beginning of one volume, Huxley gives a long quote from Strauss's later 1872 work, *Der alte und der neue Glaube* ('The Old Faith and the New'), a lengthy treatise in which Strauss sought to demonstrate that Christian dogma were historical creations rather than divine truths. For Huxley, Strauss 'one of the protagonists of the New Reformation,' and thus sees in him a kindred spirit.[74] Huxley made it clear that his criticism was never toward the Bible nor Christianity, but rather 'ecclesiasticism.'[75] Similarly, recall that Strauss' basic assumption was that, in the Gospel narratives, whatever 'is irreconcilable with the known and universal laws which govern the courses of events,' then it would be false.[76] Strauss thus *knew* that some events in the New Testament were not historical because he already *knew* that it is impossible for God to have an immediate effect on the world. At the end of his *Das Leben Jesu*, moreover, in discussing his new Christology, Strauss proclaimed the deification of humanity as 'the union of the two natures—God became man, the infinite manifesting itself in the finite, and the finite spirit remembering its infinitude.'[77] Hints of Comte's 'Religion of Humanity' should be obvious.

Interestingly enough, Huxley also contended, like Strauss, that the 'logical development of Protestantism could not fail to lay the authority of the Scriptures at the feet of Reason; and, in the hands of latitudinarian and rationalists theologians, the despotism of the Bible was rapidly converted into an extremely limited monarchy.'[78] But Huxley was not a fan of the Lutherans, Calvinists, or Zwinglians. His hero was Erasmus, who was 'essentially a theological whig,' according to Huxley. 'Erasmus was, at heart, neither Protestant nor Papist, but an "Independent Christian"…a sort of broad-church Voltaire.' Huxley also noted that while many clergymen had initially rejected historical-criticism, most now have 'consented to the proposals of that scientific criticism which the memorialists renounce and denounce.'[79] Again, despite all this criticism, Huxley re-

73 Desmond, *Huxley*, pp. 592-93.

74 Huxley, T.H. *Collected Essays, Science and Christian Tradition*, vol. 5 (London: Macmillan and Co., 1894), pp. v-vi.

75 Huxley, *Science and Christian Tradition*, p. vii.

76 Strauss, D.F. *The Life of Jesus, Critically Examined*, trans. Marian Evans, 2 vols. New York: Calvin Blanchard (1860) vol. 1, p. 71.

77 Ibid., vol. 2, p. 895.

78 Huxley, *Science and Christian Tradition*, p. 11.

79 Huxley, *Science and Christian Tradition*, p. 26.

jected the idea that the Bible should be tossed 'aside as so much waste paper.'[80] For a layman with no formal education in theology, Huxley demonstrates a surprisingly informed knowledge not only of New Testament studies but also the Biblical criticism of his time.[81]

## The History of the 'Scientific Interpretation' of the Bible

While a more detailed study will no doubt issue more dividends, in the remainder of this essay I want focus on the writings of Cornell University President Andrew Dickson White, which definitively shows how biblical criticism played a central role in his narrative of the 'warfare' between science and theology. In the final section of his *A History of the Warfare of Science with Theology in Christendom*, White sought to trace the history of the 'scientific interpretation' of the Bible, or what he also described as the movement from 'divine oracles to the higher criticism.' He begins by describing the 'laws governing the evolution of sacred literature.' Here explicitly refers to Comte's social theory of 'Law of Wills and Causes,' found in his *Cours de Philosophie Positive* (1830-42), and also translated and condensed into English in 1853 by Harriet Martineau (1802-1876), sister of famous Unitarian preacher James Martineau (1805-1900). Comte believed that society passed through three stages. The first of these stages is the theological, in which the forces of nature are personified as gods; the second is the metaphysical, a transitional phase in which the gods are replaced by abstract entities and causes; and finally the scientific or positive stage, in which all the dynamics of nature and social are understood as conforming to the laws of nature.[82]

Most historians of science claim that Draper adhered to Comte's theory. However, Draper neither cites nor even alludes to Comte throughout any of his published writings.[83] Indeed, his understanding of the 'ages of man' or human civilization is more Shakespearian than Comtean (the age of Infancy, Childhood, Youth, Manhood, Old Age, and Death).[84] Indeed, the 'ages of man' motif

80 Huxley, *Science and Christian Tradition*, p. 55.

81 For a more detailed examination of Huxley and other members of the X Club in relation to biblical criticism, see Ungureanu, J.C. 'The 'New Reformation' of Scientific Naturalism,' in Kleven, T.J. (ed), *Faith and Reason in the Reformation*, Lanham: Lexington Books (2022) pp. 179-202.

82 See Martineau, H. *The Positive Philosophy of Auguste Comte*, 2 vols. London: Kegan Paul, Trench, Trübner, & Co. (1893) vol. 1, pp. 1-14.

83 The one exception is his *Human Physiology: Statical and Dynamical: The Conditions and Course of the Life of Man* (New York: Harper & Brothers, 1856), where, in the Preface, he referred to the need of 'Positive Science' or 'Positive Philosophy' (v-vi). Even here he does not cite Comte, but rather adopts the sentiments of French priest and mineralogist René Just Haüy (1743-1822). Moreover, it is worth noting that Draper never again uses that phrase in any of his later publications.

84 See Ungurenau, *Science, Religion, and the Protestant Tradition*, p. 57. Cf. William Shake-

predates Comte, and Draper had himself referred to Blaise Pascal's (1623-62) view of 'the entire succession of men, through the whole course of ages, must be regarded as one man, always living and incessantly learning.'[85] Moreover, Broad Churchman Frederick Temple's 'colossal man' discussion in his contribution to the *Essays and Reviews* also bears striking resemblances to Draper's own analogy.[86]

When it comes to Draper's understanding of biblical criticism, he relied almost exclusively on Oxford orientalist and Dean of Norwich Humphrey Prideaux (1648-1724), who connected the history of Israel with what was known about the history of Egypt and Mesopotamia from classical sources such as Herodotus and Xenophon. He also relied on German Lutheran Ernst Wilhelm Hengstenberg (1802-69), who, despite interpreting the Bible in strictly literalist terms, nevertheless admitted that the Pentateuch was largely a redacted work. Draper also closely followed, perhaps unsurprisingly, John William Colenso. This likely led Draper to the similar conclusion that the Pentateuch was 'not written until many hundred of years' later, and that its 'inconsistencies, incongruities, contradictions, and impossibilities, as exposed by many learned and pious moderns, both German and English,' demonstrates that 'no man may dare impute them to the inspiration of Almighty God.'[87]

In his own narrative, White offered readers a more comprehensive history of biblical criticism. Unlike Draper, however, he explicitly references Comte's tripartite theory, which he appropriates to his narrative of the evolution of the interpretation of Scripture. According to White, in the past, men explained everything by 'miracle and nothing by law' in the older interpretation. White considers allegorical readings to have emerged when men reached 'higher plans of civilization,' which is central to his hermeneutical law of development. When literal interpretation clashed with new knowledge or progress in moral feeling, theologians took refuge in mystical or 'oracular' interpretations.[88]

As explained by White, biblical interpretation has evolved over time from being theological to being metaphysical to being empirical, or positivist. For centuries, the 'oracular' interpretation was the norm until the revival of learning in the fifteenth century brought about a change and undermined the old

speare's 'The Seven Ages of Man' in his 1599 comedy, *As you Like It*.

85 Draper, J.W. *A History of the Intellectual Development of Europe*, New York: Harper & Brothers (1863) pp. 13-14.

86 For a more detailed discussion of the context of Draper's ideas, see Ungureanu, J.C. ' "Your god is Too Small": Retracing the Origins of Conflict between Science and Religion', *Theology and Science* (2022), 20, 23-45.

87 Draper, J.W. *History of the Conflict between Religion and Science*, New York: D. Appleton & Co. (1875) pp. 219-22.

88 Dickson White, A. *A History of the Warfare of Science with Theology in Christendom*, 2 vols. New York: D. Appleton & Co. (1896) esp. vol. 2, pp. 290-94

interpretation of Scripture. Humanists Lorenzo Valla (1407-1457) and Desiderius Erasmus (1466-1536) were instrumental in bringing about this change. Valla, of course, was famous for debunking the 'Donation of Constantine,' which made the pope the feudal overlord of Europe. According to White, Valla embodied the 'spirit of modern criticism.'[89] Erasmus, on the other hand, published the first printed Greek edition of the New Testament in 1516 and openly criticized dogmatic traditions. According to Erasmus, Scripture reveals multiple meanings in this new age, and the conflict between old and new views has led to the 'thunders and lightnings' that shake the world today.[90] Erasmus's rationalist biblical criticism has become an important tradition, and White sees him as a spokesperson for it.[91]

White goes on to list many other notable thinkers in history who have contributed to what is now known as the 'scientific interpretation' of the Bible. Among them are figures such as Hugo Grotius (1583-1645), Isaac La Peyrère (1596-1676), Baruch de Spinoza (1632-1677), and Richard Simon (1638-1712).[92] In particular, Grotius's 1625 work, 'De jure belli ac pacis' (*On the Law of War and Peace*), argued that all nations should be governed by laws ultimately based on natural law. Grotius believed that natural law was unalterable and even asserted that God himself could not change it.[93] Additionally, Grotius held that there are certain ideas that are common to all rational people and that these ideas can be discovered through reason, without recourse to theology. In his 1640 book, 'De veritate religionis christianae' (*The Truth of the Christian Religion*), Grotius turned to the 'laws of nature' in an effort to prove the existence of God. He argued that evidence of God's existence could be seen in creation, including the rise of nations and political events.[94] As many scholars have recognized, Grotius was also a prolific exegete who challenged dominant views of biblical inspiration.

During the Hague Peace Conference of 1899, White had the opportunity to visit the tomb of the Dutch statesman, who had long been a source of inspiration for him. In fact, White went so far as to call the statesman an 'object of idolatry.'[95] In his book *Seven Great Statesmen in the Warfare of Humanity with*

89 White, *A History of the Warfare*, vol. 2, p. 303.

90 Erasmus, D. *Discourse on Free Will: Desiderius Erasmus and Martin Luther*, London: Bloomsbury (2013) p. 96.

91 White, *A History of the Warfare*, vol. 2, pp. 303-34.

92 White, *A History of the Warfare*, vol. 2, pp. 311ff.

93 Grotius, H. *The Rights of War and Peace*, ed. Tuck, R. 3 vols. Indianapolis: Liberty Fund (2005) vol. 1, p. 155.

94 Grotius, H. *The Truth of the Christian Religion*, trans. Clarke J. and ed. Antognazza M.R., Indianapolis: Liberty Fund (2012) pp. 29-95.

95 White, *A History of the Warfare*, pp. 134, 276; Dickson White, A., *Autobiography*, 2 vols. New York: Century (1905) vol. 2, pp. 274, 291, 316, 317, 318, 320. See also White, *Address before the*

*Unreason* (1910), which unfortunately has been largely overlooked by historians of science, White devoted an entire chapter to Grotius. He wrote that during a century marked by religious and political conflict, Grotius emerged 'at a point in time to all appearance hopeless, at a point in space apparently defenseless, in a nation of which every man, woman, and child was under sentence of death from its sovereign.' Grotius, White wrote, was a remarkable man who worked tirelessly to redeem civilization from the main source of human misery. He developed the precepts of right reason in international law outside of Europe, made them heard, and gave a noble change to the course of human affairs. His ideas, reasoning, suggestions, and appeals created an environment in which humanity continued to evolve.[96]

Despite being a more controversial figure, White also held Spinoza in high regard for his views on the authorship of the Pentateuch. Remarkably, White believed that 'in all the seventeenth century there was no man whom Jesus of Nazareth would have more deeply loved, and no life which he would have more warmly approved,' than Spinoza.[97] Spinoza believed that the Bible was merely a historical artifact with primitive views. He argued that it was impossible for any reasonable person to believe in biblical miracles, as science could potentially explain every phenomenon. In his *Tractatus Theologico-Politicus* (1670), he went on to claim that the Hebrew Bible was a composite text with several versions, and therefore could not be the univocal Word of God. As Ernst Cassirer and others have claimed, 'the first attempt at a philosophical justification and foundation of Bible criticism' was made by the Dutch-Jewish philosopher.[98]

The history of the 'scientific' interpretation, as White explained, covers a broad range of perspectives. English deists and latitudinarian divines, French *philosophes*, and German mediating theologians and historians all made contributions. Gotthold Ephraim Lessing (1729-81), a German dramatist and philosopher, was a significant influence on White's personal religious beliefs.[99] Mostly remembered for the publication of 'Fragments of an Unknown' by rationalist Hermann Samuel Reimarus, in which he argued that institutional Christianity was a fraud, Lessing also famously asserted that the teachings of

*Peace Conference of The Hague at the Laying of a Silver and Gold Wreath on the Tomb of Grotius at Delft, in Behalf of the Government of the United States, July 4, 1899*, The Hague (1899).

96 Dickson White, A. *Seven Great Statesmen in the Warfare of Humanity with Unreason*, New York: The Century Co. (1910) p. 55.

97 White, *A History of the Warfare*, vol. 2, pp. 317, 318.

98 Cassirer, E., *The Philosophy of the Enlightenment*, trans. Koelln, F. C. A. and Pettegrove, J. P., Boston: Beacon Press (1955) p. 184. See also Popkin, R.H., *The History of Scepticism: From Savonarola to Bayle*, Revised and Expanded Edition, Oxford: Oxford University Press (2003) pp. 239-53. See esp. Preus, J.S. *Spinoza and the Irrelevance of Biblical Authority*, Cambridge: Cambridge University Press (2001).

99 White, *A History of the Warfare*, vol. 1, p. 288, vol. 2, pp. 192, 319. See also White's *Autobiography*, 2 vols. New York: Century (1905) vol. 1, p. 39, vol. 2, p. 226.

Christ teach an 'inward truth' that existed long before the Bible. According to Lessing, this inward truth can only be known through 'spirit and power.' In his book, *Education of the Human Race*, Lessing also argued that revelation was analogous to the education of a person from childhood to adulthood. The Old Testament was an 'elementary primer' in the education process, but as humankind matured, they sensed the inadequacy of the Old Testament. The New Testament represented a move towards 'the time of a new eternal Gospel,' the last age of man, the 'time of perfection.' As such, according to Lessing, no dogmatic creed is final, for religion is continually evolving. Those who do not allow for its growth fail to understand the very nature of 'religion.' Christianity was merely one stage in the process and would itself be surpassed by a higher form of religious consciousness.[100]

Friedrich D. E. Schleiermacher (1768-1834), considered one of the most important Protestant theologians of the nineteenth century, was another important theologian that greatly influenced White's views. Schleiermacher believed in *Herzreligion*, or 'heart religion,' and created a 'theology of feeling' that aimed to reconcile Christianity with skeptical critiques. Schleiermacher emphasized the importance of personal experience and called on his readers to become aware of their innermost nature. He redefined religion as an immediate self-consciousness or feeling of absolute dependence on God, rather than as morality or knowledge. According to Schleiermacher, the essence of religion is neither thinking nor acting, but intuition and feeling. Thus at the root of Schleiermacher's theological vision was the redefinition of religion. 'Religion's essence,' he wrote, 'is neither thinking nor acting, but intuition and feeling.'[101]

When White turns to the second-half of the nineteenth century, he immediately defends the liberal Anglican authors of the *Essays and Reviews* and especially Colenso and his *Pentateuch*.[102] White believed that these thinkers were 'deeply religious,' and saw Colenso as a righteous leader in his noble efforts to cut the Church loose from outdated interpretations of the Bible.[103] Despite a historical understanding of the Bible taking hold during this time, White maintained that these critics were not generally hostile to religion. At the same time, the way these authors defined 'religion' often contrasted with traditional Christian orthodox beliefs, creating a new and intentionally constructed 'deep religious' sentiment that was distinct from traditional Christianity.

Most historians of science have argued that White's narrative is factually incorrect, which would mean that his 'scientific' interpretation of the Bible

100 Chadwick, H. *Lessing's Theological Writings*, London: Adam & Charles Black (1956) pp. 82-98.

101 See Schleiermacher, F. *On Religion: Speeches to Its Cultured Despisers*, trans. Crouter, R., Cambridge: Cambridge University Press (1988) pp. 3-22.

102 White, *A History of the Warfare*, vol. 2, pp. 341-48.

103 White, *A History of the Warfare*, vol. 2, p. 355.

is also incorrect. However, this argument misses the point. The goal is not to debunk White's work but to understand it within the context of its time. It is important to understand the motivations, inspirations, and impact of his work. The problem with criticism of White's narrative is that not enough attention has been given to what type of document it is and its particular interests and goals. White—but also Draper and many other 'co-founders' of the 'conflict thesis'—drew ideas from various thinkers, polemists, historians, theologians, and early biblical critics.

## Conclusion

Near the end of the century, a writer for the politically liberal *Speaker* believed that:

> [N]othing is more remarkable than the ubiquity of the question as to criticism and the authority of the Scriptures. It is in all the Churches, and with impartial thoroughness vexes all. It puzzles the infallibility of Rome, breaks the unity of the High Anglicans, agitates the stern and unbending Presbyterians, disturbs the peace of the Independents, invades the philosophic calm of those scientific and agnostic souls who are the jealous guardians of the truth and ever on the watch for the slips of men simple minded enough to be subtle.[104]

While biblical criticism was 'everywhere,' it was not necessarily anti-religious. As we have seen, many of the founders and champions of the discipline saw themselves as reformers of religion rather than its opponents. But how these reformers defined the new theology mattered a great deal.

But the birth and rise of modern biblical criticism is extraordinarily complicated. For instance, when Joseph Cardinal Ratzinger, now Emeritus Pope Benedict XVI, spoke about the discipline of biblical studies in 1988, he emphasized the importance of examining its history to better understand its scholarly limits and often hidden philosophical presuppositions. While recognizing the positive impact of modern biblical criticism, Ratzinger also acknowledged that modern criticism is influenced by certain philosophical assumptions and concerns that shape its historical methods and exegetical conclusions. Ratzinger further pointed out that although early modern critics claimed objectivity, scholars should follow Werner Heisenberg's lesson about the experimenter's role in the experiment—namely, that historical and literary scholars often projected their metaphysical biases, prejudices, and assumptions onto their exegetical work. Later, in his 2010 exhortation *Verbum Domini*, Pope Benedict XVI characterized modern biblical criticism as a 'secularized hermeneutic.'[105]

104 'The Churches and the Scriptures,' *Speaker* (1891) 3, 724-25.

105 Pope Benedict XVI, *Verbum Domini*, Boston: Paulin Books & Media (2010). See also his col-

What I hope to have accomplished in this essay is a partial genealogical account of the advent of modern biblical criticism, underscoring, in particular, its intimate relationship to the Victorian conflict between science and religion. That is, one cannot understand the history of science nor the history of biblical interpretation without recognizing how the two have been deeply intertwined. This history can be traced even further back, for before there was a Hermann Reimarus, Gotthold Lessing, or David Strauss, there was a Copernicus, Kepler, Galileo, and Newton.[106] Indeed, many of the central figures of the seventeenth- and eighteenth-century scientific revolution were either influenced by or promoted incipient historical-critical scholarship of the Bible. In this sense, the rise of biblical criticism cannot be understood without the history of science—and conversely.

To be sure, prior to the early modern period, a 'scriptural Bible' was interpreted by an array of exegetical traditions, as Michael Legaspi points out.[107] During the medieval period, scholars developed a set of traditions that become known as the *quadruplex senses*. This consisted of two senses (literal and spiritual) and three spiritual senses (typological, tropological, anagogical). However, with the advent of the Protestant Reformation, a more literal sense came to dominate. And as Peter Harrison has shown, this more literal sense coincided with the rise of modern science.[108] And yet, this symbiotic relationship transformed the Bible from a theological wellspring into a cultural and historical artifact from a dead civilization. Unsurprisingly, the transmutation of a religious text to a testament of customs, beliefs, and practices of the ancient world, what Jonathan Sheehan has aptly called the 'enlightenment Bible,' was achieved, in part, by early modern natural philosophers.[109] This was particularly the case in England, where there existed a long history of protest against Roman Catholicism and the Established Church. But again, as Frei noted long ago, while modern theology began in England at the turn of the seventeenth and eighteenth century, particularly among the English deists, these dissident intellectuals were neither atheists nor even agnostics but promoters of a more 'rational Christianity' or 'natural religion.'[110] Sheehan has similarly observed that the history of 'enlightened' interpretations of the Bible were not an effort

lection of essays in *God's Word: Scripture, Tradition, Office*, San Francisco: Ignatius Press (2008).

106 See, e.g., Ungureanu, J.C. 'Interpreting God's "Two Books": Isaac Newton's Hermeneutics of Nature, Scripture, and History,' *Theology and Science* (forthcoming).

107 Legaspi, M.C. *The Death of Scripture and the Rise of Biblical Studies*, Oxford: Oxford University Press (2010).

108 Harrison, P. *The Bible, Protestantism, and the Rise of Natural Science*, Cambridge: Cambridge University Press (1998).

109 Sheehan, J. *The Enlightenment Bible: Translation, Scholarship, Culture*, Princeton: Princeton University Press (2005).

110 Frei, *The Eclipse of Biblical Narrative*, p. 51.

to discard religion, but to 'remake' it.[111]

What I have emphasized here is the central role biblical criticism played in how nineteenth-century thinkers remade 'religion,' and, ultimately, how that, in turn, defined their understanding of the relationship between religion and science. The rise of biblical criticism was not an objectively neutral affair. It was ideologically driven. It was an attempt to interpret the Bible in a way that would be more compatible with a new, more 'rational' Christianity emerging in the century. This was clearly the case in the reviews and articles published in both the *Leader* and *Reader* journals mid-century. While both disclaimed atheism, they also rejected traditional, historical Christianity. And in their attempt to defend a 'New Reformation,' the editors used and promoted the new discoveries in the natural sciences *and* biblical criticism.

We find this same combination of natural science and biblical criticism in the work of the scientific naturalists at the end of the nineteenth century, especially in the final published writings of Thomas H. Huxley. But more than any other proponent of the so-called 'conflict thesis,' Andrew Dickson White offered readers the most detailed survey of the ways in which biblical scholarship had been read and understood from the formation of the Septuagint to the end of the nineteenth century. For White, modern 'science,' *natural* and *historical*, has acted powerfully to 'dissolve away the theories and dogmas of the older interpretation.' Thanks to 'the labours, sacrifices, and even the martyrdom of a long succession of men of God,' the Bible had been released from 'a mass of entangling utterances,' fruitless 'wrangling interpretations,' 'fetichism, subtlety, and pomp,' and 'everything which the Lord Jesus Christ most abhorred.' According to White, our understanding of 'sacred literature' had grown under the 'divine light which the various orbs of science' provide, which has 'done so much to bring into the mind and heart and soul of man…an exposition, not of temporary dogmas and observances, but of the Eternal Law of Righteousness—the one upward path for individuals and for nations.'[112]

Whatever its shortcoming (and no doubt there are many), a careful reading of White's history of the 'scientific interpretation' of the Bible puts us in a better position to understand how men like him attempted to reconcile the growing sense of separation between reason and faith, science and religion. In short, if we are to make sense of the nineteenth-century 'conflict thesis,' what it was, what it is, and what it may still happen to be, we need to put nineteenth-century narratives of science and religion within the larger history of the origins and rise of modern biblical criticism.

**James C. Ungureanu teaches world religions and philosophy at The Stony Brook School, New York, USA.**

111 Sheehan, *The Enlightenment Bible*, p. 260.

112 White, *A History of the Warfare*, vol. 2, pp. 394, 395.

*PHILIP J. SENTER*

# Zoology and Job 40: Review and critique of the arguments for Behemoth as a dinosaur

*Job 40:15–24 describes a monstrous creature named Behemoth, whom ancient Jewish literature treats as a supernatural monster. In contrast, much literature of the thirteenth century and later applies a zoological approach, interpreting Behemoth as a species of animal, usually the hippopotamus in publications from 1663 onward. Since 1974, numerous advocates of the zoological approach have reinterpreted Behemoth as a dinosaur, usually a sauropod. Arguments for Behemoth as a sauropod include allegations that Job 40 describes an animal that is herbivorous, aquatic, docile, and indomitable; drinks large amounts of water; has strong bones, strong hips, a bulbous midsection, tight sinews, and a cedar-like tail; and is the largest land animal that God made. Here, I investigate the relative popularity and temporal duration of each such argument and determine which such arguments are based on sound interpretations of the Hebrew text. This investigation reveals that no argument for Behemoth as a dinosaur survives scrutiny. Several, notably including the argument that Behemoth's tail is like a cedar, are based on misinterpretations of the Hebrew text. In contrast, all parts of the Hebrew text are consistent with the interpretation of Behemoth as a primordial, supernatural monster.*

**Keywords:** zoology, Old Testament, Job, Behemoth, Leviathan, dinosaur, sauropod, *Iguanodon*, creationism, hippopotamus

## Introduction

In Job 40:15–24, the biblical text describes a monstrous creature called Behemoth. Behemoth is mentioned nowhere else in the Bible. Nor is he mentioned in the writings of ancient Near Eastern people other than the Hebrews. For more information on Behemoth as he was conceived before the Christian era, we must therefore consult extrabiblical Jewish texts from during and shortly after the Second Temple period. The earliest surviving extrabiblical comments on Behemoth are in three Jewish apocalyptic texts: 1 Enoch, 4 Ezra, and 2 Baruch. 1 Enoch is from around the end of the first century BC or the beginning of the first century AD, and 4 Ezra and 2 Baruch are from the late first century AD.[1] In these texts, Behemoth is paired with the monstrous creature Leviathan,

1 Klijn, A.F.J. '2 (Syriac Apocalypse of) Baruch'. In Charlesworth, J.H. (ed.) *The Old Testament*

and the two are treated as primordial monsters that only God can overcome. God is said to have created the pair during the creation of the world, on the fifth day, and then to have separated them from each other and hidden them from human contact, Behemoth in a remote place on land and Leviathan in the depths of the sea. According to this body of literature, God will slaughter the two monsters at the end of time and feed them to the faithful at an eschatological banquet.[2]

Jewish conceptions of the two creatures evolved over time, but certain conceptions remained stable for centuries. For example, Jewish commentaries from the early centuries of the Christian era continued to portray Behemoth and Leviathan as primordial monsters that God will serve to the faithful at the eschatological banquet at the end of time, although other details about the two monsters changed from one commentator to the next.[3] Among early Christian authors, a different interpretation of Behemoth and Leviathan prevailed, in which the two monsters were seen as allegorical representations of the devil and/or his forces. Among Christian authors, this general conception remained stable for the first several centuries of the Christian era, although its details differed among commentators.[4]

In the Middle Ages, a new approach to Behemoth and Leviathan arose, an approach that would eventually supplant the previous conception of the two creatures as primordial monsters and replace it with a view of them as natural animals. Hereafter, I refer to this new approach as the Zoological Approach (ZA) and the previous approach as the Primordial Monster Approach (PMA). Saʿadia ben Yosef Gaon, a Jewish philosopher who lived in Egypt in the late ninth and early tenth centuries, tended toward naturalistic interpretations of scripture. In a commentary on Job, he rendered the name of Behemoth as "one

*Pseudepigrapha, Vol. 1*, Peabody, Massachusetts: Hendrickson (1983), pp. 615–652: pp. 616–617; Stone, M.E. *Fourth Ezra. A Commentary on the Book of Fourth Ezra*, Minneapolis: Fortress (1990), pp. 9–10; Nickelsburg, G.W.E., VanderKam, J.C. *1 Enoch*, Minneapolis: Fortress (2012), pp. 5–6.

2 1 Enoch 60:7–10, 60:24 (see English translation in Nickelsburg and VanderKam, *op. cit*., p. 76); 4 Ezra 6:47–52 (see English translation in Metzger, B.M. 'The Fourth Book of Ezra', in Charlesworth, J.H. (ed.) *The Old Testament Pseudepigrapha, Vol. 1*, Peabody, Massachusetts: Hendrickson (1983), pp 517–559: p. 536); 2 Baruch 29:4 (see English translation in Klijn, *op. cit*., p. 630).

3 Whitney, K.W. *Two Strange Beasts: Leviathan and Behemoth in Second Temple and Early Rabbinic Judaism*, Winona Lake: Eisenbrauns (2006); Mulder, M. 'Leviathan on the Menu of the Messianic Meal: The Use of Various Images of Leviathan in Early Jewish Tradition'. In van Bekkum, K., Dekker, J., van de Kamp, H., Peels, E. (eds.) *Playing with Leviathan. Interpretation and Reception of Monsters from the Biblical World*, Leiden: Brill (2017), pp. 117–130; Sneed, M.R. *Taming the Beast. A Reception History of Behemoth and Leviathan*, Berlin: De Gruyter (2022).

4 Simonetti, M., Conti, M. *Ancient Christian Commentary on Scripture. Old Testament VI: Job*, Downers Grove: InterVarsity (2006), pp. 208–217; Sneed, *op. cit*, pp. 97–110.

of the beasts" and that of Leviathan as "the coiled creature" and commented that the two represented immense terrestrial and aquatic creatures that are too powerful for humans to subdue, but he did not identify either entity as a specific species of animal.[5] The twelfth-century Jewish philosopher Maimonides included a brief statement on Leviathan as a creature "which possesses a combination of bodily peculiarities found separate in different animals, in those that walk, those that swim, and those that fly" in a section on natural animals in the book of Job.[6] The ZA was first expressed more explicitly in the thirteenth century when Thomas Aquinas wrote that the descriptions of Behemoth and Leviathan in Job 40 and 41 are descriptions of natural animals: the elephant and the whale.[7] Subsequent commentators adopted the ZA and continued to identify Behemoth and Leviathan as the elephant and the whale.[8] In 1663, Samuel Bochart posited instead that Behemoth is the hippopotamus and that Leviathan is the crocodile.[9] Bochart's interpretation ultimately prevailed and is today a more popular interpretation than Aquinas' among advocates of the ZA.[10]

However, Bochart's interpretation is beset with problems. Job 40 locates Behemoth in the mountains and characterizes him as a creature that only God can overcome. In contrast, hippos are not found in the mountains, and the ancient Egyptians are known to have overcome and slaughtered them.[11] Job 41 characterizes Leviathan as another creature that humans cannot overcome, whereas the ancient Egyptians captured crocodiles, kept them in captivity, and killed them for votive sacrifices.[12] Aquinas' interpretations fare no better un-

5 Goodman, L.E. *The Book of Theodicy. Translation and Commentary on the Book of Job*, New Haven: Yale University Press (1988), pp. 104, 402–409; Sneed, *op. cit*, pp. 184–185.

6 Friedländer, M. *The Guide for the Perplexed by Moses Maimonides*, 2nd ed., London: Routledge (1910), p. 303.

7 Damico, A. Yaffe, M.D. *Thomas Aquinas: The Literal Exposition on Job. A Scriptural Commentary Concerning Providence*, Atlanta: Scholars (1989), pp. 448–454.

8 Diodati, G. *La Sacra Bibbia Tradotta in Lingua Italiana*, Geneva: Pietro Chovët (1641), p. 471; Kirchmeyer, G.K. *Disputationum zoologicarum*, Wittenburg (1661).

9 Bochart, S. *Hierozoici, sive bipartiti operis de animalibus scripturae*, London (1663), pp. 49, 52, 136.

10 Clines, D.J.A. 'The Shape and Argument of the Book of Job'. In Zuck, R. (ed.), *Sitting with Job. Selected Studies on the Book of Job*, Eugene: Wipf and Stock (2003), pp. 125–140; McKenna, D. 'God's Revelation and Job's Response'. In Zuck, R. (ed.), *Sitting with Job. Selected Studies on the Book of Job*, Eugene, OR: Wipf and Stock (2003), pp. 381–410; Bright, M. *Beasts of the Field. The Revealing Natural History of Animals in the Bible*, London: Robson (2006), pp. 28–29; Goddard, B.L. *Animals and Birds of the Bible*, Lafayette, IN: Sovereign Grace (2007), p. 24; Slifkin, N. *Sacred Monsters. Mysterious and Mythical Creatures of Scripture, Talmud and Midrash*, New York: Yashar (2007), pp. 183–190; Ross, H. *Hidden Treasures in the Book of Job*, Grand Rapids: Baker (2011), pp. 178–180.

11 Osborn, D.J. *The Mammals of Ancient Egypt*, Warminster: Aris and Phillips (1998), p. 146.

12 Molcho, M. 'Crocodile Breeding in the Crocodile Cults of the Graeco-Roman Fayum', *The*

der scrutiny. The elephant is an animal that humans can overcome. Centuries before the Iron Age kingdom of Israel arose, the ancient Indians had already domesticated elephants and were using them as war steeds.[13] The author of Job may have considered the whale indomitable, for whales were neither hunted nor domesticated in the ancient Mediterranean world.[14] However, the biblical text calls Leviathan a *tannîn* (Ps. 74:13–14; Isa. 27:1). In the Hebrew Bible, the *tannîn* is described as venomous (Deut. 32:33) and scaly (Ezek. 29:3–4), and the word *tannîn* is interchangeable with the word *nāḥāš*, which means "snake" (Exod. 7:8–21; Isa. 27:1).[15] Furthermore, Leviathan is the Hebrew equivalent of the monstrous serpent Lotan from Canaanite myth.[16] If Leviathan is an animal, he is demonstrably a serpent, not a whale.

Despite its problems, Bochart's interpretation of Behemoth as the hippopotamus remains popular and might have been *the* predominant interpretation among today's advocates of the ZA, were it not for an alternate interpretation that has spread like wildfire in recent decades. This is the interpretation that Behemoth is a dinosaur and that Leviathan is a dinosaur or some sort of marine reptile that today is known only from Mesozoic fossil remains. Popular candidates for Leviathan according to this version of the ZA include plesiosaurs, mosasaurs, gigantic crocodile relatives, and crested hadrosaurid dinosaurs.[17] I have previously reviewed the reasons for the popularity of these extinct candidates for Behemoth and Leviathan.[18] Those reasons need not be re-reviewed here. However, it would be informative to review other aspects of this permutation of the ZA. In particular, it would be informative to address each argument that has been used to support the idea that Behemoth is a dinosaur (hereafter abbreviated ABD, for argument for Behemoth as a dinosaur) and to determine the answers to questions that have not previously been asked about such arguments. The various ABDs consist of interpretations of quotes from the Behemoth passage in Job 40. Here, I provide a study that addresses them and asks the following novel questions. Which ABDs are more commonly used

*Journal of Egyptian Archaeology* (2014) 100, 181–193; De Cupere, B., Van Neer, W., Barba Colmenero, V., Jiménez Serrano, A. 'Newly Discovered Crocodile Mummies of Variable Quality from an Undisturbed Tomb at Qubbat al-Hawā (Aswan, Egypt)', *PLoS ONE* (2023) 18 no. 1:e0279137, 1–31.

13 Csuti, B. 'Elephants in Captivity'. In Fowler, M.E., Mikota, S.K., *Biology, Medicine and Surgery of Elephants*, Ames, IA: Blackwell (2006) pp. 15–22.

14 Papadopoulos, J.K., Ruscillo, D. 'A *Ketos* in Early Athens: An Archaeology of Whales and Sea Monsters in the Greek World', *American Journal of Archaeology* (2002) 106, 187–227.

15 Senter, P.J. 'Leviathan, Behemoth, and Other Biblical *Tannînim*: Serpents, Not Dinosaurs', *Perspectives on Science and Christian Faith* (2019) 71, 218–232.

16 Day, J. *God's Conflict with the Dragon and the Sea. Echoes of a Canaanite Myth in the Old Testament*, Cambridge: Cambridge University Press (1985); Whitney, *op. cit.*; Sneed, *op. cit.*

17 reviewed in Senter, *op. cit.*

18 *Ibid.*

than which others? During what periods has each ABD been used? Is each ABD based on a linguistically correct rendition of the Hebrew text? For each ABD, is the corresponding Hebrew text in Job 40 equally compatible with the PMA?

It would be useful to first provide a brief history of the interpretation of Behemoth as a dinosaur. It began when the English politician Thomas Thompson interpreted the carnivorous dinosaur *Megalosaurus* and the herbivorous dinosaur *Iguanodon* as the biblical Leviathan and Behemoth, respectively, in an 1835 article.[19] The surgeon Charles Burnett repeated those interpretations in publications from 1838 and 1841.[20] At the time, the word "dinosaur" had not yet been coined. Sir Richard Owen recognized the relationship between *Megalosaurus*, *Iguanodon*, and the armored herbivore *Hylaeosaurus* and erected the taxon Dinosauria for them in 1842.[21] In the same century, fossil evidence mounted that today's organisms had arisen via evolution from ancient forms over the course of deep time, that the organisms of previous geologic periods had become extinct, and that vast ages had passed between the existence of the last of the dinosaurs and the appearance of the first humans.[22] It therefore became apparent that the biblical writers could not have written about dinosaurs, because dinosaurs were unknown to them.

After Thompson's and Burnett's articles, the idea of Behemoth as a dinosaur became quiescent for nearly a century and a half. During that time, an anti-evolution movement began, in which authors expressed disagreement with the findings of science regarding biological evolution and an old Earth, because such findings appeared to contradict scripture.[23] Many anti-evolution authors argued that the biblical timeline and the opening chapters of Genesis should be accepted as factual accounts of the past, in which case the Earth was only about six thousand years old and God had created the different kinds of organisms separately instead of using evolution to derive one kind of organism from another. That view is today called the young-Earth creationist (YEC) view. A corollary of the YEC view is that God had created dinosaurs and humans during the same week about six thousand years ago. YEC authors argued that humans and dinosaurs had once been contemporaries, but for nearly a century and a half after Thompson's 1835 article, they made such arguments without claim-

19 Thompson, T. 'An Attempt to Ascertain the Animals Designated in the Scriptures by the Names Leviathan and Behemoth', *Magazine of Natural History* (1835) 8, 193–197, 307–321.

20 Burnett, C.M. *The Power, Wisdom, and Goodness of God, as Displayed in the Animal Creation*, London: James Burns (1838), pp. 67–70; Burnett, C.M. 'On Some Circumstances in Zoology, and the Natural History of Man, Mentioned in Revelation. No. IV', *Church of England Magazine* (1841) 10, 260–262.

21 Owen, R. *Report on British Fossil Reptiles, Part II*, London: Richard and John E. Taylor (1842), pp. 102–103.

22 O'Connor, R. *The Earth on Show. Fossils and the Poetics of Popular Science, 1802–1856*, Chicago: University of Chicago Press (2007).

23 *Ibid*.

ing that the Bible mentioned dinosaurs.[24]

That changed in the 1970s, when the idea of Behemoth as a dinosaur reawakened with the publication of several YEC books and articles in which Job 40 was cited as a major source of evidence that ancient humans had encountered dinosaurs (Table 1). My literature search found 75 printed books and articles from the twentieth and twenty-first centuries that use ABDs based on Job 40, spanning the years 1974–2022 (Table 1). The authors of these publications used ABDs to cast doubt upon the separation of humans and dinosaurs by millions of years, and by extension to cast doubt upon the passage of millions of years. That strategy continues today, despite that abundant physical evidence demonstrates that the Earth is billions of years old and that the Bible itself contains numerous passages that together suggest that the creation story in Genesis was not meant as a historical record or a straightforward account of the material origin of the universe, and that the existence of biological evolution over billions of years is compatible with biblical teaching.[25]

## Tail like a Cedar

By far the most popular ABD is the argument that Job 40:17 says that Behemoth's tail is like a cedar. Thomas Thompson used this ABD in his 1835 article, and it has also been used by nearly every author interpreting Behemoth as a dinosaur from 1974 onward. Of the 75 twentieth and twenty-first century publications in the sample, 70 (93%) use this ABD (Table 1). Through the decades, its popularity among advocates of Behemoth as a dinosaur has held steady (Fig. 1). The rationale behind this ABD is that of all known non-marine animals, living and extinct, only a large dinosaur can be said to have had a tail long and robust enough to be comparable to the trunk of a cedar tree. Most mammals have short and/or weak tails, and most reptiles have robust tails but are too small for their tails to invite comparison to a tree as enormous as a Near Eastern cedar. Dinosaurian reptiles, on the other hand, included many species of gigantic size, with tails sufficiently long and robust to be considered cedar-like.

However, this ABD is based on a misunderstanding of the Hebrew text of Job 40:17. The verse does not say that Behemoth's tail is like a cedar. Instead, it

24 e.g. Keener, J.C. *The Garden of Eden and the Flood*, Nashville: M. E. Church South (1900); Price, G.M. *The New Geology*, Mountain View, CA: Pacific (1923); Whitcomb, J.C., Morris, H.M. *The Genesis Flood. The Biblical Record and Its Scientific Implications*, Phillipsburg, NJ: P & R (1961).

25 Senter, P.J. 'Apparent Conflict between the Pentateuch and Modern Science: The Early Church's Solution, the Solution's Biblical Origin, and Ancient Christian Approval of Evidence-Based Reasoning', *Science and Christian Belief* (2022) 34, 7–28. See also Walton, J.H. *The Lost World of Genesis One. Ancient Cosmology and the Origins Debate*, Downers Grove: InterVarsity Press (2009).

says that Behemoth is like a cedar in that he cherishes his *zānāv*. The Hebrew wording is: *yaḥpōts zənāvō ḵəmô-ʾārez*. In English, the word-for-word translation is: "He-cherishes (*yaḥpōts*) his-*zānāv* (*zənāvô*) in-the-manner-of (ḵ*əmô-*) a-cedar (ʾārez)." A good English rendition of this Hebrew sentence would be: "Like a cedar, he cherishes his *zānāv*." The word *zānāv* has multiple meanings, but the meanings have a theme: the *zānāv* is the part of a thing that resembles a handle. For example, in a firebrand, the *zānāv* is the part that you hold with your hand (Isa. 7:4). In an animal, the *zānāv* is the tail (Exod. 4:4; Judg. 15:4). In a plant, the *zānāv* is the stem (Isa. 19:15), which in the case of a tree is its trunk.[26] Job 40:17 makes a play on words by saying that Behemoth cherishes his tail like a cedar cherishes its trunk. A linguistically complete English rendition of the Hebrew sentence, in the explanatory manner of the Amplified Bible, is therefore "Like a cedar [which cherishes its trunk], Behemoth cherishes his tail."

The verb that I have translated "to cherish" in Job 40:17 is *ḥāphēts*, which means to be pleased by something or someone. The verb *ḥāphēts* has different nuances in different contexts, but its general theme is that the subject of the sentence derives pleasure from the object of the sentence, whether the object is something or someone. Use of the verb *ḥāphēts* can mean that the subject "is delighted by" the object or that the subject "cherishes" or "desires" the object.[27] There is no known use of the verb in ancient Hebrew writings that indicates that it can also mean "to move" or "to stiffen," despite some modern renderings that are influenced by the opinions of some modern scholars that verse 17 contains a double entendre in which Behemoth's *zānāv* is a euphemism for his genitals.[28] Even if the author of Job intended such a double entendre, there is no case in the biblical text in which the verb implies stiffening or movement, so there is no linguistic justification to translate the verb as "to stiffen" or "to move."

In the Hebrew text of the biblical passages that use the verb *ḥāphēts*, the preposition *bə-* usually precedes the object of the verb. This preposition is

26 In a previous article, I asserted that in a plant, the *zānāv* is the foliage (Senter, 'Leviathan, Behemoth, and Other Biblical Tannînim'), but reconsideration of Isa. 9:14 and 19:15 revealed my error. Poetic parallel structure in both verses associates the concept of a head (Hebrew: *rô ʃ*) with a plant's foliage (Hebrew: *kipâh*) and the concept of a *zānāv* with a rush (Hebrew: *ʾagmôwn*), a plant that consists mainly of a stem without foliage. Similar associations are present in English (e.g. "head of lettuce," "parsnip tail").

27 Benner, J.A. *Ancient Hebrew Lexicon of the Bible*, College Station: Virtualbookworm.com (2005), p. 340; Strong, J.A. *The New Strong's Expanded Exhaustive Concordance of the Bible*, Nashville: Thomas Nelson (2010), p. Hebrew 94.

28 Mitchell, S. *The Book of Job*, New York: Harper Perennial (1987), p. 85; Ansell, N. '"Fantastic Beasts and Where to Find Th(eir Wisdo)m"'. In van Bekkum, K., Dekker, J., van de Kamp, H., Peels, E. (eds.) Pla*ying with Leviathan. Interpretation and Reception of Monsters from the Biblical World*, Leiden: Brill (2017), pp. 90–114.

omitted in Job 40:17, which may prompt the inference that *ḥāphēts* here has some unusual meaning. However, there are other cases in the Hebrew Bible in which the preposition is omitted (Ps. 37:23, 51:19, 68:30; Hos. 6:6; Mic. 7:18), and in each case, context indicates that the correct translation of *ḥāphēts* is one of its usual meanings: "to delight in," to "to be pleased by," "to desire," etc. All such cases are in poetic passages, which suggests that the omission of *bə-* is a form of poetic expression in Hebrew. This further suggests that the lack of *bə-* in Job 40:17 is not evidence of an unusual meaning such as "to move" or "to stiffen" but is instead a manifestation of poetic style. This interpretation is supported by the frequent omission of *ʾeṯ-* (a prefix that marks a noun as the object of a verb) in poetic passages of the Hebrew Bible. The prefix *bə-* can refer to location (in which case it often means "in"), but when it follows *ḥāphēts* it marks the accompanying noun as the object of *ḥāphēts*. The cases in which *bə-* is omitted in Hebrew poetry are therefore functionally equivalent to omissions of *ʾeṯ-*, because in either case the poet omits the prefix that marks a noun as the object of a verb.

The text of Job 40:17 does not reveal why Behemoth delights in or cherishes his tail. However, the Hebrew text of the previous verse suggests that it is because he has no limbs to cherish. Of this, more will be said below in the section on Behemoth's midsection. Meanwhile, it is worthwhile to note that if Behemoth lacks limbs, he is not a dinosaur.

It is also worthwhile to note that the mention of a tail is compatible with the PMA. Primordial monsters in ancient Near Eastern narratives are often described as having physical bodies.[29] Even an incorporeal being may be described as if it has body parts. For example, this occurs numerous times within the Hebrew text of the Bible. God is incorporeal, but the Hebrew text speaks metaphorically of his eyes, ears, hands, and back, etc. Similarly, the biblical text mentions Satan's heads, horns, tail, and mouth (Rev. 12:3–4, 12:15), despite that Satan likewise is incorporeal. Therefore, despite that Job 40 describes Behemoth as having a tail, in addition to bones and other body parts, there is nothing in the text that precludes the idea that Behemoth is a primordial monster in the form of an incorporeal supernatural being.

## "Chief of the Ways of God" and Large Size

In his 1835 article, Thompson argued that the description of Behemoth in Job 40 is of an immense animal. However, he did not explicitly connect that idea with the phrase *rēʾšîṯ darəḵey-ʾēl* in verse 19, which the KJV renders as "chief of the ways of God." In contrast, the connection of *reʾšîṯ darəḵey-ʾēl* with large size is the second-most popular ABD of the most recent four decades and has held

29 Dalley, S. *Myths from Mesopotamia*, Oxford: Oxford University Press (1989); Batto, B.F. *Slaying the Dragon. Mythmaking in the Biblical Tradition*, Louisville: Westminster (1992).

steady as a standard ABD to use since 1984 (Fig. 1). It is used in 44 (59%) of the twentieth and twenty-first century publications in this study's sample. Most authors who use it claim that "chief of the ways of God" means something along the lines of "the largest land animal that God made" (Table 1). Accordingly, such authors usually pronounce Behemoth a sauropod dinosaur (Table 1; Fig. 1). The sauropods were quadrupedal herbivores with relatively small heads on long necks. Most were immense. Of all known land animals, living and extinct, the largest were sauropods. It is therefore unsurprising that most (56, which is 74%) of the publications in this study's twentieth and twenty-first century sample identify Behemoth as a sauropod.

The word *rēʾšîṯ* often refers to a beginning and is famously the root of the first word in the Bible, *bərēšîṯ*: "In the beginning." It can also refer to something chronologically first such as a firstborn or the firstfruits of a harvest. In no case does the biblical text unambiguously use *rēʾšîṯ* for "preeminent" or "chief." In most of the cases in which the KJV translates *rēʾšîṯ* as "chief," it could just as plausibly refer to a beginning, a firstborn, or firstfruits (1 Sam. 2:29, 15:21; Ps. 78:51, 105:36; Jer. 49:35; Dan. 11:41; Am. 6:1). It is therefore plausible that by calling Behemoth *rēʾšîṯ darəḵey-ʾēl*, the biblical text is saying that Behemoth is something along the lines of a firstfruit, something created in the beginning, rather than something preeminent or large. There is no case in the biblical text in which *rēʾšîṯ* implies large size, much less "the largest land animal that God made." Biblical support for Behemoth as a sauropod dinosaur is therefore lacking, and from a linguistic point of view, this ABD makes little sense.

Two of the three earliest extrabiblical texts that mention Behemoth and Leviathan state that God made them in the beginning of creation, on the fifth day (4 Ezra 6:47–62; 2 Baruch 29:4).[30] This tradition may be derived from interpreting *hattannînîm haggədōlîm* ("the great serpents") of Gen. 1:21 as Leviathan and Behemoth. Whether or not that is so, the conception that the two creatures were made on the fifth day is consistent with *rēʾšîṯ darəḵey-ʾēl* in Job 40:19 as a reference to Behemoth as a primordial creature, which accords with the PMA.

**Herbivory**

Job 40:15 describes Behemoth as eating grass. Thompson argued in 1835 that herbivory is consistent with *Iguanodon*.[31] It is also consistent with a sauropod, as users of this ABD have pointed out since 1986. Since then, it has been a staple ABD, although it has been less popular than the ABDs on the "tail like a cedar" and "chief of the ways of God" (Table 1; Fig. 1). It is used in 36 (48%) of the twentieth and twenty-first century publications in this study's sample. Unlike

30 Metzger, *op. cit.*, p. 536; Klijn, *op. cit.*, p. 630.

31 Thompson, *op. cit.*

the previous two ABDs, this one is linguistically consistent with the Hebrew text of Job 40.

It is also consistent with the PMA. A primordial monster need not be carnivorous, and its eating of plants may indicate that it has been dispelled by a higher power. Recently translated tablets from Ugarit, a coastal Syrian city of the Late Bronze Age at the northern end of the Canaanite cultural sphere, shed interesting light on this that was unavailable before their publication in 2014. Within that corpus of inscriptions are incantations to dispel disease-causing demons, which reveal that demons were thought to cause disease in plants, animals, and humans by feeding upon them.[32] Some incantations banish the demon to the mountains to feed on plants there, instead of continuing to feed on the sick person.[33] One incantation even gets specific, instructing the demon to go to a reed thicket in the mountains and consume reeds.[34] Given this imagery, it may be no coincidence that Job 40 tells us that Behemoth is in the mountains (v. 20), surrounded by reeds (v. 21), eating plants (v. 15). The use of the imperfective tense in verse 15 is consistent both with the usual translation "He eats grass [habitually]" and with the translation "He is eating grass [now, having not been eating it before]." If the latter is what the writer meant, it is consistent with the concept of a dangerous supernatural entity that has been banished from human contact. But as verses 19 and 24 emphasize, Behemoth is no ordinary demon that a human can overcome with an incantation. He is so powerful that only his Maker can overcome him. This is consistent with Behemoth as a primordial monster, for in the ancient Near East, a primordial monster was considered too powerful for anyone but a major deity to overcome. Cases in point include the Babylonian example of Marduk overcoming Tiamat, the Egyptian example of Re overcoming Apophis, and the Canaanite example of Baʿal overcoming Lotan.[35] Behemoth's grass-eating, in the context of the rest of the imagery in Job 40, is therefore consistent with the PMA.

**Unafraid of a River**

According to Job 40:23, Behemoth is not afraid of a river, even if it gushes against his face. In the words of the KJV, "he drinketh up a river, and hasteth not: he trusteth that he can draw up Jordan into his mouth." The idea that Behemoth can drink a river or is unafraid of one has been used occasionally as an ABD since 1990 but has not been very popular (Table 1; Fig. 1). It is used in only 10 (13%) of the twentieth and twenty-first century publications in this study's sample. Those who

32 del Olmo Lete, G. *Incantations and Anti-Witchcraft Texts from Ugarit*, Boston: Walter de Gruyter (2014), pp. 43, 55, 60.

33 *Ibid*., pp. 43, 55, 60.

34 *Ibid*., p. 55.

35 Batto, *op. cit.*; Korpel, M., de Moor, J. 'The Leviathan in the Ancient Near East', in van Bekkum, K., Dekker, J., van de Kamp, H., Peels, E. (eds.) Pla*ying with Leviathan. Interpretation and Reception of Monsters from the Biblical World*, Leiden: Brill (2017), pp. 3–18.

use it connect it with the idea of large size, in support of the idea of Behemoth as a large dinosaur.

The idea that Behemoth is unafraid of a river is consistent with the Hebrew wording, but the idea that Behemoth drinks huge amounts of water is only questionably so. The Hebrew wording is: *yaʿa*šōq *nāhār lō yaḥpōz yiḇṭaḥ kî-yāgîḥa yardēn ʾel-pîhû*. In English, the word-for-word translation is: "It-oppresses (*yaʿašōq*) river (*nāhār*) he-flees-not (*lō yaḥpōz*) he-is-confident (*yiḇṭaḥ*) although / even-if (*kî-*) it-gushes-forth (*yāgîḥa*) Jordan (*yardēn*) upon / against / into (*ʾel-*) his-mouth (*pîhû*). A good English rendition of this Hebrew sentence would be: "[If] a river presses upon him, he does not flee. He is confident even if the Jordan gushes against his mouth." The verb *ʿāšaq* is unrelated to drinking and instead refers to oppression, with occasional usage in reference to wronging someone by means of deceit.[36] The verse is not about quenching thirst but is instead about Behomoth's being unconcerned and unmoved by the force of a river smacking him in the face.

The significance to ancient Near Easterners of being unconcerned and unmoved by a river is revealed by Babylonian medical texts from the eleventh century BC and later.[37] Various procedures described therein include immersion of the patient, ritual implements, or related items in a river, with instructions or incantations that indicate that the river was expected to carry the disease-causing evil away.[38] Unlike the evil that causes disease, Behemoth is too powerful to be washed away by a river. This is consistent with his status as a powerful entity, in accordance with the PMA.

## Aquatic Habitat

To advocates of the ZA, Job 40 seems to describe an aquatic habitat for Behemoth: reeds (v. 21), a marsh (v. 21), a stream (v. 22), and a river (v. 23). Thompson used this argument in favor of Behemoth as *Iguanodon*, and some recent authors have used it in favor of Behemoth as a sauropod. However, it is little-used and hasn't been repeated for nearly two decades (Table 1; Fig. 1). It is used in only nine (12%) of the twentieth and twenty-first century publications in this study's sample.

Although this ABD is linguistically sound, its unpopularity is appropriate, because it is inapplicable to *Iguanodon* and sauropods. Both sorts of dinosaurs possess skeletal anatomy that indicates terrestrial rather than aquatic habits.[39] In contrast, Job 40's reference to a river and to being surrounded by a smor-

36 Benner, *The Ancient Hebrew Lexicon of the Bible*, p. 411; Strong, *The New Strong's Expanded Exhaustive Concordance of the Bible*, p. Hebrew 223.

37 Scurlock, J. *Sourcebook for Ancient Mesopotamian Medicine*, Atlanta: SBL (2024), pp. 7–8.

38 *Ibid*., pp. 219–220, 437–438, 688.

39 Norman, D. 'On the Ornithischian Dinosaur *Iguanodon bernissartensis* of Bernissart (Belgium)', *Institut Royale des Sciences Naturelles de Belgique Mémoire* (1980) 178, 1–103; Upchurch, P., Barrett, P.M., Dodson, P. 'Sauropoda', in Weishampel, D.B, Dodson, P., Osmólska, H. (eds.) *The Dinosauria*, 2nd ed., Berkeley: University of California Press (2004), pp. 259–322.

gasbord of plants (verses 15, 21–22) are compatible with the PMA, as shown above.

## Strong Limbs and Bones

Job 40:18 is a couplet that says Behemoth's bones are as strong as brass, then says his bones are like bars of iron. The word for bone is *ʿetsem* in the first phrase of the couplet and *gerem* in the second. Some English translations (e.g. ASV, ESV, NAS, NIV, NRSV) inexplicably render *gerem* as "limb," but the word specifically refers to a unit of the skeleton, in other words a bone.[40] The citation of strong bones and/or limbs as an ABD is popular and has held steady since it was first used in 1980 (Table 1; Fig. 1). It is used in 28 (38%) of the twentieth and twenty-first century publications in this study's sample. The possession of strong bones is consistent with any large, terrestrial vertebrate, dinosaurian or otherwise. It is also consistent with the PMA, for great strength is an expected attribute of a primordial monster.

## Nasal Horn

Colorfully proclaiming that Behemoth cannot be caught by human traps, Job 40:24 concludes with a turn of phrase that the KJV renders as "his nose pierceth through snares." Thompson interpreted this as a reference to a nasal horn and used it to support his identification of Behemoth as *Iguanodon*, which at the time was thought to have had a nasal horn.[41] Burnett followed suit (Table 1). No subsequent author did the same, for good reason. In 1878, the discovery of a group of articulated skeletons of *Iguanodon* showed that the bone that had previously been misidentified as *Iguanodon*'s nasal horn in a disarticulated skeleton was instead a thumb spike.[42]

The Hebrew wording of verse 24 doesn't really imply that Behemoth's nose pierces through snares, although it does acknowledge that people with snares can't catch him. The Hebrew wording is *bə-ʿênâyw yîqqâḥennw bə-môqšîm yînqoḇ-ʾâph*. In English, the word-for-word translation is: before-his-eyes (*bə-*ʿênâyw) he-shall-take-him (*yîqqâḥennw*) in / with (*bə-*) snares (*môq*šîm) he-shall-pierce-through (*yînqoḇ-*) nose (ʾâph). This verse can be rendered in English in various ways. Two possible renditions are "Shall anyone before his eyes take him in snares or pierce his nose?" and "Shall anyone before his eyes capture him? Shall a hunter (literally "[one] with-snares") pierce his nose?" The implied answer to the rhetorical question that this verse asks is "No." The question itself is a flowery way to declare that Behemoth is indomitable, at least by humans.

40 Benner, *The Ancient Hebrew Lexicon of the Bible*, p. 317; Strong, *The New Strong's Expanded Exhaustive Concordance of the Bible*, p. Hebrew 58.

41 Norman, *op. cit.*, p. 65.

42 Dollo, L. 'Première Note sur les Dinosauriens de Bernissart', *Bulletin du Musée Royal d'Histoire Naturelle de Belgique* (1882) 1, 161–178.

## Huge Midsection

The ABD that Behemoth has a huge midsection, which implies a sauropod-like shape, appears to be derived from Job 40:16, the only verse in the Behemoth passage that mentions Behemoth's midsection. This ABD is used in only five (6.7%) of the twentieth and twenty-first century publications in this study's sample, although its sporadic use has had a long duration (1980–2003) (Table 1; Fig. 1).

This ABD's lack of popularity is appropriate, for there is nothing in the verse that implies anything about the size of Behemoth's midsection. Instead, the verse says*: ḵōḥû ḇəmoṯənāyw wəʾōnô bišərîrei biṭnô*. In English, the word-for-word translation is: "his-strength (*ḵōḥû*) in-his-waist (*ḇəmoṯənāyw*) and-his-ʾōn (*wəʾōnô*) in-muscle (*bišərîrei*) of-his-belly (*biṭnô*)." A good English translation would be "His strength is in his waist, and his productive ability is in the muscle of his belly." Note that the sizes of his waist and belly are not mentioned.

This couplet is revealing with respect to Behemoth's anatomy. Strangely, neither his *kōaḥ* nor his *ʾōn* are said to be in his limbs. In ancient Hebrew writings outside Job 40, one's *kōaḥ* (strength) is consistently said to be in one's limbs (1 Chr. 29:12; 2 Chr. 20:6; Job 30:2; Isa. 10:13, 44:12; Dan. 11:6). The word ʾōn has no English equivalent and can refer to the generative power of the reproductive organs or to one's physical strength, wealth, vigor, or ability to produce creative work, i.e. to do deeds.[43] Arguably, one's physical strength and ability to do deeds are mainly products of the arms and legs, not the waist or belly. The word *šārîr* can refer to the navel but is more broadly applied to the firm parts of a bodily region. The emphasis on strength in the couplet's use of the words *kōaḥ* and *ʾōn* therefore suggests that *šārîr* in this case refers to a strength-bearing part such as a muscle. The *šārîr* of the belly is therefore more likely in this case to be belly muscle than the navel. Having the *ʾōn* in the belly is consistent with reference to a womb, but Behemoth is male. When all these clues are put together, the picture that emerges is that of a creature that for some reason has its strength and ability to do deeds concentrated in its waist and belly muscle instead of in its limbs. Why do Behemoth's limbs not contain his *kōaḥ* and *ʾōn*? The most logical explanation is that his limbs are missing. In other words, he is envisioned as a serpent. Storage of the *kōaḥ* and *ʾōn* in the waist and belly muscle is incongruous for a limb-propelled animal, whereas it is expected in a creature that slithers on its belly.

Although modern advocates of the ZA and rabbinical writings of the early Christian Era both describe Behemoth as a mammalian quadruped, both sets of writers wrote centuries after the book of Job was composed. It is therefore possible that the conception of Behemoth had evolved by the time they wrote. The conception of Behemoth's counterpart monster Leviathan certainly had

43 Benner, *The Ancient Hebrew Lexicon of the Bible*, p. 57; Strong, *The New Strong's Expanded Exhaustive Concordance of the Bible*, p. Hebrew 8.

evolved by the time the Christian Era dawned. In the rabbinical writings of the Christian Era, Leviathan is a monstrous fish.[44] But in the Hebrew Bible, Leviathan is a serpent (*tannîn*), as shown above. Because Leviathan was originally envisioned as a serpent, it is plausible that his counterpart monster also was. If this is correct, it explains the apparent identity of Leviathan and Behemoth as the *tannînim* of Gen. 1:21, created on the fifth day, in Jewish apocalyptic literature of the Second Temple period and later.

The evolution of the conception of Leviathan from serpent to fish is plausibly connected to his containment in the sea (Job 41:31–32; Ps. 74:13, 104:26; Isa. 27:10). Similarly, the evolution of the conception of Behemoth from serpent (if indeed Behemoth was originally envisioned as serpentine) to mammalian quadruped is plausibly explained by a feature that is easy to identify: his name. The name Behemoth is Hebrew for "cattle," or more broadly "livestock," or yet more broadly "beasts." His name therefore brings to mind the image of a mammalian quadruped. It is important to note that this does not mean that Behemoth was given his name because he was originally conceived as a mammalian quadruped. One's name does not necessarily describe oneself. For example, the people in the Hebrew Bible who are named Rachel (which means "female sheep"), Ariel (which means "lion of God"), and Achsah (which means "ankle bracelet") were neither livestock, predatory felines, nor jewelry. Similarly, an entity that is named after mammalian beasts is not necessarily a mammalian beast itself but may instead have been named after some sort of association with mammalian beasts. There is iconographic precedent for this possibility. Ancient Mesopotamian art depicts the demoness Lamashtu with a lion's head, standing on a horse or donkey and suckling a dog and a pig.[45] This shows that a dangerous supernatural entity could be associated with beasts in ancient Near Eastern thought.

Alternatively, it is possible that the name Behemoth is an intensive plural that means something similar to Great Ox or Great Beast.[46] This possibility has prompted some researchers to seek connections between Behemoth and bovine monsters from ancient Near Eastern narratives. Examples of the latter include the Bull of Heaven (slain by Gilgamesh in Mesopotamian myth), the bull-horned and bovine-humped Eater and Devourer (which defeat Baʿal in Canaanite myth), and the bull-calf Atik (whom the goddess Anat claims to have slain in Canaanite myth).[47] However, there are problems with these postulated

44 Whitney, *op. cit*., pp. 111–118, 128, 148–150; Mulder, *op. cit*., p. 124; Sneed *op. cit*. pp. 135–144.

45 Keel, O. *The Symbolism of the Biblical World. Ancient Near Eastern Iconography and the Book of Psalms*, Winona Lake: Eisenbrauns (1997), pp. 79–80.

46 Ember, A. 'The Pluralis Intensivus in Hebrew', *The American Journal of Semitic Languages and Literatures* (1905) 21, 195–231.

47 Pope, M.H. *Job. Introduction, Translation, and Notes*, New York: Doubleday (1965), pp.

connections. There is no serpentine counterpart, equivalent to Leviathan, in the stories of the Bull of Heaven and the Eater and Devourer, nor are there echoes of their stories in Job 40. The problems with a possible connection with Atik deserve more elaboration, because of a plausible connection with Leviathan. Atik is known only from one line in a myth about Baʿal.[48] In that line, he is called the calf of El, the head deity, who is metaphorically called a bull in numerous lines of the same myth and others.[49] It is plausible that Atik, like most major Canaanite deities, is one of the offspring of El, which makes him a calf figuratively and not literally, because he is the son of a so-called bull. Some researchers have suggested that Atik is another name of Arsh, a character known from only one line apiece in two Ugaritic texts.[50] Neither line describes Arsh as bovine. In one of the two narratives, the section that mentions Arsh and Atik is a speech by Anat in which she claims to have smitten Yam (the sea), then repeats the claim on each of the next few lines, using a different epithet for Yam with each repetition: *nhr* (river: a reference to the sea as a world-encircling river), *tnn* (the Ugaritic cognate of the Hebrew word *tannîn*, a reference to the sea in which is it envisioned as Lotan, Yam's alter ego: a multi-headed, world-encircling serpent[51]), *bṯn* (snake: another reference to the sea as Lotan), and the encircler with the seven heads (another reference to the sea as Lotan). On the next two lines, Anat claims to have smitten "the Beloved of El, Arsh" and "El's calf, Atik."[52] Neither this text nor any other explains what Arsh is, but the phrase "Beloved of El" (an epithet of Yam) in this text and the phrase "in the sea [of] Arsh and *tnn*" in another text associate Arsh with the sea.[53] It is therefore plausible that Arsh is yet another epithet of Yam and that in this line Anat is simply continuing her long-winded claim to have smitten him. The following

269–270, 321–322; Wakeman, M.K. *God's Battle with the Monster. A Study in Biblical Imagery*, Leiden: Brill (1973), pp. 113–114; Day, *op. cit*., pp. 81–82.

48 Wyatt, N. *Religious Texts from Ugarit*, 2nd ed. London: Sheffield Academic (2002), p. 80.

49 *Ibid*., pp. 41, 44, 47, 54, 55, 59. 61, 87, 94, 97, 98, 100, 184, 186, 254.

50 Day, *op. cit*., p. 81; Batto, B.F. 'Behemoth'. In van der Toorn, K., Beckung, B. (ed.) *Dictionary of Deities and Demons in the Bible*, Leiden: Brill (1995), pp. 315–322; Pitard, W.T. 'Just How Many Monsters Did Anat Fight? (*KTU* 1.3 III 38–47)?' In Younger, K.L. (ed.) *Ugarit at Seventy-Five*, Winona Lake: Eisenbrauns (2007), pp. 75–88.

51 Coogan, M.D., Smith, M.S. *Stories from Ancient Canaan*, 2nd ed., Louisville: Westminster John Knox (2012), p. 106; Wyatt, *Religious Texts from Ugarit*, p. 115; Senter, 'Leviathan, Behemoth, and Other Biblical *Tannînim*', p. 223.

52 Wyatt, *Religious Texts from Ugarit*, pp. 79–80.

53 Yam as 'Beloved of El': Wyatt, *Religious Texts from Ugarit*, pp. 49, 79, 95. But note that Mot, the god of death, is also 'Beloved of El': Wyatt, *Religious Texts from Ugarit*, pp. 113, 116, 120.

The line 'in the sea [of] Arsh and *tnn*': Wyatt, *Religious Texts from Ugarit*, p. 145. For the original text of this line, see de Moor, J.C., Spronk, K. *A Cuneiform Anthology of Religious Texts from Ugarit*, Leiden: Brill (1987), p. 44: line 51. For the original text of the smiting of Yam under various epithets in Anat's speech, see lines 38–44 on p. 4 of the same work. To transliterate the Ugaritic cuneiform script of those lines, see Gordon, C.H. *Ugaritic Textbook*, Rome: Pontifico Istituto Biblico (1998): pp. 13–15.

line about Atik is plausibly more of the same, because to call him "El's calf" may simply acknowledge that he is El's offspring (and therefore could be Yam). If this interpretation is correct, then Arsh and Atik are alternate names for Yam/Lotan/Leviathan, not Behemoth.

In the end, the idea that Behemoth was originally conceived as bovine rests on flimsy evidence. Nothing about Behemoth in Job 40 suggests a bovine creature, other than his name and his eating plants. As shown above, both items may be indicative of the imagery associated with a dangerous supernatural entity and aren't necessarily indicative of a bovine creature. Thus, neither his name nor his plant consumption convincingly overturns the possibility that Behemoth was originally conceived as serpentine.

Verse 16 of Job 40 is consistent with the PMA, whether the writer envisioned Behemoth as bovine or serpentine. It is unusual to store one's *kōaḥ* and *ʾōn* in one's waist and one's belly muscles, but such a storage location does not preclude one from being a primordial monster. After all, for a creature to be considered a monster, there must be something about it that is unusual.

## Strength in Hips

As with the previous ABD, the ABD that Behemoth has strength in his hips has not been very popular. It is used in only 11 (15%) of the twentieth and twenty-first century publications in this study's sample, and not before 1990 or after 2013 (Table 1; Fig. 1). Its lack of popularity is appropriate, for it is not linguistically sound. It is derived from the statement in Job 40:16 that Behemoth's *kōaḥ* is in his *moṯnayim*. However, the word *moṯnayim* refers not to the hips but to the constricted area above them, between the hips and the ribcage: the waist.[54] When *mōṯen* (the waist or the small of the back) is used in its plural form *moṯnayim*, it is equivalent to the plural English words "loins" (when "loins" is used for the sides of the torso, not the testes) or "flanks." It therefore does not imply the root of a limb such as a shoulder or hip.

Different authors using this ABD have elaborated on it in different ways, and some of those elaborations are rather creative. One author interpreted the phrase in verse 16 as a reference to a sauropod's ability to support weight on and pivot on its hindlimbs.[55] Another stated that Behemoth's "hips were built to withstand the enormous force of each pounding step."[56] Another connected the phrase to specialized vertebral construction.[57] One set of authors made the inexplicable statement that "a

54 Benner, *The Ancient Hebrew Lexicon of the Bible*, p. 371; Strong, *The New Strong's Expanded Exhaustive Concordance of the Bible*, p. Hebrew 177.

55 Baker, M. *Dinosaurs*. Redding, CA: New Century (1991), p. 18.

56 Anonymous. 'Dino-might', *Creation ex Nihilo* (1997) 20 no. 1, 43.

57 Sharp, GT. *Rocks, Fossils and Dinosaurs*, Noble, Oklahoma: Icon (2010), pp. 177–180.

sauropod dinosaur is double hipped."[58] This last statement deserves attention, for any vertebrate with limbs is double hipped in that it has two hips, so the reader is left to wonder how this verse applies better to a sauropod than to any other vertebrate with limbs. If the authors meant that there is something in the hips of a sauropod that is doubled in comparison to the hips of other vertebrates, then the authors were mistaken. It is possible that this misconception arose from the name of the sauropod *Diplodocus*, which means "double beam," although *Diplodocus*' name refers to the shape of the chevron bones beneath its tail vertebrae and not to any aspect of its hips.[59] In any case, as we have seen, verse 14 is consistent with the PMA.

## Indomitable

According to verse 24 of Job 40, Behemoth cannot be captured, and verse 19 implies that only his Maker dares to approach him with the sword. It is therefore accurate to describe Behemoth as indomitable, at least by humans. This ABD has been expressed in various ways by various authors, but not very often. It is used in only eight (11%) of the twentieth and twenty-first century publications in this study's sample, although its occasional use has had a relatively long duration (1984–2003) (Table 1; Fig. 1). This ABD is linguistically sound. It is also consistent with the PMA, for a primordial monster in Ancient Near Eastern literature is indomitable by any entity other than a major deity.

## Peaceful

The characterization of Behemoth as peaceful or docile and its use as an ABD is rare. It was used in only five (6.7%) of the twentieth and twenty-first century publications in this study's sample, and only during a 12-year stretch: 1990–2002. This ABD is based on Job 40:20, which in most English translations says that the mountains bring Behemoth food where the beasts of the field play (e.g. ASV, KJV, ESV, NAS, NIV, NRSV). The two authors who used this ABD apparently presumed that Behemoth is peaceful and docile if nearby animals feel safe enough to be playful in his presence. Both authors used this ABD in support of the idea of Behemoth as a sauropod, an herbivorous dinosaur, apparently under the assumption that herbivores are peaceful and docile. However, a close look at the behavior of today's large herbivores, which regularly includes aggression and sometimes great violence, reveals that that assumption is incorrect.[60]

58 Oard, M.J., Bates, G., Wolfe, T., Turbuck, C. *Exploring Dinosaurs with Mr. Hibb*, Powder Springs, GA: Creation Book Publishers (2016), pp. 48–49.

59 Marsh, O.C. 'Principal Characters of American Jurassic Dinosaurs – Part 1', *American Journal of Science* (1878) 16, 411–416.

60 e.g. Estes, R.D. *The Behavior Guide to African Mammals*, Berkeley: University of California Press (1991).

It is also incorrect that the beasts in verse 20 are near Behemoth. The Hebrew wording of the verse is *kî-b̲ûl ḥārîm yiśəʾū-lō wəḵol-ḥayyaṯ haśśāḏeh yəśaḥāqū-šām*. In English, the word-for-word translation is "Surely (*kî-*) food (*b̲ûl*) mountains (*ḥārîm*) they-bring-forth-to-him (*yiśəʾū-lō*) and-all (*wəḵol-*) beasts (*ḥayyaṯ*) the-field (*haśśāḏeh*) taunt-him (*yəśaḥāqū-*) there (*šām*)." A good English translation would be: "Surely the mountains bring forth food to him, and the beasts of the field taunt him from where they are." The word *śāḏeh* refers to a flat area suitable for cultivation.[61] A flat area stands in contrast to mountains. Although the phrase "beasts of the field" in the Hebrew Bible usually refers to wild animals in general (Gen. 3:1, 3:14; Exod. 22:31, 23:11, 23:29; Lev. 26:22; Deut. 7:22; 2 Kgs 14:9; 2 Chr. 25:18; Job 5:23, 39:15, Ps. 8:7, 80:13, 104:11; Isa. 43:20, 56:9; Jer. 12:9, 27:6, 28:14; Ezek. 34:5, 34:8, 39:4, 39:17; Hos. 2:12; Joel 1:20, 2:22), it is sometimes used to emphasize a contrast in location, such as the ground as opposed to the air (Gen. 2:19, 2:20; 1 Sam 17:44; 2 Sam. 21:10; Ezek. 29:5, 31:6, 31:13, 38:20; Hos. 2:18, 4:3), the land as opposed to the sea (Ezek. 38:20), or a flat area as opposed to mountains (Ps. 50:11). In verse 20, its coupling with a phrase about mountains implies a contrast in location. The beasts of the field are therefore not where Behemoth is (the mountains). Instead, they are where Behemoth is not (the flat field). The verb that expresses what they're doing there is *śāḥaq*, which refers to laughter, whether derisive or merely joyful.[62] The verb can also be used in reference to the operation of a musical instrument, in which case it is translated "play" in English (1 Sam. 18:7; 2 Sam. 6:5, 6:21; 1 Chr. 13:8, 15:29; Jer. 31:4). However, the operation of musical instruments by wild animals is incongruous in the context of verse 20. The verse implies that the beasts of the plain laugh at Behemoth from afar, apparently as one might taunt an exiled individual whose exile prevents him from harming the taunter. This is consistent with the PMA, for the banishing of a primordial monster to a safe distance may inspire derisive revelry.

## Tight Sinews

The idea that Behemoth has tight sinews has been used as an ABD only twice in this study's sample: once in 1993 and once in 1995. In the latter case, the author connected the idea to the ossified tendons that stiffen the tails of hadrosaurid dinosaurs such as *Corythosaurus*.[63]

This ABD is based on Job 40:17b, which says *gîḏei phaḥaḏāyw yəśōrāḡū.* In English, the word-for-word translation is "tendons (*gîḏei*) his-testes (*phaḥaḏāyw*) interwoven (*yəśōrāḡū*)." A good English translation would be:

61 Strong, *The New Strong's Expanded Exhaustive Concordance of the Bible*, p. Hebrew 272.

62 Benner, *The Ancient Hebrew Lexicon of the Bible*, p. 390; Strong, *The New Strong's Expanded Exhaustive Concordance of the Bible*, p. Hebrew 276.

63 Reinikainen, P. 'Letter to the Editor: Dinosaurs and Dragons', *Creation Ex Nihilo Technical Journal* (1995) 9, 36.

"The tendons at his testes are interwoven." This phrase is the second part of the couplet that likens Behemoth to a cedar. As we have seen, the first part of the couplet (verse 17a) uses wordplay to say that like a cedar cherishing its trunk, Behemoth cherishes his tail. The second part (verse 17b) continues to conceptually link Behemoth's hindquarters and the parts of a cedar, by using the verb *śārag*, which refers to the weaving of branches to make a wreath.[64] The parts of Behemoth that are interwoven are the plural of *gîḏ*, a word that refers to a tendon, the tough connective tissue structure that attaches muscle to bone.[65] Their location is his *paḥaḏ*, a word that refers to a testis.[66] However, because testes don't have tendons, this must refer to tendons in their vicinity, i.e. in the pelvic region, the location of the base of the tail, which is conceptually linked to the *zānāv* (animal tail or plant stem) in the first part of the couplet in 17a. It is possible that the reference to testes in 17b echoes a double entendre in 17a that conceptually links Behemoth's *zānāv* with in his genitals.

It is also possible that the wording of 17b is another colorful way to say that Behemoth has no limbs. Because the verb *śārag* would normally be used in reference to branches, the turn of phrase in the second part of the couplet in 17b may be meant to draw a contrast between the anatomy of Behemoth's pelvic region and a cedar's branches. Just as a cedar's branches extend outward from its trunk, an animal's hindlimbs extend outward from its pelvis. However, instead of sporting structures that extend outward, Behemoth's pelvis sports structures that are tightly woven as in a wreath. Limblessness is suggested not only by the lack of outwardly extending structures at the pelvis but also by the shape of a wreath, which is elongate and narrow like a serpent. Whether this serpentine interpretation of verse 17b is correct or not, the Hebrew phrasing is consistent with the PMA, for its characterization of Behemoth's anatomy does not preclude him from being a primordial monster.

## Concluding Thoughts

The Behemoth passage in Job 40 is one of the most mistranslated passages in the Bible. Most English renditions of it contain phrasing that differs strongly from that of the Hebrew text, both in literal wording and in spirit. A possible contributing factor is that, centuries before the first English translation of the Bible was undertaken, the ancient Hebrew conception of Behemoth within its original Near Eastern folkloric context had been all but forgotten. Only in recent history have we begun to rediscover its pieces and attempt to reassemble them. A second possible contribut-

64 Benner, *The Ancient Hebrew Lexicon of the Bible*, p. 396; Strong, *The New Strong's Expanded Exhaustive Concordance of the Bible*, p. Hebrew 291.

65 Benner, *The Ancient Hebrew Lexicon of the Bible*, p. 79; Strong, *The New Strong's Expanded Exhaustive Concordance of the Bible*, p. Hebrew 55.

66 Strong, *The New Strong's Expanded Exhaustive Concordance of the Bible*, p. Hebrew 226.

ing factor is the influence of a preconceived idea in the minds of the translators: in this case, the idea that Behemoth is both a natural animal and a quadruped. This idea, a product of the ZA, had long been predominant by the time the first English translations of the Bible were undertaken. Incorrect preconceived ideas have generated mistranslations in English renditions of the Hebrew Bible in other instances also. For example, in the KJV, the Hebrew words *matsēḇāh* and *ʾašerāh* are often rendered as "image" and "grove" respectively, despite that a *matsēḇāh* is not an image but is an elongate stone that was erected as a monument or religious focal point, and an *ʾašerāh* is not a grove but was a wooden religious implement.[67] Although most current English translations render these two words more correctly, reflecting the findings of modern scholarship on ancient Near Eastern culture, mistranslations of other Hebrew words in various biblical passages persist in recent English translations.[68] Similar problems with the Behemoth passage of Job 40 are therefore not unique.

Many ABDs are direct results of translation errors. As shown above, several ABDs that are contradicted by the Hebrew text are consistent with its English renditions. The advocates of such ABDs should therefore not be judged too harshly. Few modern readers of the Bible have studied Hebrew, which makes a modern-language translation the only available form of the text to many readers.

As shown above, the variety of arguments for Behemoth as a dinosaur all fail under scrutiny. Several are based on mistranslations or misunderstandings of the Hebrew text. Notably, among the ABDs that are based on mistranslation is the ABD of the cedar-like tail, which is not only the most popular ABD but is the only dinosaur-specific trait that any ABD addresses. Without it, the basis for judging Behemoth to be a dinosaur crumbles.

It is therefore evident that the text of Job 40 does not support the interpretation of Behemoth as a dinosaur. However, it is consistent with Behemoth as a primordial monster, in accordance both with ancient extrabiblical writings and with much modern scholarship.[69] The text of Job 40 also contradicts the interpretation of Behemoth as a hippopotamus or elephant. Modern scholars

67 Keel, O., Uehlinger, C. *Gods, Goddesses, and Images of God in Ancient Israel*, Minneapolis: Fortress (1998), pp. 228–240; Bloch-Smith, E. 'Massebot Standing for Yhwh. The Fall of a Yhwistic Cult Symbol', in Collins, J.J., Lemons, T.M., Olyan, S.M. (eds.) *Worship, Women, and War. Essays in Honor of Susan Niditch*, Providence: Brown University (2015), pp.. 99–115.

68 For several examples, see Budin, S.L. *The Myth of Sacred Prostitution in Antiquity*, Cambridge: Cambridge University Press (2008).

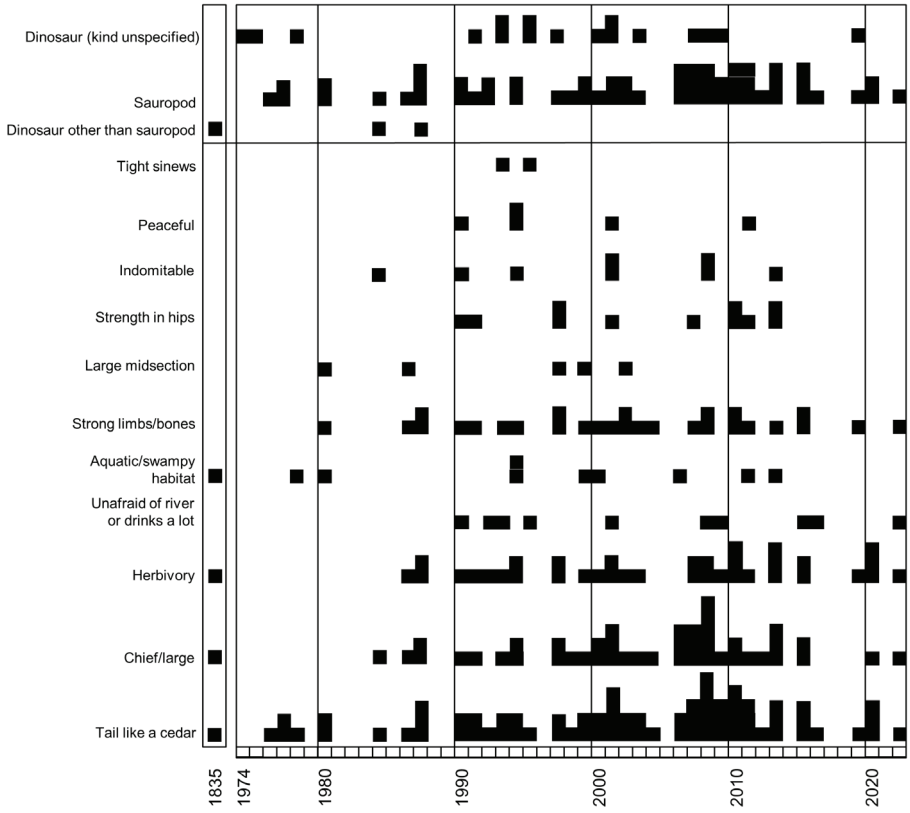
69 Day, *op. cit.*, pp. 41–42, 77–87; Stone, *op. cit.*, pp. 186–188; Batto, *op. cit.*, pp. 47, 157; Whitney, *op. cit.*; Ansell, *op. cit.*; Mulder, *op. cit.*; van de Kamp, H. 'Leviathan and the Monsters in Revelation'. In van Bekkum, K., Dekker, J., van de Kamp, H., Peels, E. (eds.) Pl*aying with Leviathan. Interpretation and Reception of Monsters from the Biblical World*, Leiden: Brill (2017), pp. 167–175; Senter, 'Leviathan, Behemoth, and Other Biblical *Tannînim*'; Sneed, *op. cit.*

would therefore do well to rethink the zoological approach to the identity of Behemoth and perhaps discard it altogether.

## Acknowledgments

Thanks to two anonymous reviewers, whose advice resulted in improvements to this paper.

**Philip J. Senter is a Professor of Zoology at Fayetteville State University in North Carolina. He has a dual education: Ph.D (Biological Sciences) and M.Theol.**




**nosaur.** Each black square represents one publication. For each argument, the number of black squares stacked vertically per year represents the number of publications that used the argument in that year. For details, see Table 1.

**Table 1. Arguments that Behemoth is a dinosaur.** All dinosaurs listed in the far-right column are sauropods, except *Corythosaurus, Iguanodon, Stegosaurus, and Tyrannosaurus.*

| Reference | Tail like a cedar | Chief of the ways of God | Herbivorous | Other | Suggested identity |
|---|---|---|---|---|---|
| Thompson 1835[70] | X | | X | aquatic, strong, large; flexible tail; nasal horn | *Iguanodon* |
| Burnett, 1838[71]: 67–70 | flexible | | X | flexible tail; nasal horn | *Iguanodon* |
| Burnett, 1841[72] | flexible | | X | flexible tail; nasal horn | *Iguanodon* |
| Beierle, 1974[73]: 34 | | | | | dinosaur |
| Segraves, 1975[74]: 31 | | | | | dinosaur |
| McGowen[75], 1976: 76–77 | X | | | | *Brontosaurus* |
| Beierle, 1977[76]: 63 | X | | | | *Brontosaurus* |
| Gish, 1977[77]: 16–17 | X | | | | dinosaur (pictured: a sauropod) |

70 Thompson, T. 'An Attempt to Ascertain the Animals Designated in the Scriptures by the Names Leviathan and Behemoth', *The Magazine of Natural History* (1835) 8, 193-197, 307-321.

71 Burnett, C.M. *The Power, Wisdom, and Goodness of God, as Displayed in the Animal Creation*, London: James Burns (1838).

72 Burnett, C.M. 'On Some Circumstances in Zoology, and the Natural History of Man, Mentioned in Revelation. No. IV', *Church of England Magazine* (1841) 10, 260–262.

73 Beierle, F.P. *Giant Man Tracks*, Prosser, WA: Perfect Printing (1974).

74 Segraves, K.L. *The Great Dinosaur Mistake*, San Diego: Beta (1975).

75 McGowen, C.H. *In Six Days*, Bible Voice, Van Nuys, CA: Bible Voice (1976).

76 Beierle, F.P. *Man, Dinosaurs, and History*, Prosser, WA: Perfect Printing (1977)

77 Gish, D.T. *Dinosaurs, Those Terrible Lizards*, San Diego: Creation-Life Publishers (1977).

| | | | | | |
|---|---|---|---|---|---|
| Rouster, 1978[78] | X | | | strong, large, aquatic | dinosaur |
| Beierle, 1980[79]: 97 | X | | | | *Brontosaurus* |
| Morris, 1980[80]: 65 | X | | | huge midsection, bones strong as iron, dweller of swampy regions | "brontosaur-type dinosaurs" |
| Morris, 1984[81]: 357 | X | X | | can't be trapped | *Brontosaurus*, *Tyrannosaurus* |
| Petersen, 1986[82]: 138–140 | X | X | X | powerful legs, large midsection | *Brontosaurus* |
| Baugh, 1987[83]: 78–82 | X | X | | bones like bronze bars | *Stegosaurus*, *Brontosaurus*, *Seismosaurus* |
| Mackal, 1987[84]: 6 | X | | X | swampy habitat | sauropod |
| Taylor, 1987[85]: 18–19 | X | | X | gigantic, "great muscles and very strong bones" | *Diplodocus*, *Apatosaurus* |

78 Rouster, L. 'Beowulf: Creationist Implications in our Earliest English Epic', *Creation Research Society Quarterly* (1978) 14, 221–223.

79 Beierle, F.P. *Man, Dinosaur, and History*, Prosser, WA: Perfect Printing (1980).

80 Morris, J.D. *Tracking Those Incredible Dinosaurs...and the People Who Knew Them*, San Diego: CLP (1980).

81 Morris, H.M. *The Biblical Basis for Modern Science*, Grand Rapids: Baker Book House (1984).

82 Petersen, D.R. *Unlocking the Mysteries of Creation*. El Dorado, CA: Creation Resource Foundation (1986).

83 Baugh, C.E. *Dinosaur*, Orange, CA: Promise (1987).

84 Mackal, R.P. *A Living Dinosaur? In Search of Mokele-Mbembe*, Leiden: Brill (1987).

85 Taylor, P.S. *The Great Dinosaur Mystery and the Bible*, Colorado Springs: Cook Communications (1987).

| | | | | | |
|---|---|---|---|---|---|
| Ham et al., 1990[86]: 33 | X | | | | *Brachiosaurus* |
| Unfred, 1990[87]: 6–8 | X | "greatest of all the land beasts that God had made" | X | aquatic, unafraid of river flooding, can't be trapped, gentle, "back legs were his strength," belly the source of his power, bones like tubes of brass and bars of iron | dinosaur (pictured: a sauropod) |
| Baker, 1991[88]: 18 | X | X | X | ability to support weight on and pivot on hindlimbs; bones strong as brass and iron | *Apatosaurus* |
| Sharbaugh, 1991[89]: 160 | X | | | | dinosaur |
| Gish, 1992[90]: 20 | X | | | big enough to drink up a river | *Apatosaurus*, *Brachiosaurus* |
| Grigg, 1992[91] | | | X | | *Diplodocus*, *Brachiosaurus* |
| Ham, 1993[92]: 12–13 | X | "perhaps the biggest land animal God had created" | | | dinosaur |

86 Ham, K., Snelling, A., Wieland, C. *The Answers Book*, El Cajon, CA: Master Books (1990).

87 Unfred, D. *Dinosaurs and the Bible*, Lafayette, Louisiana: Huntington House (1990).

88 Baker, M. *Dinosaurs*. Redding, CA: New Century (1991).

89 Sharbaugh, N. *Ammunition for Piercing the Armor of the Philosophy of Evolution*, Brownsburg, IN: Norm Sharbaugh Ministries (1991).

90 Gish, D.T. *Dinosaurs by Design*, Green Forest, AR: Master Books (1992).

91 Grigg, R. 'Dinosaurs and Dragons: Stamping on the Legends', *Creation ex Nihilo* (1992) 14 no. 3, 10–14.

92 Ham, K. *Dinosaurs and the Bible*, Florence, KY: Answers in Genesis (1993).

| | | | | | |
|---|---|---|---|---|---|
| Taylor, 1993[93] | X | | X | "drinks a lot, has strong bones, loins and belly…is tightly sinewed" | dinosaur |
| Niermann, 1994[94] | X | "largest of all the land animals" | X | peaceful, rested in water | sauropod |
| Phillips, 1994[95]: 59–60 | X | biggest | X | aquatic, strong, large-boned, gentle, can't be trapped | *Diplodocus* |
| Brown, 1995[96]: 249 | X | | | unafraid of river | dinosaur |
| Reinikainen[97], 1995 | | | | knitted sinews (as in *Corythosaurus*) | dinosaur |
| Anonymous 1997[98] | X | | X | "size was overwhelming," "hips were built to withstand the enormous force of each pounding step," "its midsection was a mass of muscle," "bones were built like steel girders with ribs like iron bars" | *Apatosaurus* |

93 Taylor, C.V. 'Dinosaurs in the Bible', *Creation Ex Nihilo Technical Journal* (1993) 7, 169–171.

94 Niermann, D.L. 'Dinosaurs and Dragons', *Creation Ex Nihilo Technical Journal* (1994) 8 no. 1, 85–104.

95 Phillips, P. *Dinosaurs. The Bible, Barney and Beyond*, Lancaster, PA: Starburst (1994).

96 Brown, W. *In the Beginning. Compelling Evidence for Creation and the Flood*, Phoenix: Center for Scientific Creation (1995).

97 Reinikainen, P. 'Letter to the Editor: Dinosaurs and Dragons', *Creation Ex Nihilo Technical Journal* (1995) 9, 36.

98 Anonymous. 'Dino-might', *Creation ex Nihilo* (1997) 20 no. 1, 43.

| | | | | | |
|---|---|---|---|---|---|
| Driver, 1997[99] | X | "'chief' (largest) of the created land animals" | X | large, "great strength in his loins and belly," bones like bars of iron | dinosaur |
| Ham, 1998[100]: 66–67 | X | "the largest animal God had made" | | | *Brachiosaurus* |
| Morris, 1999[101]: 36 | X | "biggest land animal that God created" | X | huge girth, strong bones, swamp dweller, afraid of nothing | *Apatosaurus* |
| Perloff, 1999[102]: 189 | X | | | | *Brachiosaurus* |
| DeYoung, 2000[103]: 46 | X | X | X | bones like tubes of bronze and rods of iron; hides in the marsh | *Apatosaurus* |
| Morris, 2000[104]: 73 | X | | | large | dinosaur |
| Comfort 2001[105]: 19 | X | "the largest of all the creatures God made" | X | strong hips, strong bones, lived among trees, "drank massive amounts of water, and was not disturbed by a raging river"; "impervious to attack" | dinosaur |

99 Driver, R. 'Sea Monsters…More than a Legend?' *Creation ex Nihilo* (1997) 19 no. 4, 38–42.

100 Ham, K. *The Great Dinosaur Mystery Solved*, Green Forest, AR: Master Books (1998).

101 Morris, J.D. *Dinosaurs, the Lost World, and You*, Green Forest, AR: Master Books (1999).

102 Perloff, J. *Tornado in a Junkyard. The Relentless Myth of Darwinism*, Arlington, MA: Refuge (1999).

103 DeYoung, D. 2000. *Dinosaurs and Creation*, Grand Rapids: Baker (2000).

104 Morris, H.M. *Biblical Creationism: What Each Book of the Bible Tells about Creation and the Flood*, Green Forest, AR: Master Books (2000).

105 Comfort, R. *Scientific Facts in the Bible. 100 Reasons to Believe the Bible is Supernatural in*

| | | | | | |
|---|---|---|---|---|---|
| Comninellis, 2001[106]: 119–120 | X | | | | dinosaur |
| Ham, 2001[107]: 38 | X | "the largest land animal God had made" | | | sauropod, e.g. *Brachiosaurus* |
| Lyons, 2001[108] | X | "chief [i.e., largest] of the ways of God" | X | peaceful; can't be apprehended | *Apatosaurus* |
| McGowen, 2002[109]: 110 | X | | | bones of bronze, limbs of iron | *Brontosaurus* |
| Petersen, 2002[110]: 150–151 | X | X | X | powerful legs, massive midsection | *Apatosaurus* |
| McKeever 2003[111] | X | "largest of his creation" | X | "strong legs and bones" | *Brachiosaurus*, *Apatosaurus* |
| Butt & Lyons, 2004[112]: 59 | X | "largest land-living animals ever to roam the earth" | | bones like beams of bronze, ribs like bars of iron | dinosaur |

*Origin*, Newberry, FL: Bridge-Logos (2001).

106 Comninellis, N. *Creative Defense. Evidence Against Evolution*, Green Forest, AR: Master Books (2001).

107 Ham, K. *Dinosaurs of Eden*, Green Forest, AR: Master Books (2001).

108 Lyons, E. 'Behemoth and Leviathan—Creatures of Controversy', *Reason & Revelation* (2001) 21 no. 1, 1–8.

109 McGowen, C. *In Six Days. A Case for Intelligent Design*, new and rev. ed., New Wilmington, PA: SON-RISE (2001).

110 Petersen, D.R. *Unlocking the Mysteries of Creation*, premier ed., Alachua, FL: Bridge-Logos (2002).

111 McKeever, S. 'Dinosaur Questions', *Creation* (2003) 25 no. 2, 22–24.

112 Butt, K., Lyons, E. *Dinosaurs Unleashed. The True Story about Dinosaurs and Humans*, 2nd ed., Montgomery: Apologetics Press (2008).

| | | | | | |
|---|---|---|---|---|---|
| Batten et al., 2006[113]: 242–243 | X | | | large | *Brachiosaurus* |
| Gibbons, 2006[114]: 50–52 | X | one of the "first works" (sixth day) | | swamp-dwelling | *Argentinosaurus* |
| Ham, 2006[115]: 160 | X | "the largest land animal God had made" | | | *Brachiosaurus* |
| Batdorf and Porch, 2007[116]: 133 | X | "the largest living thing God created" | X | | *Apatosaurus* |
| Hamp, 2007[117]: 139–143 | X | | X | strength in its hips; bones like bronze and iron | *Brachiosaurus* |
| Helfinstine and Roth, 2007[118]: 107 | | | | large, terrestrial | large dinosaur |
| Wilson et al., 2007[119]: 27–28, 108 | X | X | | | *Seismosaurus* |

113 Batten, D., Catchpoole, D., Sarfati, J., Wieland, C. 2006. *The Creation Answers Book*, no city listed: Creation Book Publishers (2006).

114 Gibbons, W.J. *Missionaries and Monsters*, Landisville, PA: Coachwhip (2006).

115 Ham, K. 'What Really Happened to the Dinosaurs?' in Ham, K. (ed.) *The New Answers Book 1*, Green Forest, AR: Master Books (2006), pp. 149–176.

116 Batdorf, B.R., Porch, T.E. *Life Science*, 3rd ed., Greenville, SC: BJU Press (2007).

117 Hamp, D. *The First Six Days. Confronting the God-Plus-Evolution Myth*, Santa Ana: Yoel (2007).

118 Helfinstine, R.F., Roth, J.D. *Texas Tracks and Artifacts. Do Texas Fossils Indicate Coexistence of Men and Dinosaurs?* 2nd ed., Anoka, MN: R & J(2007).

119 Wilson, C., Wilson, B,. Heffner, J. *The Paluxy River Dinosaur Controversy. Did Dinosaurs and Men Walk Together? Final Nails in the Coffin of Evolution*, Lilydale, VIC: Pacific Christian Ministries (2007).

| | | | | | |
|---|---|---|---|---|---|
| Boland 2008[120]: 58–60 | X | chief = "largest, and the greatest of all the animals" | X | gigantic; strong muscles and bones; untamable; "could drink large amounts of water" | *Apatosaurus*, *Diplodocus*, *Ultrasaurus* [sic.] |
| Butt & Lyons, 2008[121]: 67 | X | "largest land-living animals ever to roam the earth" | | bones like beams of bronze, ribs like bars of iron | dinosaur |
| Catchpoole 2008[122]: 11–13 | X | "largest land animals that God made" | | | *Brachiosaurus* |
| Dye, 2008[123]: 17 | X | "the greatest creature He ever made" | | | sauropod |
| Lyons and Butt, 2008[124]: 113–130 | X | large size | X | can't be captured | *Apatosaurus*, *Argentinosaurus* |
| Ham, 2009[125]: 49 | X | "the largest animal God made" | | big and strong | sauropod |

120 Boland, K. *Mysteries of the Bible Explained*, Bloomington: Xlibris (2008).

121 Butt, K., Lyons, E. *Dinosaurs Unleashed. The True Story about Dinosaurs and Humans*, Montgomery: Apologetics Press (2004).

122 Catchpoole, D. 'Mokele-Mbembe: A Living Dinosaur?' *Creation* (1999) 21 no. 4, 24–25.

123 Dye, L. *Dinosaurs Revealed*, Victoria, BC: Trafford (2008).

124 Lyons, E., Butt, L. *The Dinosaur Delusion*, Montgomery: Apologetics Press (2008).

125 Ham, K. *Dinosaurs for Kids*, Green Forest, AR: Master Books (2009).

| | | | | | |
|---|---|---|---|---|---|
| Malone 2009[126]: 61 | | | | | dinosaur |
| Stuckwish, 2009[127]: 12– | X | | X | drinks up a river | *Diplodocus* |
| Baker, 2010[128]: 48–54 | X | | X | vertebrae like tubes of brass, leg bones like bars of iron, strength in loins (weight borne on hindlimbs) | sauropod |
| Isaacs 2010[129]: 161 | "stiff like a cedar" | | X | large size; habitat | sauropod |
| Paul, 2010[130] | X | | X | visible loins and muscles; invincible | sauropod |
| Sharp, 2010[131]: 177–180 | X | X | | strength in loins = specialized vertebral construction; bones like bronze beams and iron bars | *Brachiosaurus*, *Diplodocus*, *Ultrasauros*, *Apatosaurus* |
| Gilmer, 2011[132]: 83–92 | X | large | X | strong loin and belly; body parts like large pipes; can't be captured; docile, aquatic | *Apatosaurus* |

126 Malone, B.A. *Censored Science. The Suppressed Evidence*, Midland, MI: Search for the Truth Publications (2009).

127 Stuckwish, D. *Biblical Cryptozoology: Revealed Cryptids of the Bible*, Bloomington: Xlibris (2009).

128 Baker, M. *The Real History of Dinosaurs*, 5th ed., Redding, CA: New Century (2010).

129 Isaacs, D. *Dragons or Dinosaurs? Creation or Evolution?* Alachua, FL: Bridge-Logos (2010).

130 Paul, M.-J. 'Behemoth and leviathan in the Book of Job', *Journal of Creation* (2010) 24 no. 3, 94–100.

131 Sharp, GT. *Rocks, Fossils and Dinosaurs*, Noble, Oklahoma: Icon (2010).

132 Gilmer, J.E. *100 Year Cover-up Revealed. We Lived with Dinosaurs!* rev. ed., Bloomington: AuthorHouse (2011).

| | | | | | |
|---|---|---|---|---|---|
| Hodge et al. 2011[133]: 87 | | | | | sauropod |
| Wilson, 2011[134]: 6–8 | X | | | | *Brachiosaurus*, *Apatosaurus* |
| Woetzel, 2012[135]: 69 | X | "biggest land animal" | | | sauropod |
| Gilmer, 2013[136]: 12–23, 67–68 | X | large | X | strong loin and belly; body parts like large pipes; can't be captured; docile, aquatic | *Apatosaurus* |
| Lacy, 2013[137]: 160 | X | "the largest living thing God created" | X | | *Apatosaurus* |
| Thomas, 2013[138]: 47–48 | X | "the largest land creature that God made" | X | strength rooted in thighs | *Apatosaurus* |
| Clarey, 2015[139]: 19 | X | | X | "tubes of bronze" = hollow vertebrae; leg bones strong as iron | sauropod |

133 Hodge, B., Mitchell, T., Ham, K. *Answers Book 4 Teens, Volume 1*, Green Forest, AR: Master Books (2011).

134 Wilson, C. 'Dinosaurs in Africa? And a Modern Plesiosaurus', in Baugh, C.E. (ed.) *Dinosaur*, Orange, CA: Promise (1987), pp. 119–124.

135 Woetzel, D. *Chronicles of Dinosauria. The History and Mystery of Dinosaurs and Man*, Green Forest, AR: Master Books (2012).

136 Gilmer, J.E. *The Bible is Right! About Dinosaurs and Evolution*, Bloomington: AuthorHouse (2013).

137 Lacy, E.A. *Life Science*, 4th ed. Greenville, SC: BJU Press (2013).

138 Thomas, B. *Dinosaurs and the Bible*, Dallas: Institute for Creation Research (2013).

139 Clarey, T. *Dinosaurs. Marvels of God's Design*, Green Forest, AR: Master Book (2015).

| | | | | | |
|---|---|---|---|---|---|
| Ham, 2015[140]: 36 | X | "largest land animal God had made" | | | *Brachiosaurus* |
| ICR, 2015[141]: 14, 113 | X | "could mean it was the largest creature God made" | X | huge (unafraid of a river); bones like beams of bronze | sauropod |
| Oard et al., 2016[142]: 48–49 | X | | | "big belly muscles"; "a sauropod dinosaur is double hipped"; can stand the torrent of the Jordan | sauropod |
| Hughes and Cosner, 2019[143] | X | | X | "bones like beams of bronze" | *Brachiosaurus* |
| Anonymous, 2020[144] | | | X | | dinosaur |
| Clarey, 2020[145]: 87 | | | X | | sauropod |
| Sarfati and Tay, 2020[146]: 208 | X | refers to large size | X | | sauropod |
| Lamoure, 2022[147] | X | "largest land animal God created" | X | strong bones and legs; not frightened by a river | *Diplodocus*, *Giraffatitan* |

140 Ham, K. *Dinosaurs of Eden*, rev. and updated ed., Green Forest, AR: Master Books (2015).

141 Institute for Creation Research. *Guide to Dinosaurs*, Eugene, OR: Harvest House (2015).

142 Oard, M.J., Bates, G., Wolfe, T., Turbuck, C. *Exploring Dinosaurs with Mr. Hibb*, Powder Springs, GA: Creation Book Publishers (2016).

143 Hughes, E., Cosner, L. 'How Did Dinosaurs Survive the Flood?' *Creation* (2019) 41 no. 4,32–35.

144 Anonymous. 'Nodosaurs Ate Flowers', *Creation* (2020) 42 no. 4, 8.

145 Clarey, T. *Carved in Stone. Geological Evidence of the Worldwide Flood*, Dallas: Institute for Creation Research (2020).

146 Sarfati, J., Tay, J. *Titans of the Earth, Sea, and Air*, Powder Springs: Creation Book Publishers (2020).

147 Lamoure, K. 'Battling Behemoth', *Creation* (2022) 44 no. 3, 22–23.

*MICHAEL SALVATORE POLITZ*

# Thomas Aquinas in Dialogue with Modern Causal Explanations

*Within modern science, the rich explanatory power of causality has been relocated down to a simple, lacking notion of causality implicitly defined as 'the material origin of a series.' Through the course of this paper, I examine two prominent examples in modern science where this notion of causality is on full display. The first of these examples is the origin of the universe as espoused by the Big Bang theory. The second is the mind/body problem. In both cases, the modern notion of causality, as the origin of a material series, is utterly deficient in explanatory power. To rescue the notion of causality, I detail the classical view of causality as espoused by the Aristotelian-Thomistic tradition and shown clearly in the Christian Faith. Most importantly, I show how reintroducing immaterial causality would absolve the explanatory gap in both cases. With this fuller notion of causality, I show how the origin of the universe and the mind/body problem are only problems considering the modern, deficient sense of causality. If the view of immaterial causality found in the Christian tradition is allowed, ample explanation is given as to the mechanics of both the origin of the universe and the mind/body problem.*

**Keywords:** Thomas Aquinas, Causality, Big Bang Theory, Mind/Body Problem, Interaction Problem

## Introduction

Causality is a rich and nuanced subject that has long puzzled philosophers and scientists alike. Certain key characteristics demarcate the current conception of causality found in most academic disciplines. The modern conception of causality is quite often reduced to a series of material, chemical, or energetic reactions. One item in the series influences another. This causes a change in the receiving item and its likewise influence on the next item in the series. This notion of 'modern' causality travels through the sciences, from physics to modern neuroscience. While theories have emerged that challenge this view of causality, the basic materialistic collision view of causality still remains quite prevalent within the philosophy of science. While science, in general, has begun treating causality through the lens of statistics (as is, most prominently, exemplified in quantum mechanics), the philosophy of science still paints the picture of causality as material contact upon a Cartesian coordinate plane. Through the course of this paper, we will examine two modern causal explanations of scientific problems in order to discern what constitutes a 'cause' in modern terms. The first of which is the origin of the universe as dictated

by modern physics and philosophy of science. The second is the mind/body problem found in psychology, cognitive science, and philosophy. By examining these two major conclusions drawn that utilize modern causality, we will see explanatory power within modern causality lies within the *material* origin of a *causal* series. After looking at these two cases from the perspective of modern causality, we will critique this notion of causality as lacking in proper explanatory power. From there, we will examine the classical notion of causality as espoused in the Christian tradition through the persons of Aristotle and Thomas Aquinas. By examining the Aristotelian-Thomistic notion of causality, we will note the indispensable notion of immaterial causality. This notion of *immaterial* causality will serve as a primary source of distinction between modern and classical forms of causality. Mainly, the classical notion of causality allows for conceptions of immaterial causation while the modern notion forbids it. From this realization, we will see how this classical notion of causality is needed in modern science to properly account for the cause of the universe's origin and the mind/body problem. Finally, we will see the Aristotelian-Thomistic notion of immaterial causality is needed if we are to call something a 'cause' at all.

## The Lineage of Bad Causality

In modern science, materialist mechanics are used to explain reality. With the thought revolution of quantum mechanics, we seemed to have opened the door back towards a notion of immaterial causality, as quantum mechanics showed both a major indeterminacy wrought within reality and the intimate relationship between matter and energy. This latter consequence of mass/energy relations seemed promising, as what could energy be conceived of if not immaterial causality? Sadly, with our dependence on the mathematization of the universe into formulaic laws, the field of statistics has taken over with explanatory power. The concept of 'energy' is useful insofar as its quantification fits into the formulas we utilize to diagram world processes. Materialism rules in its explanatory power. However, the purpose of this paper is not to diagram every instance of causality and its usage throughout the various sciences. Rather, we are concerned with how sciences reach an explanatory gap when addressing major issues which they then try to fill with a view of causality which ultimately does not succeed in its epistemic goals. It will be shown that the failure of this attempt to explain major issues stems from a view of causality which ultimately relies too heavily upon materialism as it forfeits the immaterial. Furthermore, it is this very immaterialism that may hold the key to the explanatory gap found at the extremes of modern science.[1]

1 For a detailed account of how vital this immaterial position is and has been in the history of philosophy and science, see: Grosz, E. *The Incorporeal : Ontology, Ethics, and the Limits of Materialism*, New York: Columbia University Press (2017).

Though there are many instances to blame for our current dependence on material determinism, a well-noted moment of distinction came from Hume's critique of causality. Famously given in the *Treatise of Human Nature*, Book I, Part III, Section III, Hume argues that whatever is distinguishable can also be separated. From this, he notes that cause and effect are distinguishable and, thus, separable. Since we can then conceive of cause and effect as distinct, it is possible, in reality, for effects to be distinct from their causes. This possibility of cause and effect being distinct from each other means that some effects could have no cause. Thus, causality is called into question from its bare roots, for how can there be an effect without a cause? How are we to conceive of causality if its fundamental elements of 'cause' and 'effect' are separable and their relation left a mystery?

Hume's critique represents only one instance in an evolving and multifaceted concept that is 'causality.' However, for the sake of brevity, we will use two major factors from Hume's account of causality to represent the trend in the treatment of causality after Hume. These factors are 1) the separation of cause from effect and 2) the lack of intrinsic and immaterial notions of causality. Once cause and effect have been separated and their interaction left in question, we have essentially destroyed all forms of intrinsic and immaterial causality. There is no interrelation between cause and effect, so all forms of internal cohesion and immaterial causality are gone. Thus, we will conceive of 'modern causality' as that which continues this trend and in some way separates cause from effect while ignoring all notions of internal and immaterial notions of causation.

It may be asked how modern causality can account for anything if cause and effect are separated. Since there is no allotment for internal causality, the modern notion must find some way to reconcile cause with effect in an external way. This is done through the notion of a series. Though cause and effect can be separable, they still can and do interact (if only statistically) through the medium of material or energetic exchanges. Thus, while the modern notion does not prove the necessity for causal interactions, it cannot ignore the statistical fact of causal interactions. Furthermore, it can keep track of these matter-of-fact causal interactions by tracking material causal series.

Though this view of 'modern causality' is an oversimplification (as the vast array of techniques and hermeneutical devices employed by the empirical scientific tradition cannot be confined down to the simplistic form of causality we have just described), our purpose in this paper is to highlight the explanatory power found in the Scholastic notion of immaterial causality and advocate for its adopting into the modern view of causality. Thus, though we will simplify the Humean and 'modern notion' of causality, we will do so with the intent to show the contrast between the explanatory power of a notion of causality with and without a notion of immaterial causation. More so, although we will simplify the notion of 'modern causality,' we will see from the examples taken how the notion of 'modern causality' described above still acts as a very real

undercurrent even within our contemporary methods and how instrumental the Scholastic notion of immaterial causality could be in the empirical scientific method if adopted.

Since immaterial causality is not utilized, the empirical scientific method turns towards the notion of a causal series to fill in the gaps. Tracking these series backward allows us insight into the workings and mechanics of the universe. However, problems arise once we try to reach the cause of these series using the modern notion of causality. Let us now look at two of these series at work in contemporary science. These two examples are the origin of the universe and the mind/body problem. Both of these cases, which produce significant gaps in knowledge for contemporary physics, have their explanatory gaps alleviated by applying a classical notion of causality which we will later examine. To show the explanatory gap of the modern notion of causality, first, let us look at the prevailing model of the origin of the universe.

## What is the Big Bang Theory?

The Big Bang theory is based on four sets of equations.[2] These equations consider (among quite a few other factors) the general theory of relativity and the radius of the universe. Given such presuppositions like gravity always is attractive and the relativity of space-time holds true, science posits a singularity that accounts for the beginning of the universe.[3] Hawking summarizes this point in the following:

> All of the Friedmann solutions [explained below in this paper] have the feature that at some time in the past (between ten and twenty thousand million years ago) the distance between neighbouring galaxies must have been zero. At that time, which we call the big bang, the density of the universe and the curvature of space-time would have been infinite. Because mathematics cannot really handle infinite numbers, this means that the general theory of relativity (on which Friedmann's solutions are based) predicts that there is a point in the universe where the theory itself breaks down. Such a point is an example of what mathematicians call a singularity.[4]

The 'Friedmann' solutions Hawking references above refer to the work of Aleksandr Friedmann, who posited a universe whose state changes with time.[5]

2 Smith, Q. 'Did the Big Bang Have a Cause?' *The British Journal for the Philosophy of Science* (1994) 45(2), 649-650.

3 *Ibid*., 650.

4 Hawking, S. *A Brief History of Time: From the Big Bang to Black Holes*, New York: Bantam Books (1988), p. 46.

5 Cf: Friedmann, *A. 'On the Curvature of Space' in A Source Book in Astronomy and Astrophysics* Eds. Lang, K.R and Gingerich, O. (1979), 838-843.

Additionally, the development and usage of these equations, along with their application within a universe assumed to be homogeneous and isotropic, allows for the fuller designation of the 'Friedmann-Lemaitre-Robertson-Walker Solutions.' Thus, the universe is conceived to be constantly changing, and modern science looks to the Big Bang to account for the original cause of our changing universe. We can thus summarize the Big Bang theory in the following four points. 1) Given what we know about gravity, motion, and the estimated current size of the universe, we can see that it is expanding. 2) This expansion rate can be mathematically represented and tracked back to an origin where the density of the universe is confined to a point.[6] 3) Prior to this point, we do not know what occurred or if time existed. 4) Thus, this singularity of hyper-dense material existence must explode in a way that begins the motion and expansion of the universe and thus ushers in time.

In this notion of the Big Bang theory, we can note several features.[7] Newton's time (as a fourth dimension) seems to thus be in the works in the modern conception of causality, as causality takes place *in time* in the modern sense.[8] In the modern notion of causality, there is an utter dependence on time. Causality is seen as a sequence of events that can be traced back to a progenitor event without any indication of what made the first event the cause of the series. As a result of this temporal dependence, modern science only finds the origin point in a causal series, not the cause of that series. On this note, Professor Hawking

6 'Point' here is taken to reflect the original state of the universe. Though 'point' may be an ambiguous term it reflects both the singularity in reference to the state of the nascent universe as well as the origin of the causal series which we will address later.

7 Though the Big Bang Theory provides a prime example to critique the explanatory vacuum that occurs once immaterial causality is disregarded, the strides of empirical sciences are not to be deemed as lacking. In fact, there are cosmological theories within the modern empirical science tradition which attempt to account for the Big Bang in various nuanced ways which may posit a state of existence prior to the Big Bang. However, for the purposes of this paper, we are examining the lack of explanatory power found in the modern notion of causality (as defined as 'the progenitor of material causal series'). Even though this notion is found quite plentifully in modern science, it is by no means the only means of explanation modern science has posited to explain the Big Bang theory. We are critiquing the strictly material notion of causality rather than the Big Bang Theory. For an introduction into instances of the unique methods besides this strictly 'modern' (as we have so defined it) method of causality to account for the Big Bang Theory see: Bojowald, M. 'What Happened Before the Big Bang?", Nature Physics (2007) 3(8), 523-525; Edwards, R. B. *What Caused the Big Bang?* Brill (2021); and Ratra, B. & Vogeley, M. 'The Beginning and Evolution of the Universe', *Publications of the Astronomical Society of the Pacific* (2008) 120(865), 235–65.

8 It should be noted here that our conception of time has changed drastically since the relativity brought about with Einstein. It will be shown later that causality (most properly) is not temporally dependent. But, for the sake, of the argument at this point, we will assume a Newtonian version of time. By this I mean, when causality is addressed, there tends to be a larger framework it fits in (things change in time) which is much more conducive to the fourth-dimensional notion of Newtonian time.

writes:

> As experimental and theoretical evidence mounted, it became more and more clear that the universe must have had a beginning in time, until in 1970 this was finally proved by Penrose and myself, on the basis of Einstein's general theory of relativity. That proof showed that general relativity is only an incomplete theory: it cannot tell us how the universe started off, because it predicts that all physical theories, including itself, break down at the beginning of the universe.[9]

Things change because the singularity known as the Big Bang exploded and began a series of changes that continue to this day. Change within the world around us is ultimately explainable by appealing to the original explosion of reality, which began time yet somehow *in time.*

## Problems with the Big Bang Theory

In the Big Bang theory, causality is given as a series of events dependent on each other. If the entirety of the universe is explainable by simply following the series back, once we reach the origin, we have found the first event that spawned the universe. Thus, there is no need to search for something *more* or *prior* to the Big Bang because it is the event that spawns all subsequent events. It is the first cause in the series of all causes. Why, then, should we posit something *more?* As Sean Carroll states:

> Traditionally, people have thought the opposite. It's been popular to imagine that the world is teleological—directed toward some future goal. But it's better to think of it as ekinological, from the Greek … meaning "start" or "departure." Everything interesting and complex about the current state of our universe can be traced directly to conditions near its beginning, the consequences of which we are living out every day.[10]

Though this notion may provide a *how* to account for the series which begot the world, it cannot provide a *why*. The Big Bang can account for the beginning of motion, expansion, diffusion of energy, and all other processes that shape and mould our material world. However, there is no given reason *why* the Big Bang happened. The Big Bang acts as an axiom from which everything else flows, not a cause.

9 Hawking, S. *A Brief History of Time: From the Big Bang to Black Holes*, New York: Bantam Books (1988), pp. 50-51.

10 Carroll, S. *The Big Picture*, New York: Dutton (2016), p. 54.

## The Mind/Body Problem

Let us move on to the mind/body problem to see how pervasive this material and temporal-based causal series notion is within the modern conception of causality. John Searle states the mind/body problem concisely in the following:

> …the problem of mental causation. We all suppose, as part of common sense, that our thoughts and feelings make a real difference to the way we behave, that they actually have some causal effect on the physical world. I decide, for example, to raise my arm and—lo and behold—my arm goes up. But if our thoughts and feelings are truly mental, how can they affect anything physical?[11]

How does my volition (something subjective and unquantifiable) cause something objective and quantifiable to happen in the world? Searle addresses this problem by criticizing notions of causality, which lead to a dualistic way of thinking in which the mental acts on the physical.[12] As such, Searle simplifies the notion of causality to that of pure materialism. He states this in the following:

> Each object is composed of micro-particles. The micro-particles have features at the level of molecules and atoms as well as at the deeper level of subatomic particles. But each object also has certain properties such as the solidity of the table, the liquidity of the water, and the transparency of the glass, which are surface or global features of the physical systems.[13]

This notion of the emergence of phenomena as simply a more complex version of material interactions is voiced by many physicists now. Sean Carroll further states, 'Mental states are ways of talking about particular physical states. To say that a mental state causes a physical effect is precisely as legitimate as saying that any macroscopic physical situation is the cause of some macroscopic physical event.'[14] Thus, a mental state is simply deemed a macro-state of underlying physical events.

If mental states are simply complex physical events, we should be able to track down this complexity until we find their origin. Since we cannot observe and record data from the immateriality of mental states, scientists have concentrated on the material correlates to the immaterial states of the mind. As Evan Thompson states, 'One of the main goals of the neuroscience of consciousness is to discover the so-called "neural correlates of consciousness—the

11 Searle, J. *Minds, Brains and Science*, Cambridge, MA: Harvard University Press (1984), p. 17.

12 *Ibid*., p. 20.

13 Searle, J. *Minds, Brains and Science*, Cambridge, MA: Harvard University Press (1984), p. 20.`

14 Carroll, S. *The Big Picture*, New York: Dutton (2016), pp. 376-377.

neural processes that correlate directly with conscious experience…"'[15] However, Thompson admits the shortcomings of this view. He summarizes the current condition of neuroscience's quest for the origin of mental states in the following:

> At this point, some neuroscientists and philosophers will want to argue that brain science shows or at least strongly suggests that consciousness is nothing other than a brain process. According to this "neurophysicalist" view, neuroscience provides overwhelming evidence that every conscious experience is identical to some pattern of brain activity. But neuroscience itself doesn't demonstrate this identity; rather, the identity is a metaphysical interpretation of what neuroscience does show, namely, the contingency or dependence of certain kinds of mental events on certain kinds of neuronal events. In every neuroscience experience on consciousness, the evidence is always of the co-occurrence of mental events and neuronal events, and that isn't sufficient to establish their identity.[16]

Though we continue to search for a state(s) to account for the origin of thought, mental states are fundamentally immaterial. As thought experiments like Mary's Room[17] have shown, there is fundamentally *more* involved in the mental realm than what is empirically quantifiable by neuroscience. In the Mary's Room thought experiment, it is argued that Mary, a brilliant neurophysiologist, studies the intricacies of vision. Mary knows everything there is to know about the neurological mechanics of vision from her studies, yet she has lived her entire life being deprived of all colours except black and white. Upon leaving her confined research space and being introduced to the sight of colours for the first time, does she *learn* anything new about vision? The thought experiment argues that by experiencing colour for the first time and not just knowing the intricacies of the neural correlates of our experience of vision, Mary *knows* something more. She knows what it is like to see colour. This knowledge of *what it is like* is normally dubbed 'qualia' in cognitive science. It marks a major distancing from materialism, for even if the entireties of all material mechanisms of some aspects of sensation are known, there is still something *more* that is to be known—mainly, the qualia of that sensation.

Though useful to illustrate the point that there is more to mental states than just neural activity, we should not rely too heavily upon the idea of qualia to solve the interaction problem.[18] The purpose of bringing qualia to the fore of

15 Thompson, E. *Waking, Dreaming, Being*, New York: Columbia University Press (2015), p. 26.

16 Thompson, E. *Waking, Dreaming*, Being, New York: Columbia University Press (2015), p. 101.

17 Jackson, F. 'Epiphenomenal Qualia,' *The Philosophical Quarterly* (1982) 32(127), 127-136.

18 To see the problems associated with giving too much explanatory power to 'qualia' see: Vega, M. 'What Is the Mark of the Mental?' *Journal of Polian Studies* (2014) 1, 28-33.

our attention is merely to indicate there is more than just the material aspect of mental states not to suggest that mental states are entirely immaterial. Rather, though there is correlative neurophysiological activity surrounding mental activity, the entirety of explanatory power does not reside within this activity.

We see now that contemporary neuroscience has tracked down the causal series from a set state of neurological activity. Once this neurological activity is observed, thinking is said to occur. However, these correlative material states do not account for the existence of mental states. They are simply as far back as we can track a material sequence. We can do little more than show how observable neurological states correspond to recorded subjective states and make inferences. However, we are faced with the same problem as the Big Bang. *Why* and *how* thought occurs and why there are material correlations within the body is entirely reduced to a description of those correlative material states in the body. The reason why science cannot account for more than neural activity is the same reason why we have failed to find a cause of the origin of the universe. The modern notion of causality falls short of explaining the origin of a material causal series from non-material sources.

## A Different Approach to Causality

In both accounting for the origin of the universe and rectifying the mind/body problem, modern causality has tracked down a series to its original conditions. After this point, they have 'solved' the dilemma. However, can we say that origin conditions are causes? To answer this question, let us look into the nature of causality in general. After a brief overview of causality, we will revisit both the example of the Big Bang and the mind/body problem to see if the original states proposed by modern science should be adequately taken as 'causes.'

Prior to our modern notion of causality, there was a conception of causality based on ontological (as opposed to empirical) structures. This classical notion of causality is espoused clearly within the work of the Greek philosopher Aristotle and the Angelic Doctor of the Church Thomas Aquinas. Aquinas adopted and expanded the work of Aristotle in the massive synthesis, which was his corpus. This notion of causality lives on today in the modern tradition of Thomism. As such, this classical notion of causality will be referred to as the Aristotelian-Thomistic or just Thomistic conception of causality. The modern Thomist Fr. Norris Clarke describes causality as 'that which contributes positively in any way to the being of another, which is called its effect.'[19] Causality is expressed, in the fullest sense, in terms of actuality and potency. For A to cause B, the actuality of A pours forth into B in such a way that a potency in B becomes actual. As Thomas Aquinas puts it, 'Nothing can be reduced from potentiality

19 Clarke, N. *The One and the Many*, Notre Dame, IN: Notre Dame Press (2001), p. 187.

to actuality, except by something in a state of actuality.'[20] Causality is thus an overflowing of actuality from cause to effect. Fr. Clarke puts it, '…to cause as such does not imply to lose or give something away so as no longer to have it. It implies only to make another richer, not to become poorer oneself.'[21] Thus, the effect is intimately linked to its cause, for it, in every case, owes some portion of its actuality (if not its very existence) to its cause. This close bond of cause and effect is reinforced when we realize that temporality does not define this Thomistic version of causality. As opposed to the modern conception of causality's dependence on sequencing in time, this alternative description of causality derives its explanatory power based on act and potency. Causing something is the reduction of an inherent potentiality in the effect to act by the action of the cause. This diffusion of actuality does not most properly occur within the mode of time, for the causing of the effect and the effect being caused are not separable events. Instead, they are one event and occur simultaneously.[22] As Edward Feser points out, '…it is not quite right either to speak of the *throwing of a brick* causing *the breaking of glass.* It is rather the brick's pushing into the glass that is the immediate cause and the glass's giving way that is the effect, and these (unlike *the throwing of the brick* and *the breaking of the glass*) are not temporally separated but rather parts of one and the same event.'[23] Causality is most adequately seen as an ontological change rather than a temporal sequence. However, it is worth noting that this notion of the simultaneity of cause and effect does not imply any type of temporally-monist view of the universe. We do not live in an eternal present where the entirety of all change is considered as one event. As Feser states, 'It is important to emphasize, however, that *simultaneous* does not entail *instantaneous*. An event is of course spread out through time. The point is that a cause's producing its effect is part of the same one event in which the effect is being produced, however long this event lasts.'[24]

20 Aquinas, T. *Summa Theologica: Complete English Edition in Five Volumes*, New York: Benziger Brothers (1948), I 2, 3 *Respondeo.*

21 Clarke, N. *The One and the Many*, Notre Dame, IN: Notre Dame Press (2001), p. 193.

22 Clarke, N. *The One and the Many*, Notre Dame, IN: Notre Dame Press (2001), p. 190. 'Cause and effect are simultaneous, that is, that cause as causing (the act of causing) and its effect must be simultaneous—although the cause as existing being not yet causing can of course be prior to its effect.' See also, Feser, E. *Scholastic Metaphysics: A Contemporary Introduction*, Heusenstamm: Editiones Scholasticae (2014), p. 146. 'I have noted several times that for Scholastic metaphysicians, the immediate cause of an effect is simultaneous with it (rather than, as Hume would have it, temporally prior to it). Cause and effect are not two events, but two elements of one event. The basic idea is that to cause is just to produce an effect, and it makes no sense to think of a cause producing without its effect being produced, or an effect being produced without its cause producing it.'

23 Feser, E. *Scholastic Metaphysics: A Contemporary Introduction*, Heusenstamm: Editiones Scholasticae (2014), p. 147.

24 Feser, E. *Scholastic Metaphysics: A Contemporary Introductio*n, Heusenstamm: Editiones Scholasticae (2014), p. 146.

Thus, though cause and effect are simultaneous, this does not imply there is no sequence of causes. Rather, we should view these series as those of acts and potencies instead of temporally linked sequences of material collision. This latter view leads to several problems in both the origin of the universe and the mind/body problem, as we will now see.

## Problems with the Big Bang Theory as a Cause

In determining the cause and subsequent development of the universe, modern causality traces the expansion of the universe back to an origin point. Thus, we see modern causality, like Aristotelian-Thomistic causality, follows the axiom 'Everything that is moved is moved by another.'[25] If everything is moved by another, we can trace a sequence of causes all the way back to the beginning of the universe. It must thus be the cause of the universe since it is the first event, the first state of the universe. In many ways, this is true. The totality of matter, energy, and all of Creation is ushered forth in the event of the Big Bang. But why? Modern science cannot give the cause of the Big Bang. Rather, they look to the Big Bang or conditions similar to the Big Bang for ultimate explanatory power for the known universe. With so much hovering around the explanatory power of the Big Bang, we must wonder if the event of the Big Bang can be considered the cause of the universe.

Can we classify the event known as the Big Bang as a cause? One of the most fundamental principles of reality is known as the Principle of Sufficient Reason. Usurped only by the Principle of Non-Contradiction, the Principle of Sufficient Reason (Hereafter dubbed PSR) provides a bedrock for understanding the universe. PSR is most often associated with Leibniz as he first coined the term 'principle of sufficient reason.' However, while Leibniz used PSR in a more epistemic way, we shall concentrate our treatment of PSR and its larger frame of causality in a more ontological way. To further illustrate this difference, let us examine how Leibniz classifies PSR. In *Monadology*, Leibniz states:

> Our reasonings are grounded upon two great principles, that of contradiction, in virtue of which we judge false that which involves a contradiction, and true that which is opposed or contradictory to the false; and that of sufficient reason, in virtue of which we hold that there can be no fact real or existing, no statement true, unless there be a sufficient reason, why it should be so and not otherwise, although these reasons usually cannot be known by us.[26]

25 Aristotle, Phys II, 3. See also Phys II lect. 5, no. 1; Phys VII, 1 241b 24; Aquinas, T. *Summa Theologica: Complete English Edition in Five Volumes*, New York: Benziger Brothers (1948) I 2, 3 *Respondeo*.

26 Leibniz, G. *The Monadology and Other Philosophical Writings*, ed. Robert Latta, London: Oxford University Press. (1898), [31]-[32].

Leibniz links PSR directly with our reasoning. Even more so, he lists PSR as one of two principles upon which our reasoning is founded. Let us contrast this version of PSR with that of the modern Thomistic tradition.

Fr. Clarke explains PSR as follows:

> Every being must have the sufficient reason (i.e., the adequate grounding of its intelligibility for its own real existence), either (1) in itself, or (2) in another. Otherwise, it would be totally unintelligible, which is radically meaningless, not acceptable as an explanation for our real world. But if (1), then its existence is self-sufficient or self-explanatory, and no further questions need be asked. If (2), then it must have its sufficient reason in another, something else in the order of real being.[27]

We can see that Fr. Clarke links PSR more with real beings in the world than with our reasoning. While Leibniz utilizes PSR to ground the fact of something happening within our rational grasp, Fr. Clarke states the sufficient reason for something's *real existence* lies either within itself or another. It is with this latter view of PSR with which we will concern ourselves as its concern with ontological as opposed to epistemological entities links it closer to modern empirical science.

With this more ontologically dependent version of PSR from the modern Thomistic tradition in mind, let us ask, does the Big Bang contain adequate grounding for the intelligibility of its real existence? Empirical science can bring us to the original state of the universe and explain its expansion, but it does not dictate why the Big Bang occurred. Once modern science discerns *that* something happens, it tracks it to its origin state, then describes that state and deems it a cause. Even if not explicitly, we can see this when asked, 'How did the universe come about?' The conversation almost always then turns to the discussion of the Big Bang and the conditions of the early universe.

Overall, we can summarize that in accounting for the origin of the universe material, temporally-based causality is utilized. Track a line of causality back to the first event, which puts all other events in motion, and you have the origin point. However, diagramming the origin point for the expansion of the universe does not mean we have discovered the cause of the universe. Aquinas cites this problem: 'For, if the world and motion have a first beginning, some cause must clearly be posited to account for this origin of the world and of motion. That which comes to be anew must take its origin from some innovating cause; since nothing brings itself from potency to act, or from non-being to being.'[28] We have found a point at which our equations, which dictate the expansion of the uni-

27 Clarke, N. *The One and the Many*, Notre Dame, IN: Notre Dame Press (2001), p. 179.

28 Aquinas, T. *Summa Contra Gentiles*, trans. by Joseph Kenny, O.P., New York: Hanover House (1955-1957), I 13, [30].

verse, are reduced to starting conditions, but an origin does not mean a cause. Instead, we have a point at which we can begin to make sense of the material universe. What we do not have is a cause to account for this material universe. To rectify this deficiency, let us examine how the fuller notion of causality, as espoused by Aquinas, allows us to answer this question of the origin of the material universe. In doing so, we will see that Thomistic causality allows us to account for not only the origin but also the *cause* of the material universe.

## Thomistic Causality and the Origin of the Universe

While the modern consensus of causality is a temporally linked sequence of events that can be traced back to a source, the Thomistic notion of causality is both atemporal and ontologically derived. Primarily, Thomistic causality is in terms of actuality and potency. To cause something is to have the actuality of something overflow into another. The cause is in no way diminished by its giving of its actuality. Rather, there is a flow of actuality from cause to effect. As Aquinas states, '…nothing can be reduced from potentiality to actuality, except by something in a state of actuality.'[29] Author Gavin Kerr succinctly summarizes Thomistic causality in the following:

> Causality for Thomas is a dependency relation analyzed in terms of act and potency. An effect is in potency in some respect and the cause actualizes the potency of the effect in the same respect. The cause then is a principle of act with respect to the effect that stands in potency to it. This allows Thomas a very generous notion of causality which he can then apply to different contexts in which there is an act/potency dependency.[30]

The modern notion of causality struggles with any source of causality where there is not some sort of material (or energetic) proximity and interaction to account for the change. Even then, scientism cannot account for more than the continued mechanics of change, never *why* change occurs in the first place. In general, modern causality does not concede to or allow access to the concept of potency.[31] As a result, their notion of causality always amounts to particles

29 Aquinas, T. *Summa Theologica: Complete English Edition in Five Volumes*, New York: Benziger Brothers (1948), I, 2 3.

30 Kerr, G. 'Essentially Ordered Series Reconsidered Once Again,' *American Catholic Philosophical Quarterly* (2017) 91(2), 159.

31 Clarke, N. *The One and the Many*, Notre Dame, IN: Notre Dame Press (2001), p. 120. 'As a result, no empiricist who believes that all human knowledge is restricted to what can be observed by some sense experience can discover or allow in his philosophical horizon of explanation anything like potency … It can give no adequate sense to the whole set of meanings expressed in words that are an indispensable part of our vocabulary e.g., all words signifying "can," "able to," "ability," "aptitude," "capacity for," etc. For when I say, "I can sing," my meaning is not reducible without remainder to any form of the verb "to be" signifying actuality, past, present or future,

colliding, electricity flowing, energy dispersing, or some other traceable notion of actual things in the world. For the modern conception of causality, everything is an observable reaction and is fundamentally reducible to the most elementary of reactions. Sean Carroll writes, 'We look at the world around us and describe it in terms of causes and effects, reasons why, purposes and goals. None of those concepts exists as part of the fundamental furniture of reality at its deepest. They emerge as we zoom out from the microscopic level to the level of the everyday.'[32] The sum total of modern causality is thus relocated to the observation of regularities. As Carlo Rovelli states, 'The laws of elementary physics do not speak of "causes" but only of "regularities," and these are symmetrical with regard to past and future.'[33] Although not all laws utilized in the sciences vary asymmetrically with time, it is within a larger schema of 'time' within which we observe the regularities within which we base our laws and conception of the universe.

Around these regularities, we construct our laws and equations. Once we can predict the universe based on regular observations, we believe we have a correct conception of the universe and a grasp on causality. In this way, modern science accounts for much of the *how* of the universe. Yet, when asked *why,* the contemporary notion of causality simply traces things back to an origin point and deems it a 'cause.' Whether it is the origin of the universe or in explaining the mind/body gap, they simply are able to trace things back to the first known point of their causal series and then state that this origin point is the ultimate cause. Fr. Clarke summarizes this view:

> This is the theory of causality most radically opposed to the classical metaphysical one expounded above and the keystone of empiricism ever since. Since, according to Hume, we can assert nothing of the real world save what we can observe with our senses, and since all we can observe is a temporal sequence between an antecedent event and a consequent event, never any actual passage of causal power between the two, we have no right to assert anything more than a mere temporal sequence between the two, no intrinsic link of productive power or dependence of one on the other. Rather, by repeated observation of a regular sequence between A and B, we form the purely mental habit of joining the two together as though there were some necessary connection between them. A purely mental projection, with no grounding in reality as we actually observe it! Thus the whole explanatory power of the efficient cause as the reason why, by its productive power, the effect exists, has been evacuated, with only sheer, factual sequence and pre-

i.e., to "I am singing," "I did sing," '" will sing again." I might have decided I will never sing again, but in no way does this signify that I cannot sing.'

32 Carroll, S. *The Big Picture*, New York: Dutton (2016), p. 54.

33 Rovelli, C. *The Order of Time*, New York: Riverhead Books (2017), p. 169.

dictability left.[34]

In positing the origin of the universe, we are trying to discern the beginning of every real existent to which empirical science has access. The beginning state of the universe provides us with a starting point, but it leaves out an answer to the fundamental questions of *how* and *why*. Empirical science has temporally tracked back to the source of our universe; however, we still have yet to discern the ontological source of the universe. How can something come from nothing? This seems to violate PSR, as the actuality of the universe does not sufficiently provide a rationale for its own existence. We have tracked down a timeline, but the fundamental spark and evolution of the universe remains a mystery. The actuality and rationale of the universe must have come from somewhere besides the universe itself. We have traced the origin of the universe, but we do not have an account of this origin. As William Carroll states, 'Beginning refers to a temporal event, and an absolute beginning of the universe would be an event which is coincident with the beginning of time. Creation is an account of the origin, or source of existence, of the universe, and, as such, Aquinas thinks that creation can be demonstrated in the science of metaphysics.'[35] By positing God as the source of actuality which bestows the actuality of the universe onto it through the act of Creation, Aquinas provides adequate causation and the reason for existence as we know it as opposed to simply the temporal originator of the universe. The act of Creation as well as the purpose and reason of Creation is an immense subject within the thought of Aquinas. For the purposes of this paper, we will not cover the exactitudes of Creation. Rather, we will note that through his notion of 'Creation,' Aquinas provides adequate grounding for the actuality of the universe via a transcendental cause who maintains the totality of actuality within Himself. Because Aquinas provides ontological grounding (as opposed to temporal origination) to account for the origins of the universe, we can say he properly posits a 'cause' of the universe as opposed to the original temporal conditions of the causal series that comprises the universe.

## Problems with Causality in The Mind/Body Problem

Now that we are beginning to see the wanting notion of causality in the case of the Big Bang theory let us turn our attention back to the mind/body problem to see why a notion of immaterial causality is so needed in modern causality. In the case of the mind/body problem, we saw modern science produce neural correlates, which then account for subjective states. Something immaterial (like thought) is fundamentally caused by and conceived of complexity in the material realm.[36] However, this complexity is ultimately reducible to

34 Clarke, N. *The One and the Many*, Notre Dame, IN: Notre Dame Press (2001), p. 196.

35 Carroll, W. 'Thomas Aquinas and Big Bang Cosmology,' *Sapientia* (1998) 53(203), 83-85.

36 For useful overviews of this reductive position see: Moser, P. and Trout, J. D. (eds.) *Contem-*

simple observable processes. This reductive approach is complemented by the emergent approach found in epiphenomenalism. While the reductive approach attempted to reduce mental states down to only their material components, epiphenomenalism describes the emergence of higher orders of mental states from the complexity of material components.[37] By noting the complexities found in nature sometimes result in higher orders of being, epiphenomenalism continues this trend in order to bridge the mental with the material realms. Given a sufficient number of organized entities a larger, and higher order entity will emerge. For instance, though a city is comprised of people, infrastructure, and civic rules, the city, itself, seems fundamentally something more than just the totality of its parts. In a like manner, epiphenomenalism sees the high complexities of neural-physiological activity and determines this complexity results in the emergence of the higher level of the mental realm. The mind/body problem has been reduced to the explanation of the mind by the complexities of the body. There is no room for the immaterial causality strictly of the mind. We have essentially moved past Cartesian dualism into full materialism. As such, there is no attempt to explain the unity of the human person, for mental reactions and everything we believe to be the immaterial realm are simply emergent phenomena from the complexities of the material realm. There is no human person anymore, only the human body. This point leads to the conceptualization of the body as quantifiable and explainable by the mind without any proof or acceptance given to the mind. José Ignacio Murillo summarizes this view, 'The body is mostly referred to via its members and organs, thus pointing to its functions in a way that seems not to recognize the body itself as something having a complete unity.'[38] However, we should realize the body is not '"something," but rather as life, and life is not a thing that is possessed by us, but the way through which possession is possible …'[39]

Modern causality is happy to forgo any notion of immaterial causality, for there is no need to account for the problem of Cartesian dualism if mental states are simply explainable like everything else—through material causality, which can be traced back to origin states. Everything, then, is ultimately explainable by neural activity. Mental states we perceive are simply epiphenomenon based upon complexity in neurological activity. As Marga Vega summarizes, 'Although an attractive solution in many ways, epiphenomenalism leaves us clueless as to

*porary Materialism: A Reader*. Routledge (2002) & Westphal, J. *The Mind-Body Problem*. MIT Press (2016).

37 Cf: Patrick, G. 'The Emergent Theory of Mind,' *The Journal of Philosophy* (1922): 701-708; Jackson, F. 'Epiphenomenal Qualia,'*The Philosophical Quarterly* (1982) 32(127), 127-136; and Macdonald, C. and Macdonald, G. (eds.) *Emergence in Mind*, Oxford University Press (2010).

38 Murillo, J. 'Leonardo Polo and the Mind-Body Problem,' *Journal of Polian Studies* 1 (2014): 84.

39 *Ibid.*

what are the obscure reasons that guide our behaviour and decision making, since we cannot attribute causal power to mental states like desire, sadness and elation, and it would be up to our inaccessible neurophysiologic basis to take the lead for action.'[40] Though epiphenomenalism is attractive for sustaining a unified materialistic system of explanation for the world, we run into the same problem yet again. If mental states are ultimately reducible to complex firings of neurons within the body, what accounts for the firings of the neurons? More so, if neural activity causes mental states, how do we account for instances like mood changes which then dictate a change in neural activity? Take, for example, the case of being frightened. The source of your fright comes from some external source (say a horror movie). This notion of 'being scared' directly correlates to different neural activity. However, the cause of this change came from something entirely external to the body. How, then, is neural activity to be conceived of as 'causing' the state of fear within the person when the source of fear is entirely external to the person? As Marga Vega summarizes:

> The problem is that providing the neuro-physiological basis for consciousness gives us a genetic explanation but it does not tell us what mental states consist in as opposed to non-mental states. We could state differences between mental and non-mental states by referring to the types of causes that sustain them, but we would still not know what a mental state is and why it has properties like subjective feeling and aboutness.[41]

Even if not conceived of as causing mental states and stated to merely be equivocal with mental states, neural activity still is fundamentally different from mental states. Modern causality finds correlates to mental activity in the material realm by observing neural activity. We report mental states like happiness, sadness, or specific thoughts. Then, neuroscientists observe the firing patterns of neurons during that period. These neural firing patterns are then deemed the cause of those mental states. However, it is difficult to see the entirety of the subjective experience of something like 'thinking about an elephant' as explainable by electrical activity in an organ under our skull. The fullness of the subjective experience is dismissed in modern causality. Once a material origin is found (in this case, electrical activity occurring then reported as subjective experience), there is no need to investigate further. However, explaining how exactly bioelectrical signals translate to subjective experience has plagued scientists for years, with still no satisfactory explanation that is widely held. Now, let us look at the Thomistic account of mental causality to see how this lack of explanatory power is solved.

40 Vega, M. 'What is the Mark of the Mental,' *Journal of Polian Studies* (2014) 1, 31.

41 *Ibid*., 32.

## Thomistic Explanation of the Mind/Body Problem

In the Thomistic account of mental states, we do not have to account for the apparent disconnect between mental and material realms because it is all intertwined. Mental states are caused (as are all activities of the human person) by the soul. The soul is the 'first grace of actuality of a natural body having life potentially in it.'[42] As the substantial form of the human person, the soul holds the act of existence within itself. In other words, the source of the real existence of the human being lies within the soul. Furthermore, the intellect is a power of the soul.[43] Through the activity of the intellect, we are put in touch with the world around us. There is an absolute cohesion between body and mind within Thomism, for there is not truly a demarcation of 'mind' from 'body.'[44] Rather, the human person is that which is said to be equally composed of soul and body, with both coming into existence as the human person does. Just like modern science, Thomism does not fall into a Cartesian Dualism. However, while modern science posits radical materialism to solve Cartesian Dualism, Thomism posits a metaphysical realism that allows for immaterial causality. The human soul is that which actualizes and dictates *what* we are and *that* we are. From our fingers to our thoughts, the reality of the human person is dictated by the actualizing power of the soul. Thus, in tracing back the lines of causality in accounting for a mental state, we ultimately run into the soul. As the source of our very act of existence, the soul is the immaterial cause that modern science will not allow itself to explain the mind/body gap.

## Summary of Work

In both the case of the Big Bang and the mind/body problem, we see that the modern notion of causality tracks down the causal sequence to original conditions. Then, they leave it ambiguous as to what to do next. One must only

42 Aristotle, 'De Anima' in *The Basic Works of Aristotle*, (ed.) McKeon, R., New York: Random House (1941), BK II CH. 1 412b 5.

43 Cf: Aquinas, T. *Summa Theologica: Complete English Edition in Five Volumes*, New York: Benziger Brothers, (1948), I 78-79.

44 Though this absolute cohesion of body and mind helps to solve the interaction problem with which we are concerned, it does open up many eschatological and ontological concerns, mainly, what happens to the soul after bodily death if it is so intimately united to the body. For a detailed account of this interaction problem and an overview of the various states of the soul surrounding bodily death, see: Ratzinger, J., *Eschatology: Death and the Eternal Life,* (trans.) Waldstein, M., Washington D.C: Catholic University of America Press, 1988; Toner, P. 'St. Thomas Aquinas on Death and the Separated Soul,' *Pacific Philosophical Quarterly* (2010) 91(4), 587-599; Van Dyke, C. 'Human Identity, Immanent Causal Relations, and the Principle of Non-Repeatability: Thomas Aquinas on the Bodily Resurrection,' *Religious Studies* (2007) 43(4), 373-394; Nevitt, T. 'Survivalism, Corruptionism, and Intermittent Existence in Aquinas,' *History of Philosophy Quarterly* (2014) 31(1), 1–19; and De Haan, D., and Dahm, B. 'Thomas Aquinas on Separated Souls as Incomplete Human Persons.' *The Thomist* (2019) 83(4), 589-637.

infer that these original conditions serve as the cause of their series. The original conditions just prior to the Big Bang caused the universe as we know it. Similarly, the correlative neural activity observed during cognitive processes must cause the action of the mind. However, these initial conditions are just that—the original state of a causal series. They do not constitute a 'cause' in themselves. A boulder's location atop a hill does not tell you the cause of its rolling down the hill. To do that, one must know the underlying forces at work, such as gravity, friction, mass, and the like. Just because we track the expansion of the universe back to its initial conditions does not mean we have uncovered the cause of the universe. Likewise, the various patterns of ocean waves do not tell you the cause of the tides. To do that, one must have a notion of underlying forces at work, such as the gravitational interaction of the Earth and the moon. Just because we correlate neural patterns to observable actions of the physical body does not mean the patterns cause mental activity. All the Big Bang and neural activity tell us is the origin condition of the causal series, which we then can track back to a source to account for the impetus. These are not causes in the proper sense.

## Conclusion

Through the course of this paper, we have observed the modern notion of explaining causality is that of a temporally dependent sequence, which is ultimately explainable once a material origin of the series is found. In two seemingly unrelated yet fundamental cases for modern science, we observed this notion of causality at work. In the case of the Big Bang, the very origin of the universe was deemed the first instance in which we can state materiality existed. Based on the expansion of the universe, scientists were able to track the universe back to a singularity. Anything prior to this singularity is deemed nonsense, as this singularity began motion and time within the known universe. As such, causal powers rest entirely on the fact *that* the universe expanded from an origin point. Thus, explanatory power for the origin of the universe relies on when t=0 for our notion of material existence. Likewise, in explaining the mind/body problem, scientists explain mental states entirely by neural correlation. What we perceive as the mental realm is entirely explainable as the complex emergence of a subjective realm from material complexity. In both of these cases, it is difficult to classify either as a 'cause.' In the case of the Big Bang, we see modern science accounting for the origin of the universe by tracking a causal series back to an origin point. However, if anything, this gives us a principle, not a cause. In the case of the mind/body problem, we see modern science dictating the emergence of the subjective realm from complexity in the material realm. However, emergence fails to account for how material patterns cause mental realities. Also, given the reality of things in the world other than our neural activity affecting our mental state, emergence simply falls short in explanatory power. Overall, even the mystery of the mental realm is reducible

to origin states dictated entirely by material existence.

Some notion of immaterial causality must be undertaken to account for the 'cause' of each causal series, for they have traced the line of material causality back as far as possible. In both cases, the origin of material causality was found, but the causal series was still without adequate explanation. As such, there must be an immaterial cause at work that explains the series' existence. However, modern science will not allow this notion of immaterial causality. As such, causality is simply original, material conditions. In the case of the Big Bang, we saw that the singularity at the beginning of the universe offers only a principle from which we can see material existence emerge around us. This singularity does not provide grounding for its existence, though, and is therefore indebted to some kind of immaterial cause for its existence per the PSR. In the mind/body problem, the theory that mental states are emergent from complex material states fails to account for how subjective experience occurs from material complexity. Additionally, how other things affect the human mind other than the human body (observable in cases like that of being scared) is never answered. To account for both the causal effects external realities have upon our mental realm and for the *qualia* of our subjective realm in general, there must be some immaterial causality at work.

In both examples in this paper, the modern notion of causality is that of a temporally dependent sequence that is ultimately explainable once the material origin of the series is found. This notion is insufficient to be deemed as a cause. The notion of immaterial causality (found most prominently within the Thomistic school) provides a necessary further step that can account for a proper 'cause' which begins the material and temporal series that modern science looks to for explanatory power. Further examination of how things like an immaterial first cause of existence and the human soul could completely solve the problems of the origin of the universe and mind/body interaction is the subject of a much larger work. However, for the sake of this paper, we must note that the modern notion of causality reaches a dead end once the material origin point is found. This obstacle of explanation can be traversed for a fuller understanding of the mechanics of the universe if the Thomistic notion of immaterial causality is allowed.

**Michael Salvatore Politz is a PhD student at the University of Saint Thomas, Houston.**

*GEORGE M. COGHILL*

# Donald MacCrimmon MacKay (1922 – 1987): Scientist and Accidental Philosopher. A Critical Appreciation.[1]

*In this paper I present an overview of the life and work of Donald MacCrimmon Mackay, a distinguished Christian polymath who made significant contributions across a number of domains in science and philosophy in the middle part of the 20th Century, and the centenary of whose birth was in 2022. After a brief biographical sketch, we will review his contribution to theology & science, the main ones of these being: complementarity, an innovative concept relating information and matter, and mind and brain; and logical indeterminism, a proposed solution to the problem of free will and determinism. I hope that this overview will stimulate interest in, and further exploration of, his ideas.*

**Keywords.** Determinism, Free will, Compatibilism, Complementarity, Realism, Logical Indeterminism, Theology & Science

Donald MacCrimmon Mackay was a distinguished Christian polymath who made significant contributions across a number of domains in science and philosophy in the middle part of the 20th Century. He was a pioneer in the early days of information theory, artificial intelligence, and neuroscience; and as a leading figure in the early days of the Research Scientists Christian Fellowship (which later became Christians in Science) he made several important contributions to the subject of theology & science. Unfortunately, he is relatively unknown these days, but since the year 2022 marked the centenary of his birth, this seems like a good time to introduce a new generation to his life and work.

The fact that people do not know much *about* him would not have bothered MacKay: he did not reckon analysis of his personal life important, preferring that his ideas be scrutinised instead. "When reminded that he was a model for many in the UK and USA he would smile and shake his head."[2] As with any presentation of another person and their work, especially when they covered a wide swath, it is inevitable that the perspective and the interests of the author influence what is reported and what is omitted. In keeping with this I shall

1 Parts of this paper were first presented at the Christians in Science Autumn Conference 2022 –The Clockwork Image – Humanity, Artificial Intelligence and God; Celebrating 100th anniversary of Donald M MacKay

2 Haas, J. W. 'Donald MacCrimmon MacKay (1922 – 1987): A view from the other side of the Atlantic', *Perspectives on Science and Christian Faith* 44 (1992): 55–61.

only give a brief overview of his life and focus mainly in his ideas insofar as they are relevant to the aims of this journal.[3] Finally, a word about the title. Donald Mackay was first and foremost a scientist in his professional life, and so that comes first in the description of him. The term "accidental" is ambiguous and used in two senses to convey that, first, his philosophical and theological ideas arose from his consideration of scientific results, rather than directly from philosophical reflection; and also in the sense that philosophy was ancillary to his primary interest. Of course, there is nothing secondary about the substance of his philosophical-theological output.

## A brief biography

In a paper of this kind and length it is not possible to provide a detailed biography, so this section may be seen as edited highlights. A more detailed account can be found in in David Norman's PhD thesis[4] and there are also a number of eulogies written from different perspectives around the time of his death.[5]

## Early Years

Donald MacCrimmon MacKay was born in Lybster, Caithness, the eldest child (and only son) of Henry (a Free Church of Scotland minister and GP) and Janet MacKay. Much of his childhood was spent in Wick, where he attended the high school. Growing up in the Free Church Donald received a solid biblical and theological education, both in church and at home, which stood him in good stead in later years.[6]

During his teenage years Donald developed a keen interest in physics, particularly electronics and set up a laboratory in the garden shed. He and some other like-minded pupils formed a radio club that adopted the motto 'It is better to send than to receive'[7] (so the biblical education was paying

3 However, and notwithstanding his preference, there is a need for an analysis of his life and contributions from an history of science perspective. Though that is a task for someone with more expertise and interest in history.

4 Norman, D. 'Mind, Body, and the Philosophical Theology of Donald M. MacKay' (PhD diss., University of Edinburgh, 2004), ch. 2.

5 Evans, E. F. 'Donald MacCrimmon MacKay, 1922 – 1987', *Experimental Brain Research* 66 (1987): 225–227; Haas, 'Donald MacCrimmon MacKay (1922 – 1987): A view from the other side of the Atlantic'; Paul Helm, 'The contribution of Donald MacKay', *Evangel* 7, no. 4 (1989): 11–12.

6 Much of the information for this biographical sketch was gleaned from Valerie MacKay's unpublished biography of him: MacKay, V. 'Donald M. MacKay: A Biography by his wife, written for their grandchildren' (Unpublished, 2021).

7 MacKay, V.

off). This was a time when radio communication was becoming more readily available commercially, and his ability to keep the family radio operating properly and to repair friends' radios enabled him to demonstrate his entrepreneurial spirit. He set up his own little business and was in such demand that he was able to supplement the family finances. Such was his proficiency in practical electronics that a wartime colleague commented that 'Donald must have been born with a soldering iron in his hand.'[8] In the latter part of his school career Donald would sometimes head off on his bike into the countryside and read. One of the books he enjoyed was Arthur Eddington's *The Nature of the Physical World* which introduced him to the interaction between physics and philosophy (though he did not realise the significance at the time).[9]

He finished his time in secondary education as *Dux*[10] of Wick High School and went on to study Physics (with a specialisation in Electronics) at St Andrew's University in 1940. Because of the exigencies of war, the honours degree, normally four years, was squeezed into three. In later life he was happy to tell stories of his time at St Andrews that were against himself and showed his impish sense of humour. One such relates to a fellow student in Halls who tended to play his radio rather too loudly for Donald's liking. To counteract this he constructed a device that would interfere with the radio signal so that it became mostly noise. Then every time the radio got annoying Donald would switch on his device and listen instead to the expressions of puzzlement and frustration emanating from the other student's room. Eventually the radio playing stopped.

As part of the war effort there was a programme set up to find the best young scientific minds to work on top secret projects. Donald, with prizes for physics and maths and a first class honours degree, was identified as an ideal candidate and approached to work at the Admiralty Research Establishment (ARE) on what would come to be known as Radar.[11]

One unfortunate aspect of the religious climate in the early part of the twentieth century was a tendency to defend Christianity by 'clever arguments to show the limits of science.'[12] As a science student he found these underwhelming, which created a crisis of faith. While he did not stop at-

8 Evans, E. F. *op.cit*. 1987' E. F. 'Ted' Evans was a close friend and colleague of MacKay, and succeeded him as Head of the Department of Communication and Neuroscience at Keele

9 This is the book of his 1928 Gifford Lectures: Eddington, A. S. *The Nature of the Physical World*, 1st, Cambridge: CUP (1929).

10 *Dux* is name given to the school pupil who achieved the top academic performance in their senior year at school.

11 MacKay, V. *op.cit*.

12 Barclay, O.R.'The Open Mind and other Essays: A Scientist in God's World', chap. Forward, ed. Melvin Tinker, IV (1988).

tending church completely, religion took a back seat during most of his undergraduate career. This was also a time where Donald's view of science was such that he could not see what the point of philosophy was.[13] Fortunately in later life he changed his view on this, though his primary interests always remained scientific.

## Young Researcher and Academic

Donald moved to the South of England to carry out the initial work that would inform the rest of his career. The development and construction of radar equipment involved a thorough understanding of the new disciplines of communication and information as well as control theory, and Donald quickly became an expert in these. But he was not a disengaged backroom boffin; he was fully involved with the development, deployment, and commissioning of the state-of-the-art equipment and spent time at sea monitoring its performance and effectiveness (even though he did not particularly enjoy the nautical experience).[14]

One of his fellow researchers at ARE was a Christian who invited him along to the (high Anglican) church he attended. Donald accepted the invitation and over time, through the patient pastoral engagement of the vicar (who had himself been a scientist before entering the ministry), entered a renewed and deeper understanding of Christianity. He now had a passion to serve his Saviour and carry out excellent scientific research (the latter being a manifestation of the former); but his previous experience gave him a life-long distaste for anything that smacked of a 'God-of-the-gaps' approach to the relation between Christianity and science. His thinking on the relation between theology and science was developed and refined through interaction with Prof. Rayer Hooykaas (Professor of the History and Philosophy of science at Utrecht University) with whom he became close friends. He thereby came to distinguish between a solid biblical foundation to one's thinking, and what he termed 'rationalistic biblicism.'[15]

While working at ARE on high frequency electronics MacKay noted that what could be achieved with these systems had physical limitations analogous to those of quantum physics and that the things measured were related in a complementary manner. These limiting factors he termed 'quanta of information.' Further discussion and reflection caused him to consider that the logical atomism of Wittgenstein's *Tractatus Logico-Philosophicus*[16] was well suited to

13 MacKay, V. *op.cit*. This is a little strange given his familiarity with the work of Eddington, *The Nature of the Physical World* which is basically a work of philosophy.

14 MacKay, V. *op.cit.*

15 MacKay, D.M. *The Clockwork Image*, London: IVP (1974).

16 Wittgenstein, L.*Tractatus Logico-Philosophicus*, 2nd edition. London: Routledge (2001).

the logical analysis of information.[17] This then led him to think about what could be considered 'complementary relations' more generally. MacKay's basic idea is that two descriptions are complementary 'if they refer to the same object, each is in principle exhaustive, yet they make different assertions because the context of the concepts used are mutually exclusive, so that significant aspects referred to in one are necessarily omitted from the other.'[18] Over time he applied this idea of complementarity to information theory, artificial intelligence and neuroscience, as well as science and theology.[19]

There is a view, still prevalent, that human beings can be accounted for purely as material objects: that the mind is simply (or nothing but) the operations of the brain in one way or another. This position MacKay referred to as 'nothing-buttery', and argued that it is clearly undermined by complementarity. It is not brains that think, but persons! In assessing the relation between mind and body, complementarity means that the physical and mental aspects of humans are correlated but not identical. He did not consider dualism as incoherent, just unnecessary. This he referred to as 'duality without dualism' and related it to the unity of man as described in Genesis 1 and 2. As such there is a hierarchy in the complementary relations: the thinking person is higher than the brain activity.[20] We will look at Complementarity more closely in section 2.1.

After the war he took up a post as Lecturer in Physics at King's College (part of the University of London) where he continued his research in information and Computing, which in his case was Analogue Computing (for which he received a Ph.D. in 1950). This was a time when scientists were becoming interested in whether machines could be made to behave like humans and 'think' for themselves. (The term 'Artificial Intelligence' had not yet been coined. That did not happen until the Dartmouth Conference in 1956, at which MacKay was a British delegate.[21]) The discussion was mainly focussed around the new digital computers, but MacKay was not convinced that that was the correct way to look at the problem: ' . . . being an analogue man . . .'.[22] He did not think it was entirely correct to think of it as exactly analogue either, but as some form of hybrid system. These days

17 MacKay, D. M. *Information, Mechanism and Meaning*, Cambridge MA: MIT Press (1969).

18 MacKay, D. M. 'Complementarity II', *Proceedings of the Aristotelian Society* suppl. vol XXXII (1958): 105–122.

19 As an aside: MacKay is often credited with proposing the definition of Information as 'A distinction that makes a difference', usually cited as D. M. MacKay, *Information, Mechanism and Meaning*. However, neither I, nor anyone else that I am aware of has yet been able to find evidence that he did coin that definition. Nonetheless, it is a good definition since it directly contrasts with the description of being uninformative as 'a distinction without a difference'.

20 MacKay, D. M. *The Clockwork Image*, p 106.

21 McCorduck, P. *Machines Who Think*, 2nd ed. London: Routledge (2004).

22 McCorduck. *op.cit*.

we are used to hearing about the successes of Machine Learning (especially 'Deep' Learning) but what is not generally known is that one of the earliest Machine Learning systems was built by MacKay at King's College in the late 1940s. It was basic by today's standards, but it could adapt its behaviour, based on observations, to successfully drop ball-bearings on a target.[23] MacKay was open to the idea that an artificially intelligent artefact could be built; he likened it to *pro-creation* rather than any notion of creation (thereby avoiding the claim that AI was 'playing God.')[24]

In the late 1940s a group of young researchers around London got together to discuss ideas in cybernetics and philosophy of science. They called themselves 'The Ratio Club' and included, as well as MacKay, Alan Turing and Grey Walter. No professors were allowed to join in order to allow free discussion (it was felt that someone at professorial level would have an unfair advantage in these discussions). Also at this time he was part of a seminar on the nascent Philosophy of Science started by Sir Karl Popper and had a four month residence in the Spring of 1949 at which he had almost daily discussions with the retired philosopher Sir Walter Moberly as well as meeting Michael Polanyi. These interactions undoubtedly had a strong influence on forming MacKay's understanding and appreciation of, as well has his approach to, philosophy.[25]

At one of the meetings of the Ratio Club, MacKay presented a paradox that he had come across. He had devised a thought experiment in which he considered a scenario where one might try to get a picture of a person's brain by means of what he called a 'cerebroscope.' From his deliberations on this thought experiment he concluded that 'there does not exist a complete specification of a person's brain state that they would be correct to believe and incorrect to disbelieve.'[26] This led to the formulation of logical indeterminism, and we shall explore this idea in detail in section 2.2.

As a young lecturer at King's College he learned the effect of a 'word in season'. The Christian staff in the college would meet for lunch from time to time, and on one occasion the professor of New Testament, R. V. G. Tasker, enquired concerning what evangelicals actually believed. MacKay suggested that he could find out firsthand by going to hear Martyn Lloyd Jones who was giving a talk in the College organised by the Christian Union. Tasker attended the meeting, his thinking was changed and he espoused evangelicalism. He went on to edit the IVP Tyndale New Testament Commentary series.[27]

23 MacKay, D. M. *Information, Mechanism and Meaning.*

24 MacKay, D. M. *The Open Mind and other Essays: A Scientist in God's World*, 1st ed., ed. Melvin Tinker London: IVP (1988).

25 MacKay, V. *op.cit.*

26 MacKay, D. M. 'The logical indeterminateness of human choices', *British Journal for the Philosophy of Science* 24 (1973): 405–408.

27 MacKay, V. *op.cit*.

During this time he met and fell in love with a fellow physicist, Valerie Wood. The two were married in 1955 and started a family, which eventually consisted of two boys and three girls. Four of them followed in the broadly scientific footsteps of their parents while one became an accountant (showing that his business acumen was also passed to the next generation).

While at King's, his interest in the relation between science and religion grew and he became engaged with the Research Scientists Christian Fellowship (RSCF). This organisation had started in the early 1940s under the leadership of Oliver Barclay. MacKay's involvement had such an influence on the group that one recent commentator could write 'Only after a young brain scientist named Donald M. MacKay joined the group in 1948 did the RSCF find its message of the complementary relationship between science and Christianity.'[28]

MacKay had a strong Reformed view of God's sovereignty. One other reason that he rejected a 'God-of-the-gaps' approach was because he understood that God is active in every moment 'upholding all things by the word of His power' (Heb. 1:3) For God a miracle is no harder, or different in principle, from his normal operation moment by moment.

As his thinking developed, he became more interested in understanding the one intelligent being to whom we have ready access (humans) rather than trying to create artificial ones. In 1951 the shift to neuroscience was completed after he spent a year as a Rockefeller Fellow in the United States. He still continued to work in the physics department at King's, but in 1960 he was head-hunted by the newly established Keele University to fill the research chair endowed by Granada television: 'The Granada Chair in Communication' (the name was later changed to 'Communication and Neuroscience') a position he held till his retirement in 1982. A building on the Keele University campus is named in his honour.[29]

## Professor and Later Years

At Keele he established a world leading interdisciplinary team studying the sensory communication systems of the brain. An example of this is one of Donald and Valerie's last set of experiments. Roger Sperry had won the Nobel Prize in Medicine and Physiology for his work on 'split brain syndrome' which occurs in patients who have the bundle of nerve fibres joining the two hemispheres of the brain (the Corpus Collosum) severed as

28 Rios, C. M. *After the Monkey Trial: Evangelical Scientists and a New Creationism* New York, NY: Fordham University Press (2014).

29 Evans, *op.cit.*

a treatment for epilepsy. Sperry speculated, based on his experimental results, that doing this created 'two persons in one cranial space.' Donald and Valerie set out to test this hypothesis and found that while the two sides of the brain could be made to compete, this could only be pursued so far, and ultimately the unity of the person would shine through.[30]

Throughout his academic career MacKay engaged with philosophers and theologians on issues related to the mind/body problem and the relation between science and theology, to which he made significant contributions. In all his dealings with others, whether in conversation or debate, he sought to bring glory to Jesus by conducting himself as a Christian gentleman. This is clearly demonstrated in a televised discussion with B.F. Skinner (the major proponent of Behaviourism in the 20th century).[31] About three quarters of the way through, Skinner is perceived by the host, William Buckley Jr, to be struggling, and he starts to pounce on him. At this point MacKay steps in and provides Skinner with a graceful way out; it didn't help Skinner's argument but it preserved his dignity. He, and his work on the brain, was the subject of a BBC documentary as part of a series: *God and the Scientist*.

MacKay's reputation continued to grow over the rest of his career. This resulted in his receiving an increasing number of responsibilities and accolades. Examples of these reflect the breadth of this respect. As well as being the founding editor of two major scientific journals (Experimental Brain Research and Biological Cybernetics) he was an international member of the neuroscience group at MIT, foreign member of the Royal Netherlands Academy of Arts and Science, and recipient of the Heinrich Helmholtz Prize for Distinguished Research in the Cognitive Neurosciences. But it is in the domain of science and religion that his lasting legacy resides: he gave a number of invited and named lectures on the subject[32] and the last of the accolades he received was in this area.

In 1986, while he was suffering from the cancer that would soon take his life, MacKay gave the Gifford lectures at the University of Glasgow. As with all his endeavours he took the remit specified by Lord Gifford in his bequest very seriously. This meant that in presenting his ideas in their Christian context he refrained from making use of Special Revelation and focussed exclusively on the science and what he considered that could tell us

30 MacKay, D.M. & MacKay, V. 'Explicit dialogue between left and right half-systems of split brains', *Nature* 295 (1982): 690–691.

31 This debate is available on YouTube (https://youtu.be/1DMyDYgxFlo).

32 e.g. The Riddle Lectures (Newcastle), London Lectures in Contemporary Christianity, The Henry Drummond Lectures (Stirling), as well as series at Oxford, Cambridge, Johns Hopkins and Waterloo.

about humans, God, and freedom. His diligent adherence to the specification was noted by the chair, Neil Spurway.[33] These lectures formed the content of his final book, *Behind the Eye*, edited by his widow Valerie.[34]

Donald MacKay ended his earthly sojourn and entered the presence of the Saviour he had served so well in March 1987. As Paul Helm wrote:

Those Christians who knew Donald personally give thanks to God for the life and gifts that he gave to him. It was a privilege to see at work someone who was so wholly committed to the obedient service of his Maker and who so readily recognised his sovereignty over his own life and the whole of creation.[35]

## Main contributions to Theology & Science

In recent years it has become common to hear calls for more scientifically informed theology, and in response, for more theologically informed science.[36] With regard to both these MacKay's contributions are clear: his church and theological background certainly informed his approach to science, and being first and foremost a scientist in his professional life, his philosophical and theological ideas arose from his scientific reflection.

The breadth and depth of his contributions to theology & science make it impossible to cover them in detail. Further exploration and analysis may be found in the theses by David Norman[37] and the author[38] or by consulting the primary sources. In this section I shall present an overview of MacKay's main contributions to theology & science.

## Complementarity

We gave MacKay's basic definition of complementarity in section 1.2. It comes in two forms: non-hierarchical and hierarchical, of which the latter is the one that he spent most time discussing and developing. A straightforward example of the former is the possible projections of a three dimensional object onto a two dimensional plane.[39] Here, unlike in a photograph, every point in the

33 This is from my memory of attending those lectures.

34 MacKay, D.M. *Behind the Eye*, Oxford: Blackwell (1991).

35 Helm, P. *op.cit*.

36 Messer, N. Science in Theology: Encounters between Science and the Christian Tradition, London: T & T Clark (2020).

37 Norman, *op.cit*.

38 Coghill, G.M. 'A Critical Analysis of Donald M. MacKay's Contribution to Theology and Science.' (master's thesis, Edinburgh Theological Seminary & University of Glasgow, 2023).

39 Or from any n-dimensional space onto a lower dimensional space, such as is routinely done

object is projected onto each plane, hence each two dimensional plane is complementary to the others. In each plane all the information about every point is retained, what is lost is the information about the relationship between (some of) the points.[40] This observation resonates with more recent development in the philosophies of science and information, such as the perspectival realism of Massimi[41] or Floridi's levels of abstraction.[42]

The second kind of complementarity, *hierarchical*, is based on the relation between descriptions from different domains in particular, the physical and the informational. That is, for example, one can have a message written somewhere (one of MacKay's favourite examples was a billboard of lights), such as *'Vegetables are good for you'*. This message could be exhaustively analysed in the language of physics, say, by a physicist or engineer. They could talk about the electrical and mechanical properties of the bulbs, their spatial distribution etc. without saying anything about the message being communicated. Similarly, a linguist could interpret and describe the message with respect to its semantics in accordance with the rules of the language, without any mention of the physics of the situation. Here the message can be said to be *embodied* in the physical array of bulbs, and each description is complete with respect to its own domain. The hierarchy is such that the informational sits above the physical because one cannot change the meaning of the message without the physical layout having to change, whereas one can change, to some degree at least. the physical layout without changing the message: for example if some of the bulbs were to fail.

From this it was a short step for MacKay to consider how this might apply to the mind/body problem. There were at least three things that influenced MacKay in this regard. As well as the complementarity, already established, between the physical and the informational, there was the unity of a human (*nephesh*) as described in Gen. 1, and the fact that it is persons, not brains, that think.[43] In this, as noted previously, he was responding to the ontological reductionism prevalent in the middle of the 20th century.[44] MacKay did not consider *dualism*, as put forward in recent times by for example Eccles and Popper,[45] to be in any way incoherent. He simply did not think it was necessary to posit two substances in order to

in data science to make problems more tractable.

40 MacKay, D.M. 'What makes a contradiction?', *Faith and Thought: The Journal of the Victoria Institute* 97 (1968): 7–14.

41 Massimi, M. *Perspectival Realism*, Oxford: OUP (2023).

42 Floridi, L. 'The method of levels of abstraction', *Minds and Machines* 18 (2008): 303–329.

43 MacKay, D.M. 'The sovereignty of God in the natural world', *Scottish Journal of Theology* 21 (1968): 13–26.

44 Recall, this is what caused him to coin the term "nothing-buttery".

45 Popper, K. and Eccles, J. *The Self and its Brain* London: Routledge (1984).

account for the duality between mind and brain. This he termed 'duality without dualism'.[46]

It does not take much to be struck by the similarities between MacKay's complementarity and *supervenience*. The standard definition of supervenience is almost identical to the basic understanding of hierarchical complementarity, namely '[a] set of properties A supervenes upon another set B just in case no two things can differ with respect to A-properties without also differing with respect to their B-properties.'[47] However, given the multiple versions and applications of complementarity given above, it is arguable that it is more general than supervenience. One unfortunate side effect of using the term complementarity is that in his earlier papers MacKay had to spend a significant amount of time defending his use against criticism that it was not in line with Bohr's use of it in quantum mechanics (sometimes nearly fifty percent of the paper).[48] This may be why latterly MacKay changed to calling it *Comprehensive Realism* instead.[49] Had he done so from the beginning people might have been discussing and developing his ideas instead of Davidson's 'supervenience'.[50]

## Logical Indeterminism

Debates on the issue of free will and determinism are still very much alive, especially since Peter van Inwagen published a paper in 1975 purporting to show the incompatibility of free will and determinism.[51] In fact it is probable that more papers have been published on the subject since then than for several centuries prior to that. Nonetheless a majority of philosophers (in the analytic tradition at least) remain determinist.[52] Amongst the plethora of responses, there are both *compatibilist* and *incompatibilist* versions,

46 MacKay, D.M. 'Ourselves and our brains: Duality without Dualism', *Psychoneuroendocrinology* 7, no. 4 (1982): 285–294.

47 Horgan, T. 'Supervenience', in *The Cambridge Dictionary of Philosophy*, ed. Audi, R. Cambridge: CUP (1995), 778–779; McLaughlin, B. and Bennett, K. 'Supervenience', in *The Stanford Encyclopedia of Philosophy (Summer 2021 Edition)*, ed. Zalta, E.N. (Stanford University, 2018). https://plato.stanford.edu/archives/sum2021/entries/supervenience/.

48 The irony here is that Bohr may well have borrowed the term from 19th C. psychology; see Busemeyer J.R. and Bruza, P.D. *Quantum Models of Cognition and Decision*, Cambridge: CUP (2012).

49 In his final book, *Behind the Eye*, he does not use the term at all.

50 Davidson, D. 'Mental Events', in *Experience and Theory*, 1st, ed. Foster L. and Swanson, J. W. Clarendon Press (1970), 207–224.

51 van Inwagen, P. 'The incompatibility of free will and determinism', *Philosophical Studies* 27 (1975): 185–199.

52 Bourget, D. & Chalmers, D.J. 'What do philosophers believe?', *Philosophical Studies* 170 (2014): 465–500.

covering a wide variety of proposals. The interested reader is directed to Helen Beebee's comprehensive work on the subject.[53]

One of the basic compatibilist solutions is to note that the problem can be framed as a conditional, such that if an agent were to try to do otherwise, they would succeed. Since this is a conditional, even though determinism dictates that they do not do otherwise, the conditioned remains true, and hence they are deemed free. Even superficially this seems like sleight-of-hand since at face value it applies as much to inanimate objects as to sentient agents.

On the other side a basic proposal for incompatibilism relies on 'randomness' playing a part in the decision process to adjudicate between possibilities. While this may provide a means of arguing for indeterminism, it is not clear how it helps with free will. A key feature of human freedom is *control*,[54] and randomness here would appear to remove that aspect. Another direction was to look at the problem in modal terms. Again this has incompatibilist and compatibilist versions. On the incompatibilist side Plantinga, for example, advocates a form of libertarian free will based on Molinism.[55] On the other hand List has proposed a compatibilist-libertarian approach utilising modal logic to separate what he refers to as the physical and agential level.[56] It is into this melee that we introduce MacKay's proposed solution. The disappointing thing here is that despite the, sometimes frenetic, activity, and despite the fact that than MacKay's proposal was matured prior to van Inwagen's paper, there has been little or no interaction with his work on this subject since his death.

Logical indeterminism (LI) is the most controversial of MacKay's ideas, possibly because it is also the one people have found hardest to understand. In an earlier section we described when and how he came up with the idea. Here I shall present an outline of the argument and the ensuing controversy. I shall also point out what I believe is a flaw in the original formulation and propose a solution which makes it more robust, by means of modal logic.

To review MacKay's approach to the problem of free will we must consider how he defined free will:

> … unless he makes the decision it will not be made, that he is in a position to make it, and that no fully-determinate specification of the outcome already exists which he would be correct to accept as inevitable, and would be unable to falsify, if only he knew it.[57]

53 Beebee, H. *Free Will: An Introduction*, Basingstoke: Palgrave MacMillan (2013).

54 Fischer, J.M. and Ravizza, M. 'Precis of Responsibility and Control: A Theory of Moral Responsibility', *Philosophy and Phenomenological Research* 61, no. 2 (2000): 441–445.

55 Plantinga, A. 'On Ockham's way out', *Faith and Philosophy* 3, no. 3 (1986): 235–269.

56 List, C. *Why Free Will is Real*, Cambridge, MA: Harvard University Press (2019).

57 MacKay, D. M. *The Clockwork Image*, p 110. It is also used as the definition of LI by Malcolm

The basic proposed mechanism and argument follows from the idea that mind and brain are in a complementary relationship. This being the case, the observation of the brain state, *B*, by means of the cerebroscope will have direct correlates in the mind, assumed one-to-one for the argument. Consider then a super-scientist, *O*, who is able to use the cerebroscope to obtain a complete map of the brain of a subject, *S*. They would then have a complete specification of *S*'s brain state, *B*. Now, consider someone (again *S*) using the cerebroscope to try and obtain a complete picture of their own brain.[58] This might be possible to a degree, but there would always be one part they would not be able to specify: the part where they were stored the specification itself.[59] That is, the specification of *B* does not exist for *S*.[60]

From this observation, which seems straightforwardly correct, MacKay went on to consider what might happen if hard determinism were the case.[61] In such a case the super-scientist, with the complete specification *B* and knowledge of the input to *S* could predict what action, *A*, they would perform in their immediate future. That is, *O* could make the argument: If *B* then *A*. *B* is the case, therefore *A* will happen. Here MacKay draws a very clear distinction between an event being logically indeterminate and unpredictable by anyone.[62] The super-scientist can accurately predict *S*'s action in the situation where *S* is not informed of the prediction.

MacKay then asks whether this prediction would have an 'unconditional claim to the assent' of *S*, such that they would be 'correct to believe it and incorrect to disbelieve it'. That is, is the action *A* inevitable for *S*? His answer is that it is not. The reason for this has two parts. In order for *S* to have the means to believe the prediction, they must be informed of its content. However, if that is done then a) the act of communication would change their mental state, and hence their brain state *B* (on which the prediction was based) renders the prediction obsolete, and b) as noted previously, *B* does not exist for *S*, so any prediction based on it will not be such that *S* would be 'correct to believe it

Jeeves in his presentation of of MacKay's ideas: Jeeves, M.A. *Psychology and Christianity: the View Both Ways*, 1st ed. London: IVP (1976).

58 What an external observer might be able to say about the brain state, MacKay referred to as the "O-story" (for 'outside' or 'observed') in distinction to what a subject could say about themselves ('I see', 'I feel', etc.) which he called the "I-story" (for 'inside' or 'I').

59 MacKay, D. M. *Behind the Eye*, p114.

60 A useful physical analogy is what happens if one has a system with a mic connected to an amp, which is connected to a loudspeaker, and one places the mic in front of the loudspeaker. The ensuing howl is due to the positive feedback that cannot stabilise (and the volume is only limited by the capacity of the system).

61 Though it must be emphasised that MacKay was not in any way committed to the truth of determinism. This is simply a 'what if' thought experiment.

62 That is, this is a logical argument, not a physical one.

and incorrect to disbelieve it'. Thus, since there is one person in the world for whom it does not have a claim to their assent, the prediction is not inevitable, and so *S* has free will. Something else which follows from this is that *after the event A* has taken place, *S* could be shown the prediction and would, from that temporal vantage point, be correct to agree with the prediction. This is MacKay's principle of logical relativity.

Over a period of decades there were several responses to MacKay's argument. Many of those pivoted on severe misunderstanding: e.g. seeing it as an attempt to revive the medieval 'two fold view of truth',[63] confusing freedom and unpredictability,[64] equating it with speed of computation,[65] that future brain states are uncaused,[66] and that LI is inherently self-contradictory.[67] And MacKay dispensed with those quite easily. Others demonstrated a misunderstanding, but the discussion led him to clarify things.[68] Only one exchange, that I am aware of, came close to being a significant critique, that of William Hasker.[69] The outcome was Hasker taking on board some of MacKay's corrections but finally commenting that MacKay's position resulted in a tautology, from which nothing followed. This would not have bothered MacKay since a tautology as output is the ultimate in openness. Here, in the exchange there was, it seems to me, an extent to which they talked past one another. In the end, during his Gifford lectures, MacKay felt able to claim that his arguments had withstood nearly four decades of criticism and he was confident in them. Nonetheless, I think there is a flaw in his argument for LI.

The flaw is that as MacKay states his argument it is guilty of the *modal fallacy*: that is, it associates inevitability (or necessity) to the consequent

63 Clark, G.H. *Behaviorism and Christianity*, 1st ed. Jefferson, MD: Trinity Foundation (1982).

64 McDermott, J. 'I'm free because I don't yet know what I'm going to do', *British Journal for the Philosophy of Science* 23 (1972): 343–346.

65 Good, I. J. 'Free will and the speed of computation', *British Journal for the Philosophy of Science* 22 (1971): 48–49.

66 Thalberg, I. 'New light on brain physiology and free will?', *British Journal for the Philosophy of Science* 21 (1971): 379–383.

67 de Witt, L. W. 'The hidden assumption in MacKay's logical paradox concerning free will', *British Journal for the Philosophy of Science* 24 (1973): 402–405.

68 Williams, C. J. F. 'Logical indeterminacy and free will', *Analysis* 21 (1960): 12–13; Watkins, J. N. W. 'Freedom and predictability: an amendment to MacKay.', *British Journal for the Philosophy of Science* 22 (1971): 263–275; MacKay, D.M. 'Divine activity in a scientific world', *Faith and Thought: The Journal of the Victoria Institute* 91, no. 2 (1960): 75–96; MacKay, D.M. 'Choice in a mechanistic universe: a reply to some critics', *British Journal for the Philosophy of Science* 22 (1971): 275–285.

69 Hasker, W. 'MacKay on being a responsible mechanism: Freedom in a clockwork universe', *Christian Scholar's Review* 8 (1978): 130–140; MacKay, D.M. 'Responsible mechanism or responsible agent: a reply to William Hasker', *Christian Scholar's Review* 8 (1978): 141–148; Hasker, W. 'Reply to Donald MacKay', *Christian Scholar's Review* 8 (1978): 149–152.

of the conditional statement rather than the whole conditional itself (the consequence)[70] Once one recognises this, the argument fails because then the prediction is conditional, and hence the consequence has an 'unconditional claim to the assent' of everyone, S included.[71] The fact that the argument is fallacious does not mean that the conclusion is false. In the case of LI, recognising that 'inevitable' is a modal term suggests that we might be able to reformulate the argument in modal terms, in particular Kripke's 'many worlds' semantics. It turns out that this is indeed the case. For the outcome (prediction) to be inevitable (necessarily the case), it would have to be true in all possible worlds. However, there exists at least one possible world where that is not the case: the world in which S is informed of the prediction. Hence LI does constitute a robust, compatibilist, argument for free will, albeit in a revised modal form.[72] This version of the argument avoids the modal fallacy because each scenario takes place in a different logical world and is based on the consequence.

There is nothing in MacKay's LI that suggests that *S* will necessarily *not* do what *O* predicts even if informed of it. The fact that the future is really open for them means they could still do *A*. It depends on how strongly they feel about or are committed to the action. Consider a trivial example. In this scenario I am about to have breakfast at a hotel. Our super-scientist has been observing my brain and predicts that I will not have beans with my 'full English'; and informs me of the prediction. Now since I do not like beans with a full English there is no way I will have them and the prediction would be fulfilled despite my having been informed of it. On the other hand, if the prediction were that I was going to have muesli, then there is a strong possibility that I would have porridge instead, just to be contrary and foil the prediction. Both of these scenarios are acceptable because according to LI the future remains open until the decision has been made.

MacKay subsequently went on to apply his findings to the knotty theological question of predestination and human responsibility. He saw that the same principles of logical relativity applied to God's sovereignty and human freedom. The conclusion is the same: that although God is absolutely sovereign over his creation, human actions are not inevitable, for the same reasons as before. In this way MacKay thought he had found a way to reconcile Calvinist and Arminian approaches to the issue.[73]

70 This fallacy was known at least as far back as Aquinas.

71 And conversely, if it does not have a claim to the assent of *S* it has no claim to the assent of *O* either.

72 The details of this argument are outside the scope of this paper. The full version can be found in Coghill, G.M 'A Critical Analysis of Donald M. MacKay's Contribution to Theology and Science.' and Coghill, G.M. 'On the modal indeterminacy of a free choice', *forthcoming*, 2024.

73 MacKay, D. M. *The Clockwork Image*, Chapter 8.

The main focus of MacKay's original work was on individuals, but later he went on to explore how these principles would apply to agents in dialogue. Here he posited two super-agents, each with a cerebroscope to observe the other's brain state. In this case the two agents form a single coupled system, and so each agent cannot obtain a complete specification of the other agent brain state nor obviously, of the system as a whole. This also has theological implications. For God to be the author and upholder of all that is (God-as-author as MacKay calls him) and to be in dialogue with his creation, whether by speech or incarnation (God-in-dialogue) requires that God be multi-personal since the same person could not perform both functions on pain of incoherence. This does not go as far as showing that God is a Trinity which MacKay acknowledges can only be discovered by means of special revelation, but it does provide a rational basis for such.[74]

## Other contributions to Theology & Science

While most of MacKay's efforts in the domain were focussed on defending complementarity and LI, he also contributed to other questions relating to theology and science, though the foundations of complementarity and LI were never far away. In this section we see his outlook on creation and miracle, and artificial intelligence. The former brings to the fore his theological position, and the latter reflects his early pioneering work in the area.

## Creation, Evolution, and Miracle

What MacKay said about issues of creation and miracle, was very much in line with his overall view of God's works of creation and providence. As he would have been taught as a child from the Westminster Shorter Catechism: 'The work of creation is, God's making all things of nothing, by the word of his power, in the space of six days, and all very good.' and 'God's works of providence are, his most holy, wise, and powerful preserving and governing all his creatures, and all their actions.' God-as-Author upholds all things moment by moment (Heb. 1:3), therefore a miracle is no harder for God than what we see as the normal operation of the universe. God does not need to find ways to interact with the universe: he writes, or re-writes, the narrative in accordance with his overall plan.

MacKay did not say very much about the relation between creation and evolution, but he did state that he could see no biblical reason for the rejection of the scientific theory of evolution. He applied his view of God's providential oversight by observing that Gods last act of creation is presented in Genesis 3: '.

74 MacKay, D. M. *Behind the Eye*, p 211.

. . Cursed is the ground because of you . . .'. That is God re-writes the narrative such that '. . . the creation was subjected to futility . . . will be set free from its bondage to corruption . . . the whole creation has been groaning together in the pains of childbirth until now.' (Rom 8: 20–22). Therefore it should not surprise us that we observe 'nature red in tooth and claw', and that the scientific evidence points to evolution. The Bible does not preclude that. He did, however, caution that one should be wary of hitching one's wagon to any particular theory of origins, since scientific theories are always tentative and it will not matter for Christianity which, if any, theory turns out to be true.[75]

The same applies to miracles. What we consider scientific laws are descriptive, not prescriptive, therefore a miracle is simply part of God's overall narrative to teach us something about himself. MacKay identifies three kind of miraculous event presented in scripture: 1) miracles of timing (e.g. the crossing of the Red Sea), 2) miracles with an apparent scientific explanation (e.g Jesus' turning water into wine) and 3) those for which there is no scientific explanation (e.g. the resurrection, which is the first fruits of the new creation, and a different order of reality).[76]

MacKay explains his understanding of the relation between theological and scientific explanations by means of an illustration. He asks us to consider something like a TV screen, say an iPad. The pixels on the screen are maintained and refreshed at 90 Hz by the electrical power source. Now consider an artist drawing a sequence of scenes to depict an ongoing cricket match. Assuming the depiction is done in a rational and coherent manner, an observer looking at the screen could, in principle, describe the physics of the scenario. This may well be complete in itself, but would in no way conflict with the fact that the whole scenario was upheld by the artist (who would not themself be part of it). That is, the two perspectives are hierarchically complementary.[77]

## Artificial Intelligence

We have already noted that MacKay was a pioneer in the early days of AI, in fact before the domain had acquired a name. He was very much an 'analogue man'[78] and remained sceptical about the possibility of creating a true AI by digital means, or more specifically by 'rule following' because when he was most closely involved with the domain, symbolic AI (digital based rule following) did not have much in the way of uncertainty handling.

75 MacKay, D. M. 'The sovereignty of God in the natural world'; MacKay, D. M. *The Clockwork Image*.

76 MacKay, D. M. *The Clockwork Image*, chapter 6.

77 MacKay, D. M. pp 58–60

78 McCorduck, *op.cit.*

However, even during his life time, pure analogue computing was running out of steam and digital (symbolic) computing had moved on from being simply rule-following engines. Uncertainty was being incorporated into digital systems by means of, for example, Bayesian nets and fuzzy logic. In fact today, those star examples of AI, deep neural nets (which for MacKay would have been the epitome of an analogue system), are implemented on digital devices.[79]

In assessing the status of AI, or claims to AI, MacKay asks for care in distinguishing between actual cognitive agency and imitation (of behaviour). When one considers an actor playing a part, Hamlet say, MacKay asks how many persons are on the stage. The answer is, of course, one. There are not two persons: the actor and Hamlet, there is just the actor playing the part of (imitating) Hamlet. No matter how sophisticated the behaviour of a rule following device, that would not be sufficient in and of itself to constitute real intelligence any more than the behaviour of the actor indicates the presence of Hamlet.[80]

However, he did not consider it a logical impossibility that an artificially intelligent agent could be produced. He did not think this was in any way encroaching on God's domain; rather he likened it to *procreation* which takes place by natural (and pleasurable) means very regularly. If the production of a really intelligent entity were to occur it would need to be by means of a hybrid of analogue and digital engineering. He was sceptical that it could be done with silicon based approaches, suggesting that some kind of 'wet' engineering might be required.[81] In fact we are now starting to see moves in this direction with the creation of neural nets constructed from laboratory grown neurons.[82] However, along with more recent philosophers, such as Luciano Floridi,[83] he thought it highly improbable that sentient AI would ever become a reality.[84]

## Concluding Comments

It is now time to reflect on MacKay's contributions as they relate to the current state-of-play in ongoing debates in religion and science, and analytic philosophy of religion. Each of the topics he wrote on, as described in this paper, is a

79 Though some would see them all as more properly called informational rather than digital: Floridi, L. *The Philosophy of Information*, 1st ed. Oxford: OUP (2011).

80 MacKay, D. M. *The Open Mind and other Essays: A Scientist in God's World*, Chapter 9.

81 MacKay, D. M. *Behind the Eye*.

82 Pavlou A. and Lieberth, T.S.K 'An organic artificial spiking neuron for in situ neuromorphic sensing and biointerfacing', *Nat. Electron*. 5 (2022): 774–783.

83 Floridi, *op.cit.*

84 As distinct from the sophisticated technological devices currently grouped under the rubric of 'artificial intelligence'.

live issue, though his contributions to each of them are not all at the same level. Therefore to bring this paper to a close I shall highlight where each topic fits in the current landscape, and suggest how MacKay's work could, and should, be further explored to enhance the various debates. This is not, it must be emphasised, a suggestion that his views in these areas were complete, or beyond criticism. No philosopher or theologian has achieved that position (no matter what their acolytes might think).

Perhaps foremost in this regard, is his proposal regarding the relation between determinism and free will. The ongoing debate does not show any sign of abating any time soon. Recent developments in the field have seen more people resorting to a modal argument (e.g Plantinga and List). In this regard a modal version of MacKay's LI works and could indeed provide a means of bridging the gap between libertarianism and determinism (as aimed for by List and Crisp for example). An additional aspect here is that the basis of LI also has implications for models of the Trinity that are ripe for exploration.[85]

His first discovery was complementarity. This, as noted, is more general than the current popular approach of supervenience. In recent times some theologians have adopted supervenience to accommodate the mind/body relation within what is essentially a physicalist framework, such as Murphy's 'non-reductive physicalism'[86] MacKay would have eschewed such a relation. There is nothing in the idea of complementarity that necessitates any kind of physicalism.[87] There is certainly a need for embodiment, but that is a different thing: for example MacKay suggests that the spirit of a human is embodied in (and thus complementary to) the mind.[88]

The complementarity of theological and scientific description is captured by his illustration of the cricket match. The similarity of that to the occasionalism of Malebranche[89] has not gone unnoticed.[90] No one has claimed that MacKay was an occasionalist, but the recent interest in and proposals towards some kind of occasionalism, by Gordon Clark[91] and Alvin Plantinga[92] for example,

85 Coghill, G.M. 'A Critical Analysis of Donald M. MacKay's Contribution to Theology and Science.'

86 Murphy, N. 'Physicalism without reductionism: Towards a scientifically philosophically, and theologically sound portrait of human nature.', *Zygon* 34, no. 4 (1999): 551–571.

87 Strictly speaking there is nothing in the concept of supervenience that necessitates physicalism either.

88 MacKay, D. M. *The Open Mind and other Essays: A Scientist in God's World*, p71.

89 Malebranche, N. *The Search after Truth*, ed. tr. Lennon T. M. and Olscamp, P. J. (Cambridge: CUP (1997)

90 Garvey, J. 'The Real MacKay', 2016, https://potiphar.jongarvey.co.uk/2016/07/24/the-real- mackay/.

91 Clark,G.H. *Lord God of Truth*, Jefferson MD: The Trinity Foundation (1986).

92 Plantinga, A. 'Law, cause and occasionalism', chap. 6 in *Reason and Faith: Themes from Rich-*

make it an interesting potential line of enquiry to seek to identify the relation between occasionalism and complementarity.

Another aspect of the relation between theology and science is his proposed solution to the biblical and scientific description of origins. While it is not strictly a form of complementarity, it does tie in with that approach. His proposal was at the time a fairly unusual one, though it did have a related precursor in the work of Gosse[93] (for whom MacKay expressed some sympathy[94]). But more interestingly it is itself a precursor to more recent proposals such as that of Hud Hudson,[95] who argues that a distinction between time and hyper-time allows for both a literal six days creation and the extended timescales needed for evolution, and the view of Dembski,[96] who also sees the fall as having cosmic effects that 'travelled' both forwards and backwards in time.

Given these considerations it should be clear that MacKay was an innovative thinker and contributed ideas across a wide range of issues related to religion & science, and theology. It is not altogether clear why his contributions have not received the attention they deserve since his death, and it is not very helpful to speculate. However, I hope that the outline presented here will inspire others to explore his ideas and arguments in greater depth.[97]

## Acknowledgements

I would like thank a number of people for kindly giving their time to discuss DMM and his work with me: His widow, Dr Valerie MacKay, Mrs Elizabeth Graham and Rev Bill Graham (his late sister and her husband), and Prof Malcolm Jeeves.

**George M. Coghill is an Emeritus Professor of Computing Science at the University of Aberdeen (where he specialised in AI). Since retiring he has been carrying out research in Theology and Science, affiliated to Edinburgh Theological Seminary.**

*ard Swinburne*, ed. Bergmann M. & Brower J.E. OUP (2015), 126–144.

93 Gosse, P.H. *Omphalos: an Attempt to Untie the Geological Knot* Paternoster Row, London: London: John van Hoorst (1857).

94 Donald M. MacKay, 'Science and Christian Faith Today', in *Real Science, Real Faith*, ed. R. J. Berry (Monarch, 1991), 88–97.

95 Hudson, H. *The Fall and Hypertime*, 1st ed. Oxford: OUP (2014).

96 Dembski, W.A. *The End of Christianity*, Paternoster: Milton Keynes (2009).

97 For anyone who is interested in pursuing MacKay's thought further, as well as the works cited here, a full bibliography of MacKay's writings has been produced by McDonald, M. 'Donald MacCrimmon MacKay (1922 – 1987): A Bibliography', 1994, https://www.asa3.org/ASA/articles/MacKay_bib.html.

*MALCOLM JEEVES*

# Donald M. MacKay's Contributions to The Research Scientists Christian Fellowship and Christians in Science: The Early days[1]

It is a privilege to say a few words dedicated to the memory of Professor Donald MacKay. Dr Valerie MacKay, Donald's widow, was present at the CiS conference honouring Donald. Following the conference she telephoned me to express her appreciation of what I had said. More importantly, she shared with me more details of Donald's earliest links with the Research Scientists Christian Fellowship, the precursor of Christians in Science. With her permission, I have added some of these details relevant to my conference presentation.[2]

I suspect that one of the reasons I was asked to contribute is that I knew Donald years before almost all of you here were born. Approaching my 96th birthday in two weeks, it was my privilege to first meet Donald during the war in 1944. Donald had achieved a first class honours degree in physics at St Andrews University and like many of the very brightest of the young physicists at that time was recruited by C.P.Snow to work at the Radar Research Establishment in Surrey. It was there that he met Roland Dobbs, later to become an active member in the beginnings of the Research Scientists Christian Fellowship and also later to become Professor of physics at London University. Roland was engaged to my sister Dorothy and I went down to be present at the confirmation of Roland in the Anglican church. At that all too brief meeting Donald and I seemed to have an immediate rapport. However, it was some years later, after I had been demobilised from the army and was up at Cambridge, that I was able to renew my friendship with Donald. The photograph I'm showing you now was taken at the wedding of my sister when Donald was Roland Dobbs's best man. Unfortunately, I was not able to be present at the wedding in 1947 because I was still serving in Germany as an infantry officer with the First Battalion of the Sherwood Foresters, part of the "Desert Rats". The next two photographs taken in Germany are graphic reminders of the horrors of that war. They were taken when I was handing over to the Polish army officers a man called Aumeier who

1 This paper was first presented at the Christians in Science Autumn Conference 2022 –The Clockwork Image – Humanity, Artificial Intelligence and God; Celebrating 100th anniversary of Donald M MacKay

2 Biography of Donald M. MacKay written by Valerie MacKay for their grandchildren. (privately circulated)

had been the 2nd in command of Auschwitz concentration camp. He was responsible for the deaths of two million Polish Jews in Auschwitz. I took him up to Lubeck on the Baltic where I met a ship coming up the Baltic with representatives of the Polish army on board to effect the handover. Fast forward a few years and the next photograph shows Donald once again performing the role of best man at a wedding, this time at my own wedding in 1955.

It was in 1944 that Dr Oliver Barclay initiated the Research Scientists Christian Fellowship. Oliver often said that it was through Roland Dobbs friendship with Donald Mackay that Donald was brought into the RSCF at such an early stage in its history. Roland was doing a Ph.D at University College and Donald at King's College, London.

*Donald's Friendship with Professor R. Hooykaas*

Dr Oliver Barclay wrote, 'He (Donald) was the leading academic thinker for CiS for a long time. Until he became involved, thinking (in the group) had often revolved around questions over events such as Joshua's "long day" or the geographical extent of Noah's flood. He brought a strong reformed theological background, and allowed us to get to the fundamental issues. Donald seems to have perceived similar trends in Professor Hooykaas.'[3]

It was at the conference of the Research Scientists Christian Fellowship in 1948 that the impact of Professor Hooykaas on RSCF's thinking became evident.[4] Hooykaas's lecture, seemingly, opened the eyes of those present to wider horizons- not only from other centuries but also from foreign countries. Both his theological position and his relaxed common sensical stance owed much to Calvin. He never shared the nervous need felt by some Christians to defend God's 'patch'. All the world is God's and it cannot be taken from Him; one's only worry is that one may, in the perversity of one's own set ideas, miss the view that God wanted one to have, the path that could have been so much more illuminating. Hooykaas had written 'It has always proved futile to try to obtain scientific knowledge by immediate divine illumination, or even by extrapolation from the word of God'.[5]

> Only 10 days before the annual conference a letter had been sent out to participants. It read
>
> 13th September 1948: 'Our programme for the conference has been somewhat altered by the fact that a very eminent Dutch professor hopes to be present. He is Professor R. Hooykaas, Professor of the History of Science at the Free University of Amsterdam. We believe we shall learn a lot from

3 Barclay, O.R. 'The RSCF in Historical Perspective', *Faith and Thought* (1988) 10, 5-11.

4 *ibid*

5 Hooykaas, R. *The Christian Approach to Teaching Science*, Tyndale Press (1960) p.10.

discussion and questions with Professor Hooykaas who is extraordinary well informed'.

There is, according to Valerie, a story behind this sudden change of plan and how it came about that Professor Hooykaas, unknown in England at that time, was invited to that RSCF London conference in 1948.

In July 1948 Dr Martyn Lloyd Jones, en route to the first IFES conference since the war, had met and had been much impressed by him and all he had to say. Lloyd Jones got in touch with his close friend Dr Douglas Johnson, the Secretary General of IVF ,and encouraged him to invite Hooykaas to the RSCF meeting,

Valerie Mackay has noted

> Donald and Professor Hooykaas came from a religious background where one's personal life is central – as a rescued friend and servant of Christ – but this dedication is set in a far wider context than the narrowly pietistic position. Where the pietistic tradition narrows the dedicated life to the vertical dimension – the life of the nun in her cell with God, for example – the tradition in which Donald and Professor Hooykaas were brought up has a breadth – an outgoing confidence also. It assumes that God is interested in not only in the individual soul struggling with temptation – the Lord's concerns are not even limited to his church – but extend also to the functioning of society as a whole...So in the reformed tradition, the whole world, the world of secular affairs, newspapers, commerce, education, politics and ordinary events, all belongs to God and is a place where it is important to consider first and foremost what God thinks.[6]

*Donald's Gift for Communication*

In the early 1950's the BBC became aware of Donald's gift for communicating complex ideas very clearly to the general public. Through Donald's contacts with the BBC the Research Scientists Christian Fellowship was invited to prepare a series of five broadcasts to go out in the Overseas Service of the BBC on Science and Christian Belief. In 1952 a small group of us met in London at the BBC to plan this series of five broadcasts. These were subsequently published by IVF under the title *Where Science and Faith Meet*.[7] The five contributors were James Torrance, at that time a research student at Oxford, Donald Mackay, Malcolm Jeeves at that time a research student at Cambridge, Robert Boyd and Oliver Barclay. James Torrance later became Professor of Theology at Aberdeen University, Robert Boyd, later to become Professor Sir Robert Boyd, F.R.S., one of Britain's leading space researchers. There is no doubt that the major influ-

6 *ibid*

7 *Where Science and Faith Meet*, IVP (1953)

ence in preparing the broadcasts was the thinking of Donald MacKay. The BBC presumably liked these talks for they invited RSCF for five more – this time for the Home Service of the BBC. A quote from Donald's contribution to these nicely captures Donald's emphasis on the importance of complementarity. He wrote 'Let us suppose we are meeting a human friend. "A mass of pink protoplasm rises to a height of five feet and begins to pucker and wobble up and down noisily" – but, of course, that's the wrong language. I should say "he rises to his feet wreathed in smiles and greets us heartily." Why should I? Because we came to meet a person, not just a thing, and it makes more sense to describe what happened in personal terms.'[8]

*Donald's Influence on the 1965 International Conference of the RSCF*

In 1965 the Research Scientists Christian Fellowship organised a week long international conference on science and Christian faith. Donald was a major figure in selecting the contributors and his thinking was pervasive in the week long discussions. It was evident that by this time Donald's regular contacts with Professor Hooykaas had become extremely influential in the development of Donald's own thinking. Professor Hooykaas was at the Oxford Conference and again his influence was evident throughout.

In 1965, I was back in Cambridge on a year of sabbatical leave from Australia and I was asked if I would attempt to put together a book reporting the main themes of the Oxford conference. As I began to write the book I was fortunate that Donald was willing to scrutinise what I was writing, critique it and offer recommendations for rewriting and improvement. The book was published under the title *The Scientific Enterprise and Christian Faith*[9] and was widely read both in the UK and in North America.

Donald's later contacts with Christians in Science will be covered by other speakers at today's conference. My contacts with him continued and it was a privilege when I was Vice Principal of the University of St Andrews to nominate him for an honorary doctorate which he duly received. Donald's contacts with Scotland continued when he gave the Gifford Lectures at Glasgow University in 1986. For three years before giving his lectures Donald was seriously ill with cancer and we are greatly indebted to his wife Valerie for seeing through their publication.

The words of Professor Longuet-Higgins on the fly cover of the book are an apt summary of the originality of Donald's thinking. Professor Longuet-Higgins wrote 'MacKay was an effective communicator of scientific and philosophical ideas', 'a first rate philosopher of science' and 'a vigorous Christian

8 MacKay D.M. 'Persons and Things,' B.B.C. Home Service (1952). Reprinted in 'The Open Mind,' IVP (1988), pp.13-19.

9 Jeeves, M. A. *The Scientific Enterprise and Christian Faith*, Tyndale Press (1969)

apologist who never allowed his religious convictions to short-circuit his scientific thinking.'[10]

I would add, as Paul Helm wrote in a short obituary of Donald 'Those Christians who knew Donald personally give thanks to the Lord for the life and gifts that He gave to him. It was a privilege to see at work someone who was wholly committed to the obedient service of his Maker and who readily recognised His Sovereignty over his own life and the whole of creation.'[11]

I was privileged to be with Donald ten days before he died and at his Thanksgiving and Memorial Service in Keele University Chapel. Dr Oliver Barclay's tribute to Donald at that service was extremely moving and underlined Donald's lasting contribution.

**Malcolm Jeeves is Emeritus Professor of Psychology at the University of St Andrews**

10 MacKay, D.M. B*ehind the Eye* (Valerie MacKay, ed.), Basil Blackwell (1991)

11 Helm, P. *The Contribution of Donald MacKay, Evangel* (1989) Winter, pp 11-13.

*DAVID McILROY*

# A Christian Response to Iain McGilchrist's panentheistic natural philosophy[1]

*Iain McGilchrist's The Matter With Things: Our Brains, Our Delusions, and the Unmaking of the World offers a comprehensive diagnosis and demolition of reductive materialism, naturalism, and scientism. Our academic disciplines and wider culture are caught in a left-brained feedback loop, in which the interconnectedness of things and the fundamentality of relationships is denied. What has been ruled out of account is the right-brained perspective, which is holistic, open to imagination and intuition, and prepared to trust that apparent contradictions can be harmonised. Through rigorous analysis of neuro-scientific findings, discussions of quantum physics, music, and a wide range of other disciplines, McGilchrist not only debunks the 'nothing buttery' of reductive materialism but goes on to offer his own visions of consciousness, material reality, and how we should understand their inter-relatedness. McGilchrist arrives, over the course of more than 1,300 pages, at a panentheistic process theology position. As a model of natural philosophy, his work is exemplary. From a Christian perspective, there is much to praise in his painstaking work destroying the golden calves of our age. The desideratum which remains, however, is sufficient recognition of the uniqueness of Jesus Christ and his centrality to all things.*

**Keywords.** Consciousness, Metaphysics, Naturalism, Natural Philosophy, Negative Theology, Process Philosophy, Process Theology, Panentheism, Reductive Materialism, Two hemispheres of the brain.

## Introduction

Iain McGilchrist is a psychiatrist, neuroscience researcher, philosopher and literary scholar. He is a polymath, best described as a natural philosopher. McGilchrist's 1,578 page *magnum opus, The Matter with Things: Our Brains, Our Delusions and the Unmaking of the World* ('*TMWT*') offers a comprehensive neuropsychological *gestalt* based on the structure of our brains. He delivers the most devastating demolition of reductive materialism since Thomas Nagel's *Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature is*

1 I am grateful to Dr McGilchrist for our private conversations and to anonymous reviewers for the thorough attention they gave to an earlier draft of this essay.

*Almost Certainly False*.[2] McGilchrist's claim is that in modernity the West has 'systematically misunderstood the nature of reality' (*TMWT* p.3) as a result of succumbing to 'the reductionist view that we are – nature is – the earth is – "nothing but" a bundle of senseless particles, pointlessly, helplessly, mindlessly, colliding in a predictable fashion, whose existence is purely material, and whose only value is utility.' (*TMWT* p.5). McGilchrist nicknames this reductionism 'nothing buttery'. McGilchrist's conclusion is 'that the reductionist account is contrary to scientific findings, unreasonable, counterintuitive, and shows a complete refusal to exercise intelligent imagination' (*TMWT* ch.26 p.1165).

In its place, McGilchrist offers a process philosophy-theology that is open to the possibility of God, and even of the Trinity.[3] This review essay attempts to summarise the contours of McGilchrist's key ideas, in order to identify their convergences and divergences with both classical theism and orthodox Christology. McGilchrist's panentheism makes God co-dependent on creation. His apophatic theology does not fully recognise the uniqueness of Jesus, the incarnate Son of God whose death was the once-and-for-all redemption of the world.

## The different ways in which the left hemisphere and the right hemisphere of the brain perceive the world

In his 2009 book *The Master and his Emissary: The Divided Brain and the Making of the Western World* (*'TMHE'*), McGilchrist demonstrates that there are two ways of attending to the world: one which seeks to take it apart and to manipulate it and the other which embraces it in its wholeness and connectedness. These two ways of attending to the world are typical of the left and right hemispheres respectively (*TMWT* Intro. pp.17-32, ch.2 p.104).[4]

The right hemisphere looks at the world holistically, responding to its flow.[5] The left hemisphere looks at the world analytically, seeking to break it down into things that can be manipulated (*TMWT* Intro. p.21). The optimum way to use our brain's potential to connect with reality is for the right hemisphere (the Master) to attend to some part of the world, for the left hemisphere (the Emissary) to seek to apprehend that part, and for the results of the left hemisphere's analysis to be re-integrated into the right hemisphere's vision (*TMWT* ch.28 p.1229). After the parts have been examined, 'There is … a need for effortful

2 Oxford: Oxford University Press (2012).

3 The metaphor for the Trinity which McGilchrist finds most helpful is that of a book: 'What is the book? Is it what was present in the mind of its writer? Or the tangible volume on the table in front of me? Or what goes on in the mind of the receptive reader? Clearly it is each and all.' (*TMWT* ch.28, p.1266, footnote 251).

4 This is shorthand, and the neurological activity may be variously located.

5 'Flow is an irreducible, not an emergent, element in the universe.' (*TMWT* ch.16, p.648).

*recomposition* to make the whole comprehensible'. (*TMWT* ch.9 p.331).

Healthy individuals, groups, and societies approach the world first via the right hemisphere, reacting to what is found there to form an impression of how everything links together. What is present to the right hemisphere is then represented by the left hemisphere, which considers the elements that can become objects of human action in isolation. The left hemisphere's representation of things must then be reintegrated by the right hemisphere into a more profound understanding of the whole. In unhealthy individuals, groups, and societies, the move to isolate and manipulate is the primary move, and the left hemisphere creates a feedback loop that fails to acknowledge the reality of that which can be embraced but cannot be grasped, that which must be accepted but cannot be captured in words (*TMWT* ch.8 p.295, ch.21 p.863).

Things have gone wrong because 'The awareness coming from the right hemisphere can embrace that of the left, but not the other way round.' (*TMWT* Epilogue p.1314). The left hemisphere makes at least two fatal mistakes: it regards its representation or analysis of the part as definitive in place of attending to the part itself and it treats the part in isolation from its relationship with other parts of the flow of reality. Instead of humbly submitting the results of its analysis to the right hemisphere, the left hemisphere becomes stuck in a feedback loop. The world as created by the left hemisphere becomes a totalising narrative from which broader reality (especially those aspects which cannot be reduced to language, measured or manipulated are excluded (*TMWT* Intro. p.26, pp.43-45, Coda to Part I p.375)). 'The left hemisphere adopts a theory, and then actually denies what doesn't fit the theory.' (*TMWT* ch.4 p.172).[6]

In late modernity, we have mistaken the map, the theoretical schema created by the left hemisphere, for the reality of the lived world that our right hemisphere connects us with (*TMWT* ch.9 p.317, ch.15 p.573). The 'consequences … are far-reaching – indeed devastating.' (*TMWT* ch.9 p.305). Our lives are 'lived' under the shadow of the 'dead hand of mechanism, scientism,[7] and bureaucracy' (*TMWT* ch.9 p.329).[8] Analytical philosophy and the dominance of the

6 At *TMWT* ch.10, p.398-9, McGilchrist reports the experience of an American woman whose brother had been taken to the morgue. When she pointed out that her brother was still warm and had a pulse, the nurse replied: 'That's odd, but you needn't worry about it, dear, because it says here on this chart quite clearly that he's dead.'

7 '… science cannot possibly fulfil the burdensome role of sole purveyor of truth. This is not a failing of science. Good science is aware of its limitations. Scientism, the belief that science will one day answer all our questions, is not.' (*TMWT* ch.11, p.407).

8 One manifestation of this is 'the triumph of procedure over meaning in every walk of life.' (*TMWT* ch.9, p.351). The left hemisphere is 'a little like a high-ranking bureaucrat, protected from the world which he or she must administrate: adept at knowing and observing the rules, but knowing little if anything about life as it is lived there. All that it leaves to the right hemisphere.' (*TMWT* Coda to Part I, p.371).

machine metaphor in science[9] have created 'a tradition in which most academics now are so thoroughly schooled that they can't see that there is a problem, let alone how to escape it.' (*TMWT* ch.9 p.347).

Already in *TMHE,* McGilchrist was arguing that in modernism, the left hemisphere had triumphed resulting in 'an over-explicitness in relation to what needs to remain implicit; depersonalisation and alienation from the body and empathic feeling; disruption of context; fragmentation of experience; and the loss of "betweenness".' *(TMHE* ch.10 p.397). 'Ultimately there is nothing less than an emptying out of meaning.' (*TMHE* ch.10 p.398).

At one level, *TMWT* is the 'unfolding and differentiation' of McGilchrist's key claim that our left hemisphere dominated worldview is having a multitude of nefarious ramifications. But it is also McGilchrist's attempt to integrate a lifetime of insights into a coherent overall framework. The result is a work of such depth and subtlety that any attempt to summarise it risks descending into caricature or parody. An important claim McGilchrist makes is that 'We cannot know anything without attending to it, and the nature of that attention alters what we find' (*TMWT* ch.26 p.1129). This means that my reading of McGilchrist is partly determined by the questions I brought to his text and the context in which I am reading his work.

With that warning in place, eleven key features of McGilchrist's worldview can be drawn out of the summary he offers in his Epilogue to *TMWT* p.1329:

1. Relationships are primary, foundational; and 'things' a secondary, emergent property of relationships.
2. Matter is an aspect of consciousness, not consciousness an emanation from matter.
3. Individuation is a natural process, whose aim is to enrich rather than to disrupt wholeness.
4. Apparent opposites are not as far as possible removed from one another but tend to coincide.[10]
5. Change and motion are the universal norm, but do not disrupt stability and duration.
6. Nothing is wholly determined, though there are constraints, and noth-

9 'The brain is often compared to a computer. This metaphor is one of the scourges of our time.' (*TMWT* Coda to Part I, p.372). See also *TMWT* ch.11, p. 410 '… the machine model remains only … a form of metaphor. … even at the relatively lowly level of explanation it has exhausted its potential, something that was obvious in physics some time ago, and is becoming increasingly obvious in the life sciences.'

10 McGilchrist is using 'coincide' in a technical way. What he means is that apparent opposites can be reconciled and harmonised.

ing is wholly random, though chance plays an important creative role.

7. The whole cosmos is creative; it drives towards the realisation of an infinite potential.
8. Nature is our specific home in the cosmos from which we come and to which in time we return.
9. The world absolutely cannot be properly understood or appreciated without imagination and intuition, as well as reason and science: each plays a *vitally* important role.
10. The world is neither purposeless nor unintelligent, but simply beyond our full comprehension. The world is more a dance than an equation.
11. At the core of the world is something we call the divine, which is itself forever coming into being along with the world that it forms, and by which, in turn, it too is formed.

These eleven aspects will be considered roughly in turn (but postponing consideration of the second aspect almost to the end), before raising questions about McGilchrist's natural philosophy in the light of classical theism and orthodox Christology.

Classical theism is a philosophical-theological description of God as 'the infinite fullness of being, omnipotent, omnipresent, and omniscient, from whom all things come and upon whom all things depend for every moment of their existence, without whom nothing at all could exist.'[11] Classical theism is committed to divine impassibility, the idea that God's nature is reliable and constant, and that God is not imperilled by what occurs in creation.

Orthodox Christology finds its definitive expression in the Nicene Creed. It is drawn from biblical sources, and this article will concentrate on one of those: Heb. 1:1-4. Orthodox Christology stresses the uniqueness of the Incarnation, providing an unparalleled revelation of God's nature and a once-and-for-all reconciliation of the relationship between humanity and God.

The relationship between classical theism and orthodox Christology is like a Venn diagram: Classical theists include non-Christian thinkers such as Plato, Maimonides, Averroes, as well as great Christian theologians such as Augustine, Anselm, Thomas Aquinas and John Calvin, but there are some Christian theologians who object, on what they assert are biblical grounds, to the claims of classical theism. I will therefore use the term classical Christian theism to describe Christian theologians who hold both to classical theism and orthodox Christology.

11 Bentley Hart, D. *The Experience of God: Being, Consciousness, Bliss*, Yale University Press (2013), p.7.

## McGilchrist's First Feature of Reality: The primacy of relationships

McGilchrist dismisses the left hemisphere view of things as isolated and 'nothing but' themselves as inadequate to our experience of the world and inconsistent with the findings of quantum physics (*TMWT* p.5).

McGilchrist, like Wordsworth, sees wonder, connectedness, and significance in nature. Speaking of his experience of the natural world, he writes: 'nothing "super" needed to be added to the "natural" for it to invoke wonder.' (*TMWT* ch.28 p.1215). McGilchrist's view of nature has similarities to that of Henri de Lubac, who insisted that nature is always already everywhere laden with God's grace.[12]

Nothing in nature exists in isolation, 'everything exists *only in relation*' (*TMWT* ch.21 p.846). In fact, McGilchrist's view is that 'relationships must be primary, since entities *become what they are only through their situation in the context of multiple relations.*' (*TMWT* ch.24 p.1006) and 'things are secondary properties of phenomena that emerge out of the web of experience' (*TMWT* ch.22 p.885).

## McGilchrist's Third Feature of Reality: the Particular and the General

McGilchrist is fascinated by the way in which the natural world is full of instances of things, such as snowflakes or sycamore leaves, that are unique yet conform to a pattern (*TMWT* ch.21 p.845). Our world is one in which there is a high degree of regularity but also an amazing amount of individuation. 'Everything is part of one whole, connected to every other part by a matter of degree. But everything is also absolutely unique' (*TMWT* ch.21 p.843). Things are recognised for what they are not because they are identical with other things, but because of their resemblance to a pattern. 'If there were no general patterns at all, there would not be uniqueness, but mere chaos.' (*TMWT* ch.21 p.844). We know what something is because it conforms to a type, because it has recognisable *'properties and functions'* but what we find time and again in the natural world is that each instance of a thing is unique. In order to apprehend the quiddity of a thing, we therefore 'need to see both the unique and the general *at once*' (*TMWT* ch.21 p.845).

12 de Lubac, H. *Surnaturel*: *Etudes historiques*, 2nd edn. Desclée de Brouwer (1991).

## McGilchrist's Fourth Feature of Reality: the Reconciliation of Apparent Contradictions

The dialectic between the particular and the general is an illustration of McGilchrist's fourth feature of reality, that two superficially contradictory perspectives can be held in tension with one another, but ultimately reconciled by integrating one into the other. Thus, McGilchrist sees reality as exhibiting a kind of *exitus – reditus* movement (a separation and return leading to a deeper union), with 'the ultimate priority of the principle of union over that of division, despite the necessary part played by division at one stage of the process.' (*TMWT* ch.21 p.847).

At times McGilchrist appears to verge towards Manicheism. 'Even what appears evil may cause some good, and what seems good cause some harm. If it is true that every devil has his angel, it is also true that every angel has his devil.' (*TMWT* ch.15 p.598). However, just as the left and right hemispheres of the brain are asymmetric (*TMWT* ch.20 p.836), so too McGilchrist sees an asymmetry in the *coincidentia oppositorum* (*TMWT* ch.20 p.833) and in the foundations of physical reality (*TMWT* ch.24 pp.1028-35). McGilchrist advocates for balance, harmony, and complementarity, but not for symmetry. The tension between asymmetric opposites is creative, perfect symmetry is inert. 'Small imbalances, differences among sameness, at all levels in nature make it work, starting with the initial inequality of matter and antimatter.' (*TMWT* ch.20 p.833). In a similar way, 'I experience both good and evil as real, and see them as necessary opposites; but while evil can … locally overwhelm good, it cannot subsume good into itself. The goodness of love can embrace its opposite; the evil of hate cannot.' (*TMWT* ch.28 p.1300).

## McGilchrist's Fifth Feature of Reality: Change and Motion are what Give Things their Identity

Our own experience of growing up and growing old is that we are the same person even as our life extends through time and the cells in our body are replaced. McGilchrist's view, following Balbir Singh, is that 'What we ordinarily call a thing is itself a process, a ceaseless coming to be and passing away.'[13] Everything flows like a river, and in this flow there is both change and continuity. '[C]hange is accentuated when one sees "*things* that flow"; persistence when one sees the flow itself.' (*TMWT* ch.23 p.954). Being is not a static quality but a continuous presencing (*TMWT* ch.22 p.934).

13 Singh, B., *Indian Metaphysics*, Humanities Press, (1987) p.10, quoted in *TMWT* ch23, p.993.

## McGilchrist's Sixth, Seventh, and Eighth Features of Reality: This is a Participatory Universe

McGilchrist strongly affirms Wheeler's famous pronouncement: 'This is a participatory universe.'[14] (quoted in *TMWT* ch.25 p.1057). The world for us is the world as we experience it. This world is not wholly made up by ourselves (as the left hemisphere is apt to think) but neither it is unresponsive to our attention.

McGilchrist consistently defends the position that 'there is something other than the contents of our own minds to which each of us aims to be true – and the right hemisphere is … a better witness to that reality than the left.' (*TMWT* ch.22 p.882). Through our consciousness, our focus of attention, our response to the real world: '… this is how we bring *all* our world into being: all human reality is an act of co-creation. It's not that we make the world up; we respond more or less adequately to something greater than we are. The world emerges from this dipole. We half perceive, half create.' (*TMWT* ch.19 p.765).

The openness of the universe to our participation is the concomitant of McGilchrist's sixth feature of reality. The insights of quantum physics reveal that in nature, nothing is wholly determined, though there are constraints, and nothing is wholly random, though chance plays an important creative role.

For McGilchrist, the world has the contours of structure which make free action possible. This involves God, who could wholly determine everything, drawing back in order to create something other than, and in relationship with, God (*TMWT* ch.28 p.1260). God has to allow the other to be in order for the other to respond in genuine love (*TMWT* ch.28 p.1262).

McGilchrist's participatory view of the universe reinforces his claim that relationships are primary. 'The idea that God is love, or even the "word" (*logos*), suggests that ultimately what is primary is relationship: a word exists only in the betweenness of utterance and audition, which has the same structure as love. Love is an experience always in process, never a thing ...' (*TMWT* ch.28 p.1237).

An 'engineering God or a detailed plan' are ideas that McGilchrist explicitly rejects (*TMWT* ch.27 p.1179). 'The grounding consciousness is not deterministic. It has none of the characteristics of an omnipotent and omniscient engineering God constructing and winding up a mechanism. It is in the process of discovering itself through its creative potential …' (*TMWT* ch.25 p.1099).

But determinism or purposelessness are not the only alternatives. Instead, McGilchrist embraces the Aristotelian/Thomist teleology of final causes, of

14 Wheeler, J.A. 'Information, physics, quantum: The search for links', in. Zurek, W.H. (ed), *Complexity, Entropy, and the Physics of Information*, Addison-Wesley (1990).

what McGilchrist calls 'intrinsic purpose'. McGilchrist argues: 'things are … attracted towards certain goals, rather than pushed blindly forwards by a mechanism from behind.' (*TMWT* ch.27 p.1190). Once we have accepted that human beings are not the only things with intrinsic purpose, then we realise that we are part of nature, that we belong in and with nature (McGilchrist's Eighth Feature of Reality).

## McGilchrist's Ninth Feature of Reality: Understanding the World requires more than the use of Science and Reason

McGilchrist is critical of narrow, unfeeling, reductive rationality. Reason is important, but is limited and never entirely separable from emotion (*TMWT* ch.4 p.167, ch.14 p.549, ch.15 p.579, ch.18 p.740). Explicit reasoning needs to be counterbalanced by intuition (the synthesis of experience with unconscious reasoning) (*TMWT* ch.8 p.256, ch.14 p.554) and imagination (*TMWT* ch.14 p.549, ch.28 p.1270). 'Human cognition is never just abstract and mechanical, but must be personal as well. As such, it involves not just calculating and categorising, but feeling and judging, and that this is *essential* to our humanity.' (*TMWT* ch.21 p.873).

McGilchrist claims that 'Some things can only be experienced or understood when they are not put to analysis. This is not because analysis defeats them, but because they defeat analysis.' (*TMWT* ch.14 p.565). Therefore, the left hemisphere fails to take proper account of them (*TMWT* ch.28 p.1265). Reliance on analytical, calculating, reason rather than experience therefore opens the way to radical scepticism because, as Bryan Magee claims, somewhat hyperbolically: 'direct experience which is never adequately communicable in words is the only knowledge we ever fully have'[15] (quoted in *TMWT* ch.28 p.1196). In denigrating this, the left hemisphere approach fails to recognise that 'there is a distinction between something beyond our means of grasp and something beyond our means of knowing.' (*TMWT* ch.28 p.1205). '[R]eality is neither undiscoverable, nor discoverable by the intellect alone, but by the whole embodied being, senses, feeling, intellect and imagination.' (*TMWT* ch.14 p.576).

Because of the interconnectedness, the richness, and the multi-layered nature of the world and our experience of the world, '[U]ltimate meaning will *always* lie beyond what reason can conceive or everyday language express.' (*TMWT*, ch.14 p.569). There is always more to know, more richness, and more connections involved than we can grasp. 'All understanding whatsoever is, at bottom, metaphorical.' (*TMWT* ch.15 p.632). Elsewhere he says: 'It's metaphors all the way down.' Our dependence on metaphors reveals our need for poems,

15 Magee, B. *Confessions of a Philosopher: A Journey through Western Philosophy*, Phoenix (1998) p.98.

art, myths and metaphysics. 'The beauty and power of art and of myth is that they enable us … to contact aspects of reality that we recognise well, but cannot capture in words.' (*TMWT* ch.15 p.631).

## McGilchrist's Tenth Feature of Reality: Reality is Bigger than we can Grasp

In order to find our home in the world, we need to approach the world as something to be embraced rather than manipulated. McGilchrist insists that 'a true understanding requires a certain disposition of the mind towards its object.' (*TMWT* ch.26 p.1127). We need to assume the connexion with the world that we are going to find.

The view from nowhere, and the God's-eye perspective, are not open to us (*TMWT* ch.15 p.612). Our knowledge of the world is always situated, contextual and partial. The reason that we cannot pin down the 'meaning' (i.e. the sense, the purpose, and the value) of the world, is not because it *has* no meaning, but because there is 'a plenitude of meaning' (*TMWT* ch.10 p.390). There are things, (like love, sunsets, and even the joy of being in a good bookshop) which we cannot reduce to writing not because they have no meaning but because they are overflowing with meaning.

> Anything truly unique cannot be expressed in [everyday] language, which is why whatever is profound, personal, or sacred, if it is to be expressed in words, can be so expressed only in poetry, the language of the right hemisphere. In poetry, language subverts its normal tendency to precision and becomes rich with ambiguity, with potential meaning again; and through the rifts created in the enclosing veil of language the light once more streams in.' (*TMWT* ch.21 p.867).

McGilchrist's speculations about God are therefore apophatic. 'God is the surplus in creation that cannot be encapsulated, that resists formulation, and that refuses all attempts at reduction.' (*TMWT* ch.28 p.1250). McGilchrist is impressed by Meister Eckhart's negative theology (*TMWT* ch.28 p.1212, p.1255) which says the most we can say is that God is not subject to time, to place, or other creaturely limitations, though McGilchrist himself thinks that are certain, qualified affirmations which can be said, including that the hidden being of God becomes manifest in all things and the being of all things participates in God.

Our fundamental calling is to experience, to *enjoy*, rather than to analyse. The metaphor McGilchrist repeatedly reaches for here is that of a dance (*TMWT* ch.23 p.969). 'Life, in its essence, is … an exuberant, self-delighting process of differentiation into ever more astonishing forms, an unending dance, in which we are lucky enough to find ourselves caught up' (*TMWT* ch.21 p.853).

## McGilchrist's Second Feature of Reality: Consciousness is Prior to Matter

McGilchrist's emphasis on experience leads to his affirmation that consciousness is prior to matter. The left hemisphere worldview thinks that material things are simple and can be understood in their totality, but that consciousness is a mystery which must be explained away as either an illusion, an epiphenomenon or as somehow magically emerging from matter. A major theme in *TMWT* is that no things can be fully understood apart from their relationships to everything else in the universe, with the consequence that our understanding of matter is necessarily partial and incomplete. Matter is therefore far more complex than is commonly assumed, and the best explanation is that 'matter appears to be an element within consciousness that provides the necessary resistance for creation; and with that, inevitably, for individuality to arise.' (*TMWT* ch.25 p.1049).

Given the total failure of the materialistic worldview to explain consciousness and its fundamentally mistaken account of matter, McGilchrist argues that it is more reasonable to regard consciousness as equally fundamental as, or even as prior to, matter (*TWMT* ch.10 p.394).

McGilchrist insists that metaphysical questions are the most important questions of all, and that they cannot be answered from within a left hemisphere framework (hence the inability of scientism to make sense of the questions).

> For me, and for many philosophers historically, the deepest question in all philosophy … is why there should be something rather than nothing. And close on its heels comes the question why that 'something' turns out to be complex and orderly, beautiful and creative, capable of life, feeling and consciousness, rather than merely chaotic, sterile, and dead. (*TMWT* ch.28 p.1193).

McGilchrist's answer to the second question is that the best explanation for the qualities of the matter of the universe is that it is the product of a cosmic scale mind.

> But if the material cosmos is an emanation or projection of a grounding consciousness it will as a matter of course have the necessary, apparently fine-tuned, conditions to come into existence; it will naturally have the qualities of order, beauty and complexity because it issues from a consciousness that, like us, is attuned to and gives rise to such elements; it will naturally produce conscious beings, and the conscious beings will naturally be able to speak its language, since they are generated by it. Of course this does not answer the unanswerable question, why there is something rather than nothing. (*TMWT* ch.25 p.1098).

Speaking of the relationship between the mind and the body, McGilchrist writes: 'During life it is possible that the spiritual and physical are entangled,

neither *causing* the other, neither *depending* on the other for its existence, but their entanglement certainly depending on the co-existence of each' (*TMWT* ch.22 p.916).

## McGilchrist's Eleventh Feature of Reality: God is becoming with Nature

McGilchrist's openness to God is part and parcel with his rejection of materialism, determinism and the metaphor for the universe as a machine or a clock. '… [I]f the nature of reality is not already fixed, but rather, evolving, participatory, reverbative, it is both rational and important to open your mind and heart to God, …' (*TMWT* ch.28 p.1263).

McGilchrist does not endorse pantheism, the idea that 'the distinction between the creator and the created is not a distinction between two entities, but a distinction between two ways of conceiving a single reality' (*TMWT* ch.28 p.1248).

McGilchrist is clear that God is both wholly transcendent and wholly immanent (*TMWT* ch.28 p.1231, 1248). As for God's transcendence: 'God is above all not a thing alongside other things – even one equipped with ultra-special powers. God simply *is* – in a use of the verb that requires that we understand God both to *have* Being and to *be the ground of* Being at one and the same time.' (*TMWT* ch.28 p.1201). Created beings exist because they participate in Being, they have a share in Being given to them by God.

McGilchrist's rejection of any notion of creation as a machine or God as a clockmaker who simply winds up the clock and then lets it tick away by itself leads him to panentheism, the view that 'all things are *in* God, and God *in* all things' (*TMWT* ch.28 p.1231). McGilchrist's God is continuously co-creating in the unfolding universe rather than having departed the scene *(TMWT* ch.27 p.1172).

McGilchrist sees Christianity as offering an account of how mind can come to inhabit and to express itself in matter. He writes: 'The extraordinary power of the Christian mythos lies in its central idea of incarnation – the intimate relationship between consciousness and matter, and the core idea of panentheism.' (*TMWT* ch.28 p.1267).

Classical Christian theism affirms the incarnation, but denies the panentheistic claim that the relationship between God and creation is one of co-dependency. McGilchrist's God is God in the making, expressed in the idea that 'God, truth, and infinity are all processes, not things; comings into being, not entities that are already fixed. … Ultimately Being and Becoming are aspects of the same thing… However, … Becoming is even more fundamental than Being.' (*TMWT* ch.28 p.1241).

McGilchrist poses his own wager, with an express nod to Pascal:

> if God is an eternal Becoming, fulfilled as God through the response of his creation, and we, for our part, constantly more fulfilled through our response to God; then we are literally partners in the creation of the universe, perhaps even in the *becoming of God* (who is himself Becoming as much as Being): in which case it is imperative that we try to reach and know and love that God. Not just for our own sakes, because we bear some responsibility, however small, for the part we play in creation … (*TMWT* ch.28 p.1263). *(emphasis original).*

Although McGilchrist's account renders God co-dependent on the world, McGilchrist is clear that 'God is certainly greater than but *includes* the universe' (quoting Keith Ward,[16] *TMWT* ch.28 p.1232). 'God … can say "yes". And to say "yes" to everything includes *saying "yes" to "no"* – limitation – which may explain the existence of sin.' (*TMWT* ch.28 p.1254).

McGilchrist's natural philosophy shades into a natural theology in which qualified affirmations about the divine can be offered. McGilchrist's God is 'that which underwrites, timelessly and eternally, whatever is: in other words, the ground of Being.' (*TMWT* ch.28 p.1194). God is 'a co-ordinating principle in the universe which is evidenced in order, harmony and fittingness; a principle that is not only true, but the ultimate source of truth.' (*TMWT* ch.28 p.1206). But McGilchrist acknowledges: 'I have … no final answers to any of the big questions. … I believe the concept of God to be fraught with difficulties. … I am merely indicating that … there is almost certainly more here than we have words for, or can expect ever to understand using reason alone.' (*TMWT* ch.28 p.1195).

Consistent with his apophaticism, McGilchrist does not want to be dogmatic in his assertion of panentheism (*TMWT* ch.28 p.1248). 'What the term "God" requires of us is not a set of propositions about what cannot be known but a disposition towards what must be recognised as beyond human comprehension.' (*TMWT* ch.28 p.1207).

## A Theological Evaluation of McGilchrist's Vision

McGilchrist writes as a psychiatrist and a natural philosopher, a sincere, erudite, and profound seeker after truth. McGilchrist offers a powerful vision which has many elements that Christians can embrace. In his insistence that the left hemisphere is wrong when it reduces something to 'nothing but' the product of its analysis, he is echoing Herman Dooyeweerd's insistence that

16 Ward, K. *The anthropic universe* (2006) www.abc.net.au/radionational/programs/scienceshow/the-anthropic-universe/3302686.

every thing, event, or experience is a whole which cannot be understood in its totality using any single approach or mode of analysis.[17]

His insistence on the interrelatedness of all things and the primacy of relations (*TMWT* p.6) is strongly redolent of the revival in trinitarianism in the twentieth century (across figures as distinct from one another as Colin Gunton, Paul Fiddes, and Jürgen Moltmann).[18] McGilchrist is excellent in explaining how differentiation can occur without division, so that the Son is not the Father but the Son and the Father are nonetheless united as the Godhead.

He says of Christianity, 'The Christian religion is unusual for its metaphysically complex creed, which unfortunately leads straight into the territory of the left hemisphere. … Although as a teenager I therefore tended to dismiss its tenets as incomprehensible and possibly nonsensical, with living I have come to see them as intuitive insights, misrepresented to me as if they were something to evaluate like a chemistry experiment.' (*TMWT* ch.28 p.1268).

Before turning to the Christological deficit in McGilchrist's philosophical-theological speculations, other areas of convergence and divergence between McGilchrist's thought and classical Christian theism will be briefly highlighted.

## God as a force of attraction rather than an omnipotent law-giver

McGilchrist sees God as a force of good to which we are attracted, rather than a despot whose arbitrary rules we disobey at our peril (*TWMT* ch.26 p.1124). He endorses Aquinas's view of 'God … as the ultimate good who attracts all things to their flourishing, the possibility that is most fulfilling for them, but does not *compel* them to take that path: they have the freedom to respond for better or for worse.' (*TMWT* ch.28 p.1242).

With regard to the trilemma created by the triad of omnipotence, omniscience, and omnibenevolence, for McGilchrist, whatever else we postulate about God must be consistent with God having a relationship of love with God's creation, in which the love of God's creatures for God is *theirs* in a meaningful sense. This leads him to advance an intriguing argument that:

God is not in a left hemisphere sense, but in a right hemisphere sense, all-knowing and all-powerful. Knowledge, as understood by the right hemisphere,

17 He illustrates this with the example of buying a box of cigars: Cameron, A.M. in Dooyeweerd, H. (tr.) Knudsen, R.D. (ed.) A.M., *Encyclopedia of the Science of Law*: Volume 1, The Edwin Mellen Press (2003), pp.13-21, 24.

18 Gunton, C. *The Promise of Trinitarian Theology*, T&T Clark (1991); Fiddes, P.S. *Participating in God: A Pastoral Doctrine of the Trinity*, Darton Longman & Todd (2000); Moltmann, J., tr. Margaret Kohl, *The Trinity and the Kingdom of God: The Doctrine of God*, SCM (1981).

is a process of openness and receptivity in which two entities progress ever closer to one another through experience. *Kennen,* not *Wissen*. In this sense, God alone has knowledge of everything, whereas we have knowledge of only that limited part of reality that we can encounter. If God were to know everything, in the sense of 'knowing the facts', God would be importantly limited, because then Creation could no longer be truly free and with that the possibility for love – which depends on the free will of a true Other – would be lost. …

And power? Power as understood by the right hemisphere is *permissive*: creative power, the power to allow things to come into being, precisely by underwriting the existence of a creative field, but *not* interfering and manipulating within it. Not making things happen according to *fiat*, but allowing things to grow. (*TMWT* ch.28 p.1252).

## A process theology

McGilchrist's view of God is profoundly influenced by the process theology of Alfred North Whitehead (*TMWT* ch.28 p.1308). In McGilchrist's view, 'Process theology is a natural counterpart or companion to panentheism, since it, too implies that God is in everything without being reducible to the sum of everything: the spring and that which comes forth from the spring.' (*TMWT* ch.28 p.1234). He defines process theology as: '… the belief that the divine is misconceived as purely a static entity outside time (though that is an accepted aspect of divinity), and is, at least in some important aspects, better seen as a process within time, an eternal Becoming rather than merely an eternal Being – though it is that, too.' (*TMWT* ch.28 p.1234).

McGilchrist is persuaded by 'Whitehead['s] view [that] God's interaction with the cosmos is dialectical, in that God and the world fulfil each other and bring each other into being.' (*TMWT* ch.28 p.1240).[19] He endorses Whitehead's view that

> God is the great companion – the fellow-sufferer who understands. Christianity is, above all, the religion that speaks of vulnerability and love, in the image of a God that cared for creation in such a way as to be unable not to suffer in and alongside it. Whitehead … thought Christianity had erred by presenting God as a divine ruler, whose outstanding characteristic is power: he preferred what he called 'the brief Galilean vision of humility', characterised by love. There are hemispheric implications here, too, that are too obvious to need pointing out. (*TMWT* ch28 p.1243).[20]

19 Griffin, D.R. and Sherburne, D.W. in Whitehead, A.N. (ed.) *Process and Reality: An Essay in Cosmology,* Macmillan (1929) p.208.

20 Whitehead, A.N. *Process and Reality*, p.351.

Process theology is not classical Christian theism, and the theological problems it raises may outweigh those it solves.[21]

## The microcosm – macrocosm in McGilchrist's thought

Classical Christian theists differ among themselves in their understanding of divine eternity, of the implications of the Incarnation for the divine life, and of the nature of God's openness to the world. Classical Christian theism is, however, committed to the one-way dependence of creation on God and to approaches to God's involvement in the world which preserve both divine freedom and divine constancy.

Given that classical Christian theism resolutely affirms divine immanence and the Incarnation, why does McGilchrist prefer panentheism? Whilst Whitehead's process theology is part of the answer, as is McGilchrist's laudable desire to affirm 'the possibility that God has a relationship not just with the divine self, but with something Other; …' (*TMWT* ch.28 p.1248), it seems to this reviewer that McGilchrist has also adopted, perhaps subconsciously, a microcosm – macrocosm approach.

The macrocosmic relationship McGilchrist conceives between the universe and God reflects the inseparable but asymmetric relationship between the left and right hemisphere. Although creation is less than God, in some sense God needs the world and is created by the world whilst it is simultaneously true that creation is dependent on God's origination and on God's creative power constantly at work within it. In McGilchrist's own words: 'the divine, which is itself forever coming into being along with the world that it forms, and by which, in turn, it too is formed.' (*TWMT* p.1329).

If it is the attraction of a microcosmic – macrocosmic analogy which has seduced McGilchrist, then he has not heeded his own warnings. He stresses that there are two problems with using anything in the world as an analogy for the relationship between the world and the divine: 'a single, simple analogy can never be right. (There are, separately, problems in finding analogies of any kind whatsoever to something that is utterly *sui generis*).' (*TMWT* ch.28 p.1225). Because God is infinite, is not a thing, is unique, God cannot be captured or controlled by any analogy. God can only be approached on God's own terms. Christianity affirms that God has revealed truths about God-self in creation, in God's dealings with the people of Israel, and supremely, uniquely, in the person and work of Jesus Christ. Therefore, the greatest lacuna in McGilchrist's natural philosophy-theology relates to questions of Christology.

21 For a discussion of those problems in the context of debates about anthropology and the status of law, see Opderbeck, D.W. *The End of Law? Law, Theology, and Neuroscience*, Wipf & Stock (2021).

## A Jesus-shaped Hole

The book of Hebrews opens with strong affirmations of the uniqueness and indispensability of Jesus (Heb. 1:1-4). Numbering those affirmations in the order in which they appear in the text: Jesus is (i) the Son of God, (ii) the heir of all things, (iii) through whom God the Father made the universe, (iv) and through whom the universe is sustained, (v) who is the radiance of God's glory and the exact representation of God's being, (vi) the one who has provided purification for sins, (vii) and the one who, having completed his work of redemption sits at the Father's right hand in heaven. As a consequence, (viii) Jesus is far, far more than a messenger (angel) from God.

Of those eight affirmations, McGilchrist's philosophy can accommodate (iii) and (iv). The historicity of Jesus, and the capacity of God to become incarnate as a human, so that God has a history of the sort affirmed by (vii) is also something McGilchrist could probably accept, but he has difficulty regarding the Incarnation of Jesus as a unique event. Orthodox Christianity's understanding of the uniqueness of Jesus goes beyond McGilchrist's philosophy in four ways. First, Jesus' unique status as (i) the Son of God and (viii) as far more than a messenger. Second, (v) the idea that Jesus is the exact representation of God's being; so that to see Jesus is to see the Father and to be in relationship with Jesus is to be in relationship with God. Third, (vi) the need for our sin to be purified, for God to enter into the world God had created in order to deal once and for all with the evil which was opposed to God and which was preventing the world from being in right relationship to God and from being all that it was meant to be. Fourth (ii), the idea of Jesus as the heir of all things, the one for whom all things were made and in whom all things are fulfilled. In short, McGilchrist has not fully come to terms with the uniqueness of the Incarnation.

## Incarnation and Revelation

McGilchrist understands creation as an act of self-limiting by God. Orthodox Christology goes further, insisting that God's ability to self-limit extended to the Son of God being born into a working-class family in Palestine under Roman occupation. McGilchrist is open to that possibility, but baulks at the claim that the birth of Jesus of Nazareth was a unique event. McGilchrist favours Schelling's idea that God has not incarnated just once, but "is always incarnating itself in the evolving cosmos." (*TMWT* ch.28 p.1240).

The Incarnation as a unique event is God coming to earth not as a temporary visitor, but as a real human being with a life-story and a full experience of what it means to be human. Colossians 1 contains the strong affirmation that the creation of the universe was mediated by the Son of God (Col. 1:15-16), but that this Son of God is none other than Jesus of Nazareth who died on the cross (Col. 1:20) and rose again from the dead (Col. 1:18). The definitive revelation of

God in Christ secures the unity and the ordering of creation, provides the focal point of history, and illuminates both the character of God and the meaning of creation in unique ways.

The Son of God, becomes flesh, and inhabits matter, in order to reveal God to human beings. Jesus shows us God the Father by showing us himself (Jn 14:9), he talks about God not by making technical or scientific statements but through metaphors and parables which feel like poetry. Jesus gives us not only *savoir* but helps to *connaître* God by reminding us, through his actions, what God does.

Even more than this, the one through whom the cosmos was made, is made flesh, in order to conquer death and to redeem matter from corruption. It is this, Athanasius insists *De Incarnatione Verbi Dei*, was the principal reason for the incarnation: 'The supreme object of His coming was to bring about the resurrection of the body.'[22]

## Atonement

Although neither the Nicene Creed nor orthodox Christology prescribe a particular conception of the atonement, Western Christianity has a long tradition of understanding the atonement in terms of the satisfaction of God's wrath and/or redemption from the punishment merited by divine judgment.

McGilchrist is uncomfortable with the idea of atonement in these senses, because he does not believe in divine retribution (*TMWT* ch.28 p.1296) and has trouble with the idea that we need to be 'bought back'.[23] He shares with Whitehead the sense that the emphasis on God as an omnipotent judge is a mistake.

McGilchrist prefers the idea of 'at-one-ment', of God ultimately bringing good out of sin and evil. Jesus' life, death and resurrection are therefore symbols of redemption, exemplars and myths, rather than unique, decisive and paradigmatic. Whether they are historical events is, for him, unclear, and less important than whether the story of Jesus carries metaphorical truth.[24]

He writes movingly:

> I understand the Christian belief in the redemption of death through God's own suffering to mean that death is not an end, but plays a part – like the

22 Athanasius, St Athanasius on the Incarnation, , tr. and ed. *A Religious of C.S.M.V.*, London: A.R. Mowbray & Co Ltd (1953), chapter 4 §22.

23 Private conversation.

24 In conversation he shared that he does not know enough about Jesus, because the gospels were written some time after the events in question.

> intermediate phase of destruction, of fragmentation, of the shattering of the vessels – in the greater story of repair and restoration; a story that is both mine and not mine, taking place in the immensity of a living cosmos where the part and the whole are as one, yet without of the loss of the meaning of the part that is each one of us. (*TWMT* ch.28 p.1297-8).

The Christian message is, however, that the victory over death is not merely a metaphor, it is also a unique and material reality. In Acts chapter 17, Paul says that in God 'we live and move and have our being' (Acts 17:28). This is not a panentheist claim but rather an assertion of God's immanence balanced against God's transcendence in the context of Paul's overall argument centred around the resurrection of Jesus Christ. The one God who had created the world and everything in it (Acts 17:24) had intervened in the world, to rescue it through the death and resurrection of Jesus (Acts 17:30-31). The vindication of Jesus in his resurrection is 'God's refusal of our refusal of the goodness of creation.'[25]

## Fulfilment

The uniqueness of the Incarnation, the revelation of God the Father in the person of Jesus Christ, and the once and for all Atonement in the cross and resurrection, open the way to a fulfilment which exceeds the inherent possibilities of the natural order. McGilchrist is hopeful that 'that strange thing one calls one's consciousness … does not end at death … – but persists in some form at which we can only guess' (*TMWT* ch.28 p.1296) but the apophatic nature of his philosophy means that he cannot be confident.

By contrast, in 1 Cor. 15, Paul stakes everything on the claims that 'Christ died for our sins according to the Scriptures, and that he was buried, and that he was raised on the third day' (vv.3-4). It is confidence in the historic fact of the resurrection which grounds Paul's anticipation of the Second Coming (vv.24-27), and the consequent moment when 'God will be all in all' (v.28).

Paul's extraordinary claim is that the sublimation of evil and the resolution of all things takes a shape defined by events which took place around AD30, when one homeless Judaean rabbi was executed as a blasphemer and traitor, only to have his authority over creation, evil, and death confirmed by being brought back from the dead by the God who is within, behind, above, and beyond creation.

25 Tranter, S. *Oliver O'Donovan's Moral Theology: Tensions and Triumphs*, T&T Clark (2022), p.48.

## Conclusion

McGilchrist's work is a magnificent affirmation that natural philosophy-theology is not beyond the age of child-bearing. He advances his positions with an appropriate confidence borne out of the breadth and depth of his reading across different fields, cultures and time, whilst readily acknowledging the imperatives of revision and openness to dialogue.[26]

McGilchrist diagnoses that 'Having abandoned God, our idol is – *ourselves*, as "God": the gaining of human power over every manifestation of Nature' (*TMWT* Epilogue p.1333). McGilchrist writes with urgency, seeing our left hemisphere-dominated societies as having fallen into an echo chamber in which artifice and manipulation have replaced encounter and acceptance, rationalism has ousted reason, and reductionism has evacuated meaning.

McGilchrist has journeyed far into the heart of reality in his philosophical vision, but there are yet greater things to be discovered. His panentheism presents a God who suffers with creation, but risks the divine constancy that classical theism is so insistent on defending. The Bible and the historic Creeds require us to temper McGilchrist's apophatic theology in the light of the uniqueness of Jesus Christ, the Son of God incarnate, the definitive revelation of God's nature, the atoning sacrifice once-and-for-all, and the one in whom creation finds its centre nad meaning.

McGilchrist offers a philosophical vision with many strengths. It is relational, it is anti-reductionist, and it integrates perspectives from a variety of disciplines into a more than plausible whole. It is a stimulating resource for all intellectually minded Christians to engage with, but one which must be measured against the claims of the Gospel about the uniqueness and centrality of Jesus Christ.

**David McIlroy is a Global Distinguished Professor at the University of Notre Dame and an Associate Tutor at Spurgeon's College.**

26 'Faith, like science, is not static and certain, but a process of exploration that always has in sight enough of what it seeks to keep the seeker journeying onward.' (*TMWT* ch.28, p.1275).

# Reviews

## Philip Hefner

***Human Becoming in an Age of Science, Technology, and Faith***

Lexington Books/ Fortress Academic 2022. 237pp, hb £77, ISBN 9781978708372.

This book is authored by Philip Hefner with contributions from other thinkers and edited by Jason P. Roberts and Mladen Turk. I found the collection very controversial.

Hefner's portrayal of the traditional Christian understanding of creation as passive – not creative – is something I cannot accept. He places traditional Christianity in the categories of 'Two Worldviews of Denial' (31), while the roots of his own philosophy he sees in the categories of 'Worldviews of Constructive Interpretation' (32), represented mostly by the very controversial panentheistic philosophy of Pierre Teilhard de Chardin. As many other neoliberal philosophers, he also misinterprets Paul's teaching about the Spirit and the flesh in Romans 8 as demonising the material order (31). In fact, what Paul says is that believers are called to act in the world according to God's purpose (Rom 12:2) and in the context of Jn 17:11,15-16, they are called to be *in the world* but *not of it*, rather transforming it. Indeed, one cannot take Paul's teaching out of the context of the rest of Bible, especially about Jesus giving authority to humanity to act in the world according to His purpose (Jn 14:12-14).

In Part 1 Hefner speaks about 'An Emerging Concept of God' and 'New Worldviews, New Interpretations' (34). I welcome his assessment in Chapter 4 that the 'crisis of technological civilisation' cannot be dealt with by a 'worldview of progressivism'. His call for humility against cynicism and against the hostility towards 'the Other', against segregation and marginalisation of African Americans and American Indians, as well as his proposed solution for 'relating the World to God' (55-62), are all constructive views. However, instead of offering hope in the crucified and resurrected Christ, a direct resource from the Bible, he rests his theological resources in 'religious traditions' and 'the great 20th century… Teilhard…' (64).

In his manifest Hefner largely ignores the fact that at the moment, governments and politicians are seeking wide consultations on the issues involved in genetic engineering. The technology of germline editing with CRISPR is not yet accepted in therapeutic practice in most countries, including the US and the UK, yet he is quick to join those who unconditionally affirm its unrestrained use by declaring that '…our behavior for all practical purposes, affirms the transhumanist program' (70). By overemphasising human 'functioning' and intelligence, without going into the details of psychological categories like personhood, consciousness, human dignity, purpose, and ethical tendencies of the human nature, he puts forward his 'General Principle' (70), in effect declaring humans identical to machines, which tomorrow unconditionally will be creating other humans without restraint and without certainty of the outcomes. This is strongly controversial and of great concern. Although germline editing of humans is expected to be eventually approved for healing purposes in humans, after clearing all technological risks, its use for human enhancements will continue to be the subject of great concern in the times ahead. Many theologians and ethicists, including those of secular transhumanism, consider such intentions far ahead of its time, posing an existential risk to humanity, and requiring extreme caution.

Part 2 contains contributions from other authors, supporting Hefner's fundamentals with no critique. There is nothing in the new discoveries of science and the technological advancements per se that requires correctives to the eternal Biblical message of salvation through love for the other, yet Jason Roberts is trying to 'review the concept of the Creator'. In his opinion 'Major shifts in ontological frameworks – from permanence to process, from substances to systems – must be allowed if the concept of *God* [his italic] is to remain scientifically tenable' (115). Further on, this school of thought is trying 'to use the idea of dynamic systems to reconfigure a basic Christian idea about *God* – a Western idea about God – namely that God is Spirit.' (117). The attempt to modify our Biblical narrative in order to have, in his words, a 'scientifically credible idea of God' (118), actually is profaning the divine and the supernatural in our understanding of a transcendent God, who is distinct from His creation and is not 'a process', taking its course in time. Proposing 'God…[to be] understood as an evolving system' (120) is deferring from God whom we know from the Bible, the One who created time and space and Who should not be described purely as a process in that material world. In fact, his description can never be made full from within the material world He created without falling into the trap of circumferential causation in philosophy. Hefner's school of thought implies a god as a concept in our minds and shies away from God, who is the source of all our faculties, who's wisdom we seek.

The *leitmotif* of this book, termed 'becoming' is inappropriate, challenging a fundamental Biblical statement, that God had already created humans (mankind) (Gen 1.26-27). Although humans are still evolving and maturing, they are not 'becoming' as such. Some established terms are inappropriately used too. We must not use the term 'eugenics' in the context of genetic engineering due to the reminiscence of the horrific events in recent history that took place in the Nazi camps. Even with good intentions we should never 'practice eugenics unabashedly' (178) but be humble, prayerful and sorrowful when we sacrifice an animal, zygote, embryo or foetus, any living thing, for whatever reason, even when the end goal is to alleviate human suffering, save lives or heal. We are prayerful also when we kill animals for food. That is why we give thanks to God before we eat. However, the spirit of this book does not offer praying and worshiping the true living God because it seeks to 'propose' a god that fits the humans of the day.

I must acknowledge the insightful analysis of the crisis of the technological civilization of some of the other contributors, who's 'diagnosis is not quite isomorphic' with Hefner's (201). Still the proposed resolution to 'place a spirit of communal well-being into the driver's seat of technological innovation' (207) suffers from the same malaise of circular logic as that of Baron Munchausen. We shall not put a spirit in the driver's seat, but *invite* the Spirit of our transcendent uncreated God to renew, transform and inspire us to drive the technological innovation along His way.

**Todd Kantchev is the Reviews Editor of S&CB.**

## Victoria Lorrimar

***Human Technological Enhancement and Theological Anthropology***

Cambridge: Cambridge University Press, 2022. 356 pp. hb £75.69. ISBN 9781316515020

Citing recent advances in gene editing, nanotechnology, and the field of artificial intelligence, transhumanism, posthumanism, and the effective altruists believe, we stand on the brink of a new humanity, one that will be technologically

altered to enjoy a longer lifespan, defeat disease, and possess expanded mental, physical, and even moral abilities. For philosophers and theologians, this raises numerous questions, including: Perhaps we can enhance human nature in these ways, but should we? How might we evaluate a given enhancement to determine if it is desirable or not? Should we eschew human enhancement as "playing God?"

Victoria Lorrimar answers the last with a definitive "No!" Her work is a paeon to human creativity, approached first through a thorough examination of humans as "created co-creators" with God, a concept introduced by Lutheran theologian Philip Hefner in 1984 and explored in *The Human Factor* (Hefner, 1993). For Hefner, being a created co-creator situates humans as God's creation, through evolution, yet a creature that possesses, via our technologies, the unique ability to create ourselves, as we modify and manipulate our environment, our fellow creatures, and, increasingly, our very selves. Lorrimar traces the development of the concept of the "created co-creator" through Hefner's work and into the broader field of science and religion. She critiques Hefner as limited by a scientific, more specifically, Lakatosian lens, whereby technological creativity is viewed as a product of our progressing scientific knowledge and little else.

Lorrimar posits imagination as a necessary companion with knowledge in driving technological creation and transhumanist visions of human enhancement. She notes how these visions are most thoroughly explored in the imaginative worlds of science fiction and film. Thus, she turns to the literary world for an understanding of the role of the imagination in creation, honing in on J. R. R. Tolkien's concept of "sub-creator" as both a parallel to and expansion of Hefner's created co-creator. Tolkien distinguishes human creativity from divine creativity in that we, as sub-creators, do not create *ex nihilo*. Rather, the works of our imagination reveal truths already extant in God's creation, "breaking through the limitations of preconceived response, and revealing an essentially sacred reality" (181). In this sense, she breaks from Hefner, noting Tolkien's assertation that we create within divine norms and limits.

In the final section, Lorrimar suggests that linking knowledge with imagination, the rational with the narrative, might give us a new perspective from which to evaluate and direct a transhuman future. In her final chapter, she sets out to apply this dual perspective to a selection of biological technologies, such as radical life extension, mind uploading, and moral enhancement. However here, she once again falls back from covering the extant literature and thus, falls short ofdemonstrating how linking knowledge with imagination might help theologians, scientists, or political bodies determine a path forward regarding particular paths toward human enhancement. Rather than advancing a defined position on any technology, she presents a list of commendable, yet general rules of thumb but fails to demonstrate how to apply these rules in a concrete way.

As a literature review of what it means to be a creator, both scientifically and artistically, this work is a remarkably thorough compilation, perhaps reflecting the requirements of the doctoral dissertation from which it is derived. That is both the book's strength and its weakness. At the high price of £75.69 for both hardback and ebook, *Human Technological Enhancement and Theological Anthropology* is likely to be purchased mainly by libraries and used as a reference. However, as I read, I could not help thinking of the words of the founder of Quakerism, as recorded by Margaret Fell: "You will say, Christ saith this, and the apostles say

this; but what canst thou say?" Lorrimar 's exhaustive treatment of the extant literature buried her own position. I would have liked to have heard less from the numerous scholars Lorrimar quotes and more from Lorrimar herself.

**Noreen Herzfeld is the Nicholas and Bernice Reuter Professor of Science and Religion at St. John's University and the College of St. Benedict.**

## Michael S Northcott

***God and Gaia: Science, Religion and Ethics on a Living Planet***

Oxford: Routledge Env. Humanities, 2023. 271 pp. pb £34.99. ISBN 9780367627744

Michael Northcott is well known as an environmental campaigner, who has long drawn attention to the ways that humans are degrading the biosphere and the planet on which we live. This book is a continuation of those themes. The chapters draw heavily on conference papers he has previously published on a variety of topics, and reads as a series of somewhat disconnected topics, including an extensive chapter on COVID-19, rather than as a single through-going argument. In his own words, Northcott writes that 'This book is an attempt at a dialogue between the Hindu, Hellenic, and medieval Christian religio-cultural sensibility of the agency of the Great Chain of Beings, which includes the Divine origin of all things emanating divine forces or spirits; angels; humans; and all other creatures, including Gaia/Earth, and the scientific theory of Gaia/Earth as a living system or network of agencies' (43 – 44).

If there is an over-riding theme that came through to me, it is Northcott's intense dislike of global governmental bodies and industrial organisations, and top-down governance which he perceives as using issues such as the Covid-19 'pandemic' [his quotation marks] and climate change, and indeed science itself as excuses for ever-increasing social control and profiteering. This polemic seriously detracts from his main arguments. Northcott also continually complains throughout the book about scientism. Now I agree with him that scientism (the view that everything can be explained ultimately without the need for any supernatural agency), is indeed a kind of new atheistic religion. But science itself doesn't need to, and indeed should not carry that baggage. When the Royal Society, the world's first scientific institution was started, the founders explicitly stated in their 1663 charter that their 'studies are to be applied to further promoting by the authority of experiments the sciences of natural things and of useful arts, to the glory of God the Creator, and the advantage of the human race'. For many of the early Fellows of the Royal Society, and indeed for many scientists today, this dual aim of giving glory to God by using scientific insights for the good of humankind fitted exactly with their religious and ethical perspective of the world. I sought in vain for any mention in Northcott's book of the benefits that science has brought to humankind – such as the fact that smallpox has been eradicated from the world after having killed an estimated 300 million people in the twentieth century alone, or the medical benefits that give us healthier and longer lives, to name but two.

Many readers will be surprised by Northcott's certainty that SARS-Cov-2 is 'a chimeric virus unleashed on the world from a bio-weapons laboratory in Wuhan, the development of which was funded by a globalist partnership between US development and scientific research agencies and Chinese Communist research funding agencies' (89). He goes on to claim that 'The globally interlinked and highly invasive restrictions on normal human life and social interactions which followed in almost every nation revealed a novel level of global political

and technological coordination' (90). Though it remains a possibility amongst several others that the virus escaped from a laboratory in Wuhan, a more commonly accepted explanation for the presence of this virus in humans, as for others previously, is that it jumped via an intermediary animal from a bat population due to the encroachment of humans on the living space of wild animals, and the forced proximity of wild animals in the unsanitary conditions of a meat market in Wuhan or elsewhere. Surely these latter explanations would fit equally well with Northcott's concern about the deleterious role of humans on the natural environment without descending into conspiracy theories. Northcott goes on to claim that the mRNA vaccines developed to counter Covid-19 were driven largely by the profit motive of large pharmaceutical companies, providing 'a financial bonanza of trillions of dollars' , and that the vaccines 'have an exceptional record of injury, including death' (140). This despite carefully peer-reviewed research in the Lancet and elsewhere that these vaccines saved an estimated 20 million lives in just the first year of vaccination.

Likewise, readers might be astonished that Northcott agrees with a 2014 statement by Lovelock that since 2000 'global average surface and atmospheric temperature has hardly warmed at all' (231). This is hardly a tenable view in light of data that show global temperature records being broken on an almost annual basis, with 2023 likely to be the hottest on record since humans have trod this Earth. He ignores the painstaking work of many tens of thousands of scientists worldwide when he asserts that there is not sufficient evidence to claim that climate change 'is principally caused by greenhouse gas emissions from humans and their animals' (247). He decries 'climate change alarmism' (231), and the 'global false alarm of climate change' (231). That would be small comfort to the relatives of the estimated hundreds of thousands of people already dying annually from the effects of overbearing hot weather, or climate driven extreme weather events such as floods and droughts – all of which affect the poor and disadvantaged most.

If we can get past the distractions of Northcott's minority (and dare I say it, unscientific) views discussed above, what about his main suggestions concerning, as he puts it, that 'The main "takeaway" of this book for environmental concern is that humans are not alone in their efforts to restore the Earth from the ecological damage industrial activities have inflicted'. His view is that 'contemporary humans need to recover a sensibility for, and revive the capacities of, all Beings – the Earth, mammals, fishes, plants and soils, and the divine Life force working through them – to restore the Earth to the state of species abundance which filled most of the Earth's surface until the colonial and industrial eras' (3). In his final chapter he puts forward three 'sacred postulates that moderns should adopt and for which they might construct rituals of care in every human community and habitat' (247). These are, first, water-catchment governance, including 'revivals of traditional water-blessing ceremonies by the leaders of local religious traditions' (257). Second, soil conservation and the suggestion that 'churches and temples have a responsibility to revive the now mostly forgotten ceremonies of blessing of the soils, food, and farming' (259). And the third and final 'ultimate sacred postulate' is species diversity. Contrary to the views of most people concerned to reduce the impacts on greenhouse gas production of huge numbers of domesticated animals, Northcott advocates 'a huge increase in the numbers of carefully managed domesticated animals, and reintroduced wild animals, on lands that are at risk of desertification' (260). He wants religious traditions to revive 'the co-agency of all species, and all Beings, including Mother

Earth or Gaia, in recomposing Earthly habitats' because 'Gaia urgently needs to replenish and revive her innate living powers of planetary healing' (261, final sentence of book).

I agree with Northcott that we have lost much indigenous knowledge stemming from a time when people lived in rural communities that were much closer to the earth than do most people today. But I have my doubts as to whether these three postulates are sufficient to provide a good quality of life to Earth's population of over 8 billion and rising, especially when more than half of them live in cities rather than rural settings. But maybe it's a start.

**Robert White, FRS is Emeritus Director of The Faraday Institute for Science and Religion and Emeritus Professor of Geophysics at Cambridge University.**

## Joseph Vukov

***Navigating Faith and Science***

Grand Rapids, Michigan: B. Erdmans Publishing, 2022. 179 pp. pb £16. ISBN 9780802879615

Joseph Vukov is Assistant Professor of Philosophy and Graduate Program Director in the Philosophy Department of the University of Chicago. This book presents a fresh, novel and well-argued view of the relative merits of the Conflict Model, the Independence Model and the Dialogue Model as descriptors of the relationship between science and faith. Although the author agrees with the majority of the SCB readership that the Dialogue Model is to be preferred as the best descriptor of the ideal relationship, the originality of this book is the proposal that in the context of the limited knowledge of humans, each of the three models can be thought of as imperfect tools which could in turn be "right for the job", according to their relevance to the given situation.

The author starts out by confirming the view that as science and religion are both endeavours aimed at discovering an accurate and holistic nature of reality, that ultimately there can be no conflict between the scientific and religious findings. He asks the reader to imagine an angelic being who can see the whole of physical and spiritual reality and sees how the two relate to each other. Vukov uses the two phrases "truth is one" and "truth unites; it does not divide" to reference this idea as his argument proceeds.

The author argues then that by contrast, there is a disjoint between our human lived experience of the relationship between the spiritual and the scientific ("is"), and what the ideal relationship should be ("ought"). He then argues that it is helpful to acknowledge the lived experience of conflict (or of independence) between our science and our faith, as this then means that the experience of conflict or independence can be "navigated" – discussed and analysed -- rather than denied from the outset. He also suggests that in many cases, in a limited context, the common experience of conflict or independence might in fact be the most appropriate approach, unless the goal is to then reflect and attain a deeper understanding.

The author argues next that this discrepancy between *is* and *ought*, arises because of our limited human understanding, and therefore to navigate this successfully, we absolutely need intellectual humility, as this then paves the way to considering the merits of other models and how one might approach an integration between science and faith. He defines intellectual humility as a clear-sighted awareness of both the extent of and the limitations of a person's knowledge and understanding.

Each of the three models (Conflict, Independence and Dialogue) is then examined in turn, and scenarios given where

the common experience is either conflict or independence. Vukov suggests that even the Dialogue Model sometimes has the weakness of elevating dialogue for its own sake above the endeavour of discovering truth. He calls this the "kumbaya" effect, and suggests this can suppress robust argument in cases where there is a misunderstanding which needs to be identified.

The style is fresh and fluent, although requiring focus due to the progression of the argument. The author uses scenarios taken from famous paintings as well as science, notably using the simile of a painting that has one impression when viewed up close up, and a different and more inspiring message when viewed from afar. The most memorable image is that of Icarus fallen, where the "fall from pride" is not even noticed in the wider picture. Vukov's engaging discourse, by focusing only on the task at hand of navigating the real world and using imperfect tools to acknowledge our limited experiences, neatly sidesteps the whole issue of pride and hubris. Instead, the reader is invited to pick up the tools and have a go themselves in the final section of suggested discussion questions.

The book is suitable for the general reader, and is also sufficiently academically robust and theologically orthodox to be of help both to students of the philosophy of science and potential authors for SCB.

**Dr Christina Biggs is a Daphne Jackson Research Fellow at the Energy Safety Research Institute, Swansea University, working on green hydrogen, and a former local group leader for CiS Bristol.**

## Peter N. Jordan

***Naturalism in the Christian Imagination: Providence and Causality in Early Modern England***

Cambridge: Cambridge University Press, 2022. 218 pp. hb £69.78. ISBN 9781009211987

The breadth of theological opinions in seventeenth-century England is notorious. The Civil War allowed previously marginalised voices a chance to be heard while the relative toleration of the Restoration meant that the borders of orthodoxy were porous. In the book under review, Peter Jordan has examined one important concern of writers on divinity during this period: the question of providence or, how God provides that the world does what He wants it to do.

Part 1 of the book, Setting the Scene, is an excellent summary of the ways that God was thought to interact with nature. Peter Jordan presents a clear taxonomy of avenues through which the subject could be approached by Christians. Methodological naturalists leave their religious beliefs at the laboratory door, regardless of their commitments outside it. This is the usual position of religious scientists today. By contrast, providential naturalists recognise God's government of the world when they consider the workings of nature. Jordan defines 'providential full naturalists' as those who claim that He acts only through natural causation. 'Providential partial naturalists' accept that, while natural causes are the dominant mechanism in the world, God does sometimes intervene, either by causing miracles or directing the outcome of natural events. Jordan also touches briefly on 'occasionalism', the doctrine that God steers the world moment by moment, although this idea receives little attention here.

There was clearly a spectrum of early-modern providential partial naturalists, and much of Jordan's book is made up of following the debates between them through books they wrote. The first topic covered is the extent God controls the outcome of lotteries and games. Many

people have issued a little prayer before rolling a dice, and providentialists would certainly maintain that God could affect which number comes up, if He desired it. One moral objection to games of chance in the early-modern period was that God Himself was being pulled into the lists, either because players believed He was influencing the result or because He actually was.

Thomas Gataker, a Rotherhithe vicar, disagreed. He saw dice as subject to natural causes and essentially random. James Balmford, a rector from Southwark, took the more traditional view that God could be directly involved in apparently random events. That said, their disagreement was not as great as might be imagined. Both men accepted that God might intervene directly if he wished, and both agreed that natural causes, even when they operated without direct divine intervention, required God's concurrence.

Other writers extended the debate. John Spencer of Corpus Christi, Cambridge challenged the idea that God communicated through apparent prodigies (from earthquakes to fountains running with blood) and other unusual events. Spencer also asked what He was supposed to mean by them if He was causing them to appear. Atomism and cosmology were other topics that brought to light similar issues. Thomas Burnet, for instance, went so far as to explain the deluge in Genesis according to natural causes. The question in all these cases was to what extent God's purposes were brought about by natural causes rather than through supernatural agency.

None of these writers were asserting that God was not the ultimate cause of what happened on earth or that events could run contrary to his purposes. However, the overall effect of the enquiries that Peter Jordan considers in this book must surely be to reduce God's immediate interactions with the world. Deism seems the next logical step, as indeed it was.

The main drawback of this book is that it wears the imprint of the PhD thesis upon which it is based rather too clearly. It's arranged as an introduction, followed by four independent chapters of research and then a conclusion. Each chapter is the fruit of a close reading of relevant early modern texts, but these chapters run on too long for a reader interested in seventeenth century science and religion in general rather than the debate on providentialism in particular. The conclusion of the book is especially disappointing because it reads more like a summary than the punchline of an argument. The book ends by noting that providential naturalists attributed events to natural causes even when they couldn't say what those causes actually were. This sounds like an important part of the history of methodological naturalism, but the idea remains undeveloped.

Overall, the clarity of Part 1 is well worth the time of anyone concerned about early-modern English science or religion. There is certainly material in the rest of the book to furnish informative articles that could further advance our understanding of these subjects. Unfortunately, a monograph was not the best format to present this.

**James Hannam is the author of The Globe: How the Earth Became Round (Reaktion, 2023)**

## Neil Laing

***Is God Really Legit? Making sense of faith and science***

Watford: Instant Apostle, 2018, 160 pp. pb £8.99. ISBN 9781909728837

*Is God Really Legit?* is an informed, easy-to-read, address of science and faith topics aimed at teenagers. However, the book will benefit anyone who prefers

non-academic writing and appreciates colloquialisms. The author, Neil Laing, a secondary school science and IT teacher in the UK, tells 'The Author's Story' in a meaningful preliminary element, which includes his Christian testimony. Although not at the same time, Laing and Richard Dawkins, attended the same Zimbabwean primary school. I appreciate the author's humble approach: 'As far as I am concerned, as long as anyone has genuine biblical and scientific evidence to support what they believe, I respect their view, whether or not I agree with them. I really will be amazed if I find I am completely right' (63).

Most of the fifteen short chapters address a 'big question'. These chapters include: 'What is atheism?'; 'Can we trust the Bible?'; 'Doesn't evolution disprove creation?'; 'Surely seeing is believing – and I can't see Him?'; 'Is there any proof of God?'; and 'Why would a good God allow suffering?'. Additional questions throughout keep readers thinking and guide them towards making an informed decision on the relationship between science and religious faith. One such question is 'Would Adam and Eve have been created as adults or as new-born babies? Either way, what would this imply?' The topic of Christian faith is of inevitable relevance to the topic of the book and is specifically treated in chapters such as: 'What is faith really about?' and 'Faith in action'. The back matter in the book includes sections on 'Famous scientists who are Christians' and the 'Top ten questions asked by teenagers' from a research conducted by 'God and the Big Bang' (https://gatbb.co.uk/). Laing responds to each question in a brief paragraph, most of which have been dealt with more fully within the book chapters.

Laing makes the important point that the main message of the Bible is not to explain scientific mechanisms, but rather the Bible is God's communication with us (41). Furthermore, both the Bible and science look at people, the world and life, from different angles. Thus, non-scientific, including biblical, explanations of a concept or phenomenon, can still be true; they are just from another perspective. For example, a rainbow can be described scientifically in terms of light being refracted by raindrops; aesthetically a rainbow can be described as beautiful; and from the Bible it can be said that it reveals the glory of God (Ezek. 1:28). Each of these descriptions can be regarded as true and complement each other. Laing made some valuable connections between the evolution of the universe and the Bible. One example is God created and 'stretched out' the heavens (e.g., Jer. 10:12), which connects to evolution's expanding universe. Another example is 'The earth was without form and void, …' (Gen. 1:2), which connects to the theory that the earth was formless during the process of being formed from gases orbiting the sun which then cooled to form liquid then solid. I appreciated the conjecture on God creating humans (58-60): 'God took creatures which were highly intelligent animals and breathed into them the breath of life so that they become living souls' (Gen. 2:7). In other words, God made humans spiritual, having the 'ability to know God'. I thought the last chapter on suffering is a commendable address of a very difficult topic within a short chapter. Laing tells moving stories from personal experience. He rightly includes a central idea to this topic that 'God gave us free will' and we are not programmed robots. Also, Laing admits that the topic of suffering would be increasingly difficult for the person who does not leave room for God in their understanding and only views it from a human perspective.

Despite this selection of positive points, I have a couple of minor criticisms. In reading the first eleven chapters it could easily be misunderstood that Christian faith is purely human effort. Even though we are told later that faith

is initiated by God (111) it may have been an idea to make the different aspects of Christian faith clear earlier in the book. The other is with the chapter on 'Faith in Action', which is predominantly about miraculous healings and miraculous provision, usually as a result of prayer. It would have been beneficial to give an appropriate amount of space to the more ordinary ways of demonstrating faith in action. Living as a radical Christian disciple in the mundane and with Christian relevance in the community may be the primary example.

I commend this book to young and old alike, and not just the Christian.

**Malcolm S. Buchanan is a Secondary school science teacher in Brisbane, has a doctorate in chemistry, and his interests include the relationship between science and religious faith.**

## Marjorie Lindner Gunnoe

***The Person in Psychology and Christianity: A Faith Based Critique of Five Theories of Social Development***

Illinois: InterVarsity Press, 2022. 247 pp. pb £20.69. ISBN 9780830828722

Marjorie Gunnoe seeks 'compatibility' between her biblically guided, Christian depiction of an embodied, purposeful, moral, accountable person made in the image of God, and the C20th developmental psychology theories of Eric Erikson, John Bowlby, B.F. Skinner, Albert Bandura, and Evolutionary Psychology (EP). Systematically and carefully reading their work through the grid of this anthropology, she firmly and unequivocally rejects those parts that her scripturally based approach rules out. Positive features include the well-structured chapters and subsequent consistent and thoughtful application of her schema. I liked the informative biographies of each thinker as well. They not only add colour, but also illuminate the theological and psychological influences on and motivations of her theorists. Gunnoe diplomatically steers a sensible course through the US culture wars too when discussing sexuality and gender, avoiding the excesses of some contemporary misunderstandings.

But whose Christianity, which psychology are in play throughout the book? It transpires that a modern protestant faith variant is being used to adjudicate the overall *theological* acceptability of what tends to be presented simply, and maybe a little uncritically at times, as a modernist discipline. Biblical 'facts' deployed to sift scientific facts from scientistic factoids we might say. How convincing this rather positivist encounter proves depends partly on one's place in the Christian family; denominational positioning does matter in these debates I'm afraid. One's stance on faith and reason's relationship is particularly crucial, as is confidence in whether Gunnoe's filtering strategy is practicable in the long term, (an obvious alternative being a more nuanced *dialogue* between two rational traditions, theology and psychological science, mediated by and through philosophy).

I wondered how others might respond to the outright rejection of uncomfortable aspects of psychology on biblical authority alone, such as developmental psychology's ignoring the *imago Dei* or any notion of ultimate purpose. A reading such as Gunnoe's rules out their acceptance definitively and unequivocally. But on what shared, reasonable grounds will this approach be accepted, or even treated as remotely credible by those sceptical of biblical inerrancy claims, especially if made by some flavours of evangelicalism? How might one use Gunnoe's method to educate an afflicted tradition, psychology in this case, of the identity of and cure for its epistemic fallacies in a language it might come to understand and accept? If the answer is 'one can't'

there remains only rhetorical posturing for the many outside what is arguably a narrow, confessional fold, with preaching to the choir for those within. This inevitably restricts the reach and readership of this book, foreclosing its usefulness as part of any wider apologetic or intellectual endeavour.

To be fair to Gunnoe, the target audience is not meant to be so wide. As intended, her book may well prove to be a necessary, useful, and crucial text for many a US Christian College fresher or sophomore or similar at a particular stage in *their* maturation and development. For those formed by fundamentalist, religious outlooks, or who need urgent assistance with their arrested or compartmentalised religious and intellectual formation, this monograph probably will refresh the parts that a free church, Biblicist background cannot reach. It will engender a healthy respect for certain scientific as well as religious routes to truth, and it can only encourage a compassionate understanding of the socio-political implications of the interpersonal and relational, whether theological or psychological. It will act as a partial prophylactic against contemporary travesties of faithful truth-seeking that eschew all commerce with secular understanding of the person. For all this it deserves a cautious welcome and recommendation. But it will most likely prove a curious read, with a somewhat dated feel, for anyone in the longer and broader Christian (especially catholic or orthodox) tradition, particularly those educated in both psychology and theology, and who are comfortable with both Athens and Jerusalem and their complex philosophical and theological connections.

Derek Mahon, the late Irish poet, wryly described himself as a 'recovering protestant'; the author of *The Person in Psychology and Christianity*, describes herself as both 'Reformed and reforming'. In Mahon's case the radically fallen, objectified, dead world characteristic of some strands of Northern Irish Christianity and post Newtonian science, became meaning-infused as his poetry teetered on the brink of the transcendent and a participatory ontology. Gunnoe, still largely in sympathy with the radical reformers, is keen to counteract unduly negative views of the person associated with certain strands of the Calvinist tradition. So far so welcome. Behind both, however, often lurk the spectres of other common, modern, but potentially unhelpful dualisms including the nature-culture, faith-reason, and subject-object splits. In his mature years, these receded in the rear-view mirror for Mahon, while some might wish for similar distancing here. This, I suspect, will be needed for similar engagements with psychology to be more widely accessible in future.

**Peter Hampson is Emeritus Professor of Psychology, UWE, Bristol and SCR Member of Blackfriars Hall, Oxford with interests in moral psychology, theology and psychology, and theology and culture.**

## Timothy M. Mosteller (ed.)

***Four Views on Christian Metaphysics***

Eugene, Oregon: Cascade Books 2022; 142pp. pb £20.25. ISBN 9781725273306

Human wisdom gets a rather bad press in the New Testament (e.g., Matthew 11: 25-26). However, the New Testament is not totally against wisdom but states it is found in a place few intellectuals think to look, namely the person of Christ crucified (Colossians 2: 3, 1 Corinthians 1: 22).

Judged against this gospel, how does the book under review measure up? Before answering this question, we need to describe the book. It consists of four chapters written by four different men each seeking to persuade the reader that

their chosen metaphysic should be *the* Christian philosophy. These four are (in the order considered) Platonism, Aristotelianism, Idealism, and Postmodernism. All the authors were required to finish their chapter by considering how their metaphysic handles the resurrection. After each author has made their case, the other three critique the arguments advanced. The author of each chapter then responds to their criticisms.

The four metaphysics may be summarised as follows: (i) Platonists hold that there are two parts to reality, physical and non-physical, the non-physical realm being where universals (such as redness) reside; (ii) Aristotelians hold that universals do not exist if there are no examples of them in the physical world (e.g. 'redness' would not exist if there are no red things); (iii) Idealists hold that there is only one kind of substance, not two, and that in order for something to exist someone (usually God) has to perceive it; (iv) Postmodernists reject the concept that metaphysics is an analysis of a reality 'out there' but rather is an interpretive task in which universals are simply names we agree upon in our use of language.

The question may be asked why Mosteller chose this four metaphysics? The reason he gives in his introduction is that they are the most prominent among Christians today.

Up until the chapter on Postmodernism, the debate was conducted in a gentlemanly manner. The debate then got heated with the Aristotelian attacking Postmodernism thus: 'For all its effort to study the meanings of words, it does more to obscure them' and 'Subjectivist language obscures the truth'. 'If [Postmodernism] is not concerned with metaphysical questions, then I will stick with systems that provide answers.' The Idealist finishes his critique of Postmodernism by stating: 'So is a truly Christian postmodern perspective actually just an excuse to avoid doing serious metaphysics? From where I stand, that would appear to be the case'. In his response to the other three authors, the Postmodernist points out that none of the four metaphysics being considered should be considered to be Christian. 'All four systems include, or may include, beliefs that do not line up with the teachings of Scripture, or that flat out contradict it'.

What is most helpful about this book? In my opinion it is that you will find here an accessible summary of the main differences between universals in Plato and Aristotle.

Reading this book will not make you great in the kingdom of heaven. For according to Jesus in the Sermon on the Mount, that privilege belongs to '*…whoever does [the commandments] and teaches them…*' (Matthew 5: 19) and, more amazingly and unexpectedly, children (Matthew 18: 1-4 and Mark 10: 13-16). Nevertheless, if you have a God-given gift of intellect, reading this book may make you more useful to both Christians and non-Christians, so long as after you have read it you remain able to make a simple and straightforward gospel presentation (Acts 16: 30-31) '*Then [the Philippian jailer] brought [Paul and Silas] out and said, "Sirs, what must I do to be saved?*". And they said, "*Believe in the Lord Jesus, and you will be saved, you and your household*"'.

**Stephen Walley is a retired research physicist associated with the Cavendish Laboratory, University of Cambridge**

## John C. Lennox

***Cosmic Chemistry: Do God and Science Mix?***

Lion Books, 2021. 400 pp. pb £25. ISBN 9780745981406

John Lennox will be well-known to many

readers of S&CB. He is a brilliant Christian apologist and has successfully debated new atheists such as Richard Dawkins and Peter Atkins. His books *Gunning for God and Can Science Explain Everything?* are widely read and greatly appreciated. He is rightly held in high regard as a Christian speaker and debater, with immense knowledge, charm and clarity. As this book is written by someone who is so highly regarded, it is natural to assume this new publication will be another masterpiece. However, we need to think carefully and critically about the contents of this book, for in my opinion it contains some flaws and incorrect or inappropriate arguments concerning evolution. Lennox is a mathematician and philosopher; this book is about biology and chemistry.

The first chapters engagingly cover familiar territory and criticise the 'nothing-buttery' of scientism. Claims that science might be able to explain everything are convincingly refuted, as in Lennox's previous books. Arguments for the existence of God based on fine tuning and the origin of the universe (why there is something rather than nothing) are clearly presented. However, most of the book is an extended argument for 'design' in biology. By this he means much more than seeing the Creator's hand in everything. Instead, this is a defence of Intelligent Design (ID) and is a critique of the adequacy of the standard model of evolution. He is not denying that things evolve, and he is very clear that he is not invoking young earth creationism, but he is highly critical of the modern evolutionary synthesis, known as Neo-Darwinism.

Lennox is careful to explain the difference between evolution and the origin of life (abiogenesis), which are very different areas of study. There are indeed very few convincing arguments for how living organisms might have arisen from non-living material (though there are plenty of speculations), yet many of Lennox's arguments concern the latter, especially questions about the origin of information in DNA and where that might come from. There is no mention of the RNA world, and nothing on endosymbiosis, let alone the difference between prokaryotes, archaea and eukaryotes. Lateral gene transfer and convergent evolution are other aspects that are not mentioned. Lennox invokes the role of a 'designer' to explain the complexity, which he claims cannot be explained by evolution.

The author claims that he is not proposing a God-of-the-gaps, but yet seems to invoke a 'designer of the gaps' to account for the complexity of the biological world. At whatever level biology is studied it is complex, whether at the level of DNA sequences, protein structure, cell biology or developmental biology. Biologists take this for granted and stand in awe of the amazing complexity of all life. There is nothing in the cell that isn't amazingly complicated! However, we no more need to invoke anything miraculous to explain evolution than we do to explain the development of baby from a single fertilised cell. He cites the bacterial flagellum as an example of irreducible complexity; though the main proponents of ID have moved on from this example, for which plausible evolutionary models have been proposed. He even claims that 'science is uncovering the design, but not simultaneously revealing any convincing natural processes to account for it' (162). In other contexts, he ignores the facts that we have learned about retroviral insertions, which convincingly demonstrate the evolutionary relationship between different species. His argument that genetic relationship is only a 'relatedness of the gaps' (256) makes no sense, as too is the claim that reverse transcription weakens the role of the genome in inherited characteristics (269). All this ignores the designer's role in the rest of biology, which has not been 'designed' in the same way. This is rather different to the usual Christian understanding of the

creator God who is intimately involved in every aspect of creation.

Lennox proposes his own definition of 'science' so that it can include unrepeatable divine activity, and so stands against the legal ruling of the Dover court case, which concluded that ID is not science and that ID 'violates the ground rules of science by invoking supernatural causation'. He sets up a false dichotomy between 'atheistic' evolution and philosophical naturalism making the implicit assumption that evolution is necessarily atheistic. Of course, Christians will be wary of strict naturalism, as nothing exists without God's involvement, but that does not mean that evolutionary mechanisms are necessarily atheistic.

In several places (too many to list here) Lennox's arguments are in error, or are exaggerations. His statements about the evolution of the peppered moth are simply wrong; the molecular basis for this small change in phenotype, leading to a change in population, have even been mapped to the level of a single DNA transposition. Natural selection is not only about competition for limited resources between the strong and weak, but about reproductive fitness.

There are many quotes from Dennis Noble and Thomas Nagel (neither of whom are theists, though both have criticised the standard evolutionary model) and he makes great play of the Royal Society discussion meeting on 'New trends in evolutionary biology: biological, philosophical and social science perspectives' which was held in 2016. That one called for 'revision of the standard theory of evolution, although the issues involved remain hotly contested'. His book doesn't explicitly mention the Extended Evolutionary Synthesis (EES) which addresses some of the 'top-down' questions that were posed, but which 'does not replace traditional thinking, but rather can be deployed alongside it to stimulate research in evolutionary biology'.

Lennox invokes arguments from information theory and makes the classic error of arguing as if proteins or long stretches of DNA assembled in a single step, purely by chance (like assembling a Boeing 747 from a scrapyard). But that is not what evolution is claiming; rather that the various stages occurred incrementally, and that successful ones were preserved, allowing for further improvement. Nothing started in the optimised state in which we find biology today.

He mentions systems biology and invokes 'jumping genes' (transposons) and epigenetics as if these give evidence for interference by the designer. These do indeed give added complexity to the mechanisms of evolution, and call for some new approaches, but they are very far from claiming that evolution is a theory in crisis, as Lennox seems to suggest. Epigenetics gives added levels of complexity for development and control, which are inherited in a non-Darwinian fashion, but these do not go any way to producing any new information or refuting the main mechanisms of evolution. He invokes 'systems biology' as if this helps his case, without explaining how. This is merely an aspect of biomedical research which tries to understand things at the level of cells/tissues/organisms by putting the pieces together, in contrast to reductionist approaches, which take things apart.

Many readers of S&CB will see this as a well-meaning departure from Christian understanding of God's role in Creation. In the biblical view God is much more than a divine tinkerer who occasionally steps in to overrule natural processes. He gives no hint of how the 'designer' went about his business – by miracles that defying the known laws of science, or maybe by individual new acts of creation or by loading the dice to enable the less likely? Arguments from quantum uncertainty (occurring at the subatomic level),

generally don't work at the molecular, or higher, levels of biology

This is not such an easy read as Lennox's previous work, and it necessarily contains far more technical terms. Read it for yourself and reach your own conclusions, but beware – this does not represent mainstream biological science. The subtitle of the book is 'Do God and Science Mix?' Lennox's conclusion is yes (and I wholeheartedly agree), but he claims this while denying much of contemporary evolutionary science. This can only cause confusion.

**Keith Fox is Editor of Science & Christian Belief, Emeritus Professor of Biochemistry in the University of Southampton and former Director of the Faraday Institute for Science and Religion in Cambridge.**

## Graeme Finlay

***God's Gift of Science: Theological presuppositions underlying exploration of the natural world***

Eugene, Oregon: Cascade Books, 2022. 143 + xii pp. pb £19. ISBN 9781666748062

Graeme Finlay works in the field of cancer research and scientific pathology. *God's Gift of Science* is perhaps best read as a series of reflections on the ways in which science and the Christian faith, which are so often presented as inimical to one another, do not need to be seen in this way but might rather offer jointly visions which address the malaises of contemporary Western society.

Finlay sets out his ideas in six chapters. The first covers the nature of science: Finlay here maintains both that 'science cannot justify its own existence' (14), and that, historically speaking, 'The human enterprise of science rests on the bedrock of biblical faith' (19). The second is a reflection on the idea of creation and the understanding of God as creator that emerges in the Judaeo-Christian tradition. The third, similarly, is a reflection on the nature of humanity: here Finlay ponders *inter alia* issues around biblical hermeneutics and critical realism. These opening chapters have a rather piecemeal feel: they quote extensively from other authors, and it is hard to discern what is being added to these sources.

Things pick up with the fourth chapter, which discusses 'threats to science' in the contemporary world. Finlay sees these as coming from the use of technology to support vested power interests, postmodern thinking with its critiques of science as a tool of Western imperialism (Finlay suggests that '[w]hen people speak (disapprovingly) of European *science*, they probably mean European *ideologies* that are often dressed up as science' (60, italics in original), and the attacks made on scientific findings by powerful lobbying groups such as those associated with the tobacco and fossil fuel industries. In a 'post-truth' society, Finlay urges, 'the remedy is not to place our hope in science, but to return to the God upon whose truth science is most securely founded' (68).

A fifth chapter looks at the way in which both scientific and theological findings can generate surprise in those investigating these areas, whilst the sixth chapter explores issues of sustainability and justice from scientific and theological standpoints. Here Finlay draws on the work of economist Bill Rees and theologian Michael Northcott to offer a penetrating analysis of the current ecological crisis, an explanation of it in terms of the models of humans and the environment provided by Enlightenment thinking, and an alternative rooted in the Christian Gospel. Finlay concludes that '[Jesus's] call for justice in place of acquisitive living supplants consumerism. To adopt Jesus's paradigm is to gain inner motivation to live sustainably and justly' (115).

Finlay frequently refers to 'biblical faith', which he understands as 'a commitment to a way of living that is based on the biblical narrative – especially the story of Jesus' (49), but he is no naïve biblical literalist, commenting of the creation narrative that 'evolution … has compelling evidential support, ... and that the biblical concept of creation must encompass every conceivable natural process' (67).

There can sometimes be a clashing of the gears on moving between theological topics (discussions of which are often heavily indebted to a handful of scholars such as Tom Wright, and regarding which Finlay's position tends to the conservative) and some of the scientific material, of which Finlay's handling is rather more assured. Many of the topics discussed here have been extensively covered elsewhere, but Finlay's final chapter – comprising a third of the entire book – is both challenging and timely, and the arguments presented here deserve to be widely heard.

**Michael Fuller is a Lecturer at New College, University of Edinburgh: he is also a Fellow of ISSR, and Vice-President for Publications of ESSSAT.**

## Cees Dekker, Corien Oranje, and Gijsbert van den Brink

***Dawn. A Proton's Tale of All That Came to Be***

Downers Grove, Illinois: IVP Academic, 2021. 295 pp. pb £14.63. ISBN 9781514005668

This book is the English translation of a book published in the Netherlands in 2020. It is jointly authored by a professor of nanobiology and biophysics, a novelist and theologian, and a professor in theology and science. The book provides a narrative that combines the scientific story of creation with the story of God's redemptive involvement in human history and in His creation. The story is told from the perspective of Proton, a proton who witnesses the origin and evolution of the universe, the origin and evolution of life on Earth, the origin of human beings, and the birth and life of Jesus and the beginnings of the Christian church.

The story is told in 24 short chapters. Chapters 1 to 7 cover the history of the universe and the history of life on Earth in accordance with our current scientific understandings. Proton is formed in the Big Bang, becomes part of a helium nucleus, ends up inside a star, and through nuclear fusion becomes part of a carbon atom. The star becomes a supernova, the carbon atom is ejected into space, becomes part of a dust particle, and ends up in the water on Earth. Proton, as part of the carbon atom, then becomes part of a variety of living organisms and witnesses key events in the evolution of life on Earth.

The story then moves towards the history of mankind and God's involvement in this, covered in chapters 8 to 22. This part of the book covers the essentials of the biblical narrative. As part of the carbon atom Proton ends up in a bamboo cane, and meets the first humans. As time progresses Proton meets a number of biblical characters including Abraham, Josua and David, and witnesses key events in the birth, life and death of Jesus. Chapter 22 ends with the beginnings of the Christian church and the discussion of God's plans by the apostle John with his friend Gaius.

In chapter 23 Proton is in a space station and follows the discussions about God amongst the five astronauts on board. These discussions reflect the current discussions in religion and science. Proton and his friends (the other protons and neutrons in the carbon atom) end up on the gloves of one of the astronauts, and during a spacewalk find themselves back in interstellar space after billions

of years. In chapter 24, as Proton and his friends drift further and further away from Earth, they recap the six eras that they have experienced: The Big Bang and the first moments after that, the formation of stars and galaxies, the origin and evolution of life, the emergence of human beings, the coming of Jesus, and the coming of Breath (the Holy Spirit). And they discuss God's promise of a future seventh era: the return of Jesus. The book ends with an epilogue in which the authors summarise a number of the discussions they have had in the writing of the book, and a set of discussion questions.

This is a delightful and inspiring book that is easy to read, and a scientific background is not needed to appreciate it. In simple and engaging language, the narrative covers the essentials of the Gospel. The synopsis of the history of the universe and evolution of life on Earth is true to current scientific understandings. In this way the authors effectively endorse the relevance and harmony of the two books of God's works: the book of the Bible, and the book of Nature.

The choice by the authors of a proton as the narrator of the story is a very clever one. In the ongoing recycling of atoms and molecules in nature, Proton as part of the carbon atom becomes part of a variety of objects and creatures. These include different plants and animals, the sheep skin of Abraham's tent, one of the strings of David's harp, and Jesus' walking stick. This enables the authors to make Proton and his friends witnesses of all the key historical events.

In many parts of the book, Proton and his friends discuss the events they witness, in particular in relation to God's plans for the redemption of mankind. They voice excitement, concerns, misunderstandings and doubts, and in this way, they draw the reader into the story and induce the reader to think for him- or herself about the relevance of these events. This book is highly recommended, a must-read for both Christians and non-Christians alike.

**Peter J. M. van der Burgt is emeritus associate professor in the Department of Experimental Physics at the National University of Ireland Maynooth.**

## Terryl & Nathaniel Givens

***Into the Headwinds: Why Belief Has Always Been Hard—and Still Is***

Grand Rapids: William B. Eerdmans, 2022. 132 pp. hb £15.99. ISBN 9780802882431

The Givens ask two questions in this book: What are the challenges to faith? Are they particular to this modern moment? Here, 'faith' is defined as loyalty—maintaining religious commitment (e.g., beliefs) beyond being easy or costless (vii). Briefly, their answers are: The challenges to faith do not come from specific 'truths' of secularism but are rooted in the limited, biased, and fallible operations of our mind; these challenges are not particularly modern—hence 'why belief has always been hard'.

The title of the introduction, *Secularism Is Not the Problem*, is quite telling. Here, the Givens debunk the secularization hypothesis (myth of scientific enlightenment), which says life was hard in the dark times before the Age of Reason; religion fed on the people's ignorance and fear, offering tales that made life tolerable; science, however, exposed the folly of religion and led to great intellectual, moral, and technological progress (2-4). According to the authors, this theory is implausible for many reasons, such as that Christianity did not make life easy; it instead required countercultural aspirations and demanded costly material, social, and ideological sacrifices (9).

But if the secularization hypothesis is wrong, why has religion declined? The Givens argue for the counter-intuitive:

because the choice to believe has become too easy (9). The secular age is not one of disbelief per se, but one of casual belief or domesticated religion—religious affiliation mistaken for genuine conversion. While authentic faith has always been costly, we expect from our affiliation the comforting tales: 'a map of meaning… minimum tension with prevailing social norms… escape from cognitive dissonance, uncertainty, risk, and vulnerability' (12). Consequently, substitutes of faith readily emerge on the market which offer exactly what we want but with fewer personal costs. They are rationalism and scientism; they pose challenges to faith not because secularism is right, but because our religion has gone wrong (11).

Next, the Givens argue that rationalism and scientism are false. Their refutation of rationalism is based on the recent findings of psychology and neurology which support intuitionism (19). People rarely make highly rational decisions, and our mind offers only after-the-fact rationalization (28); we often do not actually believe what we think we believe, and we are ignorant of our self-inconsistency (41). Their refutation of scientism is based on the real character of science—depending considerably on intuition (58), not directly correlated with technology (64), and quite fallible in finding truth (68).

The authors are telling us that rationalism and scientism cannot deliver what they promise; the kind of certainty, objectivity, self-knowledge, and self-mastery which we want are simply unattainable anywhere. Reality is multi-layered, and our mental faculties are fallible (79). So rather than running away from risk and exposure, we should embrace our limitations as part of ourselves—what real faith has espoused all along. Facing cultural, biological, and psychological headwinds, the way forward is to rethink our faith: it is not a proposition, but a disposition of epistemological openness (80). It is a gesture of trust in our diverse faculties of knowing (intuition, conscience, imagination, etc.), which enrich our apprehension of reality (96, 107). It is a personal response to this reality outside us—God in particular—thus it is relational and volitional, making us vulnerable and holding us responsible (100, 110). Then, knowing that the struggle to believe is largely self-inflicted, we can proceed into the headwinds confidently and prayerfully (117), trusting in our moral and intellectual intuitions and avoiding the stumbling blocks, including over-reliance on reason and science.

The Givens present a valuable insight. However, their finer points are difficult to grasp, as the book is overwhelmingly occupied with introducing and refuting the secularization hypothesis, rationalism, scientism, and other headwinds. The reader's initial impression may be that this is another book lamenting how the champions of secularism misunderstand and abuse reason, science, and faith. If the Givens' message stopped there, we may as well say that secularism is still the problem, thanks to the (debunked) conflict myth, when reason conquered ignorance and science disproved religion. The Givens show that their position is far more nuanced: the problem before us is not what to believe, but whether to trust; there are perennial idols tempting us to withhold trust, avoid exposure, and escape from responsibility. Though the idols change their appearances, running away from faith is nothing new. Alas, the Givens' response to the keystone question—'why is religion apparently difficult in a secular culture'—is very brief, a mere five pages in the introduction.

The Givens can strengthen their case by a greater sensitivity to the diverse meanings of 'secularity'. They quote Charles Taylor but do not engage with Taylor's

work significantly (1). Also, if scientific enlightenment is false and is 'not the problem', how our faith has changed (for the worse) requires further elaboration. Is the Givens' picture of an imperial corruption and institutional domestication of Christianity true? Did the early Christians measure faith with authenticity? Did they even think of religion in terms of conversion? I do not find the answers self-evident. Since the Givens' argument depends on an explication of the nature of faith and an analogy between the modern moment and late antiquity, more evidence from church history is necessary.

**Pu Ji (Preston), a science tutor at Mount Mary University, studies theology at Nashotah House Theological Seminary, both in Wisconsin, USA. Drawing on his previous training in diverse disciplines including chemistry, engineering, philosophy, and theology, he aims to transform the discourse of science and religion into a ministry of the church and establish it as an integral part of Christian education.**

## Carl Mitcham, Jim Grote, and Levi Checketts

***Theology and Technology, Volume 1: Essays in Christian Analysis***

Eugene, OR: Wipf & Stock, 2022. 174 pp. pb £23.00. ISBN 9781666734621

***Theology and Technology, Volume 2: Essays in Christian Exegesis and Historical Theology***

Eugene, OR: Wipf & Stock, 2022. 272 pp. pb £32.00. ISBN 9781666734638

Through the efforts of Levi Checketts and collaborators, these volumes are a republication of Carl Mitcham and Jim Grote's 1984 edited, largely unattended, collection on the relationship between theology and technology. Checketts states that the goal of revisiting this work is to '[expand] the field of philosophy of technology to theology' (I, xiii), emphasizing his use of these essays as a teaching tool for theology students. While the new preface acknowledges potential challenges to this task, such as rightfully noting that the volumes have a serious 'blind spot' for people who are 'not white, cis-gendered, heterosexual Christian males' (I, xviii), there are other issues which may create difficulty for instructors to use these volumes as a teaching tool. Because the rhetorical strategies used by many of the authors do not meet the standards of academic rigor, in 2023 or in 1984, *Theology and Technology* is more of an interesting artifact from a historical research program which went undeveloped, rather than a springboard for new scholarship. However, a handful of exceptions shine through which show the potential for the tradition Checketts hopes to regenerate.

Volume 1 contains a series of philosophical perspectives on the relationship between Christianity and technology, as well as two new pieces written for this volume. Volume 2 has sections on biblical studies, classical theology, and technological culture. Issues of method run throughout, where dubious claims and strawmen spoil the arguments made in more essays than I can list: Jacques Ellul (II, 42-59) polemicizes against the *new theologians* and atheists while only citing himself, Wilhelm Fudpucker (I, 25-41) tells us with no supporting evidence that all non-Christian religions are non-historical, non-eschatological, or both, and Egbert Schuurman (I, 77-90) claims that many engineers struggle with aspirations to 'unlimited, megalomaniacal achievements,' (I, 89) which is more a description of a Saturday morning cartoon villain than a woman who make plans for bridges. Instructors deciding to use these volumes to teach theology trainees should ensure their students have enough critical training to identify claims which are not substantiated. Be prepared to discuss issues of questionable biblical interpretation and overly prescriptive

conceptions of technology. For potential examples see: (I, 78-83; II, 30; II, 60-61, II, 138; II, 145-146).

The essays that hold up best are ones which implemented historical methods alongside theological arguments. Both Terry J. Tekippe (I, 42-60) and Ernest L. Fortin (II, 99-114) engaged the corpuses of other theologians to expound on their relevance to technological questions, Bernard Lonergan and Augustine, respectively. By surveying the works of the mighty dead and contextualizing them with questions about technology, both Tekippe and Fortin created secondary literature which can be used by instructors to introduce these figures to students. Checketts's new contribution in Volume 1 (I, 91-115) pulls from his background in Science & Technology Studies to show how engagement with non-theological literature can anchor novel theological arguments. As Checketts examines the 'sacred technologies' (I, 110) of navigation tools, the printing press, and the cross, he also places these tools within economic and Christian history. Grounding his research in these histories builds trust with readers, giving people who hold different religious views something interesting to ponder on while building credibility for his theological analysis to those who do not already agree with him.

Were I asked to teach a theology and technology course next semester, I would first question why a heretic like me would be asked to do such a thing, but then accept because these volumes drove me to ask about my own positions on this subject. Checketts suggests supplementing the volumes with Science & Technology Studies literature, and I would also ensure students got a background in the history and philosophy of technology. Kate Stockly and Wesley Wildman's ponderings on "spirit tech" (Stockly, Kate J., and Wesley J. Wildman. "Interpreting the rapidly changing landscape of spirit tech." *Religion, Brain & Behavior* 13, no. 1 (2023): 109-118) deserve attention and I would dedicate a week to Karel Čapek's *The Factory for the Absolute*. Theology and Technology would be discussed as a stage in the history of the field's development, one which continued a tradition worth theologians' time, with Checketts's own essay being a shoo-in for the syllabus.

**Scott Ryan Maybell is a court mediator in the USA with a research background in neurohermeneutics and recognitive analysis, and an MSc degree in Science and Religion from the University of Edinburgh, UK.**

## Alister McGrath

***Natural Philosophy: On Retrieving a Lost Disciplinary Imaginary***

Oxford: Oxford University Press, 2023. 248 pp. pb £32.99 ISBN 9780192865731

'No one should expect great progress in the sciences (especially in their practical part) unless natural philosophy is extended to the particular sciences, and the particular sciences in turn brought back to natural philosophy.' So wrote Sir Francis Bacon in 1620. In 2015, as Professor of Divinity at Gresham College, Alister McGrath set out to retrieve the import of this historic actors' category'. The result is vintage McGrath. *Natural Philosophy*, with its 60-page bibliography, is a timely *ressourcement* for a goal beyond science or religion. 'A natural philosophy is the grander vision of nature, that arises from transcending disciplinary divisions, affirming the value of all its disciplinary components, while actively seeking to discern the larger picture of nature they disclose' (177).

In Part I, McGrath initiates a conversation with a tradition of natural philosophy, which as practiced, 'was a way of life, not merely an intellectual endeavour' (3). Combining learning *about* nature with

learning *from* nature, the subject was oriented to the *knowledge* and the *reformation* of its practitioners as worldly agents. Before it 'bifurcated into "science" and "philosophy" '(91), the discipline sought more than a unified theory of natural "science". If 'the singular term "science" has functioned satisfactorily for many as a disciplinary imaginary for two centuries' (176), neglect of natural philosophy may explain the plausibility and produce the sensibility of Stephen Weinberg's saying, 'the more the universe seems comprehensible, the more it also seems pointless.'

Drawing on Charles Taylor's notion of social imaginaries, McGrath's proposal in Part II is not to recover a discarded *theory* but to renew engagement in practices of *theoria* by which the objectivity, open to different forms of subjective engagement (including but not limited to scientific, aesthetic, and ethical perspectives), may be incorporated into the image of reality in all its fullness. Central to McGrath's vision of a natural philosophy is the potential of contemplation (*theoreia*) to disclose what nobody's eyes can yet have seen, except in part. Whence Mary Midgley's insistence on many ways 'mapping reality', Thomas Nagel's integration of multiple 'points of view', Karl Popper's talk of many 'worlds', and Hans Georg Gadamer's of many 'horizons of interpretation'.

There is a tension in McGrath's historical narrative. In chapter 1 we read that 'natural philosophy emerged as a significant intellectual domain in Western Europe in the late modern period' (3), but post-Kantian traditions of *Naturphilosophie* are not the focus of this study. In chapter 2 we learn that natural philosophy was 'conceived by Aristotle as 'an autonomous and self-contained discipline' (19), which was consolidated in 'the middle ages', when 'Aristotelian natural philosophy dominated Western attempts to make sense of the world of nature' (30) centuries before Descartes or Newton. Historiographical difficulties are inevitable in the work of retrieval. The conversation with the tradition in Part I is suitably selective, but has a distinctly English flavour. Positions of historical actors are routinely presented via their reception by twentieth century figures, which the publisher's decision to not put the dates of the works cited in footnotes obscures.

The prevalence of 'natural philosophy' as an actor's category is sometimes overstated, and the influence of political economy understated. Galileo, the visionary Pythagorean, waxed lyrical in 1623 of the grand standing of *philosophy* - not [natural philosophy] (60) - being written in the then highly figurative language of mathematics. Keats, the romantic poet, felt in 1819 the clip of cold *philosophy.* I found McGrath's reading in each case quite unnatural. The 1810 *Encyclopaedia Brittanica* does not provide the synonymy he intends (95-96), but serves to show rather how natural historians and philosophers were distinguished by their chief objects in the nineteenth century. It may even help to iron out a few historical details. For example, why McGrath's suggestion that the term 'scientist' was coined to replace 'natural philosopher' (89) would have been verboten by Coleridge and Whewell alike; 'why the term «natural philosophy" is absent from *The Origin of Species*' (101n.); and why Whewell described Darwin's work as 'utterly unphilosophical'. It had nought to do with Darwin's preference for 'a "naturalistic" approach to biological science' (99).

These are minor historical details. McGrath's concern 'lies elsewhere' (12). He anticipates a more basic objection: 'why bother resurrecting an obsolete form of thought in the light of inexorable scientific progress?' (5). Whiggish readers are directed to Maria Rosa Antognazza's demonstration of 'The Benefit to

Philosophy of the Study of its History'. It remains to be seen how McGrath's visions for a natural philosophy interact with his visions for a Christian natural theology. '*Theoreia*' finds fertile expression in the gospel according to John, and readers of this journal may notice Hooke's desire to 'furnish the Learned with an *experimentum crucis*' (49n.). More must be said on the subject of *Natural Philosophy*. We may thank McGrath for initiating the conversation.

**Christopher Oldfield is a philosopher at King's College London, a member of Trinity College in the University of Cambridge and a research associate at the Faraday Institute for Science and Religion.**

## Felicia Wu Song

***Restless Devices: Recovering Personhood, Presence and Place in the Digital Age,***

IVP Academic, 2021. 232 pp. pb £17.05.
ISBN 9780830851133

This book is not what I had expected it to be. Although I did know the book was about social media and its various effects on society at large, I had broadly anticipated discussions of what social media was today, how it was broadly affecting us, its consumers, and describing the various commercial and technological forces at play actively shaping our experiences. Yes, the book is certainly all of these things - but it is also so much more than that, and in a rather surprising way. What I was not prepared for was the richness and depth of discussion contained within, especially for a Christian audience.

The author is Dr Felicia Wu Song, a cultural sociologist based at Westmont College in California who specialises in studying 'the place of digital technologies in contemporary life'. Despite the academic context, I found the writing to be accessible and well-crafted, although somewhat wordy at times. Song carefully communicates her points clearly in an approachable, conversational manner, mostly without using technical jargon, but also with surprising conviction. Even when sociological terms were used, such as 'social imaginary' and 'plausibility structures', they were skilfully explained within context. An index is also helpfully provided.

I found the rather personal introductory chapter to be essential reading, providing overall context and a flavour of what comes later. As said already, I had expected a somewhat different book, perhaps focusing on the downsides of technology and how social media corrupts our souls and leads us into endless distractions. Fortunately, Song continues further by giving a surprisingly uplifting and positive message, not only acknowledging benefits but equally suggesting ways to examine, diagnose, and even counteract how social media may be leading us astray.

A significant part of practically doing this counteracting is what Song terms 'The Freedom Project'. This consists of four separate coda sections dotted throughout the book that provide helpful suggestions and exercises designed to help attain a greater awareness of how we can use digital media more safely and establish a 'new normal' in its use.

In the first part of the book, Song focuses mostly on sociological aspects, describing what she terms the 'digital ecology', to characterise what digital social media does along with its effects on users, both positive and negative. This discusses the origins of the digital ecology, the landscape of social media and the known inclinations and motives of the usual litany of organisations that operate it. I found myself agreeing vigorously with what was said here. Although quite well-known, Song nevertheless

expresses it all extremely well. Despite the known benefits of this digital ecology, those benefits can all too easily come at a true cost to everyone in terms of misdirected attention, spiritual isolation and ever-present distraction.

Reading the first part of the book didn't prepare me for the second part, which goes to form its bulk. Broadly, this opens with two chapters transitioning from the more sociological perspective taken in the first part to the thoroughly Christian theological perspective taken in the second. Song's general observation here is that although technologies like social media broadly provide us with a basic sense of 'connection' with others, often what we are truly seeking is instead a genuine communion with them - that is, being faithfully present in fellowship. In short, the ease and convenience of using social media have persuaded us to accept mere connection as a substitute for what we would prefer, which is communion with those whom we know. Song emphasises that, in a Christian context, communion means being in an abiding relationship with the Lord as well as with others in our various communities.

The remaining four chapters explore both the consequences of accepting mere connectedness over communion within our communities (such as reluctance towards physical engagement) as well as considerations of how to ameliorate those consequences through applying more traditional spiritual disciplines (such as prayer, lectio divina, intentional habits, etc.). I am particularly grateful here for Song's discussion of what author James Davison Hunter calls 'faithful presence' in Chapter 8. For me, this beautifully summed up what it means to be an intentional Christian.

Overall, this is a remarkable work, one that is immensely timely given its topic and will stay relevant for some time to come. If there is any criticism, the book could have been shorter and yet delivered its message just as powerfully. This book is relevant to church leaders, Christians studying/working in social sciences, theology and philosophy, together with those interested in the use and development of digital media.

**Brian Monahan is a (retired) mathematician, computer scientist and software developer living near Bristol.**

Science and Christian Belief

(www.scienceandchristianbelief.org)

## *Editorial Policy*

The articles and book reviews in *Science and Christian Belief* represent the opinions of the authors and not necessarily those of the Editors, Publishers or Sponsoring Bodies.

## *Copyright*

Copyright for all articles and book reviews will be retained by the author(s). If authors or book reviewers wish to re-publish all or part of their contributions elsewhere within twelve months of publication in Science & Christian Belief, permission should be gained from the Editors and mention of its first publication in Science & Christian Belief should be made. Single copies of articles and book reviews may be made for research and/or private study without permission. Permission to make multiple copies in the UK must be obtained from the Copyright Licensing Agency Ltd, 90 Tottenham Court Road, London W1P 9HE. Permission to make multiple copies overseas must be sought via the Publishers.

## *Subscriptions 2023/2024*

Please contact the Editor (Professor Keith Fox K.R.Fox@soton.ac.uk) or the CiS membership secretary (membership@cis.org.uk) for enquiries about subscriptions.

## *Instructions to Authors of Articles*

The following are brief instructions but intending authors are encouraged to write to the Editor Prof. Keith Fox, at K.R.Fox@soton.ac.uk. 'Instructions to Authors' are also posted at: www.scienceandchristian belief.org. All full-length articles will be professionally refereed and any comments referred back to the author. The Editor will decide whether and in what form to accept the paper. The Editor's decision is final.

Submission of a manuscript. Manuscripts should be submitted by email to Prof. Keith R. Fox at k.r.fox@soton.ac.uk. Please include the phrase Science & Christian Belief in the subject line. Documents can be submitted as Word, rtf or pdf files; please enquire for any other file type. Papers should be prepared with 1.5 or double spacing, with a generous margin all round (at least 2.5cm). Authors should retain a copy in case of loss or damage, for which the Editor can take no responsibility.

***Abstract.*** The manuscript should be accompanied by an abstract of 150-200 words. This should be followed by alist of key words for indexing purposes.

***References.*** With the exception of biblical references (which should be placed in parentheses within the main text), all references should be numbered consecutively in the text. The references should be prepared as footnotes at the bottom of the relevant pages

***Author affiliations.*** A suitable note of the author's position, in no more than 25 words, should be prepared as footnotes at the bottom of the relevant pages.

## *Instructions to Book Reviewers*

Full instructions to reviewers will be included together with each book sent out for review. Book reviews are normally solicited by the Reviews Editor, Dr Todd Kantchev. However, the Editors are eager to add to the panel of those who review books for Science & Christian Belief. Those who wish to help in this capacity are asked to send their name, address and some indication of their suitability and background to Dr Todd Kantchev. Book reviews may be submitted electronically to Dr Kantchev (tkantchev@btinternet.com).

In addition, we are grateful for information regarding books which readers consider should be reviewed in the journal.

Science and Christian Belief

The Journal of
*Christians in Science* and
*The Victoria Institute*

Volume 36 (1) 1-152 April 2024

## CONTENTS

### ARTICLES

S & CB Editorial .. ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...5
*Keith Fox*

The 'Scientific' Interpretation of the Bible and the Victorian Conflict between Science and Religion.. ... ... ...7
*James C. Ungureanu*

Zoology and Job 40: Review and critique of the arguments for Behemoth as a dinosaur ... ... ... ... ... ... ... 31
*Philip J. Senter*

Thomas Aquinas in Dialogue with Modern Causal Explanations ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 63
*Michael Salvatore Politz*

Donald MacCrimmon MacKay (1922 – 1987): Scientist and Accidental Philosopher. A Critical Appreciation ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 83
*George M. Coghill*

Donald M. MacKay's Contributions to The Research Scientists Christian Fellowship and Christians in Science: The Early days... ... ... ... ... ... ... ... ... ... ... ... ... ... . 103
*Malcolm Jeeves*

### ESSAY REVIEW

A Christian Response to Iain McGilchrist's panentheistic natural philosophy ... ... ... ... ... ... ... ... ... . 108
*David McIlroy*

## BOOK REVIEWS

*Human Becoming in an Age of Science, Technology, and Faith* ... ... 128
Philip Hefner (Todd Kantchev)

*Human Technological Enhancement and Theological Anthropology* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 129
Victoria Lorrimar (Noreen Herzfeld)

*God and Gaia: Science, Religion and Ethics on a Living Planet* ... ... 131
Michael S Northcott (Robert White)

*Navigating Faith and Science* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 133
Joseph Vukov (Dr Christina Biggs)

*Naturalism in the Christian Imagination: Providence and Causality in Early Modern England* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 134
Peter N. Jordan (James Hannam)

*Is God Really Legit? Making sense of faith and science* ... ... ... ... ... 135
Neil Laing (Malcolm S. Buchanan)

*The Person in Psychology and Christianity: A Faith Based Critique of Five Theories of Social Development* ... ... ... ... ... ... ... ... ... ... ... ... 137
Marjorie Lindner Gunnoe (Peter Hampson)

*Four Views on Christian Metaphysics*... ... ... ... ... ... ... ... ... ... ... ... ... 138
Timothy M. Mosteller (ed.) (Stephen Walley)

*Cosmic Chemistry: Do God and Science Mix?*... ... ... ... ... ... ... ... ... ... 139
John C. Lennox (Keith Fox)

*God's Gift of Science: Theological presuppositions underlying exploration of the natural world*... ... ... ... ... ... ... ... ... ... ... ... ... ... 142
Graeme Finlay (Michael Fuller)

*Dawn. A Proton's Tale of All That Came to* ... ... ... ... ... ... ... ... ... ... 143
Be Cees Dekker, Corien Oranje, and Gijsbert van den Brink (Peter J. M. van der Burgt)

*Into the Headwinds: Why Belief Has Always Been Hard—and Still Is* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 144
Terryl & Nathaniel Givens (Pu Ji (Preston))

*Theology and Technology, Volume 1: Essays in Christian Analysis Theology and Technology, Volume 2: Essays in Christian Exegesis and Historical Theology* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 146
Carl Mitcham, Jim Grote, and Levi Checketts (Scott Ryan Maybell)

*Natural Philosophy: On Retrieving a Lost Disciplinary Imaginary* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 147
Alister McGrath (Christopher Oldfield)

*Restless Devices: Recovering Personhood, Presence and Place in the Digital Age* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 149
Felicia Wu Song (Brian Monahan)

ISSN 2756-0988 S&CB 36 (1) 1-152 (2024)